

Salt lakes and global change: the inland connection

In January, CSIRO's smallest research vessel, the RV Albedo, was launched at the Division of Wildlife and Ecology in Canberra. The launch was a dryland one as the division's closest lake (the waterfowl pond) was dry, 'a casualty of climatic variability', according to Dr Dean Graetz, the scientist responsible for the RV Albedo. Undaunted by the parched conditions, the director of CSIRO's Office of Space Science and Applications (COSSA), Dr Brian Embleton, anointed the bow with Australian champagne, wishing 'good fortune for all the crew and instruments that sail in her'.

The boat will carry instruments to measure the reflectance (or albedo) characteristics of Australia's large inland lakes. Scientists will use these measurements to enhance the value of satellite imagery as a tool for understanding global change and its implications for Australia.

By knowing how reflective certain lakes are, it is possible to use them to help precision calibrate the daily images of Australia acquired by the orbiting satellites, Graetz says. The satellites (NOAA AVHRR now and SPOT 4 Vegetation Instrument and ADEOS in 1996) take images of the surface of the continent up to four times a day, day and night, providing a library of observations of the state of the nation, and the entire globe if required.

The problem is, the writing in this library of satellite data is literally a bit fuzzy and it tends to wander a little. The fuzziness is caused by the ever-changing atmosphere in the 10 kilometres nearest to Earth, and the wandering is due to the slow ageing of the satellite sensors.

To discover what is really going on at the Earth's surface, these two sources of 'noise' must be removed from the signal desired. One method involves precision calibrating the satellite images against stable ground targets, thereby removing the transient effects of atmospheric aerosols, from local dust or distant volcanos (such as Mt Pinatubo) and the ageing of the satellite sensors.

Monitoring global warming

Precision-calibrated satellite images are required to detect and interpret the real fluctuations and long-term trends in the way the continent functions. The year-to-year variations of the seasons, and the special occasions of an El Nino, all need to be measured and understood before more subtle trends, such as global warming, can be detected and monitored.

RV Albedo will facilitate regular surveys of the albedo or brightness of the inland lakes and this data will then be used to calibrate not only the satellite data being acquired now, but also

that held in archive (some important data sets date back to 1981). Graetz says this is where the simple strategy promises such great benefit.

'This research vessel is a small part of a comprehensive CSIRO program designed to provide Australians with the best possible data on global change,' Graetz says. 'What we find will drive our research as well as support decision-making by a wide range of public and private authorities.'

'When working in an area as significant as climate change, we must be able to communicate our findings precisely. The launch of the RV Albedo represents a small but significant step towards describing how our continent responds to climatic variability and changing land use. I have no doubt it will contribute to untangling the complex story of greenhouse climatic change.'

Graetz and his 'crew' from the Gondwana Laboratory for Global Change, Sue Campbell and Murray Wilson, are keen to begin precision-calibrating the archived data.

'It's like starting a library and finding you have 12 years of books already in it,' Campbell says. 'For example, the El Nino drought of 1982/83, Ash Wednesday and the 'big wet' of 1988 all can be re-analysed.'

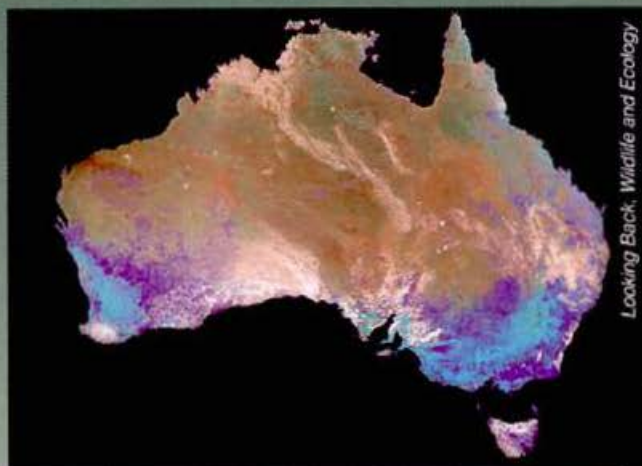
'All our data will be archived in CSIRO's Australian Land

Research Data Centre at the division and will be available to all interested parties,' Wilson says. 'We are going to ensure that the data is around to inform future generations about the state of the nation from 1981 to 1994 and on into the future.'

The methodology is expected to cause worldwide interest and to be used by other countries involved in climate change research. RV Albedo's first trip will be on Lake Menindee in Kinchega National Park, New South Wales followed by repeated expeditions to Lake Frome, South Australia and Lake Argyle, Western Australia. Being just 3.2 metres long and with a crew of two, RV Albedo makes the long overland journeys on the roof of a four-wheel-drive vehicle.

The equipping of RV Albedo was made possible by Wildlife and Ecology's involvement in two CSIRO Multi-Divisional Projects: Space Data Acquisition and Utilisation managed by COSSA and the Climate Change Research Program managed by the Institute of Natural Resources and Environment. Similar dryland calibration sites have been established at Hay, NSW, and Alice Springs in collaboration with the Division of Atmospheric Research.

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The RV Albedo will help scientists to understand how the Australian continent responds to changing land use.

Looking Back, Wildlife and Ecology