CRU CORRESPONDENCE

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Subject: Invitation to the SRES meeting in Berkeley
Date: Tue, 13 Jan 1998 17:50:47 +0100

<x-rich>Dear Colleagues,

I would like to confirm that we will hold the next SRES meeting on 7-8 February

at Lawrence Berkeley National Laboratory in Berkeley, California. Lynn

Price is the organizer of the meeting. Below is her contact information.

Ms. Lynn Price

Energy Analysis Program

Lawrence Berkeley National Laboratory

MS 90-4000, 1 Cyclotron Road

Berkeley, CA 94720

U.S.A.

(001-510) 486-6519

(001-510) 486-6996

e-mail: lkprice@lbl.gov

The main purpose of the meeting is to review the work progress of the four

modeling groups that have been involved in first quantifications of the four storylines. My expectation is that we can harmonize various model runs into four initial scenarios. Thus, this will be primarily a modelers' meeting focusing on technical issues, storyline interpretation and consistency of first quantifications. It will not have the character of a Lead Authors meeting in the strict sense. It is nevertheless an important meeting for all modeling groups who have volunteered to quantify storylines, since this work needs to proceed in order for us to meet our original timetable and cannot be postponed until the next Lead Authors' meeting in the spring.

I hope that most of you can attend. Your input would be valuable in this early stage of modeling work. Furthermore, it would be good to also take the opportunity of this meeting to review the so-called zero-order-drafts (ZODs). The deadline for the submission of the final versions of the ZODs is 15 January (Thursday), so I expect that we will also have new material to discuss.

Although I realize that this meeting will take place on rather short notice and not all of you will be able to obtain the necessary approvals and visas to attend, I nonetheless believe that it is important at this stage to hold an informal meeting with the four modeling groups. I have funds available for the four lead authors from developing countries: Matthew Luhanga, Zhou Dadi, Henryk Gaj, and Emilio La Rovere. As noted above, a more formal meeting of the complete writing team will be held sometime in March or April, at which time I hope everyone will be able to attend.

Please confirm your attendance for the February meeting with me as soon as possible (this week if you can), so that we can reserve sufficient hotel space in Berkeley.

Again, for those of you who are working on Zero Order Drafts, please

remember that this Thursday is the deadline for completion. I look forward to

receiving these.

Best Regards,

Naki

Katalin Kuszko

Environmentally Compatible Energy Strategies

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From: P R Shukla <shukla@iimahd.iimahd.ernet.in>
To: Nebojsa Nakicenovic <naki@iiasa.ac.at>
Subject: Re: Invitation to the SRES meeting in Berkeley
Date: Wed, 14 Jan 1998 09:10:12 -0800
Reply-to: shukla@iimahd.iimahd.ernet.in
Cc: "Joseph M. Alcamo" <alcamo@usf.uni-kassel.de>, "Knut H. Alfsen"
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Dessus <benjamin.dessus@cnrs-dir.fr>, Jae Edmonds <ja_edmonds@pnl.gov>, "(although
he cancelled) Joergen Fenhann" <j.fenhann@risoe.dk>, "Stuart R. Gaffin"
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Naki,

Thanks for the invitation to the SRES meeting.

Given the funds situation at your disposal, I am opting out of attending

the meeting. I would however like to offer any assistance on issues concerning developing / Asian countries. Specifically, I have data on structural changes of GDP and energy for countries in Asia-Pacific. The structural transitions in these countries offer interesting insights and directions for scenarios. I have passed an analysis of 12 countries to Tae. The countries include the important economies in Asia-Pacific, namely China, India, Japan, Korea, Indonesia, Malaysia, Thailand, Pakistan, Bangladesh etc. I think the structural changes in developing countries is a very vital aspect for specifying future emissions. Also, well documented and specified information on this shall help the policy exercises later which shall use our emissions scenarios as reference.

I think the modelling groups may also require some inputs (and insights) for handling developing country specifications in the models. In the past we have pointed out several lacunas - such as neglect of traditional biomass, disequilibrium, informal economy, geopolitical realities etc. These also influence technological assumptions and constraints. In fact our scenarios are very well suited to handle some of these aspects differently. The modellers may have to be advised to handle these aspects suitably. This is vital since we aim to specify the emissions regionally.

An another issue I wish to bring to your attention relates to discount rates. I know your competence on this issue. However, the modelling difficulties (and paradigm itself) often stop us from using different discount rates. The persistence of high discount rates in developing economies is an observed fact. This may not equalize globally during the next half century (or more). Even if we may not want to have different discount rates (since this upsets the underlying neoclassical paradigm), we may just ask the modellers to ensure that the results are not sensitive to this.

A more interesting issue concerning the discount rates for our scenarios is that the different futures (scenarios) would have different associated discount rates. The sustainable development type scenarios (e.g. B1 scenario) may have lower discount rate than our A scenarios. If we run all scenarios with same discount rate, this would be a contradiction. I know there are no easy answers around this since we do not want to confuse the users of scenarios later on with too many different parameters. However it may be worth providing different specifications for important parameters or caveats where we anticipate contradictions.

Given the recent developments in East Asia, it may be worth to take a relook at A1 scenario and consider whether the Tiger World would transit to A1 or A2. This is just an aside.

Wishing you a very happy new year.

P.R. Shukla

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From: Keith Briffa <k.briffa@uea.ac.uk>
To: frank.oldfield@pages.unibe.ch
Subject: Re: Poster competition
Date: Fri Jan 16 10:26:08 1998

Frank
    I do not recall what Kyrdianov has worked on - sorry. However, Hantemirov has done outstanding work putting together and as yet preliminarily analysing what wii no doubt become a world famous sub fossil chronology in the Yamal area of northern Siberia. Indeed I will feature this work in my presentation.
    Frank , an important point requiring your instant help! Some time ago I got a request to write something for a NERC(?) publication related to my talk in April. Now I can't find it and desperately need to contact the guy about length and deadine - which may have passed. Can you help? I know you coordinated with him.
                    Yes I know I'm a _anker!
                            Keith

At 10:12 AM 1/16/98 +0100, you wrote:
>Dear Keith,
>
>I'm trying to draw up a short list for the 5 young scientists who will
>receive financial support from UCL. I need to balance them for theme and
>region and it seems that one of them should probably be a former USSR
>dendro-person. I've consulted Gene who points to Hantemirov and
>Kyrdianov as the two most worthy. Do you have any advice? Both abstracts
>look good and Gene thinks highly of each piece of work. seems better to
>get a second opinion from the dendro-world than to leave it open or try
>to resolve the question from a non-specialist perspective.
>
>I look forward to hearing from you,
>
>Cheers,
>
>Frank
>_____
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From: GERNER THOMSEN <gerner@get2net.dk>
To: Keith Briffa <k.briffa@uea.ac.uk>
Subject: Ph.D. in Sweden
Date: Mon, 19 Jan 1998 06:15:55 +0100
Reply-to: gerner <gerner@get2net.dk>

Dear Keith!

I contacted Hakan Grudd last week. He is also positive about a Ph.D. for me in Stockholm.
I have tried to make a formulation of a project. Please, read it and let me know what you think. Maybe the project is overlapping with that of Grudd or maybe you have better ideas. It could also be that I have misunderstood some points.
I have sent the project formulation to Schweingruber, Grudd and Kalen. I send it to Schweingruber because I already contacted him last week (before I got the message from you). He is also interested in the project and anyway he will get involved if I am going to train in Birmensdorf.

Best regards from:

Gerner Thomsen

Description of project

1. Background
Dendroclimatology can be defined as the use of tree rings to study and reconstruct past and present climate (Kaennel & Schweingruber, 1995). Global average surface temperatures have risen by 0.3-0.6 °C since the middle of the 19th century (Folland et al., 1990). Climatologists seek to establish the extent to which this rise may be attributable to an enhanced greenhouse effect and so need to distinguish anthropogenic from 'natural' climate fluctuations (those that would occur without anthropogenic influences) to help them make predictions of future climate changes (Briffa et al., 1996a). Clearly the century-long instrumental record is not long enough to accomplish this. Paleoclimatic fluctuations older than meteorological measurements can be inferred from a variety of data sources, including tree rings, records of vegetation processes (e.g. pollen in lake sediments), records of ice layer in ice cores, historical records, etc. (Eddy, 1992). However, within a time frame of the last two millennia dendroclimatology has shown to be the most powerful tool available to provide globally distributed, annually resolved paleoenvironmental records (Luckman, 1996). The growing influence of dendroclimatology in paleoenvironmental studies can be seen in the fact that almost a third of Bradley and Jones' volume Climate since AD 1500 (Bradley & Jones, 1992) deals with dendrochronology and dendroclimatic reconstruction.
Near the polar and altitudinal tree lines, tree growth is mainly dependent on summer temperature. As northern latitudes are regarded as being strongly affected by global climate changes, a network of chronologies is established along the polar tree-line in Eurasia (Briffa et al., 1996b). At specific locations in these northern high-latitude regions it is possible to extend the tree-growth record back beyond the life span of living trees by amalgamating the measurements from overlapping, absolutely-dated series of measurements made on dead wood from historical or archeological provenances or naturally surviving above ground, in peat or alluvial sediments, or preserved in lakes. The first pair of (ring-width and density) chronologies, made up from samples of Scots pine (Pinus sylvestris L.) at several locations adjacent to Lake Torneträsk, northern Sweden, have been used to reconstruct summer (April-August) temperatures representing a large region of northern Fennoscandia from AD 500 to 1980 (Briffa et al., 1990, 1992). The Fennoscandian temperature records show that marked high-frequency (interannual-to-century) timescale variability together with marked long-timescale (multicentury) variations in summer temperatures have been a characteristic feature in this region during the last millennium.

Similar data from samples of larch (Larix sibirica) on the eastern slopes of the northern Urals have been used to reconstruct regional summer (May-September) temperatures representing a region of north-western Siberia for the period 914 to 1990 (Briffa et al., 1995b). As a part of developing the north Eurasian chronology network, two projects currently underway aim to build continuous multimillennial pine ring-width chronologies in northern Sweden and Finland, spanning 7000-8000 years (Briffa et al., 1995a). In Russia a similar project underway aim to build larch ring-width chronologies in Yamal Peninsula, also spanning 7000-8000 years (Shiyatov, 1997).
The application of radiodensitometry in the analysis of conifer rings throughout Europe (Schweingruber, 1985) show the considerable amount of additional information lying in density, as compared with total ring width. Obviously, external factors have a more uniform influence on cell wall growth in latewood (density) than on cambial activity (ring-widths). In trees of the northern and subalpine timberlines, maximum latewood density is essentially a measure of mean summer temperature (ibid.).

2. Purpose of this study

2.1. Main objective
The main objective of this study is to provide additional information for a more precise climate reconstruction based on the already existing Torneträsk-chronology in northern Sweden (AD 500 to 1980) and a future supra-long chronology (BC 7000 to 1996), based on ring-widths and maximum latewood density of Scots pine (Pinus sylvestris L.) from the same area.

2.2. Elaboration of the main objective
One of the most fundamental underlying principles in dendroclimatology is the assumption of uniformitarianism in the response of data to climate forcing. The uniformitarian principle implies that "the physical and biological processes which link today's climate with today's variations in tree growth must have been in operation in the past" (Fritts, 1976). However, it is a moot point whether the assumption of uniformitarianism holds when past climate variations are inferred from long chronologies. The problem arises because the extrapolation always is based on a regression model calibrated on very short meteorological records. Long chronologies, as those seen in northern Scandinavia and Siberia, are made up from trees of different ages growing under more or less uniform conditions. In such chronologies there must always be uncertainty regarding the long-term stability of (non-climate) environmental influences or differing climate sensivity due to the inhomogeneity in the sampled material (Briffa, 1995a, Briffa et al., 1996a). The climate signals in chronologies may, to some extent, be affected by:

1.
Inhomogeneity in the site characteristics of the samples (soil fertility, water holding capacity of the soil, altitude, exposure of slope, etc.)

2.
Inhomogeneity in series length of samples (tree age)

3.
Inhomogeneity in tree growth form and population density of samples

4.
Anthropogenic influence (nitrogen deposition, raise in CO2 level) producing enhanced tree growth in the recent part of the chronology

5.
Series replication in the chronology

6.
The technique used to remove the non-climatic, age-related bias in individual series (a technique known as standardization in dendroclimatology)

This study will focus on the influence of point 1-3 on the climate signal seen in densities of Scots pine from the area of Torneträsk in northern Sweden. It is well-known that the Torneträsk-chronology is subject to the inhomogenity in samples described in point 1-3, but it is not clear to what extension these inhomogenities affect the climate signal in the chronology. Thus, a study of the influence of inhomogenity in the samples will provide valuable additional information for a more precise interpretation of the summer-temperature record inferred from the already existing Torneträsk-chronology. In the same way it will highly increase the value and confidence of climate reconstructions from future supra-long pine-chronologies in this region. The growth parameter under investigation is maximum latewood density. In this way the study will complement an ongoing similar study on ring-widths of Scots pine from the same region (Grudd, 1998).

2.3. Partial objectives of the study and publications

Methodologically, the project can be divided into three, but overlapping stages:

1.
Building of density pine-chronologies around Torneträsk from different sites. Various site conditions (mainly soil fertility, water holding capacity of the soil, altitude, and tree population density) and different age classes must be taken into consideration. No less than 10-12 chronologies must be estimated.

2.
Analysis of climate-growth relationships of the pine-chronologies, focusing on differences between high-frequency and low-frequency variability in the climate date. The results are compared and conclusions are drawn about the diversity of climate signal seen in density-chronologies from Scots pine growing under various conditions in the area around Torneträsk.

3.
Re-interpretation of the already existing Torneträsk-chronology on the basis of the new information provided by the study in case and the ongoing similar study of ring-widths from the same region (Grudd, 1998)

The results are published in three articles with the following provisional titles:

a)
"Site-induced differences in climate-growth response of Pinus sylvestris L." (The article focuses on differences in climate-growth response for trees growing on different soil types and for trees from stands with different population density)

b)
"Altitude and age as parameters of climate-growth response in Pinus sylvestris L." (The article focuses on differences in climate-growth response for trees growing at different altitudes and trees in different age-classes)

c)

"Possible site-induced changes in the climate-growth response of the 1,400 year tree-ring chronology from northern Fennoscandia" (A re-interpretation of the existing Torneträsk-chronology is made on the basis of the new information)

3. Methods

3.1. Sampling strategy

3.1.1. Selection of sites and stands
As already pointed out, various site conditions and different age classes must be taken into consideration. Site homogeneity largely determines the quality of the chronology. That is, the factor under investigation which is assumed to affect the climate-growth response must be constant all over the site, and other possible affecting factors are minimised. It is important that the stand have not been similarly damaged by fires, wind, or other catastrophic factors to extract reliable climatic information. Site characteristics will be noted (typography/geomorphology, soil conditions, vegetation description, signs of human impact, etc.).

3.1.2. Selection of trees
Trees should be in a dominant position (with the possible exception of stand density studies), without irregular growth which probably disturb the climate signal in the tree-rings. Individual variability in the final chronology decreases with an increasing number of samples. Consequently, two cores from at least 12 living trees are necessary to obtain a site-chronology of sufficient quality. It is best to sample a few more trees than necessary so that anomalous cores may be discarded. Trees of different age classes will be cored to allow for systematical studies on age-related bias in the climate-growth response.
Samples are taken at breast height with an increment borer. The cores are stored in air-dry conditions after labelling with a pencil. Growth irregularities (compression wood, wound tissue, etc.) are excluded by avoiding sampling in the vicinity of wound and of upslope and downslope sides of trees growing on sloping ground. Cores are taken as nearly perpendicular to the fibre orientation as possible. This can greatly reduce the variability owing to technical processing in densitometric studies (Schweingruber et al., 1990). Core characteristics will be noted (tree height, stem diameter at breast height, crown size and condition, injuries and irregular growth, coring direction and height, etc.). Sites and trees will be documented photographically.

3.2.Sample preparation, measurement, and chronology building

3.2.1. Preparation
Resins and heartwood substances must be chemically removed as they will influence on the X-ray absorption (Schweingruber, 1990). This is done through distillation in Soxhlett device; resins are extracted with alcohol, heartwood substances with water. After removal of resins and heartwood substances, laths of equal thickness have to be cut from the round cores. The Birmensdorf system may be used where the core is glued to a wooden support with the radial surface uppermost and a 1.25-mm-thick lath cut out with a small twin-bladed circular saw. To obtain comparable density values, the moisture content of the wood must be kept constant.

3.2.2. Measurement of density

The irradiation of film can be done with different methods. Two methods, which have proved to be useful are:

1.
Irradiation of a film (Kodak, Type R, single-coated industrial X-ray film)

resting on the moving stage. The film is transported at five cm/min under the radiation source, which is 31 cm above, and irradiated at 20kVh and 2mA (Vancouver system)

2.
Irradiation of a film (Kodak, Type X-Omat TL, double coated medical X-ray film) resting on a stationary stage at 11 kVh and 20 mA for 90 min. The source is 250 cm above the film (Nancy system)

The film is developed and the different gray levels produced on the radiograph by the wood samples are converted to wood density values. The basic instrument used is the densitometer (ibid). Analog or digital processing of the actual measurements produces a density profile from which the desired parameter (maximum density) is registered.

3.2.3. Dating and chronology building
For dating, chronology building and quality control, the program COFECHA (Holmes et al., 1986) may be used. In addition a manual dating control has to be done at the light table or monitor, comparing each curve with an existing master chronology. The procedure ensures precise dating of every tree ring.

3.3. Data processing

3.3.1. Standardization of tree-ring data
Before averaging tree-ring curves to mean chronologies which shall be used for dendroclimatological purposes, the raw values must be standardized to index values. In the same process, one has to remove the natural age trend of trees and eventual density variations caused by stand dynamics, and not representing climate. Also in this process, it is crucial to control the effect of detrending at the light table or on the monitor, comparing the original with the detrended curve. Much depends from this process, as the dendrochronologist here decides which portion of low frequency variation that is removed from the series. This in turn affects climate information inferred from the chronology. Therefore, several detrending methods have to be tested in this study.

3.3.2. Computing climate-growth response
Climate-growth models will be computed for all individual chronologies. The period selected for climate-growth modelling, is the period for which climate data are available (the earliest series start in AD ??). Different techniques are existing for estimation of the climate-growth response. For example, simple correlation analysis may be used or a regression-technique based on principal component analysis. It may be relevant to detect non-linear relationships between climate variables and ring growth, as well as to study single years with special tree-ring (pointer years) and climate events. To detect changes in climate-response over time the Kalman filter can be used.

4. Time schedule
The project will be performed during three years (June 1998 to June 2001). The Ph.D. student will follow courses corresponding to 40 weeks of studies. >From earlier working, the following assumptions regarding time consume for field work and measuring can be made: It can take a number of days to become familiar with the localities and to find the most suitable pine stands. At each site, one to two days are needed for sampling and site description, provided that the pines do not stand too scattered, and long walking distances can be avoided. Time for measuring and chronology building should be estimated rather high (2-3 weeks per site).

1998:
Summer:
Preparing of a detailed sampling strategy for the whole project (2 weeks) and field work (6 weeks). The field work will focus on sampling of trees from about six sites with varying conditions (soil fertility and water holding capacity).

Autumn semester:
Training in use of densitometry equipment at the institute of Forest, Snow and Landscape in Birmensdorf, Switzerland. Measurement of samples collected in the summer.

1999:
Spring semester:
Continued measuring of samples at the university in Stockholm. Systematical analysis of standardization methods and construction of six site chronologies. Start of analysing climate-growth response in chronologies.

Summer:
Field work (6 weeks) which will put focus on sampling trees from about six sites in different altitudes and with different stand densities.

Autumn semester:
Measuring of the summer's material at the university in Stockholm. Systematical analysis of standardization methods and construction of six new site chronologies. Analysing climate-growth response in chronologies.

2000:
Spring semester:
Analysing climate-growth response in all chronologies. Preparation of publication (a).

Autumn semester:
Analysing age-related climate-response. Preparation of publication (b). Comparison of results with similar study on ring-widths (Grudd, 1998).

2001:
Spring semester:
Last statistics, preparation of publication (c), preparation of disputation.

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From: Lynn Price <lkpocd@dante.lbl.gov>
To: Nebojsa Nakicenovic <naki@iiasa.ac.at>
Subject: Confirmation of Attendance for Next IPCC SRES Meeting
Date: Tue, 20 Jan 1998 12:42:40 -0800 (PST)
Reply-to: Lynn Price <lkpocd@dante.lbl.gov>
Cc: "Joseph M. Alcamo" <alcamo@usf.uni-kassel.de>, "Knut H. Alfsen" <knut.alfsen@cicero.uio.no>, Dennis Anderson <dennis.anderson@ic.ac.uk>, Zhou Dadi <becon@public3.bta.net.cn>, "Gerald R. Davis" <Ged.R.Davis@si.simis.com>, Benjamin Dessus <benjamin.dessus@cnrs-dir.fr>, Jae Edmonds <ja_edmonds@pnl.gov>, Joergen Fenhann <j.fenhann@risoe.dk>, "Stuart R. Gaffin" <stuart@edf.org>, Henryk Gaj <Fewewar@ternet.pl>, Ken Gregory <kennethgregory@msn.com>, "A. Gruebler" <gruebler@iiasa.ac.at>, Erik Haites <EHaites@netcom.ca>, William Hare <bhare@ams.greenpeace.org>, Michael Hulme <m.hulme@uea.ac.uk>, Michael Jefferson <jefferson@wec.co.uk>, Tae-Yong Jung <tyjung@his.keei.re.kr>, Tom Kram <kram@ecn.nl>, Emilio Lebre La Rovere <emilio@ppe.ufrj.br>, Mathew Luhanga <vc@udsmucc.gn.apc.org>, Douglas McKay <Doug.D.Mckay@si.simis.com>, Julio Torres Martinez <dpid@[169.158.128.138]>, Laurie Michaelis <laurie.michaelis@oecd.org>, Shunsuke Mori <mori@shun-sea.ia.noda.sut.ac.jp>, Tsuneyuki Morita <t-morita@nies.go.jp>, Richard Moss <rmoss@usgcrp.gov>, "Youssef H. Nassef" <nassef@hotmail.com>, William Pepper <wpepper@icfkaiser.com>, "Hugh M. Pitcher" <hm_pitcher@pnl.gov>, Lynn Price <lkprice@lbl.gov>, Hans-Holger Rogner <h.h.rogner@iaea.org>, Cynthia Rosenzweig <crosenzweig@giss.nasa.gov>, "Jim F. Skea" <J.F.Skea@sussex.ac.uk>, Priyadarshi Shukla <shukla@iimahd.ernet.in>, Leena Srivastava <leena@teri.ernet.in>, Rob Swart <rob.swart@rivm.nl>, "H.J.M. de Vries" <Bert.de.Vries@rivm.nl>, "John P. Weyant" <weyant@leland.stanford.edu>, Ernst Worrell <e.worrell@nwsmail.chem.ruu.nl>, ASM@Stanford.edu, rrichels@epri.com, johnson@iiasa.ac.at, Kuszko@iiasa.ac.at

Hi everyone,

I need to have a firm number of attendees by the end of the day tomorrow (Wednesday January 21st) in order to hold rooms at the hotel. At the end of this e-mail I have listed the information that I currently have

regarding who is planning to attend, who is not planning to attend, and who has not responded.

I will hold a room for each of the people listed below as attending unless I hear otherwise from you.

If you are in the list of people who have not yet responded and you plan to attend, please let me know ASAP.

If I have not heard from you by the end of the day tomorrow I will assume that you will make your own arrangements for accommodations.

For those of you who want me to hold a room for you, I will send information on how to make your reservations in a day or so.

Thanks,

Lynn

****
Lynn Price
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(510) 486-6519
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****

Confirmed as attending:
Nebojsa Nakicenovic
Zhou Dadi
Stuart Gaffin
Henryk Gaj
Ken Gregory
Arnulf Gruebler
Erik Haites
Tae-Yong Jung
Emilio Lebre La Rovere
Alan Manne
Tsuneyuki Morita
Richard Moss
Hugh Pitcher
Rich Richels
Rob Swart
H.J.M. de Vries
Ernst Worrell

Not attending:
Knut Alfsen
Dennis Anderson
Joergen Fenhann
Laurie Michaelis
Priyadarshi Shukla
Jim Skea

Have not responded:
Joseph Alcamo
Ged Davis
Benjamin Dessus
Jae Edmonds

William Hare
Michael Hulme
Michael Jefferson
Tom Kram
Mathem Luhanga
Douglas McKay
Julio Torres Martinez
Shunsuke Mori
Youssef Nassef
William Pepper
Hans-Holger Rogner
Cynthia Rosenzweig
Leena Srivastava
John Weyant

47. 0887057295.txt
##

From: Tom Wigley <wigley@meeker.ucar.edu>
To: Mike Hulme <m.hulme@uea.ac.uk>
Subject: Re: New MAGICC/SCENGEN
Date: Mon, 9 Feb 1998 15:48:15 -0700 (MST)
Reply-to: Tom Wigley <wigley@meeker.ucar.edu>
Cc: hm_pitcher@pnl.gov, o.brown@uea.ac.uk

Mike,

Thanks for the quick response. Responses to responses follows....

(1) I tried the composite GHG plus UIUC SUL on Norm's machine, in just the way you said. However, the results for the USA seem to be identical to those using *only* UIUC GHG input. I'll try again.

(2) You are right in saying one shouldn't scale GHG patterns by GHG+SUL dTs. However, to be strictly consistent one should never allow GHG patterns to be used alone. So you are *not* being consistent if you allow this---which you do. The point then is to minimize the extent of the inconsistency.

It is unarguably correct that the global-mean temperature to use is the one containing all forcings (i.e., column 6 in *DRIVE.OUT). The choice then is what pattern(s) to use. If we had no SUL information, we would have to use GHG patterns; as in the original SCENGEN. Scaling these with the MAGICC GHG output would give both incorrect patterns and incorrect global-mean warming. Scaling with column 6 at least gets the global-mean warming correct (within MAGICC uncertainties). You seem to have chosen to get *both* things wrong, instead of just the patterns.

I can see some logic in your method; I just think (strongly) that it is wrong. At the very least, it will be confusing to the user. If the user selects only GHG model patterns, then won't they wonder why the global-mean temperature is inconsistent with MAGICC? To take an extreme case, suppose the full dT is 2degC and the GHG-alone dT is 3degC. Is it better to scale an approximate pattern (i.e., the GHG pattern) by 2degC or 3degC? In my view, GHG scaled by 2degC would be much closer to GHG+SUL scaled by 2degC than GHG scaled by 3degC. Surely the real issue (given that it is impossible to be entirely consistent in this case) is to get a result that is as close to the 'right' result as possible. I feel quite sure that scaling by column 6 is best on this basis---especially given that the patterns are much more uncertain than the global-means. I

think this is absolutely beyond doubt.

The bottom line here is that consistency is impossible if one uses only GHG patterns. Column 6 was included deliberately, and after some thought (along the lines noted above).

Of course, it is possible to get column 6 results by adding columns 2, 3, 4 and 5 as they now stand (and as they are in the version that you have). However, one cannot do this with the correct *raw* column 3, 4, and 5 output because of the nonlinear direct forcing effect. It just happens that, in your version, I 'faked up' column 5 as the difference between column 6 and the sum of columns 2, 3 and 4. I did this simply to get the code working; but (as you now know) I never got around to fixing it up until now. In the latest version, column 6 is again equal to the sum of columns 2, 3, 4 and 5 because I scale columns 3, 4 and 5 to ensure that this is so.

(3) Re HadCM2, again it is impossible to be consistent. What I said before is that the reason for adding these results is simply to make them readily available. I do *not* advocate using them in combination with any other model results. It is, I believe, perfectly reasonable to scale these results with column 6 data. Of course, this 'hides' an assumption about the relative magnitudes of the GHG and SUL components---i.e., it assumes that the HadCM2 relative magnitudes are okay. The point of scaling, however, is to account for other factors that change the global-mean temperature relative to HadCM2 results, such as different sensitivities.

I agree with you that it would not be an efficient use of time splitting the HadCM2 SUL results into GHG and 'aerosol' component patterns. The whole point of the sulphate part of SCENGEN is to look at the influence of different SO2 emissions patterns. Splitting up HadCM2 wouldn't help here at all.

I also think it would be valueless to hardwire HadCM2 dT results into SCENGEN---again, this would defeat the purpose of including these results. It would introduce an additional inconsistency; since HadCM2 patterns change with time, it would not be logical to scale the 2071-2100 pattern with (e.g.) 2031-2060 dT. Of course, you could argue that it is illogical to scale this pattern with (e.g.) 2031-60 dT from MAGICC; but this is a different issue that I don't think is worth discussing at this time.

(4) Thanks for explaining the UIUC 'other data' problem. I will ask Michael whether he can provide full global fields for the other variables, since it really would be valuable to include them. If he can give us these data, could you add them to SCENGEN? (re this, see below)

(5) I appreciate your problems with Olga and Mike Salmon. As far as I can see, incorporating the revised MAG.FOR code into MAGICC/SCENGEN shouldn't be too difficult. I can, however, get hold of some money to pay for some of Mike's time to do other work---perhaps $5000 or so. Can we set something up? The contractual side would be easy---just a matter of agreeing a brief statement of work, and having CRU send a bill. If this is useful and possible, then can you check it out with Mike and Trevor?

Cheers,
Tom

On Mon, 9 Feb 1998, Mike Hulme wrote:

> Tom,

> Got your fax and email. Five responses:
>
> 1. UIUC SUL results *can* be combined with any GHG pattern (or combination). Simply click on the relevant GCMs in the GCMs menu. You can choose all 15 GHG patterns and also the UIUC SUL pattern simultaneously if you want. Not sure how you missed this one.
>
> 2. We do *not* allow GHG patterns to be scaled by GHG+SUL dTs from MAGICC (what you call 'global sulphate'); i.e., we never use column 6 in the *DRIVE files. We always follow the 'disaggregated sulphate' route by using columns 2, 3, 4 and 5. I still maintain it is not correct to scale GHG patterns by a global dT that results from GHG+SUL forcing. The way we have designed SCENGEN is so that the choice of what columns in *DRIVE to use is governed by what GCMs are selected in the GCMs menu. If only GHG patterns are chosen we use column 2. If only SUL patterns are chosen we use columns 3, 4 and 5 with the appropriate weightings applied (i.e., we have three UIUC SUL pattern files corresponding to the three SCENGEN regions, re-combined of course from Schlesinger's six original regions). If *both* GHG and SUL patterns are chosen then we combine the various patterns using columns 2, 3, 4 and 5. You will see that the global dT displayed in red on the main screen changes in keeping with these selections (i.e., GHG only, SUL only or GHG+SUL).
>
> If we allowed GHG patterns to be scaled by dTs from MAGICC that resulted from GHG and SUl forcing I believe that we break the consistency of our method. Column 6 is therefore redundant and serves only to check the summing of the other columns.
>
> 3. This parallels an earlier discussion about using HADCM2 SUL results in SCENGEN. Strictly, we should not use them since they are SO2 pattern specific. Allowing the user to scale HADCM2 SUL by a set of dTs resulting from *any* SO2 pattern is plainly wrong. A compromise would be to allow HADCM2 SUL to be scaled by the dT from the HADCM2 SUL simulation (i.e., hard-wiring these dTs into SCENGEN and using only these if the user wants HADCM2 SUL). Of course, other GCM patterns should not then be added to this. There is another way of using HADCM2 SUL results more flexibly and that is by differencing HADCM2 GHG from HADCM2 SUL (2071-2100), standardising the result according to the dTs from the three SCENGEN regions and then treating these standardised HADCM2 SUL only patterns as independent aerosol patterns to be used in SCENGEN. This would be my approach but again requires more time and effort.
>
> 4. We only include T and P from UIUC for the very good reason that only T and P contain complete global fields (at least from the ftp site data). The other variables exist only for land areas. Since the UIUC grid is 4 (lat) by 5 deg and SCENGEN is 5 by 5 we would need to regrid (and the longitudes are displaced by 0.5 a box as well which complicates matters). Regridding land only grids onto a different land only grid is non-trivial (possible, but would take some working at). For example, UIUC have no Iceland or Caribbean islands so what do we give to SCENGEN for these boxes? We have to tell SCENGEN something since we add other GCMs together. Faking up data here is very time-consuming. If UIUC have other fields apart from T and P for a full global grid but just not put them on the web site then fine, the problem is quite straightfoward. If not, then we have a messy problem on our hands.
>
> 5. Points about revised MAGICC code noted and we will have a look at the new code when it is here. Please also note that apart from Olga not being paid by me now, neither is Mike Salmon. Indeed, Mike's contract is rather uncertain again. But I hope I can pursuade him (and Trevor) to keep pace with MAGICC changes for all our sakes.
>

> Regards,
>
> Mike
>
> At 19:23 06/02/98 -0700, you wrote:
> >Dear Mike,
> >
> >Some rather urgent SCENGEN issues have arisen from my meeting with Norm
> >Rosenberg, Hugh Pitcher et al. at Battelle. While at Battelle, I had my
> >first chance to look at the new SCENGEN, since I have not had time to try
> >to get it working under NT. (I haven't had time to try your new batch
> >file yet.)
> >
> >The first thing is that you seem to have constrained things so that
> >Schlesinger's sulphate results can only be added to *his* ghg results.
> >This defeats the purpose of the method. The sulphate patterns,
> >appropriately scaled, can be added to *any* (or any combination) of ghg
> >(i.e., CO2 alone) results. I am at a loss to understand why you did this,
> >because it seems to me that the coding should be easier for the more
> >general case. The way it should work is this:
> >
> >First, the user selects the MAGICC output; low, mid, high or user climate
> >output. This determines which file to use to get the normalized pattern
> >weights, LODRIVE, MIDDRIVE, HIDRIVE OR USRDRIVE.
> >
> >The user must then select whether to use global sulphate or disaggregated
> >sulphate. This determines whether to use the last column only in *DRIVE
> >(labeled SUM) to weight the ghg (or composite ghg) pattern (global
> >sulphate case); or to use the second, third, fourth and fifth columns of
> >*DRIVE (labeled GHG, ESO21, ESO22, ESO23) to weight, respectively, the ghg
> >(or composite ghg), region-1 sulphate, region-2 sulphate and region-2
> >sulphate patterns---and then sum these weighted patterns.
> >
> >What you seem to be doing now is to only allow SCENGEN to use
> >Schlesinger's ghg pattern for weighting with the GHG column. It should be
> >trivial to fix this. The ghg (or composite ghg) pattern should be
> >calculated no matter whether the user selects the global or disaggregated
> >sulphate case. You may have switched this calculation off for the
> >disaggregated case---but you *shouldn't*. As I noted above, the coding
> >should be easier for the proper working of the model.
> >
> >You may recall that I said earlier that I think there is still a glitch in
> >the sulphate pattern weights. On looking at the *DRIVE outputs again I
> >still think this is a problem. Have a look yourself and see whether you
> >think the numbers look reasonable or not. Ill check this out further over
> >the weekend.
> >
> >The second thing that came up in the Battelle meeting was the fact that
> >the only data sets for Schlesinger's output seem to be temperature and
> >precipitation. Battelle wants to do some sulphate cases (driving crop and
> >hydrology models with SCENGEN output), and they need the other variables.
> >They are working to a tight deadline, so getting these data into SCENGEN
> >is much higher priority that plugging HadCM2 SUL into SCENGEN. This is
> >why I am going to spend some time (at last!) checking out the pattern
> >weights a.s.a.p. I hope you can help out with these things. The first
> >should be easy---but I realize the second could be both tedious and
> >somewhat time consuming. There is clearly a lot of scope for using
> >SCENGEN to define the pattern consequences of sulphate aerosol forcing;
> >both to look at the implications of different SO2 emissions scenarios and
> >to investigate uncertainties. We can't do this until I've fixed the
> >MAGICC end to get the weights working properly. It is something we could
> >spend some time on (i.e., writing something up for publication) when I'm
> >in CRU in the summer (and/or earlier).

> >
> >Thanks for your help on this. The people at Battelle are very impressed
> >by SCENGEN--as am I.
> >
> >Cheers,
> >Tom
> >
> >
> >
> >   **
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<e.worrell@nwsmail.chem.ruu.nl>
Subject: minutes of the SRES informal modelers' meeting
Date: Mon, 16 Feb 1998 16:48:49 +0100
Cc: kuszko@uea.ac.uk, naki@uea.ac.uk

Dear Colleagues,

Please find attached the minutes of the SRES informal modelers' meeting,
7-8 February 1998 in Berkeley, California. I would like to thank those who
participated in the meeting and Lynn Price in particular, both for the
excellent organization of the meeting and for drafting the minutes. Please
note the deadlines detailed in our
work plan; for those of you completing the next two rounds on model runs
and storylines, this will be especially important. Additional submissions
to the SRES scenario database would be also greatly appreciated. Finally,
if anyone would like to receive a hard copy of the materials we discussed
in Berkeley, please contact Anne Johnson at johnson@iiasa.ac.at. (The same
material was sent to you by e-mail on January 30).

With best regards,

Naki

Attachment Converted: "c:\eudora\attach\draft-minutes1.doc"

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id 0y5ptk-0005i2-00; Fri, 20 Feb 1998 10:41:40 +0000
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Fri, 20 Feb 1998 10:40:44 +0000 (GMT)
Received: from hc1300 by hc0800 with ESMTP (1.39.111.2/1.1) id AA146051261;
Fri, 20 Feb 1998 10:41:02 +0000 (GMT)
Date: Fri, 20 Feb 1998 10:41:01 +0000 (GMT)
From: David L Roberts <dlroberts@meto.gov.uk>
Subject: From dlroberts@meto.gov.uk
To: m.hulme@uea.ac.uk
Message-id: <199802201041.AA146051261@hc0800>
Posted-Date: Fri, 20 Feb 1998 10:41:01 GMT
Received-Date: Fri, 20 Feb 1998 10:41:02 GMT
MIME-Version: 1.0
Content-type: text/plain; charset="X-roman8"

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Dear Mike,
   What is the current state of play regarding definition of improved sulphur emission scenarios? I have the 'zero-order draft' by Arnulf Grubler that you sent me at the beginning of November, as well as a shorter note by Hugh Pitcher. Have there been more developments since then?
   As you can probably guess, this enquiry results from Geoff Jenkins's visit to Brussels (?) a few days ago. Geoff is now keen that we should use better emission scenarios than IS92a and is pressing me for action, even if this means using an interim scenario that has not yet been agreed by IPCC.
   Best regards,
     David

49. 0888364876.txt
##

From: Nebojsa NAKICENOVIC <naki@iiasa.ac.at>
To: Joseph Alcamo <alcamo@usf.uni-kassel.de>, Knut Alfsen <knut.alfsen@cicero.uio.no>, Benjamin Dessus <benjamin.dessus@cnrs-dir.fr>, Dennis Anderson <dennis.anderson@ic.ac.uk>, Zhou Dadi <becon@public3.bta.net.cn>, Gerald Davis <Ged.R.Davis@si.simis.com>, Benjamin Dessus <Benjamin.Dessus@cnrs-dir.fr>, Bert de Vries <Bert.de.Vries@rivm.nl>, Jae Edmonds <ja_edmonds@pnl.gov>, Joerg Fenhann <j.fenhann@risoe.dk>, Stuart Gaffin <stuart@edf.org>, Henryk Gaj <Fewewar@ternet.pl>, Kenneth Gregory <kennethgregory@msn.com>, Arnulf Gruebler <gruebler@iiasa.ac.at>, Erik Haites <ehaites@netcom.ca>, William Hare <bhare@ams.greenpeace.org>, Michael Hulme <m.hulme@uea.ac.uk>, Michael Jefferson <jefferson@wec.co.uk>, Tae-Yong Jung <tyjung@his.keei.re.kr>, Thomas Kram <kram@ecn.nl>, Emilio La Rovere <emilio@ppe.ufrj.br>, Mathew Luhanga <vc@admin.udsm.ac.tz>, Julio Torres Martinez <dpid@[169.158.128.138]>, Douglas McKay <Doug.D.Mckay@si.simis.com>, Laurie Michaelis <laurie.michaelis@oecd.org>, Shunsuke Mori <mori@shun-sea.ia.noda.sut.ac.jp>, Tsuneyuke Morita <t-morita@nies.go.jp>, Richard Moss <rmoss@usgcrp.gov>, Nebojsa Nakicenovic <Naki@iiasa.ac.at>, Youssef Nassef <nassef@hotmail.com>, William Pepper <WPepper@icfkaiser.com>, Hugh Pitcher <hm_pitcher@pnl.gov>, "Richard G. Richels" <rrichels@msm.epri.com>, Lynn Price <lkprice@lbl.gov>, Holger Rogner <rogner@iiasa.ac.at>, Cynthia Rosenzweig <crosenzweig@giss.nasa.gov>, Priyadarshi Shukla <shukla@iimahd.ernet.in>, James Skea <J.F.Skea@sussex.ac.uk>, Leena Srivastava <leena@teri.res.in>, Robert Swart <rob.swart@rivm.nl>, Robert Watson <rwatson@worldbank.org>, John Weyant <weyant@Leland.stanford.edu.>, Ernst Worrell <e.worrell@nwsmail.chem.ruu.nl>
Subject: Next SRES Meeting, week of 27 April in Washington
Date: Tue, 24 Feb 1998 19:01:16 +0100

Dear Colleagues,

I am writing to let you know that the next IPCC-SRES Full Authors meeting will be held the week of 27 April 1998 (instead the week of 6 April) in Washington, D.C. Bob Watson of the IPCC will attend. The exact dates during that week are not yet fixed, but I expect that we will have a full authors meeting for two days, preceded by a two-day modelers meeting. Please let me know soon--today if possible--whether you will be available during this week; it is critical that we finalize the dates early so there will be sufficient time to ensure funding for our colleagues from developing countries who need IPCC support.

I look forward to hearing from you very soon.

Best regards,

Naki

Prof. Dr. Nebojsa Nakicenovic
Project Leader
Environmentally Compatible Energy Strategies
International Institute for | Email: naki@iiasa.ac.at
Applied Systems Analysis | Phone: +43 2236 807 411
A-2361 Laxenburg, Austria | Fax: +43 2236 71313

50. 0888609364.txt
##########

From: Keith Briffa <k.briffa@uea.ac.uk>
To: climat@ipcom.ru (L.Kitaev)
Subject: Re: for Proff.A.Krenke, Moscow
Date: Fri Feb 27 14:56:04 1998
Cc: eugene,stepan

Dear Prof. Krenke
I am happy to submit the proposal from here or to be associated with it in collaboration with our ongoing tree-ring development work (with Fritz Schweingruber, Eugene Vaganov and Stepan Shiyatov) but you will have to take the initiative in writing and organising the proposal. I am very tied up with meetings and I have to write and submit another INTAS proposal with the people I mentioned to continue development and analysis of the long chronologies at Yamal and Taimyr. The others need not be listed if you do not wish but I would ask you to discuss with Prof. Vaganov how he sees this being balanced with his priorities and our ongoing work. We will use our own transfer function approach (in our ADVANCE European project) to reconstruct circulation in summer based only on the tree-ring data but this is no worry for you. If you can get the draft to me soon - with details of all participants and money I will then look at it and revise and submit as you wish.If this is to happen you must take the initiative of putting it together.
please let me know what you intend as soon as possible. I am here only for one more week!
Keith

At 09:56 AM 2/24/98 +0300, you wrote:
>
>
>Attachment Converted: "c:\eudora\attach\BRIFFA2.TXT"
>

51. 0888611422.txt
##########

From: Nebojsa NAKICENOVIC <naki@iiasa.ac.at>
To: Joseph Alcamo <alcamo@usf.uni-kassel.de>, Knut Alfsen <knut.alfsen@cicero.uio.no>, Dennis Anderson <dennis.anderson@ic.ac.uk>, Zhou Dadi <becon@public3.bta.net.cn>, Gerald Davis <Ged.R.Davis@si.simis.com>, Benjamin Dessus <Benjamin.Dessus@cnrs-dir.fr>, Bert de Vries <Bert.de.Vries@rivm.nl>, Jae Edmonds <ja_edmonds@pnl.gov>, Joerg Fenhann <j.fenhann@risoe.dk>, Stuart Gaffin <stuart@edf.org>, Henryk Gaj <Fewewar@ternet.pl>, Kenneth Gregory <kennethgregory@msn.com>, Arnulf Gruebler <gruebler@iiasa.ac.at>, Erik Haites

<ehaites@netcom.ca>, William Hare <bhare@ams.greenpeace.org>, Michael Hulme <m.hulme@uea.ac.uk>, Michael Jefferson <jefferson@wec.co.uk>, Tae-Yong Jung <tyjung@his.keei.re.kr>, Thomas Kram <kram@ecn.nl>, Emilio La Rovere <emilio@ppe.ufrj.br>, Mathew Luhanga <vc@admin.udsm.ac.tz>, Julio Torres Martinez <dpid@[169.158.128.138]>, Douglas McKay <Doug.D.Mckay@si.simis.com>, Laurie Michaelis <laurie.michaelis@oecd.org>, Shunsuke Mori <mori@shun-sea.ia.noda.sut.ac.jp>, Tsuneyuke Morita <t-morita@nies.go.jp>, Richard Moss <rmoss@usgcrp.gov>, Nebojsa Nakicenovic <Naki@iiasa.ac.at>, Youssef Nassef <nassef@hotmail.com>, William Pepper <WPepper@icfkaiser.com>, Hugh Pitcher <hm_pitcher@pnl.gov>, "Richard G. Richels" <rrichels@msm.epri.com>, Lynn Price <lkprice@lbl.gov>, Holger Rogner <rogner@iiasa.ac.at>, Cynthia Rosenzweig <crosenzweig@giss.nasa.gov>, Priyadarshi Shukla <shukla@iimahd.ernet.in>, James Skea <J.F.Skea@sussex.ac.uk>, Leena Srivastava <leena@teri.res.in>, Robert Swart <rob.swart@rivm.nl>, Robert Watson <rwatson@worldbank.org>, John Weyant <weyant@Leland.stanford.edu.>, Ernst Worrell <e.worrell@nwsmail.chem.ruu.nl>
Subject: Tentative Attendance of IPCC SRES Meeting, 27-30 April 1998
Date: Fri, 27 Feb 1998 15:30:22 +0100

Dear Colleagues,

Thank you for your prompt response to my recent e-mail message regarding the next IPCC SRES meeting. I am glad to hear that so many of you will be able to attend, since this will be a very important discussion. The plan is to hold the modelers' meeting on April 27 and 28, followed by the full authors' meeting on April 29 and 30.

Below is a list of those who are planning to attend:

Joseph Alcamo <alcamo@usf.uni-kassel.de>
Dennis Anderson <dennis.anderson@ic.ac.uk>
Zhou Dadi <becon@public3.bta.net.cn>
Gerald Davis <Ged.R.Davis@si.simis.com> (part of the meeting)
Bert de Vries <Bert.de.Vries@rivm.nl>
Jae Edmonds <ja_edmonds@pnl.gov>
Joerg Fenhann <j.fenhann@risoe.dk>
Stuart Gaffin <stuart@edf.org>
Henryk Gaj <Fewewar@ternet.pl>
Kenneth Gregory <kennethgregory@msn.com>
Arnulf Gruebler <gruebler@iiasa.ac.at>
Erik Haites <ehaites@netcom.ca>
Michael Hulme <m.hulme@uea.ac.uk>
Tae-Yong Jung <tyjung@his.keei.re.kr>
Mathew Luhanga <vc@admin.udsm.ac.tz>
Julio Torres Martinez <dpid@[169.158.128.138]>
Laurie Michaelis <laurie.michaelis@oecd.org> (part of the meeting)
Tsuneyuke Morita <t-morita@nies.go.jp>
Richard Moss <rmoss@usgcrp.gov>
Nebojsa Nakicenovic <Naki@IIASA.ac.at>
Youssef Nassef <nassef@hotmail.com>
Hugh Pitcher <hm_pitcher@pnl.gov>
Lynn Price <lkprice@lbl.gov>
Holger Rogner <rogner@iiasa.ac.at> (strong possibility)
Priyadarshi Shukla <shukla@iimahd.ernet.in>
Leena Srivastava <leena@teri.res.in>
Robert Swart <rob.swart@rivm.nl> (strong possibility)
Ernst Worrell <e.worrell@nwsmail.chem.ruu.nl>

I will be in touch with additional details in the coming weeks.

Best regards,

Naki

52. 0889047457.txt
##

From: Anne JOHNSON <johnson@iiasa.ac.at>
To: Joseph Alcamo <alcamo@usf.uni-kassel.de>, Knut Alfsen <knut.alfsen@cicero.uio.no>, Dennis Anderson <dennis.anderson@ic.ac.uk>, Zhou Dadi <becon@public3.bta.net.cn>, Gerald Davis <Ged.R.Davis@si.simis.com>, Benjamin Dessus <Benjamin.Dessus@cnrs-dir.fr>, Bert de Vries <Bert.de.Vries@rivm.nl>, Jae Edmonds <ja_edmonds@pnl.gov>, Joerg Fenhann <j.fenhann@risoe.dk>, Stuart Gaffin <stuart@edf.org>, Henryk Gaj <Fewewar@ternet.pl>, Kenneth Gregory <kennethgregory@msn.com>, Arnulf Gruebler <gruebler@iiasa.ac.at>, Erik Haites <ehaites@netcom.ca>, William Hare <bhare@ams.greenpeace.org>, Michael Hulme <m.hulme@uea.ac.uk>, Michael Jefferson <jefferson@wec.co.uk>, Tae-Yong Jung <tyjung@his.keei.re.kr>, Thomas Kram <kram@ecn.nl>, Emilio La Rovere <emilio@ppe.ufrj.br>, Mathew Luhanga <vc@admin.udsm.ac.tz>, Julio Torres Martinez <dpid@ceniai.inf.cu>, Bert Metz <bert.metz@rivm.nl>, Douglas McKay <Doug.D.Mckay@si.simis.com>, Laurie Michaelis <laurie.michaelis@oecd.org>, Shunsuke Mori <mori@shun-sea.ia.noda.sut.ac.jp>, Tsuneyuke Morita <t-morita@nies.go.jp>, Richard Moss <rmoss@usgcrp.gov>, Nebojsa Nakicenovic <Naki@iiasa.ac.at>, Youssef Nassef <nassef@hotmail.com>, William Pepper <WPepper@icfkaiser.com>, Hugh Pitcher <hm_pitcher@pnl.gov>, Lynn Price <lkprice@lbl.gov>, Rich Richels <rrichels@epri.com>, Holger Rogner <rogner@iiasa.ac.at>, Cynthia Rosenzweig <crosenzweig@giss.nasa.gov>, Priyadarshi Shukla <shukla@iimahd.ernet.in>, James Skea <J.F.Skea@sussex.ac.uk>, Leena Srivastava <leena@teri.res.in>, Robert Swart <rob.swart@rivm.nl>, Robert Watson <rwatson@worldbank.org>, John Weyant <weyant@Leland.stanford.edu.>, Ernst Worrell <e.worrell@nwsmail.chem.ruu.nl>
Subject: ZOD attached
Date: Wed, 04 Mar 1998 16:37:37 +0100
Cc: kuszko@uea.ac.uk

Dear Colleagues:

Naki has asked me to send you the attached IPCC Zero Order Draft by Dennis Anderson on the influence of social and economic policies on future carbon emissions. It is an updated version of the ZOD presented at the Berkeley SRES meeting. The attachment is missing the last three charts, but these will be available in time for the Washington, D.C. meeting. If you have any comments, please send them directly to Dennis Anderson:

Dennis.Anderson@Economics.oxford.ac.uk

I have attached the ZOD in both rich text and MS Word formats.

Regards,

Anne Johnson

Attachment Converted: "c:\eudora\attach\anderson.doc"

Attachment Converted: "c:\eudora\attach\anderson.rtf"

Anne JOHNSON
IIASA
International Institute for Applied Systems Analysis
A-2361 Laxenburg, Austria
E-Mail: johnson@iiasa.ac.at
Phone : +43 2236 807-0
Fax : +43 2236 71313

53. 0889211121.txt
##

From: Padruot Nogler <nogler@wsl.ch>
To: k.briffa@uea.ac.uk
Subject: From Rashit Hantemirov
Date: Fri, 06 Mar 1998 14:05:21 +0100

Dear Keith,

I am in Birmensdorf now and will stay here until March 20s.
As far as I know Stepan Shiyatov has to translate the proposal
into Russian because of this year there are two possibility to get grant.
The one is just INTAS competition and other is joint INTAS-RFBR (Russian
Foundation for Basic Researches) ones with the same requirements and
grant amounts. For second one we have to submit russian version to RFBR.
If proposal will reject by RFBR it will be automatically submit for
INTAS competition.

Attached file is the ring-width series of subfossil (first
letter is L in series number) and living larches from Yamal,
used for mean chronology developing (best or the only ones for
corresponding period).

Best regards,
hope to see you in London next month,

Rashit Hantemirov

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54. 0889554019.txt
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From: Anne JOHNSON <johnson@iiasa.ac.at>
To: Joseph Alcamo <alcamo@usf.uni-kassel.de>, Knut Alfsen
<knut.alfsen@cicero.uio.no>, Dennis Anderson <dennis.anderson@ic.ac.uk>, Zhou Dadi
<becon@public3.bta.net.cn>, Gerald Davis <Ged.R.Davis@si.simis.com>, Benjamin
Dessus <Benjamin.Dessus@cnrs-dir.fr>, Bert de Vries <Bert.de.Vries@rivm.nl>, Jae
Edmonds <ja_edmonds@pnl.gov>, Joerg Fenhann <j.fenhann@risoe.dk>, Stuart Gaffin
<stuart@edf.org>, Henryk Gaj <Fewewar@ternet.pl>, Kenneth Gregory
<kennethgregory@msn.com>, Arnulf Gruebler <gruebler@iiasa.ac.at>, Erik Haites
<ehaites@netcom.ca>, William Hare <bhare@ams.greenpeace.org>, Michael Hulme
<m.hulme@uea.ac.uk>, Michael Jefferson <jefferson@wec.co.uk>, Tae-Yong Jung
<tyjung@his.keei.re.kr>, Thomas Kram <kram@ecn.nl>, Emilio La Rovere
<emilio@ppe.ufrj.br>, Mathew Luhanga <vc@admin.udsm.ac.tz>, Julio Torres Martinez
<dpid@ceniai.inf.cu>, Douglas McKay <Doug.D.Mckay@si.simis.com>, Laurie Michaelis
<laurie.michaelis@oecd.org>, Shunsuke Mori <mori@shun-sea.ia.noda.sut.ac.jp>,
Tsuneyuke Morita <t-morita@nies.go.jp>, Richard Moss <rmoss@usgcrp.gov>, Nebojsa
Nakicenovic <Naki@iiasa.ac.at>, Youssef Nassef <nassef@hotmail.com>, William Pepper
<WPepper@icfkaiser.com>, Hugh Pitcher <hm_pitcher@pnl.gov>, Lynn Price
<lkprice@lbl.gov>, Rich Richels <rrichels@epri.com>, Holger Rogner
<rogner@iiasa.ac.at>, Cynthia Rosenzweig <crosenzweig@giss.nasa.gov>, Priyadarshi
Shukla <shukla@iimahd.ernet.in>, James Skea <J.F.Skea@sussex.ac.uk>, Leena
Srivastava <leena@teri.res.in>, Robert Swart <rob.swart@rivm.nl>, Robert Watson
<rwatson@worldbank.org>, John Weyant <weyant@Leland.stanford.edu.>, Ernst Worrell
<e.worrell@nwsmail.chem.ruu.nl>

Subject: new IPCC-SRES Zero Order Draft
Date: Tue, 10 Mar 1998 13:20:19 +0100

Dear Colleagues:

I am sending you a copy of Ged Davis' IPCC-SRES Zero Order Draft on storylines and scenarios. The text is appended below, but I am also attaching versions in MS Word and in Rich Text formats so that you can better view the graphics.

Please send any comments directly to Ged Davis at

Ged.R.Davis@si.simis.co

Regards,

Anne Johnson

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******
Zero Order Draft

IS99
Storylines and Scenarios

February, 1998

Ged Davis et al

For Comment Only
Draft Paper for the IPCC Special Report on Emissions Scenarios

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Contents

1. Introduction

The IS99 scenarios have been constructed to explore future developments in the global environment with special reference to the production of GHGs. These scenarios are being developed in three phases:
- Phase 1: the Special Report on Emissions Scenarios (SRES) team is

preparing a set of scenarios for wide public discussion, which is the subject of this note,
- Phase 2: the scenarios will be placed on the World Wide Web, subject to public scrutiny, and suggestions for relevant modification of the scenarios will be sought,
 - Phase 3: the scenarios will be finalised for peer review, incorporating suggestions received during the public review, by April 1999.
Phase 1 centred on a facilitated open process for Lead Authors at workshops in Paris, Vienna and Utrecht. The scenarios developed allow for a broad range of GHG emissions and provide a basis for reflection on policy.

1.1 What are scenarios?
Scenarios are pertinent, plausible, alternative futures. Their pertinence, in this case, is derived from the need for climate change modelers to have a basis for assessing the implications of future possible paths for Greenhouse Gas Emissions (GHGs). Their plausibility is tested by peer review, in an open process, which includes their publication on the World Wide Web.

There are clearly an infinite number of possible alternative futures to explore. We have consciously applied the principle of Occam's Razor , seeking the minimum number of scenarios to provide an adequate basis for climate modelling and challenge to policy makers. The alternative futures constructed are not, and cannot be, value free since like any work they self-evidently reflect the team's view of the possible. The scenarios should not be construed as being desirable or undesirable in their own right and have been built as descriptions of possible, rather than preferred, developments. There can be no objective assessment of the probability of the scenarios, although in the prevailing zeitgeist some will appear to individuals to be more likely than others. Scenarios are built to clarify ignorance rather than present knowledge -- the one thing we can be sure of is that the future will be very different from any of those we describe!

2. Scenarios - overview

2.1 Scenarios: key questions and dimensions
Developing scenarios for a period of one hundred years is a relatively new field. Within that period we might expect two major technological discontinuities, a major shift in societal values and a change in the balance of geopolitical power. A particular difficulty is that people are not trained to think in these time-spans, are educated in narrow disciplines and our ability to model large-systems, at the global level, is still in its infancy. Additionally, most databases do not go back much further than 50 years and many less than that. How best to integrate demography, politico-economic, societal and technological knowledge with our understanding of ecological systems? Scenarios can be used as an integration tool, allowing an equal role for intuition, analysis and synthesis.

Terminology
Storylines, Scenarios and Scenario Families

Storyline: a narrative description of a scenario (or a family of scenarios), highlighting the main scenario characteristics, relationships between key driving forces and the dynamics of the scenarios.

Scenario: projections of a potential future, based on a clear logic and a quantified storyline.

Scenario family: one or more scenarios which have the same demographic, politico-societal, economic and technological storyline.

Scenario Classification

Our approach has been to develop a set of four "scenario families". The storylines of each of these scenario families describes a demographic, politico-economic, societal and technological future. Within each family one or more scenarios explore global energy industry and other developments and their implications for Greenhouse Gas Emissions and other pollutants. These are a starting point for climate impact modelling.

The scenarios we have built explore two main questions for the 21st century, neither of which we know the answer to:
- Can adequate governance -- institutions and agreements -- be put in place to manage global problems?
- Will society's values focus more on enhancing material wealth or be more broadly balanced, incorporating environmental health and social well-being.
The way we answer these questions leads to four families of scenarios:
- Golden Economic Age (A1): a century of expanded economic prosperity with the emergence of global governance
- Sustainable Development (B1): in which global agreements and institutions, underpinned by a value shift, encourages the integration of ecological and economic goals
- Divided World (A2): difficulty in resolving global issues leads to a world of autarkic regions
- Regional Stewardship (B2): in the face of weak global governance there is a focus on managing regional/local ecological and equity

Within these scenario families we examine plausible energy industry and other developments which will contribute to GHG emissions. Although the storylines cannot have explicit climate change policy measures in them there are examples of indirect mitigation measures in some of the scenarios. The scenario quantifications of the main indicators related to growth of population and economy, the characteristics of the energy system and the associated greenhouse gas emissions all fall within the range of prior studies .

3. Golden Economic Age (A1)

This scenario family entitled "Golden Economic Age", describes rapid and successful economic development. The primary drivers for economic growth and development "catch up" are the strong human desire for prosperity, high human capital (education), innovation, technology diffusion, and free trade. The logic of successful development assumes smooth growth with no major political discontinuities or catastrophic events. The scenario family's development model is based on the most successful historical examples of economic growth, i.e., on the development path of the now affluent OECD economies. Historical analogies of successful economic "catching up" can be found in the Scandinavian countries, Austria, Japan, and South Korea. "Intangible" assets (human capital, stable political climate) take precedence over "tangible" assets (capital, resource, and technology availability) in providing the conditions for a take-off into accelerated rates of development. Once these conditions are met, free trade enables each region to access knowledge, technology, and capital to best deploy its respective comparative economic and human resource advantages. Institutional frameworks are able to successfully sustain economic growth and also to handle the inevitable volatility that rapid economic growth entails.

The "intangible" prerequisites for accelerated rates of economic growth also offer long-term development perspectives for regions that are poorly endowed with resources or where current economic prospects are not auspicious, such as Sub-Saharan Africa. There, for instance, fostered regional trade and capital availability enhance the pull-effects of a strong South African economy. In other regions, growth may be fuelled by

domestic know-how and high human capital valued at the international market. An example of this is the thriving software industry of the Indian subcontinent. In yet other regions, growth could be stimulated by the expansion of regional economic partnerships and free trade arrangements (e.g., extensions of NAFTA and the European Union).

The main difference with the historical OECD experience is a certain acceleration in time and space, (i.e., "leapfrogging") made possible by better access to knowledge and technology, a consequence of the high-tech and free trade characteristics of development. Successful catching up becomes pervasive; all parts of the "developing world" participate, though with differences in timing. The final outcome is that practically all parts of the world achieve high levels of affluence by the end of the 21st century, even if disparities will not have disappeared entirely. The current distinction between "developed" and "developing" countries will in any case no longer be appropriate.
As in the past, high growth (a "growing cake") eases distributional conflicts. Everyone reaps the benefits of rapid growth, rising incomes, improved access to services, and rising standards of living. The economic imperatives of markets, free trade, and technology diffusion (i.e., competition) that underlie the high growth rates provide for efficient allocation of resources. Efficiency and high productivity are the positive by-products of the highly competitive nature of the economy. They also provide the economic resources for distributive and social measures required for a stable social and political climate, vital for sustaining high growth rates in human capital, productivity, innovation, and hence economic growth.

The economic development focus explains its central metric: the degree of economic development as reflected in per capita income levels (GDP at market exchange rates as well as at purchasing power parity rates). The principal driver is the desire for prosperity, all major driving forces are closely linked to prosperity levels, with actual causality links going in both directions. For example, demographic variables co-evolve with prosperity: mortality declines (i.e. life expectancy increases) as a function of higher incomes (better diets and affordable medical treatment). In turn, changes in the social values underlying the fertility transition also pave the way for greater access to education, modernisation of economic structures, and market orientation. These are key for innovating and diffusing the best practice technologies underlying the high productivity, and hence economic growth, of the scenario.

3.1 Key Scenario Drivers and their Relationships

3.11 Population and Economic Development

High education, stable social relations, and incentives for innovation and experimentation are the preconditions for productivity increases underlying rapid economic development in this world-- as a result, social, economic, and demographic development are highly correlated .
The link between demographic and economic variables in the scenario corresponds to present empirical observations: the affluent live long and have few children. High per capita incomes are thus associated with both low mortality and low fertility. Together, this results in rather low population growth, characterised in addition by a considerable "greying" of the population.
This family of scenarios combines high life expectancy with low fertility, where OECD rates are assumed to stabilize at current (below replacement) levels, and developing countries follow a similar transition by the mid-21st century. Fertility rates range between 1.3 to 1.7 children per woman. Life expectancy can approach some 95 years, with a regional variation between 80 and 95 years. Global population grows to some 9 billion by 2050, and declines to 7 billion by 2100, the result of continued below replacement fertility in all regions.

Population ageing results in economic growth rates somewhat lower than historical experience, especially in the OECD countries. Economic growth rates slow over time in proportion to the reduction of the potentially economic active population (age 15 to 65), which decline in some regions to 50 percent compared to the historical average of approximately 70 percent.

For "developing countries", economic growth is based on the most successful cases of economic "catch up" found in history. The economic growth profile of Japan after WW II served as a model to delineate the upper bounds of possible GDP growth for all regions. Consistent with growth theory, GDP expansion initially accelerates, passes through a peak, in which growth rates around 10 percent per year can be sustained for several decades, and then declines. Once the economic and industrial base is firmly established and the economy matures, growth rates decline with increasing income levels. This reflects saturation effects and a higher emphasis on quality rather than quantity at high income levels.
The global economy in the "Golden Economic Age" expands at an average annual rate of three percent per year to 2100. This is about the same rate as the global average since 1850 and in this respect may simply be considered "dynamics as usual". Non-Annex-I economies expand with an average annual growth rate of four percent per year, twice the rate of Annex-I economies. By approximately 2030 Non-Annex-I GDP surpasses that of the Annex-I economies. Per capita income disparities are reduced, but differences between regions are not entirely eliminated. Non-Annex-I per capita income reaches the 1990 Annex-I level (14,000 $/capita) by around 2040. By 2100 per capita income would approach 100,000 $/capita in Annex-I countries and 70,000 $/capita in Non-Annex-I countries.

3.12 Equity
Equity issues are not a major concern in the world, but is rather a by-product of the high rates of economic development. Existing per capita income gaps between regions close up in a similar way as between Western Europe and Japan compared to the US in the 20th century. Disparities continue to persist between regions, but more so within particular regions. Nevertheless, the high economic growth rates require a certain degree of income distribution. Extreme income disparities are found to be negative influencing factors for economic growth. Additionally, fair income distribution only assures the large consumer markets and the social cohesion and stability required for the realisation of high economic growth.

3.13 Settlement patterns/communication
Communication technologies and styles are highly homogeneous and extremely developed -- rather than a "global village" future, this is one of "global cities." Existing trends towards urbanisation continue, as cities provide the highest "network externalities" for the educational and R&D-intensive economic development pattern underlying the scenario. Regional differences in settlement patterns persist. They range from fragmented, compact, but large (i.e., 20+ million inhabitants) cities that depopulate their respective rural hinterlands in Latin America to urban "corridors" connected by high capacity communication and transport networks (in Asia). Regional transport networks include high speed trains and maglevs, which ultimately fuse short- and long-distance transport means into single interconnected infrastructures. In some parts of the world high-tech cars take the place that high-tech trains occupy in other parts.
The large urban agglomerates and the high transport demands of a high material growth economy generate vast congestion constraints. These are solved by applying market-based instruments (prices) rather than regulation. Economic instruments include access and parking fees, auctioning off the limited number of new car and truck licenses in megacities, much along the lines of the current stringent Singapore model. Therefore, even at very high income levels, car ownership rates could be comparatively low in parts of the world. In extremely densely populated areas, cars remain a luxury rather than a means of mass transport (viz.

Hong Kong). In areas with lower population density, car densities are high (+1 car per inhabitant). Car fuels could be either oil, synfuels, electricity, or hydrogen. Intercontinental transport is provided by energy- and GHG-intensive hypersonic aircraft fuelled by methane or hydrogen. They are the physical transport equivalent of the high capacity virtual communication links of a truly global economy.

3.14 Environmental Concerns/Ecological resilience

Ecological resilience is assumed to be high. In and of themselves, ecological concerns receive a low priority. Instead, the valuation of environmental amenities is strictly in economic terms, e.g., a function of affluence. Non-congestion, clean water and air, and recreational possibilities in nature all assume increasing importance with rising affluence, although preferences for environmental amenities may differ across regions and income levels. For instance, urban air quality and human health are valued highly even at income levels lower than those prevailing in England, where stringent air quality measures were introduced after the "killer smog" of 1952. Reduced particulate and sulphur air pollution become a matter of major consumer preference at levels of $2,000 - 3,000/capita income in Asia. Altogether, the concept of environmental quality changes from "conservation" of nature to active "management" --and marketing-- of natural and environmental amenities and services.

3.2 Scenarios

The core bifurcation (with respect to GHG emissions) of the scenario family unfolds around alternative paths of technology development in the agriculture and energy sectors. In the energy sector, the central question is how to manage the transition away from the current reliance on conventional oil and gas. In the agricultural sector, the key issue concerns land productivity.

Alternative technology bifurcations lead to a number of scenarios embedded and consistent within the overall theme of "prosperity via high techologies". All scenarios provide the high quantities of clean and convenient energy forms and diverse, high quality food demanded in an affluent world. Because technological change is cumulative, it can go in alternative, mutually exclusive directions, i.e., changes become "path dependent". Alternative directions unfold around the interrelated cluster of variables of resource availability and conversion technologies in both energy and agriculture. For instance, new technologies may enable humanity to tap either the vast quantities of fossil resources existing in the form of coal, unconventional oil, and gas with technologies that are both highly economic, efficient, and clean in terms of traditional pollutants, such as particulates or sulphur. Alternatively, technological change could unfold favouring non-fossil technologies and resources, such as nuclear and renewables.

A similar bifurcation unfolds in the agricultural sector. In one sub-scenario, only incremental improvements are achieved in farming practices and land productivity. This is combined with a gradual global diffusion of meat-based diets. Both of these trends are land- (and deforestation-) intensive. Alternatively, global agriculture could move in the direction of genetically engineered, high productivity crops and "sea-farming," combined with a quality- and health-oriented diet based on fish and vegetables, both of which are relatively less land intensive. As a result, GHG emissions range widely even for otherwise similar scenario characteristics.

3.21 Energy Resources/Technology

Resource availability and technology are tightly interrelated. The "Golden Economic Age" of high productivity growth results from substantial technological innovation. Both contribute to economic growth, expansion of accessible resources, and improved efficiency in resource use. Factor productivity improvements occur across the board for agricultural land, materials, and energy. Improvement rates largely follow long-term

historical trends and are entirely technology- and income- driven. Energy intensity (total commercial and traditional primary energy use per unit of GDP) improves at an aggregate global rate of 1.5 percent per year. Improvement rates vary across regions as a function of distance from the productivity frontier and the turnover rates of capital stock. Ceteris paribus, improvement rates are higher in regions with currently lower efficiency and greater than average GDP growth. This assumes no particular policy intervention or additional price regulation apart from the ones consistent with a free market environment (i.e. price subsidies are removed, and full costing principles are established).

Per capita final energy use gradually converges as income gaps close. Final energy use per capita in non-Annex-I countries would reach approximately 85 GJ (2 tons of oil equivalent) by 2050 and approximately 125 GJ (3 toe) by 2100, i.e., about the current average of OECD countries outside North America. Despite improvements in productivity and efficiency, the high income levels lead to resource use close to the upper bounds of the scenarios available in the literature. For instance, global final energy use would increase to approximately 1000 EJ by 2100.

The scenarios developed are a function of the different directions taken by technological change. The key question is which primary resources may become economically accessible in the future, and which technologies will become available to convert these primary resources into the final goods and services demanded by consumers. In the energy area, resources/technologies are key variables in determining the timing and nature of the transition away from currently dominant conventional oil and gas.
Four pathways are possible:
1. Progress across all resources and technologies.
2. "Clean coal" technologies: environmentally friendly except for GHG emissions and possible resource extraction impacts.
3. "Oil/Gas": smooth transition from conventional to unconventional oil and gas, tapping the vast occurrences of unconventional fossil fuels, including methane clathrates.
4. "Bio-Nuclear": rapid technological progress in non-fossil supply and end-use technologies, e.g. renewables, such as solar and biomass combustion, nuclear and hydrogen-fuelled end-use devices, such as fuel cells.

For the scenario quantification, a number of contrasting cases, characterised by the main energy form used in the second half of the 21st century, have been evaluated with the aid of formal energy models:
1. The dominance of Non-Fossil fuels -- the "Bio-Nuclear" scenario (A1R).
2. The dominance of unconventional gas, including hydrates, and oil (A1G)
3. The dominance of "Clean Coal" (A1C)

A brief scenario taxonomy is given below.

Scenario	Dominant Oil/Gas Resource	Availability	Technology Improvements: Coal	Oil/Gas	Non-fossil
A1R	Non-fossil	Medium (<50 ZJ)	Low	Medium	High
A1G	Oil/Gas	High (>75 ZJ)	Low	High	Low
A1C	Coal	Low (<35 ZJ)	High	Low	Low

*
Depending on the assumed availability of oil and gas, (low/medium/high) and corresponding improvements in production and conversion technologies for coal, oil/gas, and non-fossil technologies, different energy systems structures unfold. For instance, in the dynamic technology cases, liquid fuels from coal or unconventional oil/gas resources would become available at less than $30 /barrel, with costs falling further by about one percent

per year with exploitation of learning curve effects. Non-fossil electricity (photovoltaics, new nuclear) would become available at costs of less than 10 mills/kWh ($.01/kWh) and continue to improve further as a result of learning curve effects. The basic premise of the "dynamic technology" scenarios is that energy services could be delivered at long-run costs not higher than today, but with technologies having radically different characteristics, including environmental. In the event that such technology dynamics do not materialise, energy costs and prices would be significantly higher than suggested above -- illustrative model runs suggest energy demand would be up to 20 percent lower for a fossil scenario without significant cost improvements .

3.22 Agriculture

In the agricultural sector, two contrasting scenarios of land productivity could unfold, depending on the nature of advances in agricultural technologies. However, CO2 emissions from land use changes could range from 0.5 (low) to 1.5 (high) GtC by 2030 and from -1 to -2 (low) to zero (high) GtC emissions by 2100. In the latter case tropical forests essentially become depleted as a result of land-use conversions for agriculture and biomass fuel plantations. In the former case, land productivity gains are so substantial that ploughing of marginal agricultural land is no longer economically feasible and is abandoned, following recent trends in the OECD. The resulting expansion of forest cover leads to a net sequestration of atmospheric CO2.

3.23 Scenario Quantification

An initial scenario quantification in terms of population, GDP, energy use, and CO2 emissions for the three energy resource/technology sub-scenarios is summarised in Appendix 1 . The global scenario for 2100 is also summarised in the form of a snowflake diagram. All scenario quantifications are tentative and subject to revisions.

[Figure: "Snowflake" for A1 scenarios]

3.24 CO2 Emissions

The diverging pathways of resource availability and technological change characteristic of the three scenarios examined result in a wide range of annual CO2 emissions: from 10 to 33 GtC by 2100. It is interesting to note that the emissions of the two "fossil fuel" sub-scenarios, "clean coal" and "oil and gas," are quite close to each other (33 CtC versus 29 GtC). Continued reliance on oil and gas, coupled with demand growth, explain the emission patterns for the oil/gas scenario. Coal is the only fossil resource available in the "clean coal" scenario. Therefore, over time coal is increasingly required for conversion into premium fuels such as synliquids and syngas. This conversion "deepening" leads to a feedstock premium for coal and increases the market potential of non-fossil fuels. CO2 emissions are therefore not as high as in traditional coal-intensive scenarios.

4. Sustainable Development (B1)

The central elements of this scenario family include high levels of environmental and social consciousness, successful governance including major social innovation, and reductions in income and social inequality. Successful forms of governance allow many problems which are currently hard or difficult to resolve to fall within the competency of government and other organisations. Solutions reflect a wide stakeholder dialogue leading to consent on international environmental and social agreements. This is coupled with bottom-up solutions to problems, which reflect wide success in getting broad-based support within communities.

The concerns over global sustainable development, expressed in a myriad of environmental and social issues, results in the eventual successful management of the interaction between human activities and the biosphere. While no explicit climate policy is undertaken, other kinds of initiatives lead to lower energy use, and clean energy systems, which significantly

reduce greenhouse gas emissions. Besides cleaning up air quality, there is emphasis on improving the availability and quality of water.

4.1 Key Scenario Drivers and their Relationships

4.11 Technological Development

High levels of technological development focused on achieving sustainable development leads to high levels of material and energy saving, innovations in emissions control technology, as well as labour productivity. The latter is essential to support the rapid growth in personal income, given that a major increase in labour force participation is implicit in the equity assumptions. Technologies tend to be implemented in an industrial ecology mode, implying a much more highly integrated form of industrial production than at present. Information technology achieves a global spread, and is fully integrated into production technologies. Advances in international institutions permit the rapid diffusion of new technologies -- R&D approaches two percent of GDP.

4.12 Population and Economic Development

Population -- reaches only 9 billion by 2100 -- due to a faster than expected completion of the demographic transition arising from a large increase of women in the labour force, universal literacy, and concern for the environmental impacts of high population levels. The potential impacts of ageing populations which emerge from this low level of population growth are offset by relatively high levels of immigration, which reduce the negative impacts of ageing populations on savings and the ability of societies to adapt and implement new and cleaner technologies.

This world has a faster than expected transition from traditional to modern economic sectors throughout the developing world. In addition, widespread education leads to high labour productivity, and high labour force participation. Migration serves to sustain the size of the labour force in developed countries, which helps to maintain their growth in per capita income. Developing countries experience few institutional failures, enabling them to grow at or near the historical upper bounds of experience given their per capita incomes.

This yields a world of high levels of economic activity, with significant and deliberate progress being made with respect to international and national inequality of income. The current order of magnitude differences in income between developing and developed countries are reduced to a factor of two, with moderate growth continuing to occur in OECD countries. Gross World Product (GWP) reaches $350 trillion by 2100 and average global incomes $40,000 per capita. Economic development is balanced and, given the high environmental consciousness and institutional effectiveness, this leads to a better quality environment, with many of the aspects of rapid growth being anticipated and dealt with effectively. Active management of income distribution is undertaken through use of taxes and subsidies. The composition of final demand will evolve to a mix reflecting lower use of materials and energy, thus easing the impact of high income levels.

4.13 Equity

In this world there is a preparedness to address issues of social and political equity. The increases in equity, reflect a shift in values which, with widespread education, leads to greater opportunity for all. New social inventions, such as the Grameen Bank's micro-credit schemes, are a significant contributor to an increase in institutional effectiveness and equity improvement.

4.14 Communications, Settlement Patterns and Environment

The social innovations and effective governance rest on high levels of communication, both in a passive (i.e. TV) and active sense. Governance systems reflect high levels of consent from those affected by decisions, and this consent arises out of active participation in the governance process. Settlement patterns arise from design, and tend to reflect a distributed,

compact, city design structure. This results in high amenity levels, and the careful design and location of these cities results in a lessening of the natural disasters which plague many cities today. Advanced hazard warning systems and careful design limit the impact of such disasters. Low emission technologies, and careful management of land use, preservation of large tracts of land, and active intervention to counteract the impacts of imprudent societal actions strengthen the resilience of the ecological system.

4.2 Scenarios

4.21 Energy Resources/Technology

Energy efficiency innovations, and successful institutional innovations disseminating their use, result in much lower levels of energy use relative to historic patterns. The forward-looking nature of societal planning results in relatively smooth transitions to alternative energy systems as conventional oil and gas resources dwindle in availability. There is major use of unconventional natural gas as fuel supply during the transition, but the major push is towards renewable resources such as solar and wind. The impact of environmental concerns is a significant factor in the planning for new energy systems.

Two alternative energy systems, leading to two sub-scenarios, are considered to provide this energy:

1. Widespread expansion of natural gas, with a growing role for renewable energy (scenario B1N). Oil and coal are of lesser importance, especially post-2050. This transition is faster in the developed than in the developing countries.
2. A more rapid development of renewables, replacing coal and oil; the bulk of the remaining energy coming from natural gas (scenario B1R).

4.22 Scenario Quantification

Per capita incomes in the developed world are close to ___ in 2100, while average per capita income in the developing world grows from ___ % of the developed world in 1990 to ____ % in 2100. Energy per unit of output continues to fall at about historical rates in the developed countries, resulting in total energy use of ____ EJ in 2100. Rapid spread of technology from developed to developing countries enables an energy growth of ___ percent less than GDP, resulting in total energy use of ___ EJ in the developing part of the world

An initial quantification of the scenarios in terms of population, GDP, energy use, and CO2 emissions for the two energy resource/technology scenarios is summarised in Appendix 1. The global scenario for 2100 is also summarised in the form of a snowflake diagram. All scenario quantifications are tentative and subject to revisions.

[Figure: "Snowflake" for B1 scenarios]

4.23 CO2 Emissions

The range of carbon in CO2 emissions for the scenarios is 7.5 to 20 billion tons in 2100, reflecting 3 and 2 percent per year reductions in carbon per unit of GDP

5. Divided World (A2)

In a retreat from the globalising trends of the previous century, the world "consolidates" into a series of roughly continental economic regions. Regions pursue different economic strategies based on the resources and options available to them. Trade within economic regions increases, while trade between regions is controlled by tariff and non-tariff barriers to support the region's economic strategy. High income regions restrict immigration and impose selective controls on technology transfer to maintain high incomes for their residents.

High income regions encourage higher levels of education to increase the productivity of their labour force. They impose restrictions on immigrants,

except skilled immigrants, to keep per capita incomes high. They also try to impose selective restrictions on technology transfer to maintain the productivity of their labour force.
Low income regions are only able to increase per capita incomes slowly. They do not have the resources to invest in educating the labour force or in research and development. Investment from other regions is constrained. Thus exports are primarily products manufactured with low cost labour and some natural resource-intensive products. Population growth is high relative to high income regions. Income inequality becomes more pronounced within low income regions and increases between regions.

Regions use non-tariff barriers, such as differences in standards and labelling requirements, to limit trade. Trade is also dampened by differences in tastes in products. These factors favour the use of resources found within each region. Regions that have abundant coal resources but very limited oil resources, for example, encourage use of "local" coal by heavy industries and electric utilities while allowing restricting free imports of crude oil and petroleum products .

5.1 Key Scenario Drivers and their Relationships

5.11 Population and Economic Development

Fertility rates vary among regions. North America, Northwest Europe and Asia experience falling fertility rates and populations. The Middle East, Africa, and to some extent, Southern Europe and South America see rising population although the rate of growth decreases. This leads to a shift in the world population balance from the Indian sub-continent and South East Asia to the Middle East and Africa by the end of the century. World population reaches 16 billion by 2100.
Regional economies emphasise self-sufficiency with wide variations in growth levels. Average global economic growth is relatively low at around 2.5%/year, leading to a GWP of $250 trillion by 2100. Trade across regions consists primarily of raw materials and semi-finished goods in a relatively low trust world where dependence on other regions is minimised.

5.12 Government and Geopolitics

National boundaries become less important within the regions as an increasing share of policy is agreed at the regional level. This allows considerable cultural diversity within regions. Governmental style is also diverse across regions. In some, government and religion strengthen their links, in others, secular democracy is maintained or consolidated. Education is strengthened in most regions with a deepening understanding of cultural history and religion. The growing strength of the economic regions, and their competing economic interests, lead to reduced international co-operation. Global environmental, economic and social issues are subject to relatively weak governance. Conflicts between ethnic and religious groups within economic regions become less violent as a result of economic pressures on the parties. Where ethnic and religious violence persists, the groups are excluded from the economic region. Thus wars occur in the boundary zones between economic regions. Wars may also occur near regional boundaries for control of scarce natural resources.

5.13 Technology Developments

While underlying science is conducted in all regions an information about scientific developments are available world-wide, consumption and production patterns and hence, technology and practices, are determined by local circumstances.

Research activity increases in all regions; in high income regions due to the need to increase productivity with limited regional resources and in low income regions due to the growing size of the population. Restrictions on transfer of some technologies to other regions is widespread.

High income regions invest heavily in education to enhance labour productivity. Some high-income regions move towards broad-based education for a knowledge-based society. Others move towards practical education (lots of science and engineering) for an advanced industrial society. Low income regions are not able to invest as heavily in education, but the levels (and future rates of economic growth, vary significantly.

Technological change is rapid in some regions, slow in others, with industry adjusting to local resource endowments, cultural characteristics and education levels.

5.14 Communication and Settlement Patterns

Languages become more uniform within regions, but globally more diverse. Speakers of the main world languages are fairly evenly split. Computerised translation eliminates the language barrier to technology diffusion and economic development.

Urban concentration continues except in Europe and North America, which move towards larger numbers of smaller cities and towns. Urban shares of population in other countries rise to current OECD levels by 2020. While there is free movement within most regions, there is very little migration among regions. Refugee problems are confined to edge areas, for example, Baltics and Tibet.

5.15 Environmental Concerns

Environmental management follow pragmatic paths: with rising incomes, people become increasingly concerned first about urban pollution, then about regional pollution, finally about global problems. In this world, global environmental problems are discussed extensively but the will to tackle them is lacking. Propensity to worry about the environment is regionally variable. Sulphur emissions are rapidly reduced in South and South East Asia due to the impacts on agriculture but increase in Africa with exploitation of coal and minerals there.

5.2 Scenarios

Divided World is explored through a single scenario.

5.21 Resource Availability

Regions try to use their resource endowment for their economic advantage. Regions with abundant energy and mineral resources use those resources domestically and to produce exports (surplus to expected long-term needs). Regions poor in energy and mineral resources will minimise their dependence on these resources. High-income, resource-poor regions will develop as service-based, dematerialised economies, while low-income, resource-poor regions are forced to limit their consumption of resources.

High-income regions without indigenous oil and gas undergo a near-complete conversion to an energy economy based on nuclear or renewable based electricity and synthetic gases and liquids by 2050. India and China adopt these technologies at the largely exhausting domestic coal reserves by 2050. Renewable input, zero waste industry is pioneered in South East Asia and adopted in Europe, minimising mineral and fossil fuel requirements by 2050. Oil and gas-rich regions (North Africa, the Middle East, Central Asia, Russia) continue to use fossil fuels but towards 2050 the falling cost of renewable technology (wind and biomass in Russia, photovoltaic in the other regions) begins to make them competitive even in these regions

5.22 Scenario Quantification

An initial quantification of the scenario in terms of population, GDP, energy use, and CO2 emissions is summarised in Appendix 1. The global scenario for 2100 is also summarised in the form of a snowflake diagram. All scenario quantifications are tentative and subject to revisions.

[Figure: "Snowflake" for A2 scenarios]

5.23 CO2 Emissions

The level of carbon in CO2 emissions for the scenario is 15 billion tons in 2100 as only oil and gas rich regions continue to use fossil fuels.

6. Regional Stewardship (B2)

"Regional Stewardship" is based on a natural evolution of the present institutional policies and structures. As such it does not incorporate major geopolitical power shifts or fundamental technological discontinuities. There is relatively low trust, global agreements are difficult to reach and the result is 'multiple islands' with inward looking policies.
This is a world of good intentions, which are not capable of being implemented. The late 20th century value shift towards environmental stewardship continues, for example as envisioned in the Cairo and Rio Programs of Action, with increasing recognition of the importance of human welfare and inequity. These concerns cannot be tackled at a global level and are resolved regionally or locally. Environmental solutions are tempered by the desire for balance with economic goals in many areas - but poor governance means that meeting the needs of the poor and future generations is hampered by limited prosperity.
Families think seriously about the fact that their offspring may be dealing with a more ecologically stressed world, moreover one with limited financial resources for dealing with such problems. Education levels are high so that the ability of families to internalise global concerns in their family planning decisions is also high. The relative stabilisation of world population growth after 2050 leads to general optimism about the ability of society to solve problems such as food and water supply.

6.1 Key Scenario Drivers and their Relationships

6.11 Population
Both local governance and environmental concerns limit population growth. The world largely supports efforts to reduce unwanted births both as a social service but also because there is an implicit belief that even increasing populations have severe environmental consequences. Education and welfare programs for the young and illiterate are widely pursued.

Population stabilises at 10.5 billion people by 2100. Since economic growth is relatively slow, fertility rates do not decline strongly. But, the effect of fertility rate declines on lowering population size outweigh those of mortality rate decreases increasing population size.

The stabilisation of global population (largely after 2050) leads to a new atmosphere for social planning. It becomes considerably easier than at present for education, health care and pension programs. Age cohort sizes are much more stable through time than at present, although of course, overall ageing continues.

6.12 Economic Development
GWP grows to around 240 trillion $ in 2100 with a North/South income ratio of approximately 7/1 (presently 13/1). Concerns about the ecological costs of consumerist lifestyles receive wide attention and attempts are made, first in industrial countries, but later in developing countries, to seek satisfaction through community activities rather than high consumption. Overall people are eager to find alternatives to the high income world of materialism.

6.13 Governance
Governance is weak globally but strong nationally and regionally. Deliberate policies to limit trade for environmental and social reasons hinder the transfer of technologies. However pollution trading concepts catch on as a way of driving down the costs of pollution control. International alliances occur based on particular national circumstances,

such as in the development of biomass technologies. This fragmentation gives rise to pockets of environmental and social justice activists. Environmental policies vary widely across regions, for example in acceptable sulphur emission levels. NGO and public interest groups are strong, influential and busy.

6.14 Equity

While strong redistribution policies are enacted within regions to reduce income disparity, income differences between regions persist globally throughout the century and even increases in absolute terms, although the relative inequity decreases. The mechanism by which global equity increases relates in part to population dynamics: as fertility rates decline in developing countries, the decrease in youth dependency ratios leads to an increase in savings rate and strengthened economic growth during the first half of the century. In the developed regions, by contrast, ageing becomes an increasing drag on economic growth in helping to converge global incomes, concerns about the persistence of income inequality world-wide are swamped by the local concerns and conscious policies to limit international trade.

6.15 Settlement Patterns

A strong deurbanization trend occurs in this world because of increasing concern about the marginalization of the very poor that accompanies massive urbanisation. There are also concerns about managing large transient populations that migrate seasonally to cities for short term employment, for example in the construction industry.

Immigration is controlled but accepted, partly to compensate for very low fertility rates in some regions and partly to help economic development worldwide without the problems of uncontrolled globalisation.

6.16 Environmental Policy

Environmental improvement is strongly pursued although regional policies vary widely such as with sulphur controls. Marked reductions in S, CH4, deforestation, CFCs and N2O occur and water quality is addressed. Ecological resilience is not seen as high. The environment is viewed as quite fragile and requiring careful policy stewardship. Resource extraction is viewed as intrinsically problematic and scepticism persists regarding the ability of society to prevent environmental disasters like the Valdez oil spill and Kuwaiti oil fires. Indeed the world is increasingly sensitive about and intolerant of such events and much tension exists concerning this aspect of development. Environment groups lobby hard on these themes and paint a picture of rapidly depleting natural resources.

6.2 Scenarios

6.21 Energy Resources/Technology

Because of the concern about ecological fragility, alternative and renewable energy systems are viewed with much hope and are socially and politically encouraged. Biomass technologies and policies are invigorated. The labour and land intensive developing countries pursue biomass production while the capital intensive developed regions develop the required technologies. A degree of co-operation coalesces about such mutually symbiotic activities.

Consumers accept a rather long return in evaluating energy-efficiency investments. Mass transit systems are very successful and profitable. Advances in transportation technology are rapid.

Hydroelectric power is a constrained bag. Dams are viewed with disdain because there are soon no more wild rivers anywhere and the rights of indigenous people have been egregiously violated. Although they are relatively clean from the perspective of carbon emissions, their effects on

indigenous people (mercury poisoning of fish, etc.) becomes unacceptable. Decommissioning dams is widespread to restore pristine ecological systems downstream.

Reduction in carbon intensity is not viewed as a policy goal but it declines for other reasons. It is a frugal world with limited resource availability and so the paradigm grows that it is less costly to save energy than it is to buy it and use it. This spurs the development of technologies that use carbon more efficiently. In addition the accompanying emissions of NOx and SOx and tropospheric ozone are increasingly viewed as unacceptable.

6.23 Scenario Quantification
An initial scenario quantification in terms of population, GDP, energy use, and CO2 emissions for the scenario is summarised in Appendix 1. Energy intensity declines at a rate of 1.3%/year to a value of 0.12 toe/$1000 in 2100. This represents a total global energy usage in 2100 of 1250 EJ, of which 300 EJ is oil and gas; 100 EJ coal and 900 EJ is non-carbon renewables, with nuclear's role limited.

The global scenario for 2100 is also summarised in the form of a snowflake diagram. All scenario quantifications are tentative and subject to revisions.
[Figure: "Snowflake" for B2 scenario]

6.24 CO2 Emissions
By 2100 CO2 emissions 11.5 GtC/year, of which 5 GtC/year is emitted by the North and 6.5 GtC/year by the South. Carbon intensity declines at a rate of 0.8%/year to 2100, to a value of 0.3 tC/toe, some 50% of today's value.

7. Scenario Comparisons
[To be written]

8. Conclusions
[To be written]

Appendix 1: Scenario Quantification
[To be written]

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From: Fritz Schweingruber <fritz.schweingruber@wsl.ch>
To: k.briffa@uea.ac.uk
Subject: No Subject
Date: Thu, 12 Mar 1998 11:43:51 +0100

Dear Keith

Yesterdy we had the final meeting to a natonal research program climat and natural catastrophies. Local authorites and Grassel, WMO summarised the major open questions on which Switzerland could work:

-Changes of Forest and treeline borders eg. subalpine, or invasion of evergreen species in the chestnut forests in the Tessin
-long term chronologies (they spoke about climate)
-seasonal chronologies
-frequency and intensity of extrem climatic events.
-amount of anthropogenic input on climate and natural catastrophies.
- reconstruction of precipitations
-influence of natural phenomena as volcanoes and el nino on climate

Nowbody said anything about growth but few were aware of the local validity of the studies made in Switzerland.

Our actual studies fit perfectly to this topics. For the future (discussion in Kopenhagen) I see the following condensation points:

-continue millenial temperature sensitive chronologies.Some money should go to Taimyr and Yamal an perhaps French Alps.

-start with a precipitation sensitive network in Eurasia. Pinus, Juniperus in a transect from Spain to Tibet including dry sites in Sibirea. Partner could be Inst. of Geography, Bonn (Jan Esper) and Birmensdorf.

-Analysis of recovery of upper timberlines in Putorana mountains in north-central Sibirea,(similar study like Shiyatov in Polar Ural). A Vice director of the Inst. of Forest in Krasnoyarsk made a little Proposal (Dr. Abraimov). I have a PhD Student who make the same in the Swiss Alps near St. Moritz.

-Growth-climate studies in a test region in central Sibirea. Very good is the baikal region. There is a very steep precepitation gradiant ,200mm - 1800mm in a distance of 40 km.and in accordance a steep vegetation gradiant from the steppe to pine forest to Abies sibirica stands.Victor Voronin made a little proposel) At least one valley in the Abies region in the south of lake Baikal is heavily polluted An almost identical study has been made in southern Germany(Spiecker) in a transect from Lorraine to the black forest mill,(SO2).

-Reconstruction of extreme events in Central Europe (R. Vogels thesis shows how to do it) I am convinced that we could gather much mor material across Europe. That could be a topic for a thesis. It must not be part of an EU-proposal.

Can we discuss this suggestions at Kopenhagen?

Sincerely Fritz

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From: Anne JOHNSON <johnson@iiasa.ac.at>
To: Joseph Alcamo <alcamo@usf.uni-kassel.de>, Knut Alfsen <knut.alfsen@cicero.uio.no>, Akhiro Amano <z95020@ksc.kwansei.ac.jp>, Dennis Anderson <dennis.anderson@ic.ac.uk>, Zhou Dadi <becon@public3.bta.net.cn>, Gerald

Davis <Ged.R.Davis@SI.shell.com>, Benjamin Dessus <Benjamin.Dessus@cnrs-dir.fr>, Bert de Vries <Bert.de.Vries@rivm.nl>, Jae Edmonds <ja_edmonds@pnl.gov>, Joerg Fenhann <j.fenhann@risoe.dk>, Stuart Gaffin <stuart@edf.org>, Henryk Gaj <Fewewar@ternet.pl>, Kenneth Gregory <kennethgregory@msn.com>, Arnulf Gruebler <gruebler@iiasa.ac.at>, Erik Haites <ehaites@netcom.ca>, William Hare <bhare@ams.greenpeace.org>, Michael Hulme <m.hulme@uea.ac.uk>, Michael Jefferson <jefferson@wec.co.uk>, Tae-Yong Jung <tyjung@his.keei.re.kr>, Thomas Kram <kram@ecn.nl>, Emilio La Rovere <emilio@ppe.ufrj.br>, Mathew Luhanga <vc@admin.udsm.ac.tz>, Sandy MacCracken <smaccrac@usgcrp.gov>, Nicolette Manson <Nicolette_Manson-Engelbrecht@edf.org>, Julio Torres Martinez <dpid@ceniai.inf.cu>, Douglas McKay <Doug.D.Mckay@si.simis.com>, Roberta Miller <roberta@ciesin.org>, Laurie Michaelis <laurie.michaelis@oecd.org>, Shunsuke Mori <mori@shun-sea.ia.noda.sut.ac.jp>, Tsuneyuke Morita <t-morita@nies.go.jp>, Richard Moss <rmoss@usgcrp.gov>, Nebojsa Nakicenovic <Naki@iiasa.ac.at>, Youssef Nassef <nassef@hotmail.com>, William Pepper <WPepper@icfkaiser.com>, Hugh Pitcher <hm_pitcher@pnl.gov>, Lynn Price <lkprice@lbl.gov>, Rich Richels <rrichels@epri.com>, Holger Rogner <rogner@iiasa.ac.at>, Cynthia Rosenzweig <crosenzweig@giss.nasa.gov>, Priyadarshi Shukla <shukla@iimahd.ernet.in>, James Skea <J.F.Skea@sussex.ac.uk>, Steve Smith <ssmith@ucar.edu>, Leena Srivastava <leena@teri.res.in>, Susan Subak <S.Subak@uea.ac.uk>, Robert Swart <rob.swart@rivm.nl>, Robert Watson <rwatson@worldbank.org>, John Weyant <weyant@Leland.stanford.edu.>, Ernst Worrell <e.worrell@nwsmail.chem.ruu.nl>
Subject: meeting next week
Date: Tue, 21 Apr 1998 15:53:20 +0200
Cc: kuszko@uea.ac.uk

Dear Colleagues,

Due to the large number of participants at the Lead Authors meeting, the location has been changed from IPCC WG II TSU offices to the World Bank, H Building, 600 19th Street, N.W.

The closest metro stop to this building is Farragut West on the orange and blue lines. Take the 18th Street exit from the metro and go one block to 19th Street and then two blocks over to G Street. You will need a badge to get
into the meeting, but someone will be there to help you with this. In any case, it may be a good idea to come a bit early on the first day to get checked in. The meeting begins at 8:30 a.m. Wednesday morning.

The Modelers meeting will still be held at the WG II TSU office as originally planned. That meeting starts at 8:30 a.m. on Monday morning. The address, once again, is 400 Virginia Avenue S.W., Suite 750, Washington, D.C.

We look forward to seeing everyone in Washington.

Best regards,

Anne Johnson

Anne JOHNSON
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A-2361 Laxenburg, Austria
E-Mail: johnson@iiasa.ac.at
Phone : +43 2236 807-0
Fax : +43 2236 71313

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##########

From: Ged.R.Davis@si.simis.com
To: alcamo@usf.uni-kassel.de, dennis.anderson@ic.ac.uk, bob.chen@ciesin.org, becon@public3.bta.net.cn, ddokken@usgcrp.gov, Bert.de.Vries@rivm.nl, ja_edmonds@pnl.gov, j.fenhann@risoe.dk, stuart@edf.org, Fewewar@ternet.pl, kennethgregory@msn.com, gruebler@iiasa.ac.at, ehaites@netcom.ca, m.hulme@uea.ac.uk, tyjung@his.keei.re.kr, johnson@iiasa.ac.at, kram@ecn.nl, emilio@ppe.ufrj.br, vc@admin.udsm.ac.tz, Nicolette_Manson-Engelbrecht@edf.org, roberta@ciesin.org, laurie.michaelis@oecd.org, mori@shun-sea.ia.noda.sut.ac.jp, t-morita@nies.go.jp, rmoss@usgcrp.gov, hm_pitcher@pnl.gov, rrichels@msm.epri.com, lkprice@lbl.gov, rrichels@epri.com, rogner@iiasa.ac.at, A.sankovski@icfkaiser.com, shukla@iimahd.ernet.in, ssmith@ucar.edu, leena@teri.res.in, S.Subak@uea.ac.uk, rob.swart@rivm.nl, Lvanwie@usgcrp.gov, rwatson@worldbank.org, weyant@Leland.stanford.edu, xing@ciesin.org, naki@iiasa.ac.at
Subject: RE: IPCC SRES Scenario Guidelines for Authors
Date: 08 May 1998 10:50:50 +0100

Find below guidelines on how to present the IS99 storylines and scenarios. Could you the nominated authors send me your first drafts as soon as possible.
In writing up your contribution could you cover the following areas, ideally structured as follows:

1. Scenario family narrative to discuss main themes, dynamics and a diagram showing 'grand logic'

2. Key Scenario Family Drivers and their Relationships
Topics you should cover include the following:
* population
* technology developments
* governance and geopolitics
* economic development
* equity
* communication and settlement patterns
* environmental concerns/ecological resilience

3. Scenarios, include reasons for branches: this section should state clearly the reasons behind selection of scenarios and review the key highlights of the scenario quantification
* energy resources/technology, include resource availability
* land use and agriculture
* scenario quantification, include snowflake
* CO2 emissions

There may be other factors you wish to add to the paper.

Regards,
Ged Davis SI-PXG Tel: 0171-934 3226 Fax: 0171-934 7406
Shell International Limited, London
Scenario Processes and Applications

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##########
##########

From: Keith Briffa <k.briffa@uea.ac.uk>
To: j.burgess@uea
Subject: Re: report- edit this and send an email
Date: Fri Jun 12 12:36:49 1998

>Return-path: <m.baillie@qub.ac.uk>
>Envelope-to: f023@cpca11.uea.ac.uk

>Delivery-date: Tue, 12 May 1998 17:42:11 +0100
>X-Sender: mbaillie@143.117.30.62
>Date: Tue, 12 May 1998 16:42:31 +0000
>To: Keith Briffa <k.briffa@uea.ac.uk>
>From: Mike Baillie <m.baillie@qub.ac.uk>
>Subject: Re: report- edit this and send an email
>
>Keith, here are some thoughts on belfast work. Come back to me on this.
>Cheers   Mike
>
>10K Belfast Report.
>
>All the remaining long chronology (prehistoric) oak data from Ireland,
>England, north and south Germany (including the major Hohenhein holdings
>(2827 tree series spanning 8239 BC to 841 AD) and the Netherlands (667
>series spanning 6025 BC with gaps to 1721 AD) has now been centralised and
>screened.
>Work has been progressing on calculating running statistics on and between
>these data sets and their constituent ring patterns. Additional attention
>has been paid to attempting to understand/interpret the data in various
>ways. During the year, three principal work packages have been explored
>with respect to assessing the oak data.
>
>work package i)
>signatures
>With such a wide grid of chronologies it is possible to review the
>occurrence of years of common growth trend. Signatures are normally
>defined as those years in which 80% or more of all trees in a 'region'
>exhibit the same trend towards wider or narrower growth. All sub-regional
>and overall European signatures have been isolated and the intention is to
>re-do the 1985 analysis of Kelly et al. comparing rainfall, temperature and
>drought index data with the ocurrence of widespread signatures.
>
>work package ii)
>Stepped windows of correlation
>With the availability of the raw data from each laboratory all regional
>chronologies for Ireland, Britain, North Germany and South Germany have
>been reconstructed by standard means (initially fitting a 30-year spline to
>each individual tree-ring pattern). Using these standardised chronologies,
>stepped windows of correlation have been run comparing all regions across
>time back to 5000 BC. Notable changes are observed indicating periods of
>consistent, north-European-wide similarity and dis-similarity. The
>availability of the raw data then allows interrogation of anomalies. For
>example, there is a notable fall-off in correlation between the
>standardised Irish and English chronologies at AD 775 to 825. In the past
>this would have been attributed to aspects such as a) poor replication or
>b) narrow versus wide rings. In this case examination of these aspects
>showed that neither was the cause of the poor correlation; it appears that
>English and Irish trees were responding in completely opposite manner
>during this period. Such findings have important implications for both
>identifying and interrogating such episodes throughout the record.
>
>work package iii)
>Widest and narrowest rings.
>It had always been assumed that the widest (or narrowest) ring in any tree,
>in any year, would be idiosyncratic. This assumption produced the
>expectation that the information from such extremes would be largely
>meaningless. With the availability of the raw data it is now possible to
>create new chronologies of the 1st narrowest, and or the 2nd/3rd narrowest,
>the widest, etc, rings in each year, for each region, or for the entire
>regional dataset. The result of isolating these extremes turns out to be
>surprising in that plots of the extremes show remarkable coherence. Figure
>Z shows a section of the Irish chronology constructed from the widest (and

>narrowest) raw ring widths (the narrowest values being converted to indices
>for clarity). This presentation shows the 'maximum envelope of oak growth'
>year by year through time. This is a remarkable way to demonstrate periods
>when there are no narrow rings in any trees and others where there are no
>wide rings in any trees. Extreme events such as that in AD 540 can be seen
>as an overall downturn in the ring width envelope, not just a reduction in
>mean ring width.
>
>Extreme events.
>Work has continued documenting extreme events in the European oak, and
>other, records, partly as a preliminary to the detailed comparison between
>the oak and Fennoscandian and Finnish pine chronologies. Some of the
>events appear to be of a sufficiently global character that their effects
>should be apparent in the more temperature sensitive northern pine
>chronologies. Recently preliminary work has documented declines in the
>seventeenth century and twelfth century BC and in the later fifth century
>BC. Notable declines in the 1620s and 1120s in Foxtail pine chronologies
>from the Sierra Nevada (Scuderi 1993; Caprio and Baisan 1991) suggest
>reduced temperatures around the time of spaced events in the floating
>Fennoscandian record. With several exactly-spaced events available over
>several millennia it should be possible to link the major oak and pine
>holdings, with the additional possibility of using dated English and Irish
>sub-fossil pine chronologies to confirm linkages.
>Refs
>Caprio, A.C. and Baisan, C.H. 1992. Multi-millennial tree-ring chronologies
>from foxtail pine in the southern Sierras of California. Abstract in
>Bulletin of the Ecological Society of America 73, 133.
>
>Scuderi, L.A. 1993, A 2000-Year Tree-Ring Record of Annual Temperatures in
>the Sierra Nevada Mountains, Science 259, 1433-6
>
>
>Related applications:
>
>Interhemispheric Radiocarbon Calibration
>In addition collaboration has continued on a range of topics including
>interhemispheric radiocarbon calibration. Oak samples from Ireland and
>exactly contemporaneous samples of cedar from New Zealand have been measued
>in radiocarbon laboratories in Belfast and Waikato (samples from each
>hemisphere being dated in both laboratories). This work is showing
>interesting hemispheric changes through time with implications for carbon
>cycle modellers (related paper accepted for publication).
>
>Global tree-ring responses to environmental change.
>As part of our network of collaborators, it is possible to have access to
>tree-ring patterns and related temperature reconstructions from a wide grid
>of chronologies outside Europe. An example of the power of such grids is
>provided by the observed changes during the fourteenth century AD. Here
>chronologies from the EU oak group have been combined with those from Ed
>Cook (Tasmanian Huon pine); Keith Briffa (Fennoscandian and Polar Urals
>pine); Peter Kuniholm (Aegean oak and pine) and Xiong Limin (New Zealand
>cedar). When permed (random groups of five from seven chronologies) to
>show common responses, the overall pattern exhibits reduced growth in the
>1340s, the decade of the arrival of the Black Death in Europe, see Figure.
>Such a clear environmental context for the plague has never been available
>before.
>
>Comparisons with other proxy data.
>The strict annual character of tree-ring data is only truly comparable with
>precisely dated human records. For the early fourteenth century
>surprisingly complete records exist from England for crop yields and
>prices. In an attempt to compare two different but parallel proxy records,
>namely those for tree growth and for crop prices, collaboration with

>economic historians (Prof. Bruce Campbell Econ. and Soc. Hist. QUB) has
>been initiated. Preliminary plots of robust, screened European master
>chronologies against grain prices reveals surprising levels of common trend.
>
>Innundated trees
>As part of an effort to understand physiological response of oak to
>waterlogging, 21 oaks were sampled at garryland Wood, County Galway. These
>trees grow in a limestone area which is flooded in some winters to depths
>of 10s of metres, for durations up to months. Some of the trees exhibit
>scar damage almost certainly from bark burst during submersion. Scars
>appear to to coincide with winters of higher than average rainfall. The
>fact that the trees are not submerged during the growing season means that
>they do not show the extreme dieback and micro-rings associated with trees
>left standing in permanent water, such as examples from beside Loch Lomond,
>Scotland.
>
>Publications with Grant number
>
>Baillie, M.G.L. 1996 Chronology of the Bronze Age 2354 BC to 401 BC. Acta
>Archaeologica 67, 291-298
>
>Baillie, M.G.L. 1998 Evidence for climatic deterioration in the 12th and
>17th centuries BC. in Hänsel, B. Ed. Man and Environment in European Bronze
>Age, Oetker-Voges, Kiel, 49-55
>
>Baillie, M.G.L. and Brown, D.M. 1996 Dendrochronology of Irish Bog
>Trackways. (in) Raftery, B.   Trackway Excavations in the Mountdillon Bogs,
>Co. Longford. Irish Archaeological Wetland Unit, Transactions Vol. 3, Dept.
>of Archaeology, University College, Dublin, 395-402
>
>
>In Press (with Grant number)
>
>Baillie, M.G.L. 1998 Putting abrupt environmental change back into human
>history, Environments and Historical Change; The Linacre Lectures, ed. Paul
>Slack, Oxford University Press
>
>Baillie, M.G.L. 1998 Exodus to Arthur. Close encounters with comets and
>the fiery dragons of myth. Batsford, London.
>
>Baillie, M.G.L. 1998 A View from Outside: Recognising the Big Picture.
>Proceedings of the Joint AEA/QRA Conference, Sheffield January 1996.
>
>Baillie, M.G.L. 1998 Hints that cometary debris played some role in
>several tree-ring dated environmental downturns in the Bronze Age.
>Proceedings of the 2nd SIS Conference, Cambridge July 1997.
>
>Baillie, M.G.L. 1998 Dendrochronology. in Jones, T. and Rowe, N. Ed Fossil
>Plants and Spores: Modern Techniques. Geology Society.
>
>Other
>Baillie, M.G.L. 1998 Bronze Age myths expose archaeological shortcomings;
>reply to Buckland et al. 1997 Antiquity, (forthcoming).
>
>
>Mike Baillie
>Palaeoecology Centre
>School of Geosciences, Queen's University, Belfast
>(01232) 335147
>
>
>

59. 0898099393.txt
##########

From: mann@snow.geo.umass.edu
To: p.jones@uea.ac.uk
Subject: Re: Something far more interesting
Date: Wed, 17 Jun 1998 12:03:13 -0400 (EDT)
Cc: t.osborn@uea.ac.uk

Dear Phil,

Of course I'll be happy to be on board. I think the opportunity for some direct collaboration between us (me, and you/tim/keith) is ripe, and the plan to compare and contrast different approaches and data and synthesize the different results is a good one. Though sidetracked by other projects recently, I remain committed to doing this with you guys, and to explore applications to synthetic datasets with manufactured biases/etc remains high priority. It sounds like it would all fit into the proposal you mention. There may be some overlap w/proposals we will eventually submit to NSF (renewal of our present funding), etc. by I don't see a problem with that in the least.

Once the collaboration is officially in place, I think that sharing of codes, data, etc. should not be a problem. I would be happy to make mine available, though can't promise its the most user friendly thing in the world.

In short, I like the idea. INclude me in, and let me know what you need from me (cv, etc.).

cheers,

mike

_____
Michael E. Mann
Adjunct Assistant Professor, Department of Geosciences
Morrill Science Center
University of Massachusetts
Amherst, MA 01003
_____
e-mail: mann@snow.geo.umass.edu
Web: http://www.geo.umass.edu/climate/mike
Phone: (413) 545-9573 FAX: (413) 545-1200

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##########

From: mnoguer@meto.gov.uk
To: scenarios@meto.gov.uk
Subject: Scenarios issues
Date: Mon, 20 Jul 1998 18:00 +0000 (GMT)

Dear colleagues,

I will like to post here some correspondence which is clearly relevant for this "scenarios discussion group" regarding some issues related to the use of the new emission scenarios, simple models, etc. Please post any comments on these issues or any other issue that you may want to raise to the following address

"scenarios@meto.gov.uk".

I have added the following experts to the list posted in my first Email:
P Wagner
R Watson
J Edmonds
S Smith
G Marland

Many thanks.

Maria Noguer

****
Issues raised by J Mitchell:

1. There are several uses for scenarios:
a) Conversion to concentration using chemistry models to produce forcing curves
b) Forcings for GCM runs
c) Use in simpler models to produce global mean curves of concentrations, forcing, temperature and sea level. This would requires a simple model which is documented and calibrated against one (preferably several) climate models.
The final IPCC approved scenarios will not be available until February 2000, so we should decide now on which draft scenarios to use

2. The provisional emissions will be made available imminently. These need to be evaluated as there are four basic families and many variants. How is the median scenario defined?

3. What criteria are to be set for the simpler models used for global mean projections?

****
Issue raised by Tom Wigley and reponses:

Date: Mon, 13 Jul 1998 11:00:54 -0600 (MDT)
From: Tom Wigley <wigley@meeker.ucar.edu>
To: Sir John Houghton <jthoughton@ipccwg1.demon.co.uk>,
    Patricia WAGNER <wagner@iiasa.ac.at>,
    Hugh Pitcher <hm_pitcher@ccmail.pnl.gov>,
    Robert Watson <rwatson@worldbank.org>
Cc: Jae Edmonds <ja_edmonds@ccmail.pnl.gov>, Mike Hulme
<m.hulme@uea.ac.uk>,
    Atul Jain <jain@uiatma.atmos.uiuc.edu>,
    Fortunat Joos <joos@phil.unibe.ch>,
    Richard Richels <rrichels@msm.epri.com>,
    Dave Schimel <schimel@ucar.edu>, ssmith@ucar.edu
Subject: IPCC CO2 Emissions Scenarios

Dear Bob, Hugh, Naki and John,

Mike Hulme has told me something that is quite alarming about the soon-to-be-released 'IPCC' CO2 emissions scenarios. If this is correct, you/IPCC should try to remedy it as a matter of some urgency. He said that the new 'IPCC' CO2 emissions scenarios will still begin in 1990 and will not use observed (Marland) emissions for the 1990s.

You may either not realize, or not remember, that during the preparation of the SAR and (especially) TPs 2 and 4, IPCC was frequently criticized for using out-of-date emissions data that were manifestly wrong during the 1990s. It would be extremely embarrassing to be subject to the same criticism with the TAR. Indeed, since the criticism is a justifiable one, it would be inexcusable not to have responded to it.

Equally embarrassing should be the fact that, in the published literature (my 1997 Nature and 1998 GRL papers), this 'error' has already been avoided.

How can you get around this problem? Ideally, the energy-economics models need to be revised to begin in or around 2000 instead of 1990. Indeed, in talking to Rich Richels about this issue, as well as echoing my concern, he noted that his model (MERGE) is currently being updated in just this way. He also pointed out that beginning an energy-economics model run in 1990 leads to considerable 'flexibility' in 2000 emissions; when, in fact, the 2000 emissions will already be fixed and known by the time the TAR comes out.

It is probably impossible to make this ideal type of 'fix', but a 'fix' can still be made. What you could do is just what I have done in the above two papers. This is a simple procedure that CAN be used since it is in the published literature. All I did was use observed emissions to 1996 (as far as data were available), linearly extrapolate these to 2000 (under the assumption that this was a better projection than the corresponding IS92a projection), and then use IS92a CHANGES from 2000. You may be able to improve on the second step, but this is unimportant. The crucial thing is to get the beginning years of the record to match observed emissions as far as such data are available.

The above, by the way, does not have to be applied to emissions from land-use change because of the way we deal with initialization with the carbon cycle models. We do not use historical land-use- change emissions.

You may argue that, in terms of projected CO2 concentrations, incorrect 1990s emissions have only a minor effect. This is such an obviously specious argument that I won't bother to discuss it. Not least, it will not satisfy the critics.

A parallel issue does, however, arise with the CO2 concentration stabilization profiles. The 'S' profiles are already ludicrous, since their concentrations and implied emissions already diverge markedly from observations. The WRE profiles diverge less, but still enough for me to deem that they need revising. I have, in fact, already done this. I would be happy to pass the new profiles on to IPCC.

Best wishes,
Tom

==========

>From Robert Watson on July 13:

Tom: I appreciate you bringing this critical issue to the fore - you are absolutely right that we must not look naive. I assume that Naki and Jon et al. Will deal with this while I an on vacation for the next four days.

Bob

==========

Date: Wed, 15 Jul 1998 02:18:09 +0000
From: David Schimel <dave.schimel@mpi-jena.mpg.de>
To: Tom Wigley <wigley@meeker.UCAR.EDU>
Subject: Re: IPCC CO2 Emissions Scenarios

Tom,

I raised this issue at the scoping meeting in Bad (very bad) Munstereieffel, where it was greeted with general agreement but it appeared to come as a complete surprise to many that scenarios should have a relationship to reality.

There was also general mild surprise at the degree of non GCM-community interest in following Kyoto and stabilization rather than 1% per year and similar reactions to the fact that 1% year doubles the current rate of change.
But the wind is shifting

DS
==========
Date: Thu, 16 Jul 1998 09:46:49 -0500
From: Atul Jain <jain@uiatma.atmos.uiuc.edu> To: Tom Wigley <wigley@meeker.UCAR.EDU>
Cc: Sir John Houghton <jthoughton@ipccwg1.demon.co.uk>,
Patricia WAGNER <wagner@iiasa.ac.at>,
Hugh Pitcher <hm_pitcher@ccmail.pnl.gov>,
Jae Edmonds <ja_edmonds@ccmail.pnl.gov>,
Mike Hulme <m.hulme@uea.ac.uk>,
Fortunat Joos <joos@phil.unibe.ch>,
Richard Richels <rrichels@msm.epri.com>,
Dave Schimel <schimel@ucar.edu>,
ssmith@ucar.edu

Subject: Re: IPCC CO2 Emissions Scenarios

Dear Tom,

I got the same impression from Hugh's talk during the last week Community Meeting on IA, which was sponsored by NSF. It does not matter so much whether the starting point for the scenario calculations is 1990 or 2000. The main concern is that the emission scenarios should reflect the recent changes in fossil emissions, which show a decreasing trend from 1990 to 1995 in Annex B emissions. Using projected emissions that are incorrect, rather than updating them with observed emissions, is clearly not acceptable.

I agree with you that the effects of these emissions on CO2 concentration is minor. However, recent observed emissions will have a major impact on estimates of the cost of CO2 abatement, which depend mainly on cumulative emissions rather than on concentration. It is important, especially in light of Kyoto commitments, not to produce inaccurate emission pathways that overestimate emissions from 1990-2000, since they may be used as baselines for producing cost estimates.

Cheers! Atul
==========
Date: Thu, 16 Jul 1998 08:19:22 -0700
From: "Pitcher, Hugh M" <hugh.pitcher@pnl.gov>
To: "'jain@uiatma.atmos.uiuc.edu'" <jain@uiatma.atmos.uiuc.edu>,
Tom Wigley <wigley@meeker.UCAR.EDU>
Cc: Sir John Houghton <jthoughton@ipccwg1.demon.co.uk>,
Patricia WAGNER <wagner@iiasa.ac.at>,
Hugh Pitcher <hm_pitcher@pnl.gov>,
Robert Watson <rwatson@worldbank.org>,
Jae Edmonds <ja_edmonds@pnl.gov>,
Mike Hulme <m.hulme@uea.ac.uk>,
Fortunat Joos <joos@phil.unibe.ch>,
Richard Richels <rrichels@msm.epri.com>,
Dave Schimel <schimel@ucar.edu>,
ssmith@ucar.edu

Subject: RE: IPCC CO2 Emissions Scenarios

Dear Tom et al

In setting up the MiniCAM to do the scenario work for the SRES, we tuned the 2005 energy and hence emissions numbers to reproduce the latest IEA forecast, which explicitly incorporates the slowdown in 1990 to 1995. The only problem here is that informal feedback from within Russia(Igor Bashmakov) suggests the IEA data significantly overstate the reduction in energy use. Our scenarios all go through the short term forecast for 2005 and then diverge onto alternative paths.

Getting a good handle on recent historical data and a consistent/reasonable forecast for tuning the short term aspect of the scenarios is going to be increasingly critical as we try to sort out strategies and costs of strategies. This is a separate problem from the long term scenario work, and requires rather different tools.

cheers, hugh

==========

Date: Fri, 17 Jul 1998 14:27:51 -0600 (MDT)
From: Tom Wigley <wigley@meeker.ucar.edu>
To: "Pitcher, Hugh M" <hugh.pitcher@pnl.gov>
Cc: "'jain@uiatma.atmos.uiuc.edu'" <jain@uiatma.atmos.uiuc.edu>,
Sir John Houghton <jthoughton@ipccwg1.demon.co.uk>,
Patricia WAGNER <wagner@iiasa.ac.at>, Hugh Pitcher <hm_pitcher@pnl.gov>,
Robert Watson <rwatson@worldbank.org>, Jae Edmonds <ja_edmonds@pnl.gov>,
Mike Hulme <m.hulme@uea.ac.uk>, Fortunat Joos <joos@phil.unibe.ch>,
Richard Richels <rrichels@msm.epri.com>,
Dave Schimel <schimel@ucar.edu>, Gregg Marland <gum@ornl.gov>,
ssmith@ucar.edu
Subject: RE: IPCC CO2 Emissions Scenarios

Dear all,

I appreciate the responses regarding my concern about the new 'IPCC' fossil CO2 emissions scenarios. However, no-one seems to be willing to grasp the nettle and suggest what can be done about it. From what Hugh says, all scenarios go through the same 2005 value, so this suggests an obvious 'fix'.

(I am curious to know what this 2005 value is, and how close it is to what I used in my Kyoto papers.)

Hugh also suggests the 'IPCC' 2005 value may be open to improvement, but I presume it is too late to do this now. So ... what should be done? The obvious solution would be to use Gregg Marland's 'observed' values as far as they go, and then linearly interpolate from his latest year to 2005.

When I did my work, I had Gregg's values to 1995, and was able to make a good guess from what he told me about what the 1996 value would be. By now, 1996 should be available, and a good estimate may be possible for 1997. If so, then the linear interpolation would go over 1997 to 2005.

Do you all agree with this strategy? ... or does someone have a better idea??

I'm copying this to Gregg to see what more recent data he can provide.

Cheers,
Tom

61. 0901894140.txt

##########

From: mnoguer@meto.gov.uk
To: scenarios@meto.gov.uk
Subject: Scenarios - SRES description 2
Date: Fri, 31 Jul 1998 10:09 +0000 (GMT)

As promised here is the second part of the SRES description:

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Energy Analysis Program
Lawrence Berkeley National Laboratory
Berkeley, CA, U.S.A.

/p/ecs/general/admin/ipcc-sr/corr/open process/naki-short.doc 06/26/98, 11:34 AM

62. 0904080701.txt
##########

From: Nebojsa NAKICENOVIC <naki@iiasa.ac.at>
To: Joseph Alcamo <alcamo@usf.uni-kassel.de>, Knut Alfsen <knut.alfsen@cicero.uio.no>, Akhiro Amano <z95020@ksc.kwansei.ac.jp>, Dennis Anderson <dennis.anderson@ic.ac.uk>, Zhou Dadi <becon@public3.bta.net.cn>, Gerald Davis <Ged.R.Davis@SI.shell.com>, Benjamin Dessus <Benjamin.Dessus@cnrs-dir.fr>, Bert de Vries <Bert.de.Vries@rivm.nl>, Jae Edmonds <ja_edmonds@pnl.gov>, Joergen Fenhann <j.fenhann@risoe.dk>, Guenther Fischer <fischer@iiasa.ac.at>, Stuart Gaffin <stuart@edf.org>, Henryk Gaj <Fewewar@ternet.pl>, Kenneth Gregory <kennethgregory@msn.com>, Arnulf Gruebler <gruebler@iiasa.ac.at>, Erik Haites <ehaites@netcom.ca>, William Hare <bhare@ams.greenpeace.org>, Michael Jefferson <jefferson@wec.co.uk>, Tae-Yong Jung <tyjung@kier.kyoto-u.ac.jp>, Tom Kram <kram@ecn.nl>, Emilio La Rovere <emilio@ppe.ufrj.br>, Rik Leemans <Rik.leemans@rivm.nl>, Matthew Luhanga <vc@admin.udsm.ac.tz>, Michael Hulme <m.hulme@uea.ac.uk>, Douglas McKay <Doug.D.Mckay@si.simis.com>, Julio Torres-Martinez <dpid@coniai.inf.com>, Laurie Michaelis <laurie.michaelis@oecd.org>, Roberta Miller <roberta.miller@ciesin.org>, Shunsuke Mori <mori@shun-sea.ia.noda.sut.ac.jp>, Tsuneyuke Morita <t-morita@nies.go.jp>, Nebojsa Nakicenovic <Naki@iiasa.ac.at>, Youssef Nassef <Nassef@hotmail.com>, William Pepper <WPepper@icfkaiser.com>, Hugh Pitcher <hm_pitcher@pnl.gov>, Lynn Price <lkprice@lbl.gov>, Rich Richels <rrichels@epri.com>, Holger Rogner <H.H.Rogner@iaea.org>, Cynthia Rosenzweig <crosenzweig@giss.nasa.gov>, Alexei Sankovski <ASankovski@icfkaiser.com>, Stephen Schneider <shs@leland.stanford.edu>, Priyadarshi Shukla <shukla@iimahd.ernet.in>, James Skea <J.F.Skea@sussex.ae.uk>, Steve Smith <ssmith@ucar.edu>, Leena Srivastava <leena@teri.res.in>, Susan Subak <S.Subak@uea.ac.uk>, Robert Swart <rob.swart@rivm.nl>, Sascha van Rooijen <vanrooijen@ecn.nl>, John Weyant <weyant@leland.stanford.edu>, Ernst Worrell <e.worrell@nwsmail.chem.ruu.nl>, Xing Xiaoshi <xxiaoshi@ciesin.org>
Subject: Next SRES Meeting in Beijing, 7-9 October
Date: Tue, 25 Aug 1998 17:31:41 +0200
Cc: johnson@uea.ac.uk, kuszko@uea.ac.uk, dowds@uea.ac.uk

Dear Colleagues,

Zhou Dadi has been kind enough to organize the next SRES Lead Authors meeting in Beijing, China, to be held on 7-9 October, 1998. Dadi will provide us with more detailed information on meeting logistics in the near future, and I will send out a meeting agenda as we get closer to the meeting date. Basically, there are four items that need to be discussed at the meeting: 1) SRES progress to date; 2) the open process; 3) scenario revisions and additional work; and 4) planning the final report.

Please mark you calendars for this date and RSVP to both Zhou Dadi (becon@public3.bta.net.cn) and Anne Johnson (johnson@iiasa.ac.at) as soon as possible I will be out of the office 10-26 September and will not be able to receive messages during this time.

I look forward to seeing you in Beijing.

Naki

63. 0904762907.txt

##########

From: Nebojsa NAKICENOVIC <naki@iiasa.ac.at>
To: Joseph Alcamo <alcamo@usf.uni-kassel.de>, Akhiro Amano <z95020@ksc.kwansei.ac.jp>, Zhou Dadi <becon@public3.bta.net.cn>, Gerald Davis <Ged.R.Davis@SI.shell.com>, Bert de Vries <Bert.de.Vries@rivm.nl>, Jae Edmonds <ja_edmonds@pnl.gov>, Joergen Fenhann <j.fenhann@risoe.dk>, Guenther Fischer <fischer@iiasa.ac.at>, Stuart Gaffin <stuart@edf.org>, Henryk Gaj <Fewewar@ternet.pl>, Kenneth Gregory <kennethgregory@msn.com>, Arnulf Gruebler <gruebler@iiasa.ac.at>, William Hare <bhare@ams.greenpeace.org>, Michael Jefferson <jefferson@wec.co.uk>, Tae-Yong Jung <tyjung@kier.kyoto-u.ac.jp>, Tom Kram <kram@ecn.nl>, Emilio La Rovere <emilio@ppe.ufrj.br>, Rik Leemans <Rik.leemans@rivm.nl>, Matthew Luhanga <vc@admin.udsm.ac.tz>, Michael Hulme <m.hulme@uea.ac.uk>, Douglas McKay <Doug.D.Mckay@si.simis.com>, Julio Torres-Martinez <dpid@ceniai.inf.com>, Bert Metz <bert.metz@rivm.nl>, Laurie Michaelis <laurie.michaelis@oecd.org>, Roberta Miller <roberta.miller@ciesin.org>, "John F.B. Mitchell" <jfbmitchell@meto.gov.uk>, Shunsuke Mori <mori@shun-sea.ia.noda.sut.ac.jp>, Tsuneyuke Morita <t-morita@nies.go.jp>, Nebojsa Nakicenovic <Naki@iiasa.ac.at>, Youssef Nassef <Nassef@hotmail.com>, William Pepper <WPepper@icfkaiser.com>, Hugh Pitcher <hm_pitcher@pnl.gov>, Lynn Price <lkprice@lbl.gov>, Rich Richels <rrichels@epri.com>, Keywan Riahi <Riahi@iiasa.ac.at>, Alexander Roehrl <Roehrl@iiasa.ac.at>, Holger Rogner <H.H.Rogner@iaea.org>, Cynthia Rosenzweig <crosenzweig@giss.nasa.gov>, Alexei Sankovski <ASankovski@icfkaiser.com>, Stephen Schneider <shs@leland.stanford.edu>, Priyadarshi Shukla <shukla@iimahd.ernet.in>, "Michael Schlesinger <schlesin@atmos.uiuc.edu> Steve Smith" <ssmith@ucar.edu>, Leena Srivastava <leena@teri.res.in>, Susan Subak <S.Subak@uea.ac.uk>, Sascha van Rooijen <vanrooijen@ecn.nl>, John Weyant <weyant@leland.stanford.edu>, Xing Xiaoshi <xxiaoshi@ciesin.org>, "Richard H. Moss" <rmoss@usgcrp.gov>, "John F.B. Mitchell" <jfbmitchell@meto.gov.uk>, Ernst Worrell <e.worrell@nwsmail.chem.ruu.nl>, Dennis Anderson <dennis.anderson@ic.ac.uk>, Erik Haites <ehaites@netcom.ca>, James Skea <J.F.Skea@sussex.ac.uk>
Subject: Next SRES Meeting in Beijing, 7-9 October
Date: Wed, 02 Sep 1998 15:01:47 +0200
Cc: Dave Dokken <ddokken@usgcrp.gov>, Rob Swart <rob.swart@rivm.nl>, "D.J. Griggs" <djgriggs@meto.gov.uk>

Dear Colleagues,

This is a follow up on the earlier announcement of the next SRES Meeting. First, I would like to thank all those of you who have confirmed that you will join us in Beijing. Unfortunately, some of our colleagues also had to cancel due to other commitments. Attached you will find the venue of the meeting and hotel that Dadi reserved for us at a special discounted price. My proposal is to convene at 13:00 hours on 7 October and try to finish on early afternoon on 9 October so that you have some free time left for sight-seeing before we all depart.

I will soon send to all of you formal invitation letters on IIASA letter-head just in the case you need it for travel approval (unless you cancel your participation in the meantime). Dadi will send you a similar invitation letter to use in order to obtain a visa for China.

Appended is my last e-mail concerning this meeting in case you did not receive a copy. In the attachment to this e-mail you will find two letters. One is from IPCC outlining the possible role of scenarios in IPCC assessment (Microsoft Photo Editor file). It is important for our work as it indicates possible uses of new IPCC emissions scenarios. One of the agenda items at the meeting will indeed be to discuss which of our marker scenarios we recommend be used in the interim period before our scenarios are approved by IPCC in early 2000. The other letter is also from IPCC

announcing the SRES web-site (PowerPoint file). The web-site includes most of the scenario variants we have developed to date. Please circulate this second letter as widely as you can because we need as much feedback from the wider community of possible users as we can obtain.

Please let us know as soon as possible whether you are planing to attend.

I hope to see you all in China.

Regards, Naki

Venue:
National Meteorological Administration (No. 46 Baishiqiao Road, Haidian District, Beijing).

Accommodation:
Olympic Hotel (No. 48 Baishiqiao Road, Haidian District, Beijing, Tel: 086-10-62176688); discounted Price: US$65+15% service costs.

Meeting Announcement:

Dear Colleagues,

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Please mark you calendars for this date and RSVP to both Zhou Dadi (becon@public3.bta.net.cn) and Anne Johnson (johnson@iiasa.ac.at) as soon as possible I will be out of the office 10-26 September and will not be able to receive messages during this time.

I look forward to seeing you in Beijing.

Naki

64. 0905351939.txt
##########

From: "Stepan G. Shiyatov" <stepan@ipae.uran.ru>
To: k.briffa@uea.ac.uk
Subject: INTAS project
Date: Wed, 9 Sep 1998 10:38:59 +0500
Reply-to: "Stepan G. Shiyatov" <stepan@ipae.uran.ru>

Dear Keith,

Some days ago I came back from the Polar Ural Mountains. I was there about 30 days making photos from the points where I have made photos 35-40 years ago and evaluating the changes which were happened during this period. Unfortunately, Rashit could not be able to go to the

Yamal Peninsula for collecting subfossil wood this summer as a result of deficiency of money.

I am glad that we have been successful in INTAS proposal. Financial situation in our country so terrible that we will not work successfully without support from international grants.

Yesterday I have sent by post the signed form (official power of attorney). If you have any additional information concerning this grant, please give me know.

I wish the best to you, your family and Phil.

Sincerely yours
Stepan Shiyatov

stepan@ipae.uran.ru

65. 0905951700.txt
##########

From: gjjenkins@meto.gov.uk
To: m.hulme@uea.ac.uk
Subject: RE: WGI emissions/scenarios conference
Date: Wed, 16 Sep 1998 09:15 +0000 (GMT)

Mike

I think the problem is the same one as in 1988 and 1994. In order to answer the question: "what is IPCC's best estimate of climate change over the next hundred years, and the uncertainties?" we need a single best estimate of emissions (plus a range of uncertainty). In the same way as modellres say "here is our best estimate of climate sensitivity plus a range" then the SRES group should do the same thing. Of course they can make all the usual disclaimers and talk about surprises just as the climate modellers do. But NOT to come up with an estimate for a Business as Usual emissions scenario (plus a range, of 6GtC to 30GtC at 2100) seems to be ducking responsibilities. "Getting away from single number answers" is very laudable scientifically, but it presents policymakers (for whome the whole IPCC exercise is undertaken) with a problem. As long as there is a central estimate and a range, the surely both communities could be happy, as they ultimately were with BaU in 1990 and IS92a in 1995?

Geoff

-----Original Message-----
From: m.hulme@uea.ac.uk
Sent: 15 September 1998 20:23
To: scenarios
Subject: WGI emissions/scenarios conference

Dear All,

Here are three comments on the questions raised by WGI TSU on 7 Sept. and by some of the other contributions to the discussion about scenarios for IPCC TAR. I am commenting from the perspective of a climate scenario constructor servicing the impacts research community:

1. The SRES Working Group have identified 4 Marker Scenarios (out of a much larger range, although these 4 largely capture the range). I think the choice is good. I do not see why some modelling centres should not be able to run all 4 emissions scenarios through their GCM. From an impacts perspective I believe this would be very desirable and would enable a fair range of climate change scenarios to be used in impacts work using direct GCM output (without the need for scaling). And if all four Markers could be run through more than one GCM (i.e., with different climate sensitivities) then impacts work would have an even better sample of the possible climate change space to analyse. These aspects of uncertainty seem to me to be critical for impacts people (and integrated assessors) to explore, to get us away from single number 'answers'.

2. If a single emissions scenario *has* to be adopted by some GCM groups, B2 seems to have the recommendation from Naki (and maybe SRES too - the storyline refers to it as 'dynamics as usual'). I think there are probably good reasons why SO2 emissions fall so much in this storyline - regional rather than global solutions and the encouragement of environmental protection. The fact that the reduced C emissions relative to IS92a are offset by the big fall in SO2 emissions (the net global warming in B2 is actually slightly higher than IS92a if aerosol effects are included) should simply be seen as a reflection of a more carefully worked out storyline than was the case with IS92a. I do not think it a good idea (indeed, I think it would be a very *bad* idea) for GCM centres to mix-and-match elements of IS92 and SRES98 scenarios - the TAR should try and stick with the SRES stories and emissions wherever possible. The internal consistency in these storylines (and hopefully emissions) is important to maintain (especially later on for impacts work), and the thinking behind the SRES scenarios is considerably better than was achieved in the IS92 scenarios.

3. The problem of different Markers having different 1990 emissions values (and the fact that 1990s C emissions diverge from those observed) is more serious. By 2000 the four Markers range in C emissions from energy sources from 6.6GtC (B1) to 8.0 GtC (A1). Given where we are right now (about 6.7GtC in 1997) it seems daft to have such a range for only 2 years hence (as Tom Wigley has pointed out). For example, by the time TAR is published we will know that A1 C emissions for 2000 are too high by, say, 15%. Surely we need to impose a 'fix' on all 4 Markers to account for this. Such amendment may occur as a result of the SRES 'open-process', but this will take up to 12 months to be agreed and published. Should not someone (WGI or WGIII TSUs) impose a temporary solution now for climate modellers?

Similarly, something needs to be done for CH4 and N2O 1990 emissions. CH4 1990 emissions range from 281 to 481Tg in the 4 Markers (compared with 506Tg in IS92). Surely this range is not defendable. I think at the least we need some assurance from SRES that there has been some investigation into these differences and that they will withstand scientific scrutiny in peer review. Again, maybe the open-process may lead to revisions, but what do climate modellers do in the meantime? [By the way, the difference in global warming by 2100 that the SRES CH4 and N2O scenarios generates relative to those in IS92a is between 0.05 and 0.3degC - lower in all cases].

Mike

****
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Norwich NR4 7TJ
****

at about 1.2 deg C above the 1961-90 average
****
The global-mean surface air temperature anomaly estimate for the first half of 1998 was about +0.60 deg C above the 1961-90 average, the warmest such period yet recorded
****

66. 0906042912.txt
##########

From: mann@snow.geo.umass.edu
To: p.jones@uea.ac.uk
Subject: No Subject
Date: Thu, 17 Sep 1998 10:35:12 -0400 (EDT)
Cc: coleje@spot.colorado.edu, jto@ngdc.noaa.gov, k.briffa@uea.ac.uk, luckman@sscl.uwo.ca, mann@geo.umass.edu, mhughes@ltrr.arizona.edu, rbradley@geo.umass.edu

Dear Phil,

Thanks for your message. I've chosen to "expand" the distribution list to include a few other individuals who can better address some of the key points you raise.

A meeting in January built around the AMS meeting (which should bring people into the Boulder vicinity) sounds like a good tentative plan. Peck? I'm assuming everyone on this list is a potential attendee...

As for your general comments, they get to some essential points. The modeling community leaders are probably about as skeptical about our paleo-reconstructions as we are of their sulphate aerosol parameterizations, flux corrections (or more worrying, supposed lack thereof in some cases!), and handling of the oh-so-important tropical Pacific ocean-atmosphere interface...
So my personal philosophy is that more than one side here can benefit from extending the olive branch, and there are a few individuals in the modeling community who could benefit from slowing down on the stone throwing from their fragile glass tower :)

More to the point, though, I strongly believe the paleo community needs to present an honest but unified front regarding what we all agree we can definitely, probably, and simply not yet say about the climate of the past several centuries, and plan strategies that will allow us all to work towards improved reconstructions without stepping on each others toes. There's a challenge there, but one I'm sure we can all rise to. I am grateful to Peck for realizing that the time is ripe for a workshop in which we all strategize as a group towards these ends. I believe we all go into this in "good faith", and I'm very excited about what the workshop might produce, in particular, in terms of effective long-term strategies.

I share Phil's concern about getting things "straightened out" before the IPCC report. As one of the lead authors on the "observed climate variation and change" chapter for the 3rd assessment report, a key goal of mine will
be to present fairly and accurately all of our different efforts, and the common denominator amongst them...

I also understand all-to-well Phil's concerns about free data

exchange. In fact, we've been working closely w/ Peck to get every aspect of our reconstructions, including calibration/verification statistics, etc., available on-line at NGDC. The one catch w/ the paleo network is that a few of the indicators we used were provided us under conditions that they not yet be passed along (this includes, I believe, the Morrocan tree rings, and some others. And at least one important indicator--Malcolm's Yakutia record--was as yet unpublished. Not myself knowing the details of the propietary issues involved here, I have resisted simply putting our entire multiproxy network out their for public consumption. But working w/ Peck and Malcolm, I'm sure we can do this appropriately and quickly. That's an example of a key issue that would be on the table at the workshop in question.

----------PHIL'S MESSAGE TO PECK----------

Peck,
  Thanks for the comments on the paper in The Holocene ! The paper stems from work Keith and I have been doing with the Climate Change Detection group headed by Tim Barnett. It is much toned down from some of the things about paleo data that Tim and Simon Tett wanted to say. Long paleo series (either the individual ones or regional/hemispheric averages) have got to be good before these sorts of people will begin to use them and believe they tell us something about variability in the past - something that cannot be got from long control runs of GCMs.
  A small meeting would be a good idea, therefore. Mike Mann knows the next few times I'll be in the US. The first possible date for him is the AMS annual meeting in Dallas in Jan 99 - maybe we can tag something onto the end of this for a day or two. I'll let you and Mike work something out on this. I'm also in the US for a meeting on Climate Extremes which is tentatively scheduled for March 9-13 in Asheville.
  Prsentation of the paleo data is the key in all this. Tim Barnett was somewhat horrified by the coherency diagrams he produced (fig 9). He then produced Fig 10 from the GCM and that was not much better. Hidden between the lines of the paper is the theme that a number of us have been saying for years (especially Ray and Malcolm) that the LIA and MWE were not that global and not that different from today's temperatures. Mike's paper in Nature reiterates this. Keith and I have been thinking of writing a forum piece for The Holocene addressing in somewhat provocative terms what paleoclimatologists should be doing with regard the detection issue and to some extent with respect to science in general - should be continue using terms like LIA and MWE for example. We hope to address many of the issues you make in your email - seasonality, consistency of the proxy through time, goodness of the proxy etc. We need to come up with some agreed strategy on this especially with IPCC coming up.
    What we did in the paper was one way of assessing proxy quality. Something like Tables 2 and 4 are what is required though to inform the uninitiated (modellers) about proxy data. For use in detection at the moment a paleo series has to be a proxy for temperature. I know proxies tell us about other aspects of the climate as well, but a clear, unambiguous temperature signal is what is needed.

  Some other quick answers -

1) Happy to send to you all the series and the hemispheric values. I hope Mike will send all his as well, but the last time we

discussed this he said that some could not be made freely available. This isn't Mike's fault but there are still some stumbling blocks to free exchange of data within the various paleo communities.

2) We all know the quality of proxies changes with time. Trees don't have dating problems but do have the reduction in sample depths you talk about. Dendro people are much more open about this though than the coral and especially the ice core communitites.

3) Trees may not grow everywhere but they are more global in extent than the others. There are also many more chronologies available and this is a factor. We had much more choice there than in the other paleo groups.

4) Whilst we are taking bets, proxies will never be better than instrumental data. Corals will eventually extend the SOI series but never be better than it for the years after 1850. Similarly with the NAO. Instrumental data exists to extend this to about 1750 and the fact that such data is sitting out there is only just begining to be realised. A great NAO reconstruction could be produced if the real data extended over nearly 200 years, enabling the low-frequency aspects to be considered in much more detail than ever before (a la Stahle with the SOI).

That's enough for now.

Cheers
Phil

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Web: http://www.geo.umass.edu/climate/mike
Phone: (413) 545-9573 FAX: (413) 545-1200

67. 0906136579.txt

##########

From: Keith Briffa <k.briffa@uea.ac.uk>
To: "Jenkins, Geoff" <gsjenkins@meto.gov.uk>
Subject: Re: palaeo data
Date: Fri Sep 18 12:36:19 1998

Dear Geoff
       it good to hear from you. By now you may know that we had a small working meeting to consider the current draft of the thematic bid yesterday in London. Simon Tett , Nick Shackleton , Paul Valdes and I really did get to grips with a lot of the important details concerning the way in which such a project might actually run. We are going for a joint Earth science/Atmospheric Science Board application for 8 million to run over 5 years. Simon told us about your offer of some support - perhaps as money , perhaps as some equivelent- and the spirit of the offer is much appreciated. Frankly, the fact that you consider this a worthy and valid scientific exercise is what really gives me cheer. We have a long way to go to really sort out many of the problems with the palaeo data and with the methodology of using them in a validation and/or detection context, but I genuinely believe this approach will yield rewards somewhere down the line. I think our support from the earth science side is very probable. The politics of the Atmospheric Board - and the potential clash with other initiatives coming from Reading - mean that their support (in any meaningful sense) can't be thought of as more than possible. I suppose we may have something like a near 50 % chance of eventually getting some money , but 50% is pretty good. I will now ammend the document to show an explicit requirement for formal supervisory input on the programme from the Hadley Centre and I acknowledge that there will be no blanket release of data whatever happens. I will forward the application to you soon. If we get through the outline agreement stage with NERC , we will surely revisit these practical details , along with others. For now I simply say thanks to you and John for your support , and thanks for the input of Simon and Peter Cox. I will stay in touch as and when things develop. Even if we fail here, the science imperative will mean that we find other means of working with you -most likely through an EC grant - on these issues.
             Thanks again and I hope you are bearing up under the strain of recent troubles
             Keith

At 11:53 AM 9/14/98 +0100, you wrote:
>Keith
>
>Im afraid I dont have your original email abou you proposal for oa thematic
>programme on palaeo data - we just got converted to Windows NT and I have
>wiped my old emails by mistake.
>
>We would be very supportive of a programme which delivered better estimates
>of natural variability of climate over the past 1000 yrs globally and
>regionally which, as I recall, is the main aim.
>
>What do you want me / us to do, ie a letter to someone in NERC or you from
>me/ Dave Carson/ Paul Mason saying ho w important the topic is and that we
>would be immediate users of deliverables etc?
>
>Let me know and I will draft something. Can you re-email what you set please
>- sorry.
>
>Cheers
>Geoff
>

68. 0906137836.txt
##

From: Keith Briffa <k.briffa@uea.ac.uk>
To: rbradley@geo.umass.edu
Subject: Re: PAGES Open Science Meeting publication
Date: Fri Sep 18 12:57:16 1998
Cc: oldfield@ubecx01.unibe.ch

Ray
   this is simply to say that I will get my paper to you as soon as I can. Frank knows that I am currently involved with writing a bid on behalf of the earth science community to try to extract 8 million pounds for a 5 year project from NERC to support Palaeo/Modelling validatin work. I was not allowed to say no to this request and it is involving me in a lot of meetings and associated crap. I am now redrafting the proposal. Also I must write my application to NERC for a fellowship - if this fails Sarah and I are unemployed after December as things stand. God knows there is little chance of success but the application must be in be the end of September and I have not started it yet. This is a big deal for me and I am putting you down as my primary suggested scientific referee. The PAGES paper can only be done in mid October and I really need your and Frank's understanding on this. I had to do the Thematic bid proposal as Nick Shackleton asked me to , and I want to put him down as my primary Personal reference! In early October I have to attend a NERC Earth Science Board meeting to defend the Thematic bid; a meeting of PEP3 in Belgium;a UK CLIVAR meeting in London; an EC meeting to present our ADVANCE-10K results in Vienna. This is not bullshit. I will do the PAGES meetin paper as fast as I can and you must please allow me the leeway . Sorry - but this will not really hold the publication up . If I could sort out some funding I could afford to drop some of these things but with the EC future also up in the air at the moment , I have to try to juggle these things. Sorry again Ray

Keith

At 09:07 PM 9/12/98 -0400, you wrote:
>This is a reminder that the due date for your paper to be reviewed for the
>Special edition of Quaternary Science Reviews was August 31....unless you
>made a special deal with me (and have sent your checks to my Swiss bank
>account) you should send me your manuscript AS SOON AS POSSIBLE!!!
>
>Thanks
>
>Ray
>
>
>Raymond S. Bradley
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>PAGES Web Site: <http://www.pages.unibe.ch>
>
>

69. 0907258644.txt
##

##########

From: "Jonathan T. Overpeck" <jto@ngdc.noaa.gov>
To: Phil Jones <p.jones@uea.ac.uk>
Subject: Re: climate of the last millennia...
Date: Thu, 1 Oct 1998 12:17:24 -0700
Cc: k.briffa@uea.ac.uk, ray bradley <rbradley@geo.umass.edu>,
mann@snow.geo.umass.edu

Hi Phil - thanks for your detailed reply to my email. I look forward to working with you and the rest of the gang to really improve the state of paleo contributions to the detection/attribution issue. The earlier we get a small group together, the better, so I suggest we try to take you up on the AMS add-on idea. It would be ideal to have a 1 to 1.5day mtg in Boulder since we have many of the needed perspectives (ice core, coral, seds, data, etc) here. What would be the best dates for you (and Keith - I'm hoping he'll be up for this too). We can find the extra $$ to get folks to Boulder and have a quality time (do you ski?).

Once we set the dates with you (PLEASE SEND FAVORED DATES), Mike and Ray, we can set the agenda. The main thing is that it would set the stage for the extra degree of data sharing we'll need before the planned Santorini mtg (still no dates - please bug Jean-Claude!!). Sound ok?

As for the data from your paper, I'd like to get them up with the data from the other studies on the WDC www site asap. (JUST LET ME KNOW HOW!) The White House is interested in knowing the state-of-the-art, and if we can get everything together at one www site (including data and figs), I think I can get some needed visibility for the paleo perspective. You probably know this, but Henry Pollack's Borehole view of things (similar conclusions to the other recent papers) is about to appear in Science. Although each proxy and method does have it's limitations and biases, the multiproxy view is compelling with regard to the patterns of temp change over the past several centuries. The IPCC next time around should be much stronger than last on the paleo side of things (although still not as good as it can get!).

Of course, I'll continue to work with Mike and Ray to get the rest of the individual series out into the public domain. Santorini should be the goal - not alowwed on the island without coughing up data first!

Aloha and thanks again! Peck

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Boulder, CO 80303

tel: 303-497-6172
fax: 303-497-6513
jto@ngdc.noaa.gov

For OVERNIGHT (e.g., Fedex) deliveries,
PLEASE USE:

Dr. Jonathan Overpeck
NOAA National Geophysical Data Center
3100 Marine Street, RL3, Rm A136
Boulder, CO 80303
tel: 303-497-6160

70. 0907266508.txt
##########

From: mann@snow.geo.umass.edu
To: jto@ngdc.noaa.gov, p.jones@uea.ac.uk
Subject: Re: climate of the last millennia...
Date: Thu, 1 Oct 1998 14:28:28 -0400 (EDT)
Cc: k.briffa@uea.ac.uk, rbradley@geo.umass.edu

Hi Peck,

Thanks for ccing the message. I was talking to Ed Cook at
a NASA workshop we both attended a couple weeks ago, and
he also expressed quite a bit of interest in attending
the mini-meeting, since he'll be going to the AMS meeting
to.

When is the meeting? Do other people prefer just before or
just after the meeting for the workshop. Either probably
works easily well for me at this point, since I won't have
teaching committments at that point.

Looking forward to us finalizing a plan!

mike

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Web: http://www.geo.umass.edu/climate/mike
Phone: (413) 545-9573 FAX: (413) 545-1200

71. 0907293443.txt
##########

From: Nebojsa NAKICENOVIC <naki@iiasa.ac.at>
To: scenarios@meto.gov.uk, sres@iiasa.ac.at
Subject: Meeting on SRES Scenarios, 1 October 1998
Date: Thu, 01 Oct 1998 21:57:23 +0200

Dear Colleagues,

A meeting was held today on SRES scenarios during the IPCC plenary session
in Vienna. The meeting was organized by David Griggs, Fortunaat Joos,
Richard Moss, and Rob Swart. Also present were a number of delegates
including two Co-Chairs of IPCC, John Houghton from WGI and Bert Metz from
WGIII. Attached is a document with issues discussed during this meeting.

The meeting was very productive in my view, even though it was quite brief.
Two key issues were discussed that are listed in the attachment: (1)
incomplete information concerning SRES emissions as reported on the

website, and (2) consistency and plausibility of SRES scenarios and their emissions.

(1) Incomplete information

There appeared to be a general consensus that the range of CO2 emissions (especially energy-related ones) are in quite good agreement across the SRES scenarios once one adds the missing emissions categories to all model runs. They are also in a relatively good agreement with the ranges given in SAR.
The SRES ranges of CH4 and N2O emissions did not appear to be a problem in themselves, but they are considerably lower than the ranges given in SAR.

It was agreed to ask the SRES writing team to further harmonize the ranges for the base year and the period 1990 to 2000 across the scenarios for CO2, CH4 and N2O. At the same time, David Griggs will contact the colleagues from WGI to inquire whether the emissions ranges for these gases as given in SAR have changed in the mean time and will inform the SRES colleagues soon about the result. In particular, he will check whether the non-energy CO2, CH4 and N2O emissions ranges are still appropriate as best guess for the 1990 situation and about any new numbers about the ranges for more recent years. It was also suggested that the SRES writing team discuss the reasons for relatively low CH4 emissions in 1990 compared with the SAR range.

Most of the SRES models do not generate CFC and HFC emissions but these emissions are important for climate models. It was agreed that David Griggs will inquire with climate modelers whether they really need all species of these gases or whether it is sufficient to report their joint emissions. SRES team is to report whether these emissions could be added to most of the model runs and over which time-scale. Joergen Fenhann is in touch with a number of colleagues on this issue already and he is planning to make a specific proposal how to handle this question across SRES scenarios.

SRES sulfur emissions are considerably lower than the IS92 range. There are a number of reasons for this difference that were discussed at the meeting. It was decided that this exchange should continue in the future so that there is a better understanding of all issues involved. This is a new aspect of SRES scenarios that represents an important change since IS92a, a change that was also suggested by the 1994 IPCC review of emissions scenarios.

The concern raised by Hugh Pitcher (in the WGI scenario discussion group) about high productivity growth in A1 scenarios was briefly mentioned. This issue is to be settled within the SRES writing team, possibly by including the formulation of alternative scenario variants.

(2) Consistency and Plausibility

Most participants of the meeting expressed the need to have emissions trajectories that are somehow normalized for all SRES scenarios for 1990 and that have the same trends through 2000 and diverge only thereafter across different scenarios. This would meet the need of climate modelers to work with the same starting points for all scenarios they model. One suggestion was that SRES team simply takes midpoints of emissions ranges in 1990 and renormalizes all SRES emissions. Another proposal is that climate modelers suggest their preferred values for 1990 to be used in renormalization. In any case, the method that is used would need to be well documented and cited in the relevant IPCC reports. This is necessary so as not to introduce an artificial impression that there is a full agreement on base-year emissions across SRES scenarios.

There were no specific suggestions how to harmonize short-term emissions

through 2000. This issues is to be discussed within the SRES writing team and within the climate modeling community in order to collect emissions data for the last years that could be used for such harmonization.

The issue was discussed of generally lower CO2 and SO2 emissions across the range of SRES scenarios and in particular for B2 marker. This results in lower GHG forcing and lower "negative" SO2 forcing. The total forcing remains roughly the same as in IS92a but has fundamentally different implications especially at regional level.

Most of the climate models will be in the position to use just a few scenarios, in some case, may be just two. Possible ways of avoiding the impression that there is a "preferred" scenario were discussed and there was a consensus that somehow the message needs to be conveyed that the whole set of SRES scenarios is plausible and that there is really no single "central" case that can be compared with IS92a.

Climate models need gridded SO2 emissions while SRES models generate SO2 emissions for a number world regions. Mike Schlesinger and Steve Smith will attend the next SRES meeting and it was suggested that Mike would use his method to produce gridded SO2 emissions and that Steve would use the method proposed by Tom Wigley to do the same. This way there would be two alternative gridded emissions patterns for all SRES scenarios available to user groups.

In conclusion, it was agreed that it would be useful to organize an informal meeting where SRES colleagues could meet with potential user groups from TAR (especially from WGI and WGII). Next possibility to do so would be on the occasion of the WGI meeting in Paris, 30 November to 3 December. I am not quite sure that I got the dates right. The next communication will be more precise.

Regards, Naki

Attachment Converted: "c:\eudora\attach\sres_w~1.rtf"

72. 0907339897.txt
##########

From: Keith Briffa <k.briffa@uea.ac.uk>
To: stepan@ipae.uran.ru,evag@ifor.krasnoyarsk.su
Subject: INTAS,Vienna and Norwich
Date: Fri Oct 2 10:51:37 1998

Dear Stepan and Eugene (and Fritz),
I have now receivd contracts from The EC for the INTAS work.
I have received the real signed Power Of Attorney form from Stepan , but not from Eugene.
It seems I must have both . I am a bit reluctant to forge Eugene's signature! We will need to think about how the money should be handled . Also please all go back and look at the document I wrote and be sure you are happy with the committment. The most important new aspect is the biomass work and I think new , or additional collections need to be taken to look at the growth of young , medium and old trees separately through time. We have very few recent young and middle age trees in recent years. We could consider using data along north/south transects (how goes the

status of the Siberian Transect?).

Also, I must go to Vienna in 2 weeks to present the results of ADVANCE10K . We have a meeting of this group here in Norwich in November but I am very sorry that I have no funds to invite you to attend this. Could you afford a meeting some time , perhaps in a neutral spot where we all (including Fritz) might get together to talk about the INTAS work and future EC work? A state of the art report of progress of the Taimyr and Yamal work is needed very soon (by email),also so that I can report on it in Vienna and Norwich. I am also writing a paper for PAGES for the book of the conference in London that Rashit attended. I will include a report of both projects , hopefully with some Figures of the data distribution or plots of the some version of the curves themselves (along with others at high latitudes) . I would appreciate new copies of the full dated raw data sets , in Tucson compact format, to produce some curves in a standard style. I would like to compare changing variance through time at different wave lengths and perhaps co spectra.

As for money on ADVANCE10K, I initially was awarded 50,000ECU to be split between Krasnoyarsk and Ekaterinburg. Because of exchange rate changes , which have gone against us continually since the start of the project, this is now worth between 0.2 and 0.25 LESS than it did then. I have looked at the remaining money and I think I can give you each a final payment of between 4000 and 4500 US dollars. This is not definate - but it is pretty definate! I hope this means you may be able to do this year's fieldwork. We need to think also about how and if this should be coordinted with the INTAS work - but maybe not? How about some discussion by email regarding these points. I look forward to a quick reply.

my best wishes

Keith

73. 0907525054.txt
##########

From: Michael Prather <mprather@uci.edu>
To: TAR_scenarios <scenarios@meto.gov.uk>, penner <penner@umich.edu>, Prentice <colin@planteco.lu.se>, Ramaswamy <vr@gfdl.gov>, derwent <rgderwent@meto.gov.uk>, isaksen <isaksen@halo.ps.uci.edu>, ehhalt <k.sieben@fz-juelich.de>
Subject: TAR/SRES urgent use scenarios
Date: Sun, 04 Oct 1998 14:17:34 -0700

\\
Prather's comments on SRES emissions regarding the four WGI chapters on radiative forcing.

THIS ADDRESSES ONLY THE URGENT NEED
TO GET THE CLIMATE SCENARIOS STARTED.

OVERALL: It is CRITICAL that the WGI chapters are involved in and make decisions regarding the mapping of "emission scenarios" onto "trace-gas/RF scenarios" (to then be used in generating "climate scenarios"). This is needed so that the eventual chapters will back these preliminary (and hurried) approaches and present a consistent but updated (and more complete!) set of similar RF calculations in the TAR. We should not be adding new "volunteers" to calculate these forcings as has been suggested by last week's notes until we clearly agree on the rules/algorithms..

CO2: (WGI-Ch.3)

I have not heard from colleagues on Ch. 3 regarding carbon-cycle models for these scenarios that would be consistent with their pending chapter..

non-CO2 GASES: (WGI-Ch.4)

We need to make sure that the COMBINATION of adopted "atmospheric chemistry" and emissions is consistent with recent observations. It does not mean the total burden is on emissions. Once having chosen the chemistry (i.e., 120 year "lifetime" for N2O today), however, the current emissions are tied by observations. So we will do as already stated "make emissions match observations" but must be careful in the chapter to note this.

I see no obvious need to change the OH lifetimes (CH4, HFCs) and the N2O lifetimes from the SAR. The debate over a trend in OH is important for later analysis in the chapter. The key here is for consistency with the past decade. The budget of 560 Tg(CH4) /y is thus a balanced (steady-state) budget to match abundances of about 1710 ppb, and the current increase of about 1-2 ppb/y would then add about 3-5 Tg to this amount. Thus the rate of growth of CH4 emissions in the SRES in one concern, but the absolute level in the late 1990s is the most critical.

The IPCC97 Mosier & Kroeze N2O budget stands: natural = 9.0 TgN/y and anthrop = 7.2 TgN/y. Thus ALL of the N2O scenarios need to be scaled. Is this by a time-independent offset (e.g., + 5.5 TgN/y for B2)? or do we multiply the anthropogenic by a constant factor (e.g., 3 for B2)?

HFCs cannot be included as a bulk emission values since their lifetimes are so varied. What could be done is to focus on a single one as a surrogate, e.g., HFC-134a is the dominant RF from the IS92a options calculated in the SAR. Is this still so? We need to look at the projected HFC industry as in the last WMO report.

O3 - as part of the IPCC/Aviation assessment (under SAR, now in final government review) we spent considerable effort in calculating the changes in O3 and the associated RF. This included both changes due to aircraft alone and that due to increases in CH4, CO, NOx, VOC described in IS92a. The 3-d tropospheric chemistry models generally agreed upon the O3 changes, and it looks as though we shall be able to take the SAR to the next step and predict changes in tropospheric ozone with a community consensus. (The results were only for IS92a 2015 and 2050 atmospheres, RF's not fully analyzed for background , of order 0.2 W/m2 for 2050.)
For the AOGCM scenarios I propose that we use these 2050 delta-O3 scenarios to "deliver" a zonal, annual mean O3 RF as a simple function of latitude. It would be easier that transmitting the perturbed O3 patterns to the AOGCMs and would accomplish the primary goal of including the O3 RF. The IS92a 2050 pattern would be scaled to the amount of NOx emitted and CH4 concentration (maybe). This is probably OK for now, but of course the correlation of NOx and CO emissions in generating O3 and OH changes is "current science" that needs to be evaluated in the chapter. Also the regional aspects of CO and NOx emissions affect the O3 perturbation.

****
I would PROPOSE that WGI-Ch.4 define the algorithms (e.g., CH4

lifetime @ 1700 ppb plus
feedback factor and how to implement it) along with the
constraints of the 1990s and then let
the SRES scenario builders come up with a consistent set and send
these on to the AOGCMs.
****

SULFUR & other AEROSOLS: (WGI-Ch.5)

The AOGCMs should NOT use their own sulfur cycle for the first of
the climate scenarios. There is little doubt that all will
produce vastly different negative RFs and hence different
regional climate response. As I remember listening to the
arguments for preparing these climate scenarios, the PRIMARY goal
is to assess how well/consistently we can predict future climate
and especially regional changes given a set of forcings.
Likewise, we do not want these scenarios generated from different
time lines for CO2, CH4, and O3 because the models have different
cycle for these gases. So why S? While many of these models may
have scientifically excellent S cycles and include indirect
impacts on cloud formation, this task (i.e., comparison of S
models in GCMs) should be the second tier of experiments.

Given the primary goals of these climate simulations by the
AOGCMs, it would seem best to specify a simple albedo/RF by lat-
long, ONE THAT Chapter 5 of the new TAR would advocate and
support in its chapter. (e.g., what is suggested by Chapter 4
for O3 above) For example, the current geographic pattern of
direct sulfate forcing has been studied and will obviously be
reviewed/summarized by WGI - Chapter 5; this could be scaled to
total S emissions, especially since they are dropping in most of
the SRES emission scenarios. It would still provide a basic test
of our predictions of regional climate across the AOGCMs.

There is nothing here to develop scenarios for other
anthropogenic aerosol forcings that appear to be important (i.e.,
organics and soot).

summary RF: (WGI-Ch.6)

A potential issue here is the ability to de-convolve the
emissions and RFs per sector.

//////////

--
Michael J. Prather, Prof. mprather@uci.edu
Earth System Science Dept 1-949-824-5838/fax-3256
UC Irvine, CA 92697-3100 http://www.ess.uci.edu

74. 0907686380.txt
##########

From: mann@snow.geo.umass.edu
To: coleje@spot.colorado.edu, drdendro@ldgo.columbia.edu, jto@ngdc.noaa.gov,
k.briffa@uea.ac.uk, luckman@sscl.uwo.ca, p.jones@uea.ac.uk,
rbradley@climate1.geo.umass.edu
Subject: Re: climate of the last millennia...

Date: Tue, 6 Oct 1998 11:06:20 -0400 (EDT)

Dear all,

I just wanted to thank Keith for his comments. They are right on target. There is indeed, as many of us are aware, at least one key player in the modeling community that has made overly dismissive statements about the value of proxy data as late, because of what might be argued as his/her own naive assessment/analysis of these data. This presents the danger of just the sort of backlash that Keith warns of, and makes all the more pressing the need for more of a community-wide strategizing on our part. I think the workshop in Jan that Peck is hosting will go far in this regard, and I personally am really looking forward to it!

cheers,

mike.

_____
Michael E. Mann
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_____
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75. 0907695513.txt
##########

From: Keith Briffa <k.briffa@uea.ac.uk>
To: "Jonathan T. Overpeck" <jto@ngdc.noaa.gov>, p.jones@uea.ac.uk, mann@snow.geo.umass.edu, rbradley@climate1.geo.umass.edu, drdendro@ldgo.columbia.edu, coleje@spot.colorado.edu, Brian Luckman <luckman@sscl.uwo.ca>
Subject: Re: climate of the last millennia...
Date: Tue Oct 6 13:38:33 1998

Hi Peck et al.
A little late but I'd like to put in my twopence worth regarding your original message and Phil's reply. I have been tied up with a load of stuff so don't interpret my lack of speedy response as a lack of interest in these matters.
My first comment is that I agree with all of your general remarks and with your implied rebuke to Phil that we should be very wary of seeming to dam certain proxies and over hype others when we all know that there are real strengths and weaknesses associted with them all. The truth is that all of this group are well aware of this and of the associated fact that even within each of these sub-disciplines e.g. Dendro, coral etc. there is a large range of value , or concern with the external usage of our data. However, my own and Phil's concerns are motivated ,like yourself, by the outside world's inability to appreciate these points and the danger that we will all be seen as uncritical or niave about the real value of proxy data. The rationale for the recent Jones et al paper, and some things that I have written in the past is to inform would be users , particularly the modellers, that there are critical questions to be addressed about how the palaeo-data are best used in a 'detection' or 'model validation' context. Many in the palaeo-community understand these issues , but perhaps there has been some

reluctance to air them in sufficient depth or in the right situations where they will be heard/seen by those people who now seek to use the data . I believe that many of the modellers , having been blissfully unaware for years of the need to work with the palaeo-community, are now expecting too much . This carries the danger of a backlash as they undertake simple assessments of the palaeo-series and conclude that they are all of very little use. The problem is that as we try to inform them we may get the balance between valueable self criticism and scientific flagellation wrong. The more so when the whip is seemingly aimed at others!
There is no doubt though, that many palaeo- types are not concerned with the 'bigger issues' of climate change , so it is up to those who do ,such as this group, to try to sort out some sensible approach to how we do explore the good and bad ,fairly, in our collective data and how we present this to the outside world. The meeting you propose is a good way forward.If he is already not included, I also urge you to invite Ed Cook.
I hate cold feet and I don't ski so I vote for anywhere away from snow.

To answer the question about the degradation in tree-ring chronology confidence back in time - yes, we (that is several of us in tree rings , and rising out of them, in average temperature or rainfall series, have suggested a basis for quantifying chronology error as a function of series replication and time-dependent chages in the correlations of the series that go to form the mean chronology. The problem is tricky because the error is timescale (i.e frequency) dependent also. This is just the chronology. Calculating confidence limits on reconstructions derived from one or more chronologies must take account of the regression error (again likely to be timescale dependent) while incorporating the additional uncertainty associated with the chronology. When the reconstructions are derived using a spatial transfer function (such as in canonical correlation or our similar Orthogonal Spatial Regression technique)the reconstruction at each point in the predictand network has some ,different, uncertainty relating to the error in each predictor series and the magnitude of its influence in the specific regression equation relating to that point. Finally, as regards this issue, if you have detrended or high-pass filtered the original predictor series in some way (i.e. tree-ring standardisation) , you have some potential long-timescale uncertainty around the final reconstruction which can not be represented by any analyses of the remaining prdictors or their association with a relatively short instrumental predictand series. I have a half drafted paper on this which I intended to submit to Tree-Ring Bulletin - perhaps one day!

Your question about Jasper, the sample depth, in my opinion , IS responsible for the early high values. So don't put much faith in the early warmth. We have devised a simple method of scaling down the variance in average series to take account of the inflated variance that occurs when a reduced number of series are averaged - such as at the start of this chronology . We used this in our recent Nature paper looking at a possible volcanic signal in the density data averaged over the northern network. Ed has incorporated this in the latest version of his super tree-ring standardisation/chronolgy construction program , but it was not used in the Jasper work .

I agree that we must be careful not to appear to be knocking other proxies- even if this is not intended . We must also be explicit about where problems lie and in suggesting the ways to overcome them. I for one do not think the world revolves only around trees. The only sensible way forward is through interpretation of multiple proxies and we need much more work comparing and reconciling the different evidence they hold. Let's have more balance in the literature and more constructive dialogue /debate between ourselves.

Keith

At 02:38 PM 9/14/98 -0700, Jonathan T. Overpeck wrote:
>Hi Phil et al. - just read the Jones et al. Holocene paper (v. 8, p.

>456-471) and had a couple comments/questions....
>
>1) nice paper
>
>2) would you like to archive the reconstructions at the WDC-A for Paleo??
>It would be great to add them to existing recent ones (Cook et al. -
>drought; Mann et al. NH temp; Briffa et al. NH temp, Overpeck et al. Arctic
>temp). It would be ideal to get each of the 17 proxy records PLUS the
>hemispheric recons.
>
>3) regarding proxies, I wonder how much of the "quality" issue regarding
>ice cores and some other remote proxy records is due to there not being any
>instrumental stations near them (and at the same altitude)? Also, with
>respect to coral records, I get the feeling most in the coral community now
>think there is something "funny" about long Galapagos record (age model,
>maybe more - I think a new record is being generated). Also, many coral 18O
>records (e.g., New Caledonia) are influenced by both temp and salinity
>variations. This is a solid reason why the fit of such a record to temp
>won't be as good as you'd like (or as good as a buffo dendro record). I
>think Terry Quinn is generating the trace metal data to sort temp out.
>Lastly, I've now seen a number of coral records (most not published, but
>Tarawa is an example I think) where the proxy does as well as local
>instrumental data (in this case ppt) in getting the regional signal, AND
>the local instrumental record only go back to the war. I'm guessing, just
>between us, that ENSO recons based on proxies will soon be better than
>instrumental ones before 1950 - not just before 1850! In fact, I'd bet on
>it (using some of the money Ray still owes Julie!). Thus, I worry that it
>might not be wise to dismiss reconstructions on a proxy basis, particularly
>since trees lack one important trait - they don't work for all parts of the
>globe.
>
>4) About trees.... (Keith are you still reading?? - I sent this to Ed and
>Brian too, since they might have insights). Has anyone examined how a
>tree-ring recon degrades as a function of sample size back in time. I
>always see the quality of dendro recons cast as GREAT vs.other proxies (and
>they are) based on comparison with instrumental records. But, the dendro
>records usually have the best sample replication in this same instrumental
>period, and then tail off back in time. For example, Brian's Jasper recon
>has a sample depth of ca 28 trees in the last century, but drops off to ca.
>5 in the 12th century and 1 (?) in the 11th century. The "quality" of the
>recon must degrade too?? In contrast, some non-dendro reconstructions may
>not verify as well as dendro vs the instrumental record, but they might not
>degrade with time either since the sample density doesn't change with time.
>Thus, could it be that at some point back in time, the dendro records
>degrade to the same quality (or worse) than other proxies???
>
>5) Talking specifically about Jasper, it is interesting that the 20th
>century is as warm or warmer than everything in the last 1000 years EXCEPT
>before ca. 1110 AD. Since the sample depth before this time is 5 or less,
>how much faith should we put in those warmer than modern temps??
>
>6) I went to the trouble of all this mainly to A) get some feedback (and
>data into the WDC) and also B) to highlight that we need to extra careful
>in judging the quality of one proxy over or under another. If a well known
>group of paleo scientists suggest that, for example, corals are not that
>useful, then it might mean more years before we have a mutli-century
>record of tropical climate variability. I think it is clear that each proxy
>has limitations (and I like the table 2 idea of Jones et al), but the real
>need is to understand that each record (not just each proxy) has pros and
>cons, and that wise use requires knowing these pros/cons. Some coral, ice
>core and sediment records are no doubt better than some dendro records
>(also, for example, with respect to reconstructing low frequency variations
>in climate). I'm NOT trying to dis tree-rings, but rather to suggest more

>balance in what we all say in the literature.
>
>7) Lastly, I think there is a need to have a small workshop to put together
>an expanded version of Jones' et al. table 2, and, more importantly, to set
>some guidelines for data generators in terms of the kinds of data and meta
>data that need to be archived to ensure best use of the data (for example,
>information of the nature of the climate signal and what might bias it -
>like the salinity effect on a coral record or method of standardization on
>a dendro record). Also, we need guidelines on what info should be archived
>with a climate reconstruction (for example, are error bars available; if
>not, why not - there are often good reasons, but the interdisicplinary user
>might not get it). It might be best if the database could be upgreaded, so
>that users would know, for example, that a proxy record or recon they want
>to use has some recently discovered problem or verification.
>
>I've asked Mike Mann if he'd like to help put together such a workshop with
>me, and I think I have some US funding for it - it would be small, with
>just a couple folks from each proxy plus some folks like Phil and Mike who
>are well-know users of paleo data. Like the idea??
>
>Thx for reading this far. Cheers, Peck
>
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##########

From: Rashit Hantemirov <rashit@ipae.uran.ru>
To: Keith Briffa <k.briffa@uea.ac.uk>
Subject: Short report on progress in Yamal work
Date: Fri, 9 Oct 1998 19:17:12 +0500
Reply-to: Rashit Hantemirov <rashit@ipae.uran.ru>

Dear Keith,

I apologize for delay with reply. Below is short information about
state of Yamal work.

Samples from 2,172 subfossil larches (appr. 95% of all samples),

spruces (5%) and birches (solitary finding) have been collected within a region centered on about 67030'N, 70000'E at the southern part of Yamal Peninsula. All of them have been measured.

Success has already been achieved in developing a continuous larch ring-width chronology extending from the present back to 4999 BC. My version of chronology (individual series indexed by corridor method) attached (file "yamal.gnr"). I could guarantee today that last 4600-years interval (2600 BC - 1996 AD) of chronology is reliable. Earlier data (5000 BC - 2600 BC) are needed to be examined more properly.

Using this chronology 1074 subfossil trees have been dated. Temporal distribution of trees is attached (file "number"). Unfortunately, I can't sign with confidence the belonging to certain species (larch or spruce) of each tree at present.

Ring width data of 539 dated subfossil trees and 17 living larches are attached (file "yamal.rwm"). Some samples measured on 2 or more radii. First letter means species (l- larch, p- spruce, _ - uncertain), last cipher - radius. These series are examined for missing rings. If you need all the dated individual series I can send the rest of data, but the others are don't corrected as regards to missing rings.

Residuary 1098 subfossil trees don't dated as yet. More than 200 of them have less than 60 rings, dating of such samples often is not confident. Great part undated wood remnants most likely older than 7000 years.

Some results (I think, the temperature reconstruction you will done better than me):

Millennium-scale changes of interannual tree growth variability have been discovered. There were periods of low (5000-2800 BC), middle (2800-1700 BC) and high interannual variability (1700 BC - to the present).

Exact dating of hundreds of subfossil trees gave a chance to clear up the temporal distribution of trees abundance, age structure, frequency of trees deaths and appearances during last seven millennia. Assessment of polar tree line changes has been carried out by mapping of dated subfossil trees.

According to reconsructions most favorable conditions for tree growth have been marked during 5000-1700 BC. At that time position of tree line was far northward of recent one.
[Unfortunately, region of our research don't include the whole area where trees grew during the Holocene. We can maintain that before 1700 BC tree line was northward of our research area. We have only 3 dated remnants of trees from Yuribey River sampled by our colleagues (70 km to the north from recent polar tree line) that grew during 4200-4016 and 3330-2986 BC.]
This period is pointed out by low interannual variability of tree growth and high trees abundance discontinued, however, by several short (50-100 years) unfavorable periods, most significant of them dated about 4060-3990 BC. Since about 2800 BC gradual worsening of tree growth condition has begun. Significant shift of the polar tree line to the south have been fixed between 1700 and 1600 BC. At the same time interannual tree growth variability increased appreciably. During last 3600 years most of reconstructed indices have been varying not so very significant. Tree line has been shifting within 3-5 km near recent one. Low abundance of trees has been fixed during 1410-1250 BC and 500-350 BC. Relatively high number of trees has been

noted during 750-1450 AD.
There are no evidences of moving polar timberline to the north during last century.

Please, let me know if you need more data or detailed report.

Best regards,
Rashit Hantemirov

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Attachment Converted: "c:\eudora\attach\Number"

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##########

From: Rashit Hantemirov <rashit@ipae.uran.ru>
To: Keith Briffa <k.briffa@uea.ac.uk>
Subject: Re: Your data- a reference?
Date: Tue, 13 Oct 1998 12:46:54 +0500
Reply-to: Rashit Hantemirov <rashit@ipae.uran.ru>

Dear Keith,
below is the list of publications concerning Yamal chronology.

References of russian articles are in three forms:
a) original russian text. I am afraid you will be not able to read (see) it without any russian driver. Therefore, if you need this form of reference, please see attached file as well (.doc file) using attached russian font;
b) russian words written by english letters;
c) english translation (excuse me for my english).

1. Hantemirov, R.M. A 2,305 year tree-ring reconstruction of mean June-July temperature deviations in the Yamal Peninsula //Int. Conf. on Past, Present and Future Climate: Proc. of the SILMU conf. Helsinki, Finland, 22-25 August 1995 /Publication of the Academy of Finland 6/95.- Helsinki, 1995.- P. 124-127.

2. U`mrelhpnb P.L., Qspjnb @.^. 3243-kerm□□ dpebeqmn-jnk|veb`□ pejnmqrpsjvh□ jkhl`rhweqjhu sqknbhi dk□ qebep` G`o`dmni Qhahph // Opnakel{ nayei h ophjk`dmni }jnknchh (L`reph`k{ lnkndefmni jnmtepemvhh).- Ej`rephmaspc, 1996.- Q. 266-278.

Hantemirov R.M., Surkov A.Yu. 3243-letnyaya drevesno-kol'cevaya rekonstrukciya klimaticheskich usloviy dlya severa Zapadnoy Sibiri // Problemy obshchey i prikladnoy ekologii (Materialy molodezhnoy konferencii).- Ekaterinburg, 1996.- S. 266-278.

Hantemirov R.M., Surkov A.Yu. A 3243-year tree-ring reconstruction of climatic conditions for the north of West Siberia // Problems of

general and applied ecology (Proceedings of young scientists conference).- Ekaterinburg, 1996.- P. 266-278.

3. Xh□rnb Q.C., U`mrelhpnb P.L., L`geo` B.Q. Onbeqr| _l`k|qjhu ker. Kernohq| hglememhi jkhl`r` m` _l`ke g` onqkedmhe rph r{q□wekerh□, g`ohq`mm`□ b cndhwm{u jnk|v`u depeb|eb. // _l`k - qnjpnbhymhv` Pnqqhh.- 1996.- N 4.- Q. 6-7.

Shiyatov, S.G., Hantemirov, R.M., Mazepa V.S. Povest' Yamal'skich let. Letopis' izmeneniy klimata na Yamale za posledniye tri tysyacheletiya, zapisannaya v godichnych kol'zach derev'ev // Yamal - sokrovishchnica Rossii.- 1996.- N 4.- S. 6-7.

Shiyatov, S.G., Hantemirov, R.M., Mazepa V.S. The tale of Yamal's years [summers]. A chronicle of climate changes on Yamal during last three millennia recorded in tree rings. // Yamal - the treasury of Russia.- 1996.- N 4.- P.6-7.

I am sorry, it is difficult for me to translate properly the title of this article in the popular magazine.

4. Shiyatov, S.G., Hantemirov, R.M., Schweingruber, F.H., Briffa K.R. and Moell M. Potential long chronology development on the northwest Siberian plain: Early results // Dendrochronologia.- 1996.- V. 14.- P. 13-29.

5. B`c`mnb E.@., Xh□rnb Q.C., U`mrelhpnb P.L., M`spga`eb L.L. Hglemwhbnqr| kermei reloep`rsp{ bngdsu` b b{qnjhu xhpnr`u Qebepmncn onksx`ph□ g` onqkedmhe 1.5 r{q. ker: qp`bmhrek|m{i `m`khg d`mm{u cndhwm{u jnkev depeb|eb h kednb{u jnknmnj // Dnjk. @M.- 1997.- R. 358, 9 5.- Q. 681-684.

Vaganov E.A., Shiyatov, S.G., Hantemirov, R.M., Naurzbaev M.M. Izmenchivost' letney temperatury vozducha v vysokich shirotach Severnogo polushariya za posledniye 1.5 tys. let: sravnitel'nyy analiz dannych godichnych kolec derev'ev i ledovych kolonok // Doklady Akademii Nauk.- 1997.- T. 358, N 5.- S. 681-684.

Vaganov E.A., Shiyatov, S.G., Hantemirov, R.M., Naurzbaev M.M. Variability of summer air temperature in high latitudes of the Northern Hemisphere during last 1.5 thousand years: comparative analysis of tree-ring and ice core data // Proceedings of the [Russian] Academy of Sciences.- 1997.- V. 358, N 5.- P. 681-684.

Papers in press expected to be published this year:

6. U`mrelhpnb P.L. Dpebeqmn-jnk|veb`□ pejnmqrpsjvh□ kermhu reloep`rsp m` qebepe G`o`dmni Qhahph g` onqkedmhe 3248 ker // Qha. }jnk. f..- 1998.-R. 5, N 5 (b oew`rh).

Hantemirov R.M. Drevesno-kol'cevaya rekonstrukciya letnich temperatur na severe Zapadnoy Sibiri za posledniye 3248 let // Sibirskii ecologicheskii zhurnal.- 1998.- T. 5, N 5 (v pechati).

Hantemirov R.M. Tree ring reconstruction of summer temperatures on the north of West Siberia during last 3248 years // Siberian Ecological Journal.- 1998.- V. 5, N 5 (in press)

There is English version of this journal

7. U`mrelhpnb P.L. 4309-kerm□□ upnmnknch□ dk□ _l`k` h ee hqonk|gnb`mhe dk□ pejnmqrpsjvhh hqrnphh jkhl`rhweqjhu hglememhi m` qebepe G`o`dmni

Qhahph. // Opnakel{ }jnknchweqjncn lnmhrnphmc` h lndekhpnb`mh
}jnqhqrel.- QOa.: Chdpnlerenhgd`r, 1998.- R. 17.- (b oew`rh)

Hantemirov R.M. 4309-letnyaya chronologiya dlya Yamala i yeyo ispol'zovaniye dlya rekonstrukcii istorii klimaticheskich izmeneniy na severe Zapadnoy Sibiri // Problemy ecologicheskogo monitoringa i modelirovaniya ekosistem.- SPb.: Gidrometeoizdat, 1998.- T.17 (v pechati).

Hantemirov R.M. A 4309 year chronology for Yamal and its use for reconstruction of climatic changes history on the north of West Siberia // Problems of ecological monitoring and modelling of ecosystems.- S.Petersburg: Gidrometeoizdat, 1998.- V.17 (in press)

8. U`mrelhpnb P.L., Xh rnb Q.C. P`dhnsckepndm{e h demdpnupnmnknchweqjhe d`rhpnbjh onkshqjno`elni dpebeqhm{ m` _l`ke h hu hqonk|gnb`mhe dk hgswemh dhm`lhjh keqnrsmdpnb{u }jnqhqrel. // Ahnr` Ophsp`k|qjni Qsa`pjrhjh b ongdmel okeiqrnveme h cnknveme. Ej`rephmaspc, hgd-bn "Ej`rephmaspc", 1998 (b oew`rh).

Hantemirov R.M., Shiyatov S.G. Radiouglerodnyye i dendrochronologicheskiye datirovki poluiskopayemoy drevesiny na Yamale i ich ispol'zovaniye dlya izucheniya dinamiki lesotundrovych ekosistem // Biota Priural'skoy Subarktiki v pozdnem pleistocene i golocene. Ekaterinburg, izdatel'stvo "Ekaterinburg", 1998 (v pechati)

Hantemirov R.M., Shiyatov S.G. Radiocarbon and dendrochronological datings of subfossil wood from Yamal and their using to study forest-tundra ecosystems dynamic // Biota of [near]Ural Subarctic during the late Pleistocene and the Holocene. Ekaterinburg, publishing house "Ekaterinburg", 1998 (in press)

9. Xh rnb Q. C., U`mrelhpnb P. L. Demdpnupnmnknchweqj` d`rhpnbj` dpebeqhm{ jsqr`pmhjnb hg `puenknchweqjncn onqekemh _pre-6 m` onksnqrpnbe _l`k // Dpebmnqrh _l`k`. Rnank|qj, 1998 (b oew`rh).

Shiyatov S.G., Hantemirov R.M. Dendrochronologicheskaya datirovka drevesiny kustarnikov iz archeologicheskogo poseleniya Yarte-6 na poluostrove Yamal // Drevnosti Yamala. Tobol'sk, 1998 (v pechati)

Shiyatov S.G., Hantemirov R.M. Dendrochronological dating of shrubs wood from archeological settlement "Yarte-6" on the Yamal Peninsula // Antiquities of Yamal. Tobolsk, 1998 (in press).

I am not quite get your question about fieldwork. You mean "this year" is 1998? If so it is too late now, on southern part of Yamal yesterday was about -10 C. Next year we plane fieldwork, final decision about where and when we will make in the beginning of next year. I would like to go to Yuribey River, northward of our usual research area.

Best regards,

Rashit Hantemirov

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From: Sarah Raper <s.raper@uea.ac.uk>
To: scenarios@meto.gov.uk
Subject: Scenarios Conference - Simple Models
Date: Wed, 14 Oct 1998 13:25:07 +0100

3. Use of simple climate models

3.1 Simple models used only as tools for extrapolationg/interpolationg GCM results to estimate the effect of different scenarios or sensitivities?

1-D UD/EBMs (upwelling-diffusion energy balance models), such as the Wigley and Raper (1992) model updated in Raper et al. (1996), in my opinion, come into this category. I along with Jonathan Gregory and Tim Osborn have completed a very detailed comparison of this and several alternative 1-D models with HadCM2 results. With the addition of a sea ice parameter the Raper et al. model reproduces well the HadCM2 results for global mean surface temperature and thermal expansion out to 2100, for several scenarios.

However, the distinction between 3.1 and 3.2 below is not clearcut. By the end of the 900 year 2xCO2 experiment the thermal expansion for the HadCM2 model is nearly 5 times larger than that simulated by the fitted (over 1860-2100) UD/EBM, and unlike the UD/EBM shows no sign of coming to equilibrium. In our analysis we conclude that it is not immediately obvious which if either model is correct. The difference serves to highlight the uncertainty in the thermal expansion commitment. Incidently a fitted pure diffusion/EBM gives good simulation of the HadCM2 results in both the short and long term.

3.2 Simple models used to offer independent climate predictions?

It would probably be difficult to use 2+D models for 3.1, so they may belong here.

I think, 3.1 and 3.2 serve different purposes. Both may be desirable.

3.3 Depending on the answers to 3.1 and 3.2......

Whichever 3.1, 3.2 or both is adopted the results and the attendant simple model versus A/OGCM comparisons should be given in the projections chapter. A selection of the results should then carry over to the sea level chapter. This consistency is very important.

It is a separate question as to whether the simple climate model results should subsequently be used as scaling factors for regional scenario development in the scenario chapter.

3.4 How many simple climate models are needed...

For 3.1 in order to fit the A/OGCM results extensive comparisons using alternative parameter values/models (for example, UD versus pure diffusion) will be necessary. As well as my HadCM2 comparison mentioned above a comparison with ECHAM3/LSG results is also well underway. In both cases the work shows that it is advisable to calculate the effective climate sensitivity of the A/OGCMs for use in the simple model. We found that the effective climate sensitivity is non-constant but apparantly varies with the surface temperature in these models. For this calculation and for comprehensive model comparisons a specific list of A/OGCM output is

required. This includes decade ocean mean temperature profiles, a measure of the strength of the thermohaline circulation, the A/OGCM forcing change for 2xCO2 etc. I am keen to continue these comparisons specifically as input to the new IPCC assessments. Unfortunately, and I think mistakenly, the US DOE have recently decided to discontinue this line of research. An endorsement of the need for this work by the IPCC would help my attempts to acquire funding elsewhere.

For 3.2 there would be no need of tuning to A/OGCM results and many model results could be used to give a range. This would serve a different purpose to 3.1 where A/OGCM results are interpolated/extrapolated for different sensitivities and forcings.

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From: Mike Hulme <m.hulme@uea.ac.uk>
To: scenarios@meto.gov.uk
Subject: scenarios e-conf., session 3
Date: Thu, 15 Oct 1998 18:22:30 +0100

> 3. Use of simple climate models:
> 3.1 Simple models used only as tools for
> extrapolating/interpolating GCM results to estimate the effect of different
> scenarios or sensitivities?
> 3.2 Simple models used to offer independent climate
> predictions?
> 3.3 Depending on the answers to 3.1 and 3.2, where will
> the assessment of simple model results be located within the TAR (under the
> projections or the scenarios Chapter or under an Appendix?)
> 3.4 How many simple climate models are needed (again
> depending on 3.1 and 3.2)?

I wish to pick up on two of the points raised by Sarah Raper and Jonathan Gregory which, while not directly answering the questions posed above, need a clear position being taken upon by IPCC. These two points are:

>From Gregory ......
"The presentation of a wide range of scenarios and sensitivities (3.1) will be a very important output of the TAR. Tom Wigley argues that it would be inappropriate to relegate it to an Appendix. Nonetheless it is different from the discussion and assessment of models which produce the basic projections of climate change and sea-level. I think both climate change and sea-level chapters should have separate, final, sections devoted specifically to showing the full range of uncertainties and the best estimates - an appendix to each chapter. The figures given there will be brought together in the summary of the TAR."

This is a very important concern from the perspective of how Chapter 13 (climate scenarios) is written and how WGII will look over their shoulder to WGI. For many reasons which have been well-articulated elsewhere, it is too much to expect complete consistency from WGIII emissions, to WGI models and to WGII impacts - the lags in the knowledge creation and ratification are too great. However, bear in mind that most GCM results used for climate scenario construction will be 1% per annum forcing (plus a few with 0.5% forcing, stabilisation forcing or one or more of the new SRES forcings, but these latter GCM results are unlikely to feed forward into (much) impacts work in time). However, for much impacts work to be properly assessed and interpreted by IPCC it is necessary to have used a range of climate scenarios spanning a range of risk. This is difficult, nay impossible, without resorting to simple climate model results. If WGI can Fast-track this generation of headline projections spanning a range of forcings and sensitivities, then this information may be made use of by climate scenario developers and impacts analysts. If not, then WGI (Chapters 9 and 11) will be saying one thing, and all the impacts work is in danger of saying something else (e.g. using IS92 forcings with the SAR Chapter 6 simple model projections). At worst, some careful post-hoc re-interpretation of WGII results may be necessary in light of WGI for the policymakers summary and most importantly for the Synthesis Report.

>From Raper .....
"It is a separate question as to whether the simple climate model results should subsequently be used as scaling factors for regional scenario development in the scenario chapter."

This is indeed a separate question and one on which Chapter 13 can and will 'assess' the science. Scaling of GCM results has been widely used by impacts/integrated assessors since CRU started using this methodology in the early 1990s. Whether or not to adopt/recommend scaling methods for the IPCC TAR was side-stepped by the TGCIA, although it was clearly stated within the TGCIA that basing all impacts work on 1% p.a. forced GCMs which represented a narrow range of climate sensitivities, would skew impacts results in a particular (and not altogether desirable) direction. Chapter 13 will also recognise this problem and will assess the pros and cons of scaling based on simple models, but given the short length of Chapter 13, its remit now is not to convert any headline simple model results from Chapters 9 and 11 into scaled regional scenarios for impacts work - by mid-late 1999 it will be too late for that anyway. So, different impact studies will now adopt different approaches, and WGII can assess the resulting science, but what will help the writing of Chapter 13 and WGII will be as clear a statement of intent (and ideally some preliminary results) of the sort of exercises that Sarah and Jonathan refer to, preferably using the new SRES emissions scenarios.

Mike

****
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University of East Anglia web site: http://www.cru.uea.ac.uk/~mikeh/
Norwich NR4 7TJ
****

Mean temp. in Central England during 1998 is running
at about 1.05 deg C above the 1961-90 average
****

The global-mean surface air temperature anomaly estimate for the first half of 1998 was about +0.60 deg C above the 1961-90 average,

****

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##########

From: From <evag@ifor.krasnoyarsk.su>
To: k.briffa@uea.ac.uk
Subject: No Subject
Date: Sat, 17 Oct 1998 10:09:48 +0400 (MSD)

trwcrn.rwm
Tree-ring widths (TRW) chronology:

Ident., No.	Trees, No.	Inent. N (trees)
1)	118	all living and dead 2209-years chronology
2)*	4	MAY,925,927,928, CHA044
3)*	1	CHA-H1
4)*	1	MAY702
5)*	1	NOV001
6)*	1	CHA-H6
7)*	1	NOV078
8)*	1	NOV-A02
9)*	1	CHA005
10)*	1	NOV029
11)*	5	CHA060,012,009,017,001

* - calibrated radiocarbon age

1) all living and dead 2209-years chronology
2209=N -212=I 1) 118 samples -5(13F6.0)~

23000	24000	42000	14000	27000	21000	13000	28000	20000	30000	38000	65000	58000
54000	66000	65000	16000	55000	46000	56000	53000	68000	29000	21000	48000	15000
29000	25000	32000	22000	31000	29000	18000	27000	53000	41000	35000	47000	66000
89000	52000	28000	34000	39000	33000	25000	28000	36000	32000	43000	47000	63000
49000	49000	50000	56000	40000	42000	46500	65000	28000	30500	55000	40500	44500
24500	24500	50500	6500	22500	39000	37000	54000	30000	47500	41000	23000	52000
56000	46000	35000	44000	71000	53000	73000	87000	64000	53000	44000	52000	48500
41000	45000	50000	61500	42000	48000	58500	44000	50000	78500	62500	46000	73500
45000	90500	64000	99000	64000	53500	90000	80000	45000	64000	87500	37000	55500
74500	88500	61500	58500	66000	88500	76500	116500	84500	88500	44500	70500	26000
46000	51000	15000	42000	55000	81000	76000	67000	61000	34000	28000	24000	54000
34000	46000	27000	37000	33000	53000	56000	51000	52000	52000	64000	58000	39000
48000	35000	51000	49000	37000	43000	55000	32000	39000	57000	34000	29000	45000
49000	11000	33000	45000	36000	36000	32000	32000	41000	43000	30000	15000	43000
16000	23000	50000	46000	30000	23000	10000	38000	26000	28000	26000	19000	21000
27000	27000	18000	11000	20000	12000	16000	12000	24000	16000	20000	22000	11000
28000	22017	28065	21856	12882	14098	22014	25112	35140	14161	1219	19996	13315
13517	10704	15207	19702	19134	16446	3039	17992	25257	15901	23191	23203	1000
27479	15919	11296	19473	10860	19530	15335	26299	9411	5291	31041	12069	4539
27818	7493	10411	7919	10605	9945	17887	14974	13111	12423	8397	3226	22759
13618	10784	12556	15426	18972	22968	16454	17000	19389	10860	16583	17472	16410
29186	14931	19302	13833	21143	7466	21325	6210	18981	19848	12337	19850	26400
18285	20246	31337	23294	13450	17941	34285	38733	27586	32435	25338	21392	32594
28435	35517	40156	18777	23268	28298	30149	19095	25926	42906	39255	34173	22065
29118	17902	27172	38119	37347	25090	6500	34301	26855	5941	38507	35826	14832
22651	22197	36162	32763	24581	31479	25689	34191	36718	42915	26990	26878	43824
34625	32174	57385	51360	55039	55054	37906	18168	34882	34761	41604	12657	13161

16197	31916	24132	21855	30630	36385	30745	24153	40741	30006	33620	26577	33367
26186	38229	29349	52789	47438	35978	47997	17548	51853	46033	28743	12085	27608
34020	17925	32088	34944	33101	4081	30879	17446	15978	28435	18335	35868	22251
21528	34309	2773	6384	9014	19779	23547	26701	11470	22866	13911	18834	21164
20124	10157	23354	23804	25057	14675	20483	14798	8351	21108	8335	10598	17069
23246	30087	13235	14254	15864	2164	9347	19932	7031	20000	12181	12757	3687
20469	14247	10620	8746	28494	27058	13708	17022	20529	15788	28236	10115	19326
18135	23963	15390	7162	17279	32849	31069	16989	24420	13018	25653	14928	27235
23283	18571	29915	27266	33951	24041	47844	47675	44769	46163	46952	19771	23019
38639	34723	33079	33469	21124	29181	20774	26725	29081	34518	17204	28940	37208
32775	58976	10594	42606	48863	36946	32213	41849	27432	39733	16259	35834	34341
62407	42028	44445	35859	29798	36765	23502	18434	20274	45121	21526	24560	31877
34800	38334	20428	8781	37238	19716	7604	19439	30829	32487	20464	29784	31750
31928	23184	25438	32931	32310	39233	32585	27749	35201	28107	26776	28485	12709
15027	33760	11325	31204	31662	30223	36039	40012	25509	8772	19157	35361	17630
29531	29212	31187	24300	4562	21532	31632	10503	29400	31222	25730	28030	26917
4688	12078	26173	26710	9482	10246	28444	24912	24827	28289	17974	20492	7018
21514	34516	33310	36256	44727	45114	28650	23419	33516	11778	43465	20220	25175
23955	21139	26410	28461	35890	14156	38692	4772	28678	23572	30616	34457	38619
34856	26276	23577	22361	19873	37267	34284	15317	24184	48975	37987	31429	35273
18054	43859	16763	36500	38608	21093	31207	32854	30413	13416	33594	19433	30082
19389	15758	27999	39612	44671	37417	39594	37086	28268	12974	30605	29249	37753
33663	11363	36143	21306	46288	16113	30107	18372	38803	28205	29546	14434	46587
26678	41108	43586	37374	30224	28331	31544	30825	32838	26578	33066	20678	36675
25315	28839	26035	37685	30226	24501	28528	33510	51162	13581	21995	29417	32967
23924	14920	20805	20512	25141	25598	25703	18462	17040	21751	16046	21996	18069
20342	35014	28332	35165	35442	33871	33850	27816	23579	31256	28535	12889	22552
32800	23463	18168	23192	13514	12918	18007	9645	12635	13072	21150	14148	23932
9018	12498	18710	16600	21805	7213	22851	15759	15814	15200	23895	13963	25953
17684	20987	27162	17110	30437	32360	29106	16759	32655	33595	19709	33258	6052
26222	17722	34334	39148	11789	42244	36821	1797	4814	13594	26070	12939	6916
23229	4446	10246	7540	13714	22299	20476	19088	13476	18404	3900	19064	32509
18843	22990	28820	26310	43229	39537	31840	28824	37437	49123	36642	26598	35534
22271	52498	57130	24689	41995	27017	30140	37749	57837	25520	46108	54090	49658
45089	24465	57550	46258	47711	57767	40029	55404	32947	54873	46590	58746	34993
54879	61748	27910	32067	31872	7046	36295	37264	37901	26789	30777	43434	37700
29501	43272	44470	25658	40156	29332	20015	29524	36727	36948	31928	29953	19737
41447	12328	39805	22439	26927	23239	39549	7098	15840	20929	23772	15353	28007
22955	21463	24290	8873	17708	27278	21769	28332	18403	23837	14195	28935	20013
26065	23293	17814	25742	24984	18238	28932	31088	8914	36008	13544	29850	32271
43589	40051	23543	16407	22265	30511	16002	27839	32794	22413	10217	39905	27802
20776	26814	33852	34807	22456	20637	4815	21855	37894	25930	1818	6596	23364
29193	17672	24675	23853	5993	1193	29426	28114	14413	24810	26160	25576	11685
23679	28930	27702	26763	11733	36410	22337	39023	39591	5069	35118	21200	20396
8735	31218	18536	17272	31415	7196	22859	27298	25531	19425	10399	23570	12696
8352	15032	18992	14626	15444	18765	19280	16423	13234	21223	18692	21367	30821
15418	19031	27041	18009	33393	21949	9369	17344	27753	26670	14494	37218	36654
23904	16576	15594	29869	8638	29094	10394	19081	16729	39305	24061	16216	18959
35626	30247	34454	27558	23983	33922	24609	29676	30460	18236	15331	13953	11694
24988	14321	19124	20936	4785	26340	29808	33539	20732	42390	43144	48471	35663
44234	58963	18491	38119	42704	34253	30509	45563	28242	40627	26959	19787	30831
17054	29454	14203	11907	23517	12541	22802	33360	23233	45317	36219	25209	18721
16921	19920	27720	26663	34059	49228	40157	24209	39570	35193	26808	7585	20873
18554	23309	30212	16812	20517	23079	11592	18401	30493	24638	26735	13995	36813
48920	40278	28927	47026	31865	20986	39037	34740	33252	38718	22690	19176	35577
2580	11231	25408	24867	15897	22064	19354	25936	36895	19666	28904	37001	44624
50833	37233	36536	10932	23639	22069	37132	32183	18924	14646	39770	48286	41257
61823	38685	48732	17881	14121	42920	48009	43173	31532	31883	41708	27496	35394
21644	60068	59735	39445	37137	52625	62747	31373	22840	37017	4124	18122	16422
23362	11732	27172	29596	28005	12863	26527	33936	40401	25001	19088	35345	14541
41458	29285	35867	35215	41416	40820	28276	29922	54348	48932	45189	27202	40680
22536	12274	11911	15438	31847	15518	32623	16994	6958	28295	12391	20124	15200
3872	19066	6154	16046	21994	9883	13803	18203	7738	24826	25802	41665	39420

10082 23138 36672 23293 15780 30997 32336 56083 52873 12327 57182 35586 39138
25576 20923 11457 19626 15096 25439 32855 38655 44821 46423 37342 52026 68594
56632 41091 56548 10213 47772 55599 47835 50947 38083 45772 33426 42712 34339
15275 23257 18921 15782 25821 22725 11567 21104 29535 19800 39800 27438 11278
22770 28603 19851 33342 52927 32471 27769 46087 43229 17067 37574 15950 24974
27458 24971 20471 11634 36141 41870 25253 34853 36198 40878 37941 32716 14577
17551 29037 15527 27155 30336 16565 13659 17427 17985 15333 28674 31912 33061
21280 39694 16494 20841 27794 13885 2565 19240 20764 14003 15234 17235 32861
32447 37592 43724 40821 49210 38946 15957 19545 27864 13492 27344 42029 37682
27146 11498 40925 31045 29398 27439 38022 32927 49087 49043 49449 35359 36962
24378 36666 31602 50729 24814 62188 46992 57665 8994 31133 41369 49188 49729
34232 51923 44904 33188 44207 52862 39145 33680 38792 39171 26952 39862 49060
53489 47236 46363 57434 40117 62997 50508 35887 11315 40273 26840 11259 22813
29683 23477 9655 45503 48217 39129 57846 36584 54067 27905 34950 53044 49242
 6346 26682 60001 42356 39453 38095 28854 32367 43999 43182 76475 9980 26734
37163 32521 56584 52948 47244 45685 57133 54086 22626 57892 25345 31469 14592
13839 30265 43116 32693 39278 17673 47578 16717 40561 32427 46271 70501 45415
38845 32493 52634 28619 43829 41729 49462 16162 21579 36292 22750 23572 28727
33052 21509 13640 26083 3888 31372 24734 25512 27071 31571 24681 30374 24534
33169 12625 20093 53206 17146 4073 38241 27796 10701 20413 24781 13696 14691
28574 14242 17157 26778 36497 29876 10106 36171 30465 36840 30557 36331 47945
55943 49453 23943 40887 18421 35653 7226 20925 16290 39092 30054 33829 21976
27694 36015 25317 41708 28307 18924 28561 25760 21980 32029 24752 35831 31853
29046 13943 13463 29012 27598 46246 15320 14192 32116 25571 32122 37198 21309
24451 7718 29199 25351 12890 36031 18695 18575 27989 21409 22320 26659 23255
 6836 11240 14685 10076 20696 16281 8961 25734 18756 22537 6889 12456 22313
13306 15308 15505 17235 10645 30885 6203 18640 26682 10589 16431 28376 17826
 6304 17627 27904 30156 32025 27955 46022 22728 14528 20370 26056 21896 28926
34096 22612 41428 48536 56094 40957 53286 50459 32060 44338 44482 41154 13807
11326 3297 11426 7576 26075 16469 17875 40687 38680 42653 4189 15048 13883
31267 30324 8534 19704 27760 28691 32492 52563 38623 37560 27673 33206 25809
42342 53294 36139 40726 48492 45376 34414 24610 35000 20567 34436 15964 36710
32282 31438 38330 35359 34186 40505 38729 11085 23307 29585 45856 30278 35038
28031 61066 71654 75101 44821 39539 5015 23301 32435 16773 42902 38394 35250
38140 50031 34522 47063 39538 37625 44671 19419 26965 49777 39253 37798 39380
60435 32630 31485 47937 32777 43802 30784 47142 37691 30497 28847 43470 41648
37101 40726 16574 33858 35558 42346 32535 35480 39239 19817 17962 40171 19816
37158 48680 26345 38391 56809 20909 43281 26427 28300 10520 11234 37255 28329
33247 37494 15393 17142 30050 24568 30868 25822 26042 29408 8962 34690 23488
22172 23157 30993 11397 34005 23622 34032 29107 33019 39124 10729 45917 29799
21484 11154 19750 10963 25793 29698 16148 30739 40478 28837 11405 28409 42056
28589 36331 30851 14922 29795 35541 30907 29046 30087 31996 24960 10172 22222
47286 32457 29091 29240 24873 14528 23808 17266 29730 13252 16810 11011 21315
17198 20894 28959 19943 11296 13434 9382 17430 13696 25412 27865 23093 7885
13852 25494 22304 5032 21311 21766 32202 24233 32537 34665 21149 4541 17197
21595 10014 17248 23052 9932 26619 24058 31319 24079 32681 26048 23140 12880
14733 33067 20015 18721 29651 26843 21754 30090 35288 33385 22382 30894 14728
26071 25792 23771 32227 27265 24298 26117 10108 33626 11545 13202 32819 20454
20939 12584 32712 11446 29923 24529 21244 2000 29325 10270 18780 14979 29992
17247 22835 19369 36933 31079 14026 18997 22716 11568 16741 26364 20229 24592
20948 24879 29982 19867 19478 31888 17419 22989 28106 21737 4936 12040 15016
18961 5235 18167 24849 18367 27222 23919 14306 20386 33748 14910 22044 19999
22210 27410 29148 38037 12635 33100 44025 36026 9169 22049 10997 26327 23360
15028 14360 25476 19163 18067 32330 14489 31136 28690 24305 13269 27592 35264
13291 29446 26123 19894 18688 21564 28586 40368 33895 36981 22843 28835 25897
31387 15225 17297 21077 21867 12440 14398 19166 13061 11008 20385 14993 7768
23283 20160 17045 26833 22701 26387 23256 27723 21111 32775 7176 14600 6560
 4525 15770 14353 9099 15162 24470 36183 31308 31823 19556 30681 26487 20038
29204 35066 17925 36458 32013 32462 8064 28601 25226 27308 24907 17930 24206
28880 26326 46087 11387 42678 40037 31112 25112 32453 36598 19521 23389 36012
27063 36490 35092 22232 9785 37702 38043 30604 35077 43926 47220 41646 34102
26212 39082 25302 17634 23170 24958 41060 25989 17794 6167 29321 25024 31646
23853 40694 40252 44804 27458 47022 24027 27829 24725 8566 25765 37958 26832

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 44567 34530 16105 27248 26055 34928 27453 39903 34871 26434 37469 24709 39487
 30218 22976 28462 41952 49108 25851 32901 22448 18331 29066 10315 28571 29070
 32664 32870 28318 40625 10357 35280 25849 23649 19720  8395 12389 17508 13577
 16774 11858 18736  6479 12156 19628 23655 22221 18061  6689 17556 20901 29764
 30796  7261 32870 14236  5948 23671 27600 21503 20273 15348 15678 27342 22366
 27979 21643 19756 20343 27883 18753 21325  9415 21976 11436 37690 27274 28101
 25355 33940 30386 34422 25320 52582 45733 36687 35368 37902 42693 22233 16666
 45695  7105 21338 22127 26892 13168 12589 29874 19946 38389 42508 38118 44281
 34808 34262 42548 20033 17134 18463 34504 32362 18734 22133 37281 30119 18316
 28807 26584 45163 45681 23834 13205 14869 29485 27289 22233 23254 13266 19679
 17399 43549 17745 22862 19067 10631 18321 26515 32895 29419 28948 38780 37180
 30926 21697 33762 31089 41763 25857 40686 14920 39838 35513 36599 27497 43523
 38081 35011 32143 40349 36135 43614 51856 50396 67195 57225 61241 41440 65260
 48097 28219 48738 24261 40273 29658 36309 51236 32544 40954 36983 33193 27788
 32247 29070 28358 30658 23016 35060 22024 25796 37168 21417 28881 28177 23317
 24240 15012 13238 22566 26812 17797 23989 38457 13285 22011 26412 25138 40011
 18164 32288 21720 33763  9829 29992 21171 21000 10000 24000 12000 19000

2) MAY,925,927,928, CHA044
     296=N    -670=I 2) 4 samples (MAY925,927,928, CHA044)        -5(13F6.0)~
 42000 76000 35000 37000 35000 27000 47000 24000 95000105000128000 94000102000
 51000 37000 26000 38000 30000 35000 20000 37000 19000 16000 39000 50000 44000
 78000 44000 69000 79000 66000 31000 55000 32000 34000 17000 51000 22750 26000
 55000 55250 43500 37750 28250 61250 33750 55500 28750 51750 38500 42000 22250
 39250 46750 41750 32500 39250 23000 34000 15000 22750  3250  9250 21000 24250
 15250 26500 13250 15500 33750 50750 27500  9750 48000 67500 71500 70500 54500
 59000 54500 44750 31000 23250 42250 26250 44750 54750 56000 44750105500 44000
 33250 43250 30750 47250 40750 34000 33750 50750 59250 43500 72000 42000 35250
 42500 37500 47750 51000 84750 47000 73000 28500 59000 56750 46000 58000 28000
 23500 16000 13500 25500 27000 49500 31500 58000 80000 83000 73000 35500 74750
 43750 16750 12000 43000 27750 24750 26250 45250 43250 35250 38000 49500 35000
 14250 41000 44000 36500 39000 16750 54750 60250 65500 54250 36750 57250 63778
 58250 88583 83250 72250 97563117313 75875 75750 76250 38000 85563 82938 92500
 77313 98125 28250 33313 51688 42063 73438 49938 92375 32563 65125 48188 55125
 51688 63250 48125 82688 57188 99813 74313 63750 85625 39063 58563 87750 77438
 19063 79563 58750 35063 47750 36188 56750 63125 65938 49917 91833 41833 60833
 55917 94083 58083 66417 84167 842501151671027501034l7 52583 72333 52000 86917
 92167 58167 37750 41583 43000 40333 65417 43750 58667 18667 34250 52667 77583
 46917 48417 37583 54500 45833 64417 41000 28167 44417 39000 33500 23111  7167
 27667 40000 14500 13833 34500 20667 28833 35333 36000 16167 29667 32667 28500
 23167 32833 33667 21167 29500 18167 23500 29333 23167 19167 18750 14750 12750
 27250 19500 19000 12250  8250 21000 24000  7000 21000 26000 28500 24000 18000
 10500 21000  9000 10000  7000  8000 16000  3000 13000  8000

3) CHA-H1
     306=N   -1398=I 3) 1 sample (CHA-H1)                      -3(20F4.0)~
  710 520 595 790 500 760 775 425 640 410 295 115 295 405 335 305 245 575 465 365
11701070 710 630 430 315 615 640 625 540 365 310 755 295 665 550 460  90 565 735
  905 310 755 425 660 590 690 640 765 770 640 405 645 475 595 490 705 480 760 840
  375 415 675 650 650 390 770 935 815 465 660 705 980 645 595 920 715 280 490 400
  925 7501015 890 740 9201085 595 685 755 440 260 450 160 215 430 235 515 695 505
  300 605 395 530 120  60 420 500 480 260 510 485 420 515 765 475 395 675 265 475
  455 465 740 690 280 705 670 795 480 465 455 940 5551210 855 805 740 790  85 465
  405 340 615 735 280 115 510 685 610 165 280 500 765 760 960 685 715 385 300 555
  325 365 235 305  55 215 410 415 600  65 415 315 130  35 200 135 500 295 360 330
  510 415 755 765 490 305 185 145  45 225 315 215 335 325 200 165 270 255 305 280
  315 160 410 345 415 340 325 385 340 185 405 100 365 250 315 320 415 355 125 410
  425 235 270 540 415 340 470 295 525 375 385 235 320 320 125 175 140  80 155 225
  265 255  50  30 170 150  80  50 135  80  65 230 285 430 295 195 245 340 245 255
  285 405 290 395 390 450 250 400 225 250 385 325 285 400 325 315 475 170  85  55
   95 235 180 290 235 400 495 585 640 465 280 510 350 740 5601100 930 380 400 580
  350 650 500 540 510 580
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4) MAY702
     270=N   -2456=I 4) 1 sample (MAY702)   -2(26F3.0)~
 83 71101 76 62 66 89124144164 11 95 99 74 70 78 85122 55178202161102130153109
123128153124147152 68173 97131147134111 94 80106 55 72 98 22 58 28 66 76 36 73
  2 65 27 32 48 43 56 39 18 43 33 17 33 36 30 31 15 39 28 37 33 27 23 32 30 16
 29 21 17 25 29 18 35 35 36 15 28 25 26 23 21 26 25 16 14 16 21 31 26 2 20 16
 30 32 26 23 25 40 9 20 35 41 17 12 20 17 13 26 18 25 13 29 20 12 23 15 14 10
 10 19 11 15 12 17 12 10 16 9 10 2 18 14 10 16 5 13 5 4 9 7 12 10 19 21
 13 16 14 32 6 16 27 18 14 9 18 7 11 21 17 11 13 5 16 14 21 17 14 12 14 19
 16 18 15 21 22 17 13 26 4 21 7 9 14 7 23 26 29 8 15 17 13 18 13 12 12 12
 13 16 16 16 7 21 6 7 4 16 18 5 10 11 9 24 9 18 13 10 11 7 3 12 5 9
 11 7 11 10 12 40 34 9 16 2 10 13 13 2 8 5 2 6 3 9 2 8 4 6 8 10
  6 3 14 6 13 9 6 2 5 9

5) NOV001
     246=N   -2923=I 5) 1 sample (NOV001)   -2(26F3.0)~
  2 24 4 46 49 46 31 20125114115 71 33115148130 81 58 75107104 57119179106182
169117127160187162143170102174 60112 93 34 17 72 76 86100 94109125137 62104133
139 89 99 61 92 40 94 67 16 93 86136 90 60 60 40 78 79 79133 74 81120159 82103
 70 52 72 36 83 65 39108 68 79142127 56 83116138133 62 71 51 77 49113128103158
106 51 54 71 88 70149 60 14 26 43 23 89 35 64100 84 67108 78 48 52 44 22 52 52
 57 13 64 29 43 22109 71 47 37 89 74 93 82 29 52 50 34 64 53 16 8 32 19 38 18
 20 46 40 36 49 15 17 47 43 15 19 31 49 26 29 36 19 25 53 8 36 35 52 46 22 29
 26 43 31 42 22 14 46 48 17 30 49 17 60 51 48 43 32 42 33 21 21 13 28 24 20 38
 40 73 37 36 41 48 47 13 73 28 45 24 46 18 34 33 13 59 21 38 51 22 28 24 31 28
 25 17 10 10 16 23 14 26 14 20 11 18

6) CHA-H6
     345=N   -3178=I 6) 1 sample (CHA-H6)   -2(26F3.0)~
 71 90 55 99 41 94 87138157143113 98188184168144147136 66 91 65 26 95 87 62 58
 93 21 50106 79 61 68 50 85 21101 68 96 73 94 84 65 71 78 46 91 81 79 64 73 33
 49 39 71 42 82102 67 23 26 49 11 55 60 71103 91 65 61 68 38 42 47 42 50 33 37
 63 50 62 90104 87 26 58 72 52 17 9 32 22 18 44 67 78 40 76 29 62 63 57 29 4
 20 31 30 16 31 51 55 52 42 28 15 50 72 58 73 59 71 67 34 29 48 29 51 41 61 20
 31 11 34 43 40 31 45 19 44 39 48 56 29 41 11 40 44 30 40 27 32 58 5 81 18 16
 31 6 38 6 44 67 15 52105 63 97 67 33 29 43 47 87 70 39 76 63 79 54 83 33 43
 57 4 24 55 85 68 72 75 40 44 27 42 29 54 67 43 47 31 33 19 4 20 26 34 38 47
 13 17 30 24 38 5 20 19 15 12 29 19 43 25 24 31 4 20 19 20 3 34 2 52 26 42
 28 46 31 42 36 17 31 6 28 34 64 35 33 34 7 22 14 31 7 22 5 20 7 15 4 15
 13 2 37 24 8 22 34 32 19 27 31 56 27 2 28 10 21 37 18 20 9 27 18 27 9 7
  1 11 5 27 26 36 52 40 50 42 14 23 4 25 10 38 26 40 56 35 72 38 74 80 32 42
 39 20 14 28 25 8 23 28 23 44 29 54 79 28 29 36 39 45 86 94 11 51 8 3 28 5
 13 15 11 6 18 1 26

7) NOV078
     299=N   -3358=I 7) 1 sample (NOV078)   -2(26F3.0)~
 55 86139 68 20 401361421521151531611541700 95134136113106101 83119184 81166118
 92 18 78160117118 84 90132114 43112123 60 52 34 30 30 8 52 9 21 30 13 49 3
 58 52 18 25 22 33 24 60 27 44 32 39 18 33 43 60 72 81 75 67116 87 25 81 38 41
 41 71 80 93 53 34 78 67 75 82 48 66 18 49 36 41 21 6 10 44 90 53 23 63 98 33
 68 83 50104 88 70 66 60 82 65 41 80 88111 41 45 48 60 29 47 46 50 58 73 50 90
 39 73 46 68 27 68 93 55 51 83 80 40 43 72 23 40 77 86 91 60 67 47 20 20 32 50
 32 37 41 30 31 30 23 19 40 12 27 46 56 58 31 30 20 16 33 30 48 25 22 36 41 50
 24 42 28 20 46 44 19 18 25 23 22 8 37 42 25 6 22 10 20 18 25 29 20 22 23 13
 17 18 36 20 33 32 6 25 26 37 37 33 16 27 38 18 45 41 29 44 42 57 27 53 17 16
 32 17 7 20 22 20 17 22 7 14 7 18 16 6 18 25 24 19 34 14 14 17 15 10 29 24
 40 53 10 47 29 15 35 27 39 32 22 63 28 49 50 64 47 21 34 9 29 27 12 21 34 20
 43 31 34 31 32 14 41 59 42 34 25 33 24

8) NOV-A02
     286=N   -3457=I 8) 1 sample (NOV-A02)   -5(13F6.0)~
 83000 84500 67500 62000 50500 64500106500 96500 75500 82500 83000 83000 84500
 94000 73000 73000 64500 72000 75500 94000 93000 52667 66667 56333 53000 57000

 35333 46000 8000 5500 24000 32500 30000 19000 22000 37000 27500 37500 22500
 29500 33000 32500 54500 70500 42000 61000 69000 84000 68000 73500 52000 70500
 77000 91000112500 59000 14500 80000 47000 74500 64000116500 56500 88000 89500
 54500 56000 83000 58000 21000 67500 86500 85500 97000 86000 94500109000 70500
 65500 52000 82500 50500 39500 48500 49500 55000 54500 57000 47500 45000 66000
 77000 78000 76000 54000 68000 58500 21000 28000 14500 46500 29000 48500 37000
 41500 19000 28000 29500 31000 38500 22000 11500 28500 25500 28000 27500 34000
 22000 30000 62500 49500 38500 38000 47000 43000 46500 39500 39000 44000 40500
 45500 38500 74500 38500 42000 22500 30000 46000 41000 22500 37000 31500 19500
  4000 12500 26000 32000 43000 37500 43000 53000 72500 62500 46000 58500 7000
 25500 40500 51000 64000 89000 70000 81000 47500 77500 20500 70000 84000 71000
 76000 56000 54500 76500 59500 35000 51000 62500 39500 41500 28500 48000 23000
 25500 28500 36000 4000 21000 20000 13500 6500 12500 5500 21000 14500 21500
 14000 5000 12500 2000 32500 28000 26500 29000 9000 29000 37500 22500 14000
 41000 22000 1500 5000 23000 11500 19000 20000 26000 24000 29000 15000 11500
 28000 21500 26500 42000 22000 22000 8500 22000 18000 8500 7500 16500 20500
 30500 18500 39500 22000 17000 28500 21000 30000 49500 35500 54000 34500 65500
 53000 55500 44500 43500 75000 76000 56000 63500 39500 37000 10500 38000 48000
 53000 67500 82000 71000 89500103500 85500 83000107000 67000105500117500 78000
123000139500 97500122000 99500 78500 60000 69000 76000 66500 67500 44500 11000

9) CHA005
     198=N   -3513=I 9) 1 sample (CHA005)   -2(26F3.0)~
 28 66 47 28 20 50 50 36 44 38 29 38 25 22 19 17 10 18 9 16 9 10 16 19 18 19
 13 14 16 12 10 22 17 17 23 34 38 40 37 67 92 56 41 52 60 47 57 52 77100 90103
 80 49 50 56 38 47 34 44 25 31 47 65 94 91 39 29 62 40 60 44 34 33 43 41 49 34
 63 56 38 43 44 41 33 38 37 38 48 30 46 31 15 13 16 30 41 43 51 50 43 56 69 67
 30 37 52 59 43 44 53 43 64 52 40 47 17 34 35 35 52 26 32 52 43 44 16 10 37 44
 28 39 33 39 38 56 27 58 33 58 79 67 38 24 38 30 38 39 44 19 34 32 28 25 29 27
 25 30 57 55 40 34 47 49 51 37 34 35 24 17 28 35 43 38 56 62 88 79 81 69 85 38
 60 73 78 52 73 38 53 81109121 93 85124116145141

10) NOV029
     306=N   -3634=I 10) 1 sample (NOV029)   -2(26F3.0)~
1291592352642012021382131321549811113612912511510 6210012610110710810417511 1
 43 15 47 53 54108 83119 57 64 81 71 74 44 30 72 82 43 38 82 43 41117 98 98102
 68 74 88 57 47 78 61 94124168 58 41 32 51 45 44 33 37 35 33 19 62 51 65 78132
 77 90 94 79 60 60 21 16 8 21 57 61 45 67 47 64 21 53 58 59 86 50 62 60 52 27
 74 73 76 61 52 67 45 30 27 25 17 12 11 2 12 9 29 12 23 17 9 18 2 35 17 31
 58 41 67 50 52 22 60 40 13 42 28 31 46 60 34 37 23 31 55 32 59 53 27 37 18 36
 23 27 27 13 8 34 35 24 23 27 20 13 28 33 17 42 31 37 32 35 38 35 35 52 42 54
 33 35 36 45 19 20 20 18 32 33 26 46 30 53 24 55 25 46 57 39 35 69 55 37 42 41
 22 34 59 51 49 53 67 46 19 26 47 45 45 60 46 25 39 47 38 24 47 21 30 46 34 57
 30 18 21 18 39 28 34 21 26 26 15 32 16 29 25 13 33 28 29 17 25 14 31 14 39 37
 33 3 23 5 25 13 19 25 14 26 31 13 7 8 36 15 22 21 3 20 19 24 24 23 13 17
 35 18 26 24 13 31 30 37 17 23 17 10 16 12 7 21 13 12 9 9

11) CHA060,012,009,017,001
     685=N   -3964=I 11) 5 samples (CHA060,012,009,017,001)   -5(13F6.0)~
 29500 20500 15000 24000 33000 36500 10000 11000 12500 13500 10500 5500 7000
  7000 10000 4500 3000 6500 9500 16000 13000 16000 5500 7000 9000 11000
 13500 22000 15000 15500 13500 12500 4500 6000 7000 9000 21000 23000 42000
 14000 17000 5000 5000 14000 22000 21000 17000 15000 12000 15000 17000 16000
 10500 10000 15000 6000 22000 8500 17500 15000 34000 27000 12500 9500 14000
 14000 13500 9500 15500 17000 9000 5000 8000 8000 8000 9000 7500 4500
  7500 12500 15000 26500 19000 20500 32000 39500 23500 35000 29000 27000 19000
 21000 20500 22500 24500 26500 23500 41500 32500 43000 56000 33000 44000 77000
 45500 59000 29000 55500 35500 24000 41500 51500 48000 44500 42500 48500 33000
 26500 22000 30500 30500 32000 50500 40000 29000 11000 19000 21000 13500 25500
 25500 30000 5000 5500 18500 6500 31000 14000 35000 32500 15000 42000 50500
 57000 22500 50000 57000 53000 64099 21470 9631 18304 35842 46483 57075 55743
 62066 81774 72528 56319 37556 34971 50015 39598 21283 53422 56443 68633 77002
 39117 41629 35335 29859 38102 46170 39393 53294 51532 57480 43041 48908 45052

 22796 30368 71920 47418 38804 16721 18342 30597 39246 54877 44497 63724 47343
 56569 41014 35417 57015 38640 55746 40256 38815 28450 28771 35747 40459 40367
 43102 37881 33733 53481 52421 41144 57534 49544 62108 48135 32065 49386 40716
 19883 31000 43000 54000 65000 30000 19000 53000 34000 31000 51000 38000 30000
 39000 54000 31000 41000 24000 5000 26000 30000 37000 28000 27000 36000 52000
 51000 83000 94000 57000 27000 28000 40000 34000 53000 47000 35000 30000 51000
 60000 53000 45000 26000 22000 15000 47000 40000 41000 36000 29000 41000 32000
 30000 46000 28000 21000 44000 47000 61000 26000 39000 31000 23000 27000 34000
 17000 17000 14000 22000 26000 27000 42000 39000 37143 36479 34282 15973 46985
 41586 45817 35541 34462 33297 57851 38141 39830 58005 52402 64245 61268 95274
 77879 79103 44527 73461 67818 51382 66915 48836 58044 48542 60188 50493 34297
 21814 30343 27318 19330 31028 37674 22448 25890 20938 27414 34284 36175 22814
 22155 18932 34119 28429 46027 39944 28606 37674 58716 57737 33924 59131 47706
 67784 57924 47264 56184 23589 35398 50320 59990 41211 56298 48331 56917 46614
 60352 73078100871 72100100826 46340 71674 67785 70748 65034 57059 83787 82437
 97654102262 97603 96917110019 72257 67592 83499 86173107194 53370 83050 71618
 72105 62601 70925 75670 71983 92814 83718 69543 58714 54920 59474 43291 66602
 48121 79532 69034 25023 50577 63493 77587 77307 56182 45723 67844 49108 75721
 46890 84507 77881 70337 46438 52629 60915 50684 57532 58031 43993 32527 61223
 52640 49079 42544 53483 61960 79030 66823 73806 32689 35046 18242 62750 55673
 61686 52388 77760 33551 53130 63936 65666 51292 68383 50993 61192 60891 43838
 56876 51626 58651 36797 26491 52839 38990 52762 33637 22651 49848 53290 66765
 72486 53265 79909 30593 34434 40624 45162 24607 27409 45092 66972 71704 67281
 33133 53007 43198 57953 62357 38773 42726 57282 60859 38621 38300 31630 48192
 51651 34748 43513 36436 50128 54668 29234 31987 36751 31569 37721 13337 42200
 40125 59482 44299 19273 30587 26770 18675 28352 53830 37686 33647 20975 22003
 24719 35767 26587 26669 18037 25899 19415 22622 31868 31603 11966 28692 25282
 11026 24117 27808 12843 15031 12381 21029 14078 17673 24989 21396 13818 36290
 32305 30660 18314 40216 43074 55488 30400 52655 48880 80052 64740 40598 78201
 38192 61936 43419 22177 17147 17388 5300 24236 32535 13552 16430 13265 21525
 11911 36666 10407 31224 29079 21922 39323 27000 26000 45000 41000 55000 41000
 57893 51388 45397 21782 37218 35585 31277 19650 31069 5221 17963 30678 39867
 11885 34455 16000 12500 12500 31000 47500 19000 33500 24500 13000 42000 29000
 17000 44000 37000 34500 31500 55500 28500 32500 32000 25500 17000 26000 29000
 10500 27000 34000 32000 14000 11000 24000 27000 8000 14000 10000 16000 24000
 18000 26000 20500 26000 35500 48500 42500 38000 43500 29500 32500 44000 47000
 56000 55000 74500 66000 67000 80000 31000 52000 64000 81000 34000 39000 17000
 43000 29000 61000 60000 47000 65000 79000114000 22000 68000 59000113000 54000
103000106000110000 58000 82000107000133000180000178000

tem-rcs.rwm
Temperature reconstructed:
1) Early summer temperature reconstructed, RCS-RES chronology
2) Early summer temperature reconstructed, RCS-RES chronology (5-years moving
average)
3) Annual temperature reconstructed, RCS-chronology (5-years moving average)

1) Early summer temperature reconstructed, RCS-RES chronology
    2072=N   -77=I TJJ   -4(13F6.0)~
150043131332106186 94108 55646 60349 66041119600 86633105443 73367 90395 86782
11717511722410277010186 98365116284103958 74753 94355 75545106681103513 82673
 95246111730 74902 91385117818 77971 77228104255107077 48370 92672109750 93019
 95197 84505 85990103166104602 81089 59210111680 63814 83614128906111334 82673
 70942 52181110096 87623 92177 87623 73565 82475 94058 92969 76634 66437 86039
 72971 84208 77228 99058 81683 88564 90890 68665103562 92771104008 87970 67279
 74753 93910 99701117719 67031 44410 91930 77575 83911 78119 85594 95345 91138
 83564 55795 92128105196 82426 97919 92524 45944109750 79654 73268 93712 71041
 93316 82921104057 66338 61735117719 72377 62576112423 62972 76931 72724 78367
 80693 95741 86782 81188 79505 71437 64358107324 83218 77872 81485 84950 93118
 98662 81634 82624 87277 70348 86089 87227 84257110047 75100 86485 74951 91583
 64804 96830 63913 94108 94108 75595 92672101335 82030 87227106928 86287 68566
 80792113017117521 89851 95147 79010 75446101137 90742104849109205 64556 79505
 90742 95296 76486 90544120244104503 93068 69308 85940 69259 92029110789103909

80050 48469105592 90148 55894119551103958 66190 85346 81386109057100097 81931
100048 85198102919105097107423 75991 79010111631 92029 898511329651115811154422
110245 75842 49112 89851 93167108611 55993 62032 73714104057 90395 84752 97721
103414 91435 80000108364 86138 94058 81733 93761 82574104701 86831126778109700
85594107869 51736122422107324 75149 53320 86039101038 73664102671102028 96236
45004101236 74555 77278103463 78515113858 82129 81485106730 43816 63022 72823
95939103166102968 68714 92326 73417 86485 91979 87524 68962 97226 95246 96286
74060 86386 75743 66437 97177 68368 77674 919301009881120 76 70744 75298 80495
54310 78713101285 70397101582 78416 80198 62873101978 85247 77179 74456116977
107522 73615 82723 88960 80000110987 64309 90247 86930 99652 79852 61487 90395
124303113561 75347 92524 64556 96781 74357103166 92771 80792107374 95890109997
83911135143125590112472112522108760 49756 705461125221027701014 34 99157 69259
95395 77674 95840101830111136 69209 95147111581 98959155240 364901200951277 18
94702 90544107819 75347110591 571311084631038591620711045521052 45 84901 74506
100246 72130 69506 80396136975 78713 88762103265105245113809 68962 48766120739
77525 57923 89702110740112126 81832100394100147 99652 80891 86435103661100345
113611 94256 83069101434 85000 86089 91534 59606 73318115393 644081111829105196
97127109057110294 77179 47776 79010115294 76783104354 97573 98860 84950 44707
88366108413 65150107720103067 89009 95197 86534 47083 716351015331003 94 66982
70249105740 95692 94900 97523 73912 82871 58814 92969116977107423108562116927
113561 77327 71041 96187 54805128857 72872 86584 86237 79109 95098 96830109502
63368115789 44360101978 90692102374109552109552 98612 79406 77179 79060 78961
117373105443 64556 87623135589105592 91435 97028 60200123164 628241107891115 32
70051 99157 98315 93662 60745108562 75595103265 79307 724761038101242041284 61
102028102473 94504 77822 52379 97375 95147114155101533 51488109997 76139131728
63913 95890 72625116977 93316 93860 63418133658 85396117422114205 94405 83218
81040 92375 93959 99602 85940101384 74060112621 85099 94256 89059113611 94949
77971 89405 99652135292 51488 77426 94900102424 86386 67328 82525 84158 96434
96187 93316 77723 76931 89554 78218 93415 83812 88811118759 97127109552104305
97573 94652 82277 77575 97919 96385 62675 90940112175 90643 79753 86188 66734
72872 87574 70249 81139 82228 98414 81337100691 66833 77723 92672 85742 97721
63071 99602 81436 82376 82624103315 78020105641 81782 88960102374 76040107374
105889 94652 68764104156102869 73565104948 45845 96880 795551132151180 66 56092
121432101384 34955 55795 76436105146 79753 67675 98464 60299 78119 73664 85297
101335 93118 87425 74753 84851 59111 92474114106 82228 90643 96286 88861119254
104453 87029 82327 98068117719 91682 74110 92078 70249128263127916 64853100493
70843 83812101830131480 701001088591168781043549796 9 605961245501007411039 09
119600 81782113561 72229116185 99602119600 76139111185120491 60002 78812 80990
44756109601106087104503 85544 90346113611 98959 838611100961078 69 72130104255
81040 68714 96385108017106483 93613 87772 68764117373 56389118759 78763 89356
84950115096 49013 75298 88168 93811 79555105839 89999 86683 92672 58963 84703
104701 89702101335 76486 88861 70843103067 83218 95543 88564 76436 95098 91435
78416100939100741 56488115541 651501029191048491197981081 66 70397 62032 80099
100196 73219 99107104354 80990 61240121531 91336 79703 926721021271033 64 77476
76040 49360 92128122867 92474 46390 61685 98563109849 84257 95147 88960 54854
54656114898106334 77179 97177 93316 92573 65794 92722101879 97127 94256 61438
115987 82673118412113066 37430111581 77179 81683 62923110690 82129 81683111383
54409 96484102622 95098 83267 63022 96533 72773 68615 86683 95147 84703 86188
91781 90940 84059 76931 96335 88564 96137114848 72179 84604102919 79208119056
85891 57181 83960108067100196 71882122620112175 81238 68318 69754108265 59755
112373 64408 88168 84554131530 90197 71486 803471155911025231088 59 88069 79406
104255 82079 96484 96583 69704 70199 71783 72229103909 78317 88118 89900 56983
105592106631108908 796041187091113831168 78 88217102226127669 48271 96286102869
87326 86386111581 77080104057 77476 68219 93910 69160 97127 69110 69160 93860
71882 93613107770 84406121234 96137 75941 69061 69506 81089 96583 92227101879
121036 97919 70744 97919 89009 78713 52528 80198 79951 90247100345 74308 82376
86881 68516 84109101978 88663 91534 68714106483121036 99800 79802106978 80050
68219101632 91435 91138100939 71486 71338100048 47182 72080 96632 92722 79406
87722 81089 92722108463 74605 913361015331097001156 40 87128 85346 48023 78367
79852105146 95246 71932 68714108859117323101087127174 81634 99355 53171 56983
110542113710104008 81782 81386 99107 76387 91286 70942130391121630 85000 83168
104849119105 70397 63269 89900 43667 79258 78614 90643 73763 96979 97028 91286
67625 90494100592107869 80297 71239 99256 65398114452 88811 98068 95642102077

99800 77575 836141244511095021010 38 68912 95395 67477 58765 67328 77773109948
77377107176 74258 59161103265 70645 89702 79703 59309 93217 67427 89455 98464
71536 81980 88366 68269103364 99503124550111383 50251 81683106879 81584 72922
1014831004931436571250 45 40747135787 84653 98266 75298 67031 59408 83366 78367
99998111185115195120343114749 919301207881468751139 57 82228115244 22729119353
132124110245117422 82822103513 80446105344 88811 53072 81436 75446 75991101632
90989 68120 94553109651 84752130144 90692 55547 89801100889 83020115145149399
91187 81733121729109255 54508108364 57329 88960 98117 89603 83218 63962122917
128263 846531059881019781111532103661 89504 52726 69655101384 72724104008105146
71585 71090 81089 86188 826731119771115811080 17 77674121283 63022 80495 98959
65843 50993 93712 95147 81040 84208 852971174221094031137591182141040081185 11
86584 47281 66190 88762 67180 99454117175102968 82178 55201111779 91484 90247
86435101335 919301181651109381061 36 80396 85247 67972 95246 85000115492 71536
131183 98909112918 36935 809411013351122741088 09 78911106433 93860 78169 98711
108760 84158 79555 88514 90494 75892 976221081661107 89 97771 93860108809 81436
118165 95098 74803 45944 97672 79604 62477 85693 93365 84851 656951205411158 38
96830122026 79802109849 68021 84505115640104552 39658 81634133757 99899 96533
89207 73912 870791072751033641543 49 33322 73763 94751 856431312331129181017 31
100097116482107918 53666123461 62081 83564 59854 641601020771201 45 96484104255
61883118759 60794107522 910881096011461 32 90940 82129 73615110641 73070103117
97672108314 54112 70546 99305 76882 84554 91534 96682 77674 67081 90791 55201
107275 91138 90197 92227 94801 82970 92771 81931 96088 62873 80000133312 66338
52825111284 89356 65992 84703 88514 72575 78218 99899 73516 81733 96236107770
93415 59260105542 89999100840 88811 930191099971150461008 89 60349 91336 60250
93365 55052 80990 77377110294 93365 94850 75545 84554 97820 80495106087 81733
69754 88366 82426 80149 95840 82475 99454 90692 85099 64507 68615 95840 91534
117620 64952 66982 96979 85148 98018101335 73120 82723 57824 97622 90544 70447
109453 75001 78515 94603 80050 84604 89950 83119 60101 72179 80000 74951 93415
82871 70694 97177 82574 88663 64259 75397 92078 76783 81931 80792 84059 74110
106730 62477 86237 97424 68219 82723 99256 79109 63665 84406 99404100889 99701
87871114601 71882 63467 78565 89257 85297 96484100939 789111146011191051248 97
92029110641102176 71140 99602 98563 94504 50746 55745 51884 76486 75248107869
85247 853961220751081661107 40 39262 67378 71635106829102275 60398 83614 95494
96236101533128312 94801 93910 75793 86732 78119108710122917 87178 95642105196
97820 81634 68417 90593 69704 97870 67675104156 94058 90494101285 91633 89999
99355 94157 52082 79753 91187116779 88069 93019 801981316781391531328 66 80149
72971 26095 73961 95692 73219119006101137 92870 96533110789 83564105592 89455
87227100592 60002 80396118462 96236 94702 93811123263 75743 78416105889 79703
102721 79852106433 90098 79357 80594104107 99800 91633 96236 57874 92128 94949
104305 87871 90643 95791 65843 70150107374 731201045521163 33 74951 98068121778
60695103810 73516 81040 59408 65893112571 92870 99998101483 61982 72031 95345
85841 97820 85990 85396 91633 58468106235 83861 83069 86188 96187 64309105641
83960101483 90544 94058103463 53864119650 86039 74506 62675 79654 70051 99355
102572 74951101632112324 86435 59161 92128114056 88267101978 87277 60943 94652
102721 93464 90098 89752 93167 81188 58369 86287130391 96434 89405 86683 78664
66190 88811 77575103117 70496 79604 70892 92425 85049 91187104305 81980 67477
75001 69952 90346 82525104305103859 89207 59111 75496100543 92722 59210 94702
92227112324 91435104255104552 73912 46439 80842 92375 71239 89603 97523 68665
106483 95048107176 88118103018 86881 81782 64606 73664114799 83465 81584102176
91732 83564100196106285 99602 76634 95098 63319 93118 92821 87871105790 90643
84901 89455 58270112274 64408 74011115640 83119 87623 69556111383 65546106582
91435 82723 48815108760 67922 89950 81881108958 80594 91633 831681171751003 45
63616 78515 86633 68120 84554102424 86732 95989 85099 92524101978 78713 80594
105839 73763 89455 98216 82871 53221 73862 82525 92672 65249 91682101087 85247
101929 88762 70051 85544108958 70991 88267 82723 87475 98761 98117109750 59012
102077118412 98266 50300 79951 62576 99503 93712 75100 76090 96286 83663 83020
108265 69605103661 94801 84752 67427 94454107176 65497 99157 88613 78169 80248
85198 98810117620 98860101285 72278 86980 84257 96583 67328 75793 85495 87871
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2) Early summer temperature reconstructed (5-years moving average)
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3) Annual temperature reconstructed, RCS-chronology (5-years moving average)
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VARIABILITY OF LARCH RADIAL GROWTH IN THE EAST OF TAYMIR AND PUTORAN FOR THE LAST 2000 YEARS

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Abstract

Regional tree-ring chronology with extension 2209 years (since 212 B.C. till 1996 A.D.) was built for the east of Taymir according to wood of living trees, well preserved residues of dead trees and semi-fossil wood from alluvial bank deposits by the cross-dating method. In addition the "floading" tree-ring width chronology for the period of Holocene Optimum (3300-2600 B.C.) was built with extention 685 years and supported by several rdiocarbon dates. High values of synchrony and correlation of individual tree-ring series show a prevailing effect of one external factor on radial tree growth change in the studied region of Siberian subarctic. It was established that the main factor of growth variability the early summer and annual temperature is which explains up to 70% of tree growth rate variability. Cyclic components stable for two millennia were revealed at analysis of the tree-ring chronology: double secular (about 180 years), secular (78-90) and intrasecular (44, 28, 11 and 6,7-6,9 years) variations. Models for reconstruction of the early summer and annual air temperature were obtained according to tree growth variability. Temperature dynamics in the eastern part of Taymir for the last two millenia agrees well with temperature variations in the northern hemisphere obtained according to other indirect sources. The warming of the middle of the 20-th century is not extraordinary. The more long in time, and close in amplitude the warming at the border of the first and the second millennia was.

Key words: radial growth, tree-ring chronologies, temperature change, dendrochronology, climate, growth cyclicity, temperature reconstruction, response functions.

Introduction

The leading dendrochronological groups began their work in some key regions of circumpolar zone of the northern hemisphere on building the superlong (several millennia, and for the whole Holocene period if to use subfossil wood) tree-ring chronologies for the quantitative reconstruction of natural temperature variations [6,8,19,20,35,36]. The high latitudinal regions in the northern hemisphere are of greatest interest for assessing natural and anthropogenic variations of air temperature, forest-tundra ecosystem growth and productivity, regeneration regime as well as of polar timberline dynamics because the ecosystems of high latitudes have the highest sensibility to the expected global climate warming [4,15,18,19,22,43]. Owing to accessibility and great amount of well-preserved wood of dead trees as well as of subfossil wood from alluvial river deposits and wood buried in bogs several regions in high latitudes of Russia turned to be promising for building millennial chronologies: the Polar Urals [15,31], Yamal peninsula [32], the east of Taymir and Putoran [7,8,14] and the lower Indigirka river[34]. The following problems were solved in the given paper: 1) obtaining of the absolutely dated 2000 year tree-ring chronology suitable for quantitative reconstruction of climate changes; 2) revealing of the main climatic factor responsible for the year-to-year and long -term growth variability; 3) building of models of climate change reconstruction for the whole period of long tree-ring chronology.

Material and methods

Dendrochronological material was collected in Kheta-Khatanga plain as well as in Moyero-Kotuy plateau regions of the Middle-Siberian forest zone within the northern stripe of the northern taiga subzone [1] (Fig.1). The wood samples were taken with the help of a borer or chainsaw from the living trees, from the well preserved residues of a dead and subfossil wood. The whole sampled material is from trees from three types of conditions: 1) from the contemporary northern timberline of larch in the stow (urotchishche) Ary-Mas of the Taymir biospheric reservation (latitude of 72 28' N.); 2) from contemporary upper timberline with absolute marks 200-300 m above sea level in the Kotuy river valley (latitude of 70 30'-71 00' N.); 3) from alluvial deposits of flood-land and over-flood-land terraces of large tributaries of the Khatanga river (latitude of 70 30'- 73 00'N.). Measuring of the tree-ring width was made with the help of automatized devices with resolution up to 0.001 mm, and later the measured individual tree-ring chronologies were treated in the standard software package for dendrochronological and dendroclimatological analysis [26,33]. Owing to the high year-to-year variability, high synchrony of individual series between each other the results of the cross dating gave a chance to build the continuous chronology since the year 212 B.C. till 1996 A.D., it means the total length 2209 years. Besides, according to the well-cross-dated discs of subfossil wood for which the series of radiocarbon dates was made at the University of Bern (Switzerland) and at the Joint Institute of Geology, Geophysics and Mineralogy SB RAS (Novosibirsk) the "floading" chronology of 685 years long was obtained which according to the dates agreed with climatic optimum of the Holocene (3300-2600 years B.C.).

Standartization method is used to treat individual series for

the best revealing of climatic signal. This method is intended to remove the changes caused by age or by factors of the non-climatic nature (for example, effect of phytocoenotic factors) from tree-ring width variability. For standartization two approaches were used: 1) an approximating curve of age variations is tried for every individual series [15,26]; 2) an age curve is used which is built according to the entire totality of analysed individual curves of growth [3,11,21,23]. As the special studies showed, the long climatic changes (or super-secular variations) remain more reliably at the second standartization method [21]. Therefore, it was chosen for standartization of individual series and obtaining of the long chronology of tree-ring indexes. Obtaining of regional tree-ring chronology (C1) and of the so-called "residual" series (C2), from which autocorrelation was removed [26,40], was as a result of individual series standartization. The main statistic characteristics were calculated for the obtained chronologies: inter-series coefficient of correlation (as an index of synchrony of individual series), sensitivity coefficient, standard deviation,1-st order autocorrelation etc.[30,41].

Analysis of the frequency-temporal structure of obtained chronologies at the entire period and at the 500-year intervals was carried out by Fourie method of direct transforming (Blackman-Tyuki method) and Fourie method of "fast or inverse transforming" (Kuli-Tyuki method) [10]. The methods of graphical assessment of smoothed curves [15,16], analysis of autocorrelational function [2,15], a narrow-striped filtering of series [12] were used at the revealing of long (super-secular) cycles in growth variability. Revealing of the main climatic factors of growth variability was based on response function assessing and interpreting [30,42]. The quantitative reconstruction of climatic factors according to variability of growth indexes was made on the base of calculated regression model at which building one part of climatic series was used for calibration, another part - for verification [6,7,41]. Adequacy of reconstruction model was assessed by standard statistic indexes: correlation coefficient, Fisher's criterion, autocorrelation of residues - criterion of Darbin-Watson [17].

Results

In the result of the cross dating (its quality was checked by statistic estimates according to the COFECHA program [26,33]) of Larix gmelini living trees and trees dead long ago from the upper timberline as well as of subfossil wood from alluvial deposits the reginal tree-ring chronology since the year 212 B.C. till 1996 A.D. was built for the eastern part of Taymir and Putoran. The total number of wood samples being dated was 118, including 27 living and 91 dead trees. The average age of the used trees made 300 years, the maximum age was 798 years. The percentage of the missing rings is not very large - only 0,5% because the discs were analysed, mainly, but not wood cores [44]. The tree number in the regional chronology is not homogeneous in calendar scale and has a tendency to decrease when moving to the past: 3 and more models since the year 135 B.C., 5 and more models since the year 81 B.C. Dating of dead trees showed that in the upper timberline under continental climate the dead tree residues can remain on the day surface during more than 1900 years. Inter-series correlation coefficient for the whole time period is rather higher than the threshold value (0,62- 0,75, $p < 0,01$). It confirms a stable and strong external influence which synchronizes growth variability of individual trees.

The main statistic C1 chronology for the whole period and in 500- year intervals are given in the Table 1. The high and close coefficient values of sensitivity and standard deviation for the

different time intervals show that tree growth variability under these conditions is controlled by one and the same factor during two millennia. Autocorrelation of the first order which shows the growth effect of the previous year on the growth in the next year is of great importance as well. Autocorrelation is not significant after treating it by autoregression model in C2. The average tree-ring width for two thousand years is at the level 0,28 mm but it greatly varies in time, the average tree-ring width is more high (0,40 mm) for the Holocene optimum period (Fig.3). Radiocarbon datings agree well with absolute dendrochronological data.

Analysis of spectral density allowed to show the frequency stripes important by their contribution to the total growth variability and to assess their amplitude (Table 2). The contribution of millennial cyclic component makes about 4%. The large contribution is brought by double secular cycle (in frequency stripe of 120-220 years) up to 20,6% and secular cycle (in frequency stripe of 60-120 years) - up to 13,3%. The cross-spectral analysis of the 500 year old fragments of chronology showed that during two millennia the double secular (180 years), secular (78-90 years) and several intrasecular (44,28,11 6,7- 6,9 years) cycles are steadily present. Hereat, re-distribution in the capacity of separate cyclic components is observed. Such a re-distribution was already noted in the papers on dendroclimatic data from boreal taiga forests and forest-tundra regions [2,12,15]. Positive anomalies of growth, the most strong in amplitude and long in time, fall on the 4-th century, the border of the 6-th and 7-th centuries, the border of the 1-st and 2-nd millennia, the middle of the 20-th century. However, the negative anomalies fall on the 1-st century, the border of the 13-th and 14-th centuries and the first half of the 19-th century. These anomalies can be explained by superposition of cycles of different length. So, growth increase in the middle of the 20-th century agreed with positive periods of the double secular, secular, and several intrasecular cycles (44, 11, and 6,7 years).

Since at the polar timberline the summer temperature is the main factor of growth limiting [6, 15,35,43], then the dendroclimatic analysis of relation of growth variability was carried out, first of all, with air temperature data for summer period. However, some changes were brought to the traditional searching scheme of correlation with average monthly temperature data.In order to reveal the key interval of the season when temperature mainly affected on radial tree growth the value of correlation coefficient between C2 growth indexes and air temperature for every five days beginning from the 8-th of May was calculated. Everyday data of the Khatanga meteorological station since 1933 to 1989 were used. All the calculations are given in the Fig.4. As we see, the significant positive connection ($p<0,01$) between air temperature for every five days and growth indexes is observed for the period since June 17 to July 11 and it falls on the interval of stable temperature rise in the season. The temperature of the more late intervals of the season does not show large connection with growth variations. The temperature for the period June 17 -July 11 we called as an early summer temperature. Temperature sum for this time period shows the most correlation with C2 tree-ring indices ($R=0,77$). Thus, variability of C2 tree-ring indexes is determined by the early summer temperature variability in the east of Taymir and Putoran by 60%. The smoothed (the 5-year moving average) C1 tree-ring indexes and instrumental values of average annual air temperature show high agreement too ($R=0,72$). At the same time the smoothed annual temperature shows the significant relationship with the concordance coefficient calculated

for the same period of 5 years based on all wood samples available. This relationship is positive (R=0.44,p<0.01) and shows that in cool periods the synchrony in tree-ring variations among all trees measured becames lower, in warm periods it becomes higher, but has a non-significant relation to tree-ring width variations. Therefore, at seaching of quantitative models of reconstruction of leading climatic variables using tree-ring chronologies it was conventionally taken to use C2 for the early summer temperature reconstruction, and C1 - for the annual temperature reconstruction.

The results of calibration and verification of obtained models of the early summer and average annual temperature reconstruction according to 2000-year chronologies data are given in the Table 3 and in the Fig.5. As we can see, the early summer temperature variability is well explained by tree-ring indexes variability in C2 (R^2 =0,59 - 0,72), the average annual temperature variability is described by the model with two variables: by smoothed values of tree-ring indexes in C1 and by concordance coefficient values between individual series (R^2 =0,67) (Fig.5). Comparison of calculated values of the early summer and average annual temperatures with the real ones for the period of instrumental observations shows (Fig.5) that the calculated values of the early summer temperature agree well with the year-to-year variability of real values repeating the most large positive (1940-41, 1953, 1967,1979, 1984) and negative (1947, 1949, 1980, 1989) extremes. Hereat, in the curves of the early summer temperature variability the long fluctuations are not expressed. To the contrary, the periods of large temperature rise (1938-1956,1983-1989) and temperature fall (the end of (19)50s and (19)70s clearly agree in reconstructed and real values of average annual temperature.

Based on the obtained models according to two chronologies the reconstruction of the early summer and average annual air temperature was made for the east of Taymir and Putoran for the period since the year 81 B.C. to the present time (it means, for the period provided by 5 and more samples). The curves of variability of the reconstructed early summer temperature (smoothed by the 5-year and 57-year moving average) are given in the Fig.6. The average value of the early summer temperature equals to 9,6 C for the instrumental observation period. The most large fall of the early summer temperature is marked in the 1-st century (T=8,4 C), and in the end of the 13-th century (8,4 C). The most warm periods with the raised average early summer temperature are the end of the 3-rd century (T=9,7 C), the border of two millennia (9,6 C), the middle of the 20-th century (9,9 C). The middle of the 20-th century is characterized by the most rise of the early summer temperature, but the 11-th and 12-th centuries are characterized by the long period with high early summer temperatures.

Long variations of the average annual temperature range from minus 14 C to minus 12,5 C. It was of great interest for average annual temperature to compare the reconstruction data with other indirect data on dynamics of average annual air temperature of the northern hemisphere in order to make clear whether temperature variations in the east of Taymir and Putoran reflect global temperature changes in the northern hemisphere. As such the data on reconstruction of temperature variation in high latitudes according to ratio of oxygen isotopes in ice cores of Greenland were used [25,29]. In the Fig.7 both reconstructions are matched in the calendar scale since the late of the 12-th century. Their good agreement is well seen, especially in positive (the 14-th and 15-th centuries, the end of the 18-th and the middle of the 20-th centuries) and in negative (the late of the 13-th and of the 17-th centuries, and the first half of the 19-th) extremes. It means,

the long fluctuations of average annual temperature in the east of Taymir and Putoran agree well with global air temperature variations of the northern hemisphere for the last millennium, and hence the tree-ring chrnology of this region can be used to analyse both regional peculiarities and global temperature variations in the northern hemisphere.

Discussion and conclusions

The results of analysis of the super-long tree-ring chronology of the Taymir and Putoran east show that the information on the main climate changes in the northern hemisphere for the last 2000 years is reliably fixed in it: fall of temperature in the first century, climate warming in the 3-rd and 4-th centuries, warming in the Medival Warm Period (?) or "the small climatic optimum" at the border of two millennia, the long fall of temperature in the 17-th and 19-th centuries ("the small glacial period") and the present climate warming in the middle of the 20-th century [27]. Since the obtained regional chronology has good correlations with other chronologies of subarctic zone within 500- 600 km [6,43], then we can believe that similar regularities of the early summer and average annual temperature variability are typical of large sector of Siberian subarctic. It was shown earlier that the long growth variations agree well for the entire Siberian subarctic [8,24]. The studied region (and this is shown by subfossil wood samples and by obtained "floating" chronology) has a high potential to build the tree-ring chronology for the whole Holocene period and to study in details temperature variations for this period of the Earth history.

Two important consequenses from reconstruction analysis should be noted especially. First, the analysis of frequency structure of series and of their separate fragments illustrates a constancy of the main environmental factors limiting growth. It is confirmed also by comparing reconstructions with other indirect evidences. Second, the warming in the middle of the 20-th century, marked as extraordinary [22], has the analogs in the past. So, the warming at the border of millennia shows a close amplitude and was more long [27,38]. Historical evidences on climate of this Medival Warm period say about the more large climate warming than the present one [13]. The obtained data demonstrate that temperature variations in high latitudes for the instrumental period (1850- 1990) do not go far beyond limits of natural variations revealed during two millennia.

Ratio of natural and anthropogenic components in the present and future climate changes is especially discussed. It is proved in some papers based on the long tree-ring chronologies of North America that the influence of anthropogenic component becomes large and can be separated and assessed quantitatively [39]. Hereat, the trees growing above the upper or polar timberline reflect stable temperature rise in the northern hemisphere [28,35,37]. However, a direct correlation between temperature and growth is marked only for trees from growth regime especially chosen [36,37]. The stable trend of summer and especially winter temperatures for the last decades is connected with the increase of anthropogenic component share, mainly, at the expense of atmospheric green-house gases [4]. At the same time, on large areas of high latitudes (mainly, in subarctic zone) tree growth, correlating well with temperature rise till (19)60s, begins to stunt after this period from the rise of temperature [24]. We can believe that the direct temperature effect is combined with other factors which influence growth rate of trees in polar latitudes. For instance, increase of winter precipitation can shift the dates of snow cover melting to the more late time even at summer temperature rise [9]. In polar latitudes the conditions of the first season half play the leading

role in radial tree growth and tree-ring forming [5,6]. Therefore, tree growth response at the polar timberline will be more complex than we can expect only from summer temperature variations.

Conclusions

1. The long 2209-year (since the year 212 B.C. till 1996 A.D) regional tree-ring chronology was obtained for the east of Taymir and Putoran, suitable for quantitative dendroclimatic analysis and climate change reconstruction. Numerous radiocarbon data of sub-fossil wood and several built "floating" chronologies show a high potential of dendrochronological material of the given region for the building of absolute tree-ring chronology for the main Holocene period (more than 6000 years).
2. The main factors were established which determined the year-to-year variability as well as long-term variability of larch growth in the study region. They are the early summer and average annual air temperature and they determine up to 70% of the total growth variability.
3. In long-term growth variability during two millennia the millennial, the double secular and secular cycles as well as some intrasecular cycles which are met the most often in tree growth variability in polar latitudes of the northern hemisphere are steadily seen. The most large warmings and falls of temperature can be explained by matching particular cycles.
4. Reconstruction of the early summer and average annual temperature variations in the east of Taymir and Putoran showed good agreement of temperature variations in the given region with temperature variations in the northern hemisphere obtained in other indirect sources. The warming in the middle of the 20-th century is not extraordinary. The warming at the border of the 1-st and 2-nd millennia was more long in time and similar in amplitude.

The work was done under financial support of the Russian Foundation of Fundamental Research (grant 96-04-48258) and European Community Foundation (grant ADVANCE -10K).

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Tabl.1.The main statistical characteristics of C1 chronology

Period	Years	Statistical parameters				
		Mean index	Sensit.	St.dev.	1-st autocorr.	Coef.var.
212 BC-1996 AD	2209	1.016	0.421	0.443	0.41	43.6
212BC-287AD	500	1.014	0.411	0.482	0.53	47.5
0-499AD	500	0.963	0.426	0.421	0.38	43.7
500-999AD	500	0.982	0.457	0.441	0.38	44.9
1000-1499AD	500	1.015	0.427	0.433	0.37	43.6
1497-1996AD	500	1.039	0.339	0.441	0.44	42.4

Tabl.2. The relative power of different cyclic components in C1 chronology (in % to common variation)

Period	Spectral window			
	<600 years	220-600 years	120-220 years	60-120 years
81 BC-1996 AD	4.0	6.1	11.3	6.7
0-499 AD		2.8	20.6	2.6
500-999 AD		3.7	6.9	11.0
1000-1499 AD		12.0	2.3	4.9
1497-1996 AD		5.9	8.8	13.3

Tabl.3. Statistical evaluations of model for reconstruction early summer temperature based on C2 chronology and annual temperature based on C1 chronology

Calibration			Verification		
Period	R^2	F value	D-W statistics	Period	R^2	F value	D-W statistics
early summer temperature							
1933-							

1989	0.59	79.6	1.914				
	(p<0.00001)						
1960-1989	0.72	72.7	1.907	1933-1959	0.45	20.5	1.877
	(p<0.00001)				(p<0.001)		

annual temperature (average)

1933-1993	0.67	46.0	2.51
	(p<0.000001)		

FIGURES

Fig.1.The map of territory where wood samples were collected: 1- sites of living old trees; 2- sites where wood remains of dead trees and subfossil wood were collected; 3-recent polar timberline.
Fig.2.The variability of average tree-ring width (smoothed) in absolutely dated (upper) and "floating"(below) Taymir chronology. The according radiocarbon dates shown at right column.
Fig.3.Correlation of C2 index chronology with pentad temperatures (asterisk shows the significant value of correlation coefficient). The many years average temperature curve also shown as wide line.
Fig.4.Comparison between observed and calculated early summer (1) and annual (2) temperature for Taymir. Empty columns indicate the residuals.
Fig.5.Reconstructed early summer temperature from C2 chronology: 1- 5-year smoothing, 2- 57-year smoothing.
Fig.6.Comparison of long-term changes in annual temperature reconstructed from Taymir C1 chronology (2) with oxygen isotopic ratio in Greenland ice cores (2)(according to Burroughs,1992).

81. 0911405082.txt
##########

From: Keith Briffa <k.briffa@uea.ac.uk>
To: evag@ifor.krasnoyarsk.su

Subject: transfer
Date: Wed Nov 18 11:04:42 1998
Cc: stepan@ipae.uran.ru

Eugene
    I am told that the money transfer (5000 u.s. dollars) should have gone to the bank account you stated. Please let me know if this is received by you. I now also have the contract signed by INTAS and we must organise future work and I will talk to Fritz about us visiting Ekaterinburg next year. In the meantime I wish you and Stepan to organise major review papers of the Yamal and Taimyr long chronology staus for inclusion in the Holocene ADVANCE-10K Special Issue. These need to be completed by June at the latest . They will each be 10-12 pages of print. I can suggest content, do some analyses and help with editing these . I am also sending Stepan's 5000 dollars to Switzerland now to be carried back by his colleague. I have yet to sort out how claims on the INTAS money will be handled. Have you received the details of the final contract?
                    best wishes
                              Keith

82. 0912095517.txt
##

From: Keith Briffa <k.briffa@uea.ac.uk>
To: Paul Valdes <P.J.Valdes@reading.ac.uk>, Nick Shackleton <njs5@cam.ac.uk>
Subject: Re: Thematic Proposal
Date: Thu Nov 26 10:51:57 1998
Cc: sfbtett@meto.gov.uk

Paul and Nick
              at this point it would be unwise to consider the proposal dead. Yes
 it has received mixed receptions in different quarters but this was always to be expected. Each of the boards has its own family to protect , or at least this is the way science funding is now perceived, so that the only consideration in the discussion (especially of proposals from alien boards) is whether or not there will be enough on the carcass for ones own. The strength of our proposal lies in the potential for true cross-Board participation and the real scientific and strategic advantage of the focus on the Hadley Centre work. In my mind the problem has always been to get real enthusiasm from ASTB , and if COAPPEC had not been on the table this may have been more forthcoming. I can not see that we could have done anything more in the cicumstances to overcome this hurdle than by enlisting Hadley Centre support. The decision to go jointly only with ESTB and ASTB was already made. The issue of 'no money anyway ' typifies the unsatisfactory nature of the system - but in this case I hear things may not be so bleak. Apparently some millions more pounds are now available than was the case earlier! At this point NERC will say nothing - but they are equally not saying ' sorry and goodbye' . Let us wait and reconsider when we hear something definate.
   Incidently, I have seen a copy of a project funded in Germany where they have millions of marks to compare model and palaeodata to verify and otherwise explore the natural variability in the Hamburg model! They are looking forward to using our data in this exercise!
   I will be in touch as soon as I hear more.
                    best wishes
                              Keith

At 06:41 PM 11/25/98 +0000, Paul Valdes wrote:
>Keith, Nick,
>
>Have you had any news about the thematic proposal.
>
>I gather that things did not go well for it in the ASTB.
>The story I have heard is that it was tabled along with

>the other proposals, but also tabled was the proposed
>expenditure for the next 5 years. Moreover, apparently
>it was then said (or perhaps just implied) that there
>was no point looking at some thematic proposals because
>all money was already committed!
>
>If only half of this were true, then it is disappointing.
>Apparently, more atmospheric chemistry was recommended,
>plus COAPPEC (the coupled ocean-atmosphere project).
>
>Hopefully it faired better at ESTB but it clearly cannot
>be argued to be a joint proposal!
>
>Perhaps we should consider recycling it into an EC framework
>5 proposal.
>
>Paul
>
>>--
>Dr. Paul Valdes   Dept. of Meteorology,
>Email: P.J.Valdes@reading.ac.uk   University of Reading,
>Phone: + 44 118 931 6517   Earley Gate, Whiteknights,
>Fax: + 44 118 931 8905   PO Box 243
>   Reading. RG6 6BB. UK
>--
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83. 0912633188.txt
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##########

From: Bob Keeland <Bob_Keeland@USGS.GOV>
To: ITRDBFOR@LISTSERV.ARIZONA.EDU
Subject: Re: verification and uniformitarianism
Date: Wed, 2 Dec 1998 16:13:08 -0700
Reply-to: grissino@VALDOSTA.EDU

Frank is correct in that we need to define 'abrupt climatic change' or even just 'climate change.'

Using Jim's Schulman Grove example suppose that the area supported a stand of bristlecone pine 9,000 or more years ago, hence the scattered remnants. Either a major catastrophic event or a fluctuation in climate (call it climate change if you want) resulted in conditions that killed the mature trees and eliminated any further recruitment for up to 1,000 years. This site may be near the limits of recruitment and with a major (or minor perhaps) change in climate it could easily be beyond the limits of recruitment. About 8,000 years ago climate again became favorable for bristlecone pine recruitment and a new stand(s) developed and have existed ever since. Some or most of the material remaining from the original stand may be buried down in the valley, or the original stand may have been small or sparse. The amount of time between the loss of the original stand and the beginning of the new stand would depend on the period of unfavorable weather and the amount of time needed for bristlecone pine to re-invade the area. I am out on a limb here, so to speak, as I an somewhat ignorant of prehistoric climate patterns for the area and of bristlecone pine ecology, but this seems like a relatively reasonable scenario.

I guess that my point is that climate continues to fluctuate within broad bounds. Everything that we are now calling 'climate change' is

well within the bounds observed within the prehistoric record of climate fluctuations. Do we call any variation 'climate change' or should we limit the term climate change for anything considered to be caused by humans? To my mind it is not so much what we call it, but rather that we keep a clear idea of what we actually talking about.

Bob Keeland
USGS, National Wetlands Research Center
Lafayette, LA
bob_keeland@usgs.gov

84. 0913679881.txt
##

From: Bryson Bates <bryson@per.clw.csiro.au>
To: Barrie Pittock <barrie.pittock@dar.csiro.au>
Subject: Re: uncertainties guidance paper
Date: Mon, 14 Dec 1998 18:58:01 +0800 (WST)
Cc: "'econf.part2@usgcrp.gov'" <econf.part2@usgcrp.gov>

Dear All --

On Mon, 14 Dec 1998, Barrie Pittock wrote:

> 1. Two issues are being addressed and partially confused:
> (a) the confidence we have in the science (which seems to be the main
> concern of the paper);
> (b) the quantitative uncertainty regarding specific results such as: by
> what percentage will the rainfall change at 2050 in region/location A?
> or, how much will changes in tropical cyclones cost in percent of GNP
> (or additional? lives lost)? My reading of the comments from WG1 authors
> reported by Neil Leary was that they were focussing more on (a), whereas
> WG2 authors may want to focus a bit more on (b).

I wholeheartedly agree. While I agree with the probabilistic approach in general, there are a number of practical factors that will mitigate against it. Barrie has listed most, I have added one below.

> 2. Authors will be limited largely by what is in the literature,
> especially on the second class of uncertainty. So the guidance needs to
> go from the authors, or IPCC in some other way (as soon as possible), to
> the researchers to encourage greater attention to quantifying their
> uncertainties, and to the authors to put their fingers on misleadingly
> "precise" estimates by pointing out the basis of such estimates, eg.,
> "this estimated crop yield change is based on only one simulation with
> one GCM and should be considered in the light of the range of results
> from other GCMs and for other realisations".

Another source of uncertainty is the different methods used to derive climate change scenarios at regional and local scales. Some authors apply perturbations (based on changes indicated by several GCMs) to historical climate series, some use results from limited area models, while others use one of a wide variety of stochastic approaches that are based on results from one or more GCMs. The important point here is these methods would produce different estimates of uncertainty for the same region and the same suite of GCMs.

> 6. Regarding para. 67, I am more concerned about the "best" or "central"
> estimate for climate sensitivity of 2.5 deg.C for 2xCO2 than about the

> range. Several lines of evidence (paleo-evidence, fitting models to the
> last 100 years, the distribution of improved model results) all suggest
> that the "best estimate" for this increasingly dated and artificial
> notion should be raised from 2.5 to nearer 3.5. This would be
> controversial, but I believe it would also be giving the best advice
> possible. Whatever you believe is the correct number, the level of
> concern such a change would raise is in itself evidence for the
> importance of central estimates in the climate change debate.

This could be investigated and quantified in a Bayesian framework.

> 7. I share Martin Manning's problems with the use of the term "Bayesian"
> and equating it with "subjective". Personally I think this paper should
> avoid such specialist technical terms if possible, especially if there
> is disagreement about what they mean!

Yes: Bayesian methods provide a means of combining prior (expert) knowledge with data to quantify the posterior distribution. The prior knowledge may be based on the results of previous experiments and need not be subjective. Another point is that formal application of Bayesian methods usually leads to problems that are analytically intractable. The recent development of Markov chain Monte Carlo methods has largely overcome this.

> 8. I repeat my concern re too much spatial aggregation of results if it
> hides important regional differences, as these are very important for
> questions of intragenerational equity. I think the paper should
> specifically warn against this. Averaging is notorious as a way of
> hiding important differences.

I share this concern: the average of a large negative and a large positive number is close to zero.

Regards
Bryson Bates

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##########

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Subject: IPCC Emissions Scenarios
Date: Fri, 18 Dec 1998 15:34:41 +0100

LS

As you may recall, the Intergovernmental Panel on Climate Change (IPCC) is in the process of preparing a Special Report on Emissions Scenarios (SRES). Recently, it has been agreed that these scenarios are to play an important role in IPCC's Third Assessment Report. The Terms of Reference of this Special Report include a so-called Open Process to stimulate input from a community of experts much broader than the writing team. This Open Process has started in August 1998 and was planned last until the end of the year. Because of the late date of this message we decided to extent this deadline until January 10 now. A website (sres.ciesin.org) is managed by the Center for International Earth Science Information Network (CIESIN) in the United States in collaboration with the Energy Research Foundation (ECN) in the Netherlands, the Technical Support Unit (TSU) of Working Group III on Mitigation of IPCC in the Netherlands, and the International Institute of Applied Systems Analysis (IIASA) in Austria, the home institution of the co-ordinator of the SRES Report, dr. Nebojsa Nakicenovic. Three types of input are invited: (a) new scenarios (preferably from the peer-reviewed literature) that have not been taken into account by the writing team, (b) new quantification of the proposed SRES scenarios based on storylines, and (c) suggestions for improvements of the material developed until now. Several of you have responded to an earlier request for input into this open process. Thank you for that input. Amongst other things on the basis of input received so far, recently the information on the website has been improved considerably. The writing team of the report has now started to actually draft their report, but can still take into account reactions to this new information as published through the website, in principle until 31 December 1998. Herewith I would like to invite you to explore the site (again) and provide us with your comments.

PLEASE DO SO USING THE FACILITIES OF THE WEBSITE, DO NOT USE THE EMAIL ADDRESS OF THE SENDER OF THIS MESSAGE OR THE EMAIL GROUP LIST ABOVE!!!!

On behalf of Dr. Nakicenovic, thank you very much for your support to this important endeavour!

Dr. Rob Swart
Head, Technical Support Unit
Intergovernmental Panel on Climate Change Working Group III: Mitigation
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email: rob.swart@rivm.nl or ipcc3tsu@rivm.nl

86. 0914022359.txt
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From: Bill Hare <Bill.Hare@ams.greenpeace.org>
To: Mike Hulme <m.hulme@uea.ac.uk>
Subject: Re: MAGICC
Date: Fri, 18 Dec 1998 18:05:59 +0100

Dear Mike

Please send the details etc to me.

Thanks

Bill

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On 18 Dec 98 at 9:43, Mike Hulme wrote:

> Date: Fri, 18 Dec 1998 09:43:31 +0000
> To: Bill Hare <Bill.Hare@mail.nli.gl3>
> From: Mike Hulme <m.hulme@uea.ac.uk>
> Subject: Re: MAGICC

> Bill,
>
> The version of MAGICC we are distributing is the IPCC SAR 1996
> version. You can get that from me under Licence for $50. If you
> wish to proceed let me know and I can send it you with invoice.
>
> Regards,
>
> Mike
>
> At 17:59 16/12/98 +0100, you wrote:
> >Dear Mike
> >
> >I would like to know how to get the most recent version of MAGICC and
> >of COMICC (carbon cycle model). I heard from a colleague that you
> >may be distributing MAGICC??
> >
> >I look forward to hearing from you,
> >
> >Regards
> >
> >Bill Hare
> >
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From: "Stepan G. Shiyatov" <stepan@ipae.uran.ru>
To: k.briffa@uea.ac.uk
Subject: Scientific cooperation
Date: Mon, 21 Dec 1998 11:00:33 +0500
Reply-to: "Stepan G. Shiyatov" <stepan@ipae.uran.ru>

Dear Keith,

Thank you for the money transfer via Fritz Schweingruber. I received
5000 USD. Is it necessary to give you a receipt for this sum of money?
Money will be used for organization of field works in the Yamal
Peninsula and Polar Urals next year. Of course, this sum is not
enough. I hope we shall have an additional money from the INTAS
project and the Russian Funds.

I received two copy of the INTAS contract from Fritz and one copy I
sent to E. Vaganov. We would like to know your opinion concerning
transfer money.

Also, I need to know exact time you and Fritz intend to visit
Ekaterinburg next year. The new rules demand to make application to
the Russian officials before 6 months of your arriving. Do you want
or not to travel in the area of Southern Ural Mountains after meeting
in Ekaterinburg? Fritz wants to travel over this area (the Taganai and
Iremel Mountains).

Best wishes to you, your family and your colleagues.

Marry Christmas and Happy New Year!

Sincerely yours,

Dr. Stepan G. Shiyatov

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