1. Introduction.
Antarctic reconstructions of temperature rely on the extrapolation of data from a small number of sites to the whole continent. To determine these patterns requires high-quality spatial statistics. Thus, spatial statistics and how they change are vital for understanding climate trends in data sparse areas, such as Antarctica.

3. Methodology.
- Our aim is to characterize temperature spatial statistics through the inspection of temperature differences between AWS sites at a range of separations.
- The temperature records for 4 AWS sites (identified in Figure 1.) for data collected in June 2006 are shown in Figure 2.
- Note the similarity between sites A and B, which are <20km apart, and the larger difference between sites that are separated by larger distances.
- Figure 3 shows a simple second-order structure function constructed from this data.
- For this we use the mean-square difference in temperature:

\[
\Delta T^2_{ij} = \frac{1}{n} \sum_{i=1}^{n} (\Delta T_{ij})^2
\]

T is the temperature, n the number of records, i the record index, and j and k the site indices.
- The mean-square temperature difference is plotted against the distance between stations on logarithmic axes. This allows us to determine the index of the power law relationship between the two parameters.
- Examples of structure function plots for January and June 2006 are shown in Figure 4. Colours show the difference in altitude between sites.
- 120 AWS sites present in 2006 provide over 7000 2-station permutations. Although not all sites have sufficient data to be used.

4. Results.
- Figure 5 shows the gradient of the structure function for each month with sufficient data from 1984 to 2009, plotted against the mean temperature for that month.
- A significant correlation is found (r = -0.42, p < 0.01).
- A relationship between the scaling behaviour of temperature and the mean temperature is thus observed.
- Temperature varies more quickly with distance when temperatures are low.
- The result may have implications for reconstructions that model their temperature scaling on the time of year, as corresponding months of different years do not show constant mean temperatures.

5. Future Work.
- A distinct lack of data is observed at the <50km scale (apparent in Figure 4), we plan to design and deploy a short-range, high-resolution AWS network to shed light on scaling effects in this area.
- Work on the characterization of the effects of the difference in altitude between stations is on-going, as is the assimilation of further data into the analysis.
- Comparison of our results with satellite data is also planned.