

Maps are more than just a pretty picture: science and the new mapping technologies

AUSTRALIA HAS BEEN INVOLVED IN MAPPING OF THE Antarctic continent since the start of exploration there at the turn of the 20th century. Even in those days maps were used as a scientific tool to integrate and visualise data. The first maps published were as attachments to reports and scientific journals such as those presented to the Royal Geographical Society in London. Printed maps continued to be the major end product of the ANARE Mapping Program until as recently as the early 1990s. However, with the advent of Geographic Information Systems (GIS), the hard copy map is now only one of many purposes for which survey information is used. Topographic information is the foundation for the GIS but the software facilitates spatial analysis and visualisation in addition to the efficient production of maps.

The ability of GIS to rapidly overlay data from different sources makes it a powerful tool that is now being used to support a wide array of Australian environmental, scientific and operational activities in the Antarctic and Subantarctic.

In the 2000-2001 season, surveyors have been involved with mapping in support of scientific and logistic programs at Heard Island, Windmill Islands, Vestfold Hills, Larsemann Hills and Macquarie Island.

At Heard Island, aerial photography has been used for the census of seals and penguins, for mapping of vegetation and to provide detailed surveys for archaeologists. Aerial photographs from this season will be compared with those from 1985 to determine whether there have been changes in the sizes of glaciers

or vegetation cover that could be attributed to global climate change during this period.

At Casey, the GIS is being used to assist with clean-up and management of the abandoned waste disposal sites at Thala Valley and will later be used at the nearby Wilkes Station. This project will take many years to complete and one of the priorities for ensuring success is to carefully document all aspects of investigation, clean-up and subsequent remediation. The GIS has been used to calculate quantities of material that should be removed, to model the flow of melt-water through the site so this can be controlled, and to interpolate the likely distribution of contaminants from point samples. As the project moves into the operational phase the GIS will be used to visualise progress on site so that the clean-up can be managed remotely from Australia.

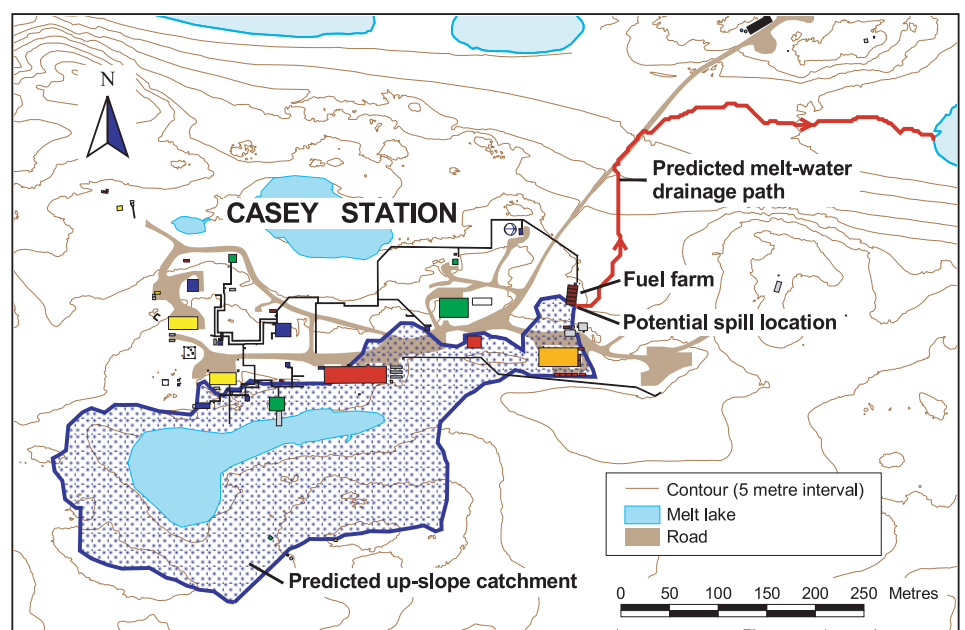
Surveying was one of the major activities of the first scientific expeditions to Antarctica—and is still an essential component of much research. The new technologies such as the Global Position System, GIS and remote sensing from satellites, allow spatial information to be captured much more efficiently. As a consequence, tasks that would have been totally impractical only a few years ago are now feasible. The entire continent of Antarctica can now be mapped at a small scale in a matter of weeks. To detect changes over time surveys can be repeated at intervals that would have been inconceivable ten years ago. Using GIS, maps can be generated in the field by scientists so that data can be immediately checked, and if necessary repeat observations can be achieved.

Henk Brolsma, Mapping Officer, AAD.

Modelling for Oil Spills

The GIS has been used to set up, for each ANARE station, a tool that allows the user to interactively specify a location and then view two types of information that are important for managing an oil spill:

- (i) the predicted melt-water drainage path from that location; and
- (ii) the predicted up-slope catchment contributing drainage to that location.





AUSTRALIAN ANTARCTIC DATA CENTRE

The Australian Antarctic Division Map Catalogue

THE AUSTRALIAN ANTARCTIC DIVISION HOLDS A COLLECTION of approximately 3,500 maps and charts. In 1998 the Australian Antarctic Data Centre began the task of collating a catalogue of its holdings. After several previous attempts to complete this large task, the Map Catalogue was published online in early 1999.

The Map Catalogue includes:

- Historical maps dating back to the mid 1800's
- Thematic maps such as geological, vegetation and bathymetry maps
- Hydrographic charts
- Topographical maps
- Satellite image maps
- Orthophoto maps

Many countries from around the world distribute their Antarctic maps and charts through an agreement by the Scientific Committee of Antarctic Research (SCAR). These are also included in the Map Catalogue. The Australian Antarctic Division online Map Catalogue was recently adopted by the SCAR Working Group on Geodesy and Geographic Information as the international standard for the cataloguing of Antarctic maps.

Ursula Ryan, GIS Officer, AAD.

Clockwise from top left: Satellite image map of the Larsemann Hills; total workstation at Atlas Cove, Heard Island, with Australia's highest active volcano, Big Ben (2760 m), in the background; an aerial photograph of Mawson Station; a scientist using real time GPS to log GIS data in the Stillwell Hills; and a map produced from the GIS of Laurens Peninsula, Heard Island.

▶ Antarctica Online

Electronic, interactive and datasets suitable for use in a GIS, can be viewed and downloaded at the Australian Antarctic Data Centre (AADC) web site at: <http://www-aadc.aad.gov.au>.

Thumbnails and details of hard copy maps can be viewed at: <http://www-aadc.aad.gov.au/mapping/aadmaps.asp>

Hard copy maps can be purchased through AUSLIG Map Sales Centres. A list of these centres is available at: <http://www.auslig.gov.au/products/maps/mpretail.htm>

Selection of Antarctic maps: <http://www-aadc.aad.gov.au/gis/maps/>

All digital and interactive maps: <http://www-aadc.aad.gov.au/gis/areamap/>

Download of digital data: http://aadc-db.aad.gov.au/pls/logon/reg_files

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