

### **Is the Antarctic cooling or warming?**

Overall, the Antarctic continent has shown substantial warming over the last 50 years for which we have widespread observations. The total warming over this period is typically 0.5 to 1°C, though there is considerable spatial variability with much stronger warming over West Antarctica (particularly the Antarctic Peninsula which has seen areas of more than 3°C warming) and less warming over East Antarctica. Recent warming is described in the paper by Steig *et al.* 2009 (Vol 457|22 January 2009| doi:10.1038/nature07669)

Seasonally the greatest warming has occurred during winter and spring, with very little change during autumn.

It is expected that warming will continue and probably accelerate this century as a result of the enhanced greenhouse effect.

### **What is causing the rainfall in northern WA to increase? To what extent are 'brown' pollutants a cause of changing rainfall patterns?**

The theory behind the 'brown' pollutants or aerosols and their effect on northwestern Australia's rainfall is as follows. There is a complex haze of pollutants over Asia which acts to cool the continent and surrounding oceans. This affects the temperature gradient between the northern and southern hemisphere, which in turn changes the structure of the atmospheric circulation resulting in an increase in summer (monsoonal) rainfall over northwest Australia. The theory has been backed up by climate model simulations that capture the rainfall increase well if aerosols are included but do not when aerosols are not included. It must be pointed out however that the models offer a very simplistic description of the complex aerosol/temperature interaction. Leon Rotstayn from the CSIRO is a leading figure in this area and climate change in northwest WA is a current topic of research in stage three of IOCI.

Some useful links are below.

[http://www.ainse.edu.au/\\_\\_data/assets/pdf\\_file/0003/38082/Rotstayn\\_Leon.pdf](http://www.ainse.edu.au/__data/assets/pdf_file/0003/38082/Rotstayn_Leon.pdf)

[http://www.ioci.org.au/index.php?menu\\_id=14](http://www.ioci.org.au/index.php?menu_id=14)

### **What is causing rainfall in southwest WA to decrease?**

Since the 1970's, we have seen an increase in the number of high pressure systems over southern Australia and a decrease in the number of fronts. The main rain source for southwest Australia is from these frontal systems, so with an increase in the number of blocking highs in the Bight forcing the fronts to the south, we have seen a corresponding decrease in rainfall over southwest WA. Related to this, there has also been a reduction in the strength of the jetstream over the area, meaning that the potential for storm development has shifted east. The likely reason for these changes is due to a combination of increased greenhouse gasses and natural variability and this drying and warming trend in southwest WA is expected to continue.

Some useful links are below.

[http://www.ioci.org.au/index.php?menu\\_id=22](http://www.ioci.org.au/index.php?menu_id=22)

[http://www.ioci.org.au/pdf/IOCI\\_Bulletin6.pdf](http://www.ioci.org.au/pdf/IOCI_Bulletin6.pdf)

<http://www.climatechangeinaustralia.gov.au/>

<http://www.bom.gov.au/climate/change/>