



Aerosol Ground Station Network (AGSNet)

The CSIRO Earth Observation Centre in Canberra established the AGSNet in 1998 in affiliation with AERONET, a global network of aerosol ground stations coordinated by NASA.

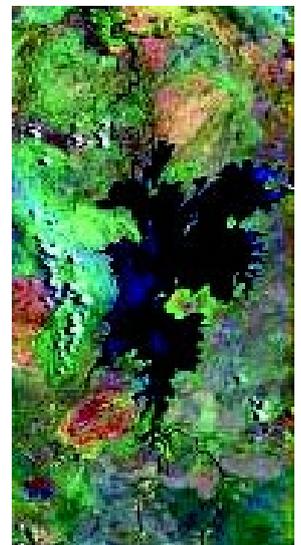
The purpose of the network is to increase our understanding of the effects and behaviour of airborne particles, or aerosols. These particles interact with sunlight, reflecting some of it back to space and absorbing some. While these effects provide us with beautiful sunsets, they have a significant influence on the climate and need to be measured for accurate prediction of climate change. The most prominent aerosols in tropical Australia come from the smoke of dry season fires that usually peak in September/October.

The primary instrument at the station is the sun photometer. This instrument periodically points to the sun and measures the intensity of incoming solar radiation (sunlight) at eight different wavelengths. These correspond to different colours ranging from blue to deep red and are used to distinguish the size and other properties of the particles. For example, smoke from early season and late season burns can be differentiated. The measurements from the sun photometer are stored in a data logger on site and relayed to CSIRO laboratories in Canberra via a satellite phone link for further analysis.

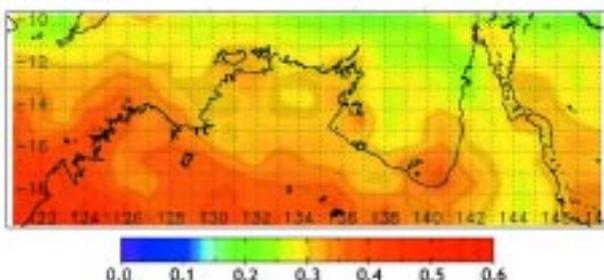


The Lake Argyle ground station was first installed in May 1999 and tested at three different locations (including South Pelican Island as shown here) before being set up near the museum in October 2001. The sun photometer is mounted on top of the apparatus for a clear view. The twin collimators reminiscent of shotgun barrels are used to reduce stray light entering the instrument.

The aim of this work is not just to measure aerosol loading at a few well-chosen spots, but to map it over large regions of the Australian continent. While this is only practically achievable using satellite-borne instruments, the variable brightness of the land surface makes airborne particles difficult to detect from space. By contrast, water almost always appears dark to the satellite and the aerosol signal is much clearer over water. Lake Argyle is the largest inland water body in Australia and its deep clear waters provide an ideal background. The Landsat image on the right, captured on 23 October 2000, shows the effects of a smoke plume over both the land and water surface. By having the ground station close to the lake, we can compare satellite data with ground data and correlate the two.



A satellite-derived map based on this method is shown below. It indicates aerosol optical depth, a measure of the degree to which sunlight is extinguished (reflected or absorbed) on its passage through the atmosphere. An optical depth of 0.5 corresponds to very hazy conditions. For comparison, the daily average optical depth in Sydney is between 0.05 and 0.1.



The map shows heavy concentrations of aerosol over the Kimberley region due to extensive spinifex fires in the Karajini National Park in October 2000.