

6 Atmosphere and Land Observation and Assessment (ALOA)

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6.1 Overview

The Atmosphere and Land Observation and Assessment (ALOA) program provides observations and analyses of the weather, climate and Earth system. These are essential for monitoring the state of the atmosphere and land surface in the Australian region and globally, evaluating climate mitigation technologies and policies, and underpinning and improving operational nowcasting technologies and Earth system models through state-of-the-art model-data fusion methods including data assimilation, model validation, and better process representation.

ALOA provides key observations for monitoring changes in the Earth system for detection and attribution of climate change in the atmosphere and for stratospheric ozone depletion. Data are interpreted for policy and environmental management purposes, including State of the Environment reporting and carbon policy development, and the Program provides essential Southern Hemisphere data for major international assessments of climate change and ozone depletion.

The Program's capability is comprehensive across the land and atmosphere sciences, considers both biophysical and biogeochemical processes, and is highly skilled in laboratory and field measurements. The Program is part of CMAR's joint operation with the Bureau, the Centre for Australian Weather and Climate Research (CAWCR), which brings complementary earth system and environmental modelling capabilities from the Bureau into the Program.

The CSIRO CMAR skill base in ALOA encompasses atmospheric chemistry, environmental physics, terrestrial biogeochemistry, metrology and engineering, physical and mathematical sciences, and microscale, mesoscale and synoptic meteorology. Some Australian universities also typically house a number of these skills but the unique feature of ALOA is the combination in one organisational unit of capabilities in the observation and interpretation of atmospheric composition (reactive gases, aerosols, greenhouse gases), biogeochemical cycles (carbon and water), cloud, radiation and precipitation processes, micrometeorology, observing system technologies, remote sensing (satellite and radar), and data assimilation. ALOA also operates nationally-unique and world-class observational infrastructure.

The capability hosts the world's first and most comprehensive 'air archive'. Dr Paul Fraser leads this activity and other scientists including Drs' John Gras and Ian Galbally have provided scientific guidance of the Cape Grim Baseline Observation program since its inception in the 1970s. ALOA scientists have led significant advances in observing technology, operate several National Association of Testing Authorities (NATA) certified and world-class laboratories, and have contributed strongly to global programs including the International Global Atmospheric Chemistry program (IGAC), World Meteorological Organisation (WMO) Global Atmosphere Watch (GAW), and Advanced Global Atmospheric Gases Experiment (AGAGE), and national programs including the Terrestrial Ecosystem Research Network (TERN) flux program. The international Global Carbon Project, set up in 2000 and co-chaired by Dr Mike Raupach for eight years, with Dr Pep Canadel as Executive Director, has generated new partnerships, high impact analyses, and research publications.

The Program responds directly to Australia's National Research Priority of An Environmentally Sustainable Australia (environmental monitoring and climate change), Australian Government climate change policy, and other nationally important issues, such as work that supported the Montreal and Kyoto Protocol positions and Stockholm Persistent Organic Pollutants (POPs) Protocols. Another principal objective is development of the Bureau's operational observation technology capability that supports core numerical weather prediction. The research undertaken by ALOA scientists specifically addresses CSIRO's strategic goals in the Climate Outcome Domain.