



CASE STUDY: Global Warming - the forest from the trees

10. Averaging temperature anomalies for whole regions.

One of the difficulties in attempting to combine the temperature time series from a number of stations to construct an '**average**' time series for a state, nation or indeed the whole globe is that Met Stations are not distributed evenly, nor randomly, across the landscape. They tend to be in clusters, with some regions data rich and others data poor.

Other difficulties include the facts that:

- Met Stations are located with respect to political boundaries and often measure and report differently across them
- while some met stations are located on the plains others partake of the thinner atmosphere of the mountains;
- the Earth consists not only of land but mainly of oceans – surface temperatures are measured very differently across the oceans than on the land;
- finally, the Earth is not flat but spherical.

	
Australia's Reference Climate Station Network (BOM, 2009 d)	A gridded, spherical earth and its atmosphere (BOM, 2009 f, p.35)

In this case study, we have adopted a simple 'flat-earth' model - which, nevertheless, goes by the rather imposing title of 'Thiessen Polygons' - to demonstrate how some of these issues are dealt with in combining met data to form State averages (see **Appendix 8** in the separate **Appendices**). On the next page, we compare the results of this analysis with those resulting from the 'Barnes successive correction technique' used by the Australian Bureau of Meteorology to produce digital analyses of temperature change on a regular latitude-longitude grid enabling 'area-weighted averages' for any region for which the user seeks knowledge.

It is beyond the scope of this case-study to delve further into the complex issues involved in choosing between the wide variety of possible different area-averaging techniques for obtaining an objective, replicable and truthful estimate of global warming.

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QUESTIONS:

1. *What would be the likely effect on the average temperature for a region of increasing the number of met stations in mountainous areas used in the estimate relative to the number in the plains?*
2. *What do you think would be the effect on the year-to-year variability of the average temperature for a region of including temperatures recorded over the ocean surface along with those recorded over the surface of the land? Explain your answer.*

