

Review of "An analysis of the Steig et al. (2009) Antarctic temperature reconstruction" by R. O'Donnell, N. Lewis, S. McIntyre, and J. Condon. JCLI 3656.

General Comments:

The issue of whether the mainland of Antarctica is warming in addition to the Antarctic Peninsula is at the forefront of the global climate change debate, given the 65 meters of global sea level contained within the ice sheet. Of course the continuing issue is the sparseness of direct temperature observations for an area of the size of the lower 48 states of the U.S. plus Mexico, leading to attempts to extrapolate from long-duration observed time series at a limited number of sites to vast unsampled regions. The Steig et al. (2009) analysis of Antarctic near- surface temperature trends produced somewhat different results than those obtained earlier by Chapman and Walsh (2007) from kriging the available but time-varying number of observations and by Monaghan et al. (2008) from extrapolation of a fixed set of station records. Most notably Steig et al. found that West Antarctica has been steadily warming for the past 50 years.

A real weakness of the Steig et al. analysis is that the West Antarctic warming is not tied to that known to be occurring on the west side of the Antarctic Peninsula especially in winter (see Figs. 4 and 5 in this manuscript). The results obtained by King and Comiso (2003, *Geophys. Res. Letts.*, 30, 1040, doi:10.1029/2002GL015580, The spatial coherence of interannual temperature variations in the Antarctic Peninsula) suggest the winter trend maps of the present authors are closer to the truth than that of Steig et al. The use by Steig et al. of the AVHRR-derived skin temperatures to extrapolate the station data will be most problematic for the very cloudy western Peninsula and for the oceanic dominated parts of West Antarctica. Therefore the Steig et al. approach deserves to be critiqued in the refereed literature where peer review acts an important test of the validity of the critique. I am not conversant with the statistical nuances of the analyses by Steig et al. and the approach adopted here, so trust that Eric Steig or Michael Mann will provide that needed expertise.

The ultimate check on what has happened to the near-surface temperatures over West Antarctica will come from bore-hole measurements and shallow ice coring for stable isotope and accumulation records, tasks mostly not yet undertaken.

It seems likely that the manuscript will be acceptable for publication once issues raised in review are resolved.

Specific Comments:

1. Has the permission been obtained from Nature to reproduce the figures from Steig et al. in this manuscript?
2. The voluminous supporting material seems totally unnecessary. The most important parts should be incorporated into the present manuscript. A website could be established where all gory detail is available.
3. Page 12: What are Chladni patterns?
4. Page 14: To what paper does North (1982) refer? North et al. (1982)?
5. Page 16: Don't think Table 2 adds to what is stated in the text.
6. Corrected uncertainties for the trend slopes in Steig et al. to take account of serial correlation are reported here:
<http://www.nature.com/nature/journal/v460/n7256/pdf/nature08286.pdf>