

SCAR WG-GGI NATIONAL REPORT FOR AUSTRALIA**Report of Current Activities of Australia in Geodesy and
Geographic Information for the period 1998 - 2000**

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The following Australian organisations / institutes have programs to conduct research or operational work in the Antarctic in the field of Geodesy, Photogrammetry, Remote Sensing, Bathymetry, Geographic Information, Cartography and Surveying.

- Australian Antarctic Division (AAD), Department of the Environment
- Australian Surveying and Land Information Group (AUSLIG)
- Cooperative Research Centre for Antarctica and the Southern Ocean (ANTCRC) - University of Tasmania
- Royal Australian Navy Hydrographic Office Detached Survey Unit (RAN - HODSU)
- Australian National University (ANU)
- University of Tasmania (UTAS)

1. GEODESY**1.1 Geodetic Surveys (AUSLIG, UTAS, & ANU)**

(a) Australian activities in the two years since the XXV SCAR Concepcion meeting has been in the consolidation of the four permanent GPS trackers at the availability of the data to the global community through rollover and Y2K events.

Current IGS sites are:

- Mawson
- Casey
- Macquarie Island
- Davis

Additionally a GLONASS receiver has been installed at Davis using a splitter from the GPS antenna. Data from these sites is available from the IGS data centres and from the AUSLIG Internet site - by ftp.

(b) The major Australian terrestrial Geodetic network has been upgraded with several GPS fixes in the Davis to Prince Charles region in conjunction with UTAS and their Glaciology work in the Amery Ice Shelf. As a result the network has been readjusted onto ITRF96 and details are available on the AUSLIG Web site

<http://www.auslig.gov.au/geodesy/antarc/antgeod.htm>.

(c) ANU has continued leading edge development of remote operating GPS continuous operating base stations in the Beaver Lake and Lambert Amery region. (ADD URL)

(d) An automated data quality reporting system the above sites is now available on the AUSLIG web site together with time series of results from processing site data.

1.2 Remote Sensing (AAD & ANTCRC)

Coastline from Davis to Casey, interpreted from ERS SAR imagery by Antarctic CRC.
 Dramatic changes to Shackleton and West Ice Shelf noted.
 Mosaic of Landsat imagery for the Amery Ice Shelf, Lambert Glacier and Prince Charles Mountains region nearing completion.
 Law Dome. Integration of topographic data sets partially completed.

1.3 Bathymetry (AAD / RAN - HODSU)

Bathymetric data acquired by the AAD has been filtered, checked, incorporated into an on-line 'Underway Database' and forwarded to GEBCO

1.4 Aerial Photography (AAD)

Aerial photography of penguin colonies in the:
 1998/99 season – Rauer Group of islands
 1999/2000 season – Davis area and Rauer Group of islands

1.5 Surveying (AAD)

Update of station area maps for Mawson, Davis, Casey and Macquarie Island in both 1998/99 and 1999/2000 season.
 Photo control for mapping completed at Sansom Island, Marine Plain, Ellis Fjord and the Platcha area of the Vestfold Hills.
 Vestfold Hills - lake levels –ongoing.
 Location of bench marks in the Vestfold Hills –ongoing.

1.6 Tide Gauges (AAD)

Level connections to tide gauges and AUSLIG ARGN units at Mawson, Davis, Casey and Macquarie Island in the 1998/99 and 1999/2000 season.
 Timed water level measurements at Mawson, Davis and Casey

Mawson

Bottom mounted tide gauge 1 downloaded. The gauge has been in operation for six years. The batteries are expected to cease operating soon.
 Bottom mounted tide gauge 2, deployed.
 The two bottom mounted tide gauges are operating in tandem to transfer datum from gauge 1 to 2.
 Aquatrak tide gauge installed. Further development work required to bring it on-line by the end of 2000-2001 season.

Davis

Bottom mounted gauge downloaded in 1999/2000 summer. Second bottom mounted gauge expected to be deployed by August 2000. Casey
 Bottom mounted gauge downloaded.

Macquarie Island

Aquatrak and Druck pressure gauge downloaded monthly. Low voltage problems have been resolved by the installation of extra solar cells and battery.

Zhongshan

A cooperative agreement has been signed with CHINARE to operate a bottom mounted gauge in the Larsemann Hills. The gauge was successfully installed by the Australian Antarctic Division in February 2000.

Metadata tide gauges

Metadata for each tide gauge installation can be found at:
<<http://www-aadc.antdiv.gov.au/Metadata/>>

Tide gauge data

Records of tidal data can be viewed at the Australian Antarctic Division web site at:
<http://www-aadc2.antdiv.gov.au/Metadata/tide_gauge/available_data.html>

Tidal data is available on request from the National Tidal Facility at:
<<http://www.ntf.flinders.edu.au/TEXT/WOCE/databases.html>>

2. MAPPING ACTIVITIES**2.1 Topographic Mapping (AAD)**

The following maps were published in the period 1998 -2000:

Completion of the revision of 1:1 Million scale line maps SR41-42 Northern Prince Charles Mountains and SR43-44 Prydz Bay. Digital maps only, no print run.

1:5000 map of Béchervaise Island. Digital map only, no print run. Available on request.

1:5000 map of Welch Island. Digital map only, no print run. Available on request.

1:5000 map of Verner Island. Digital map only, no print run. Available on request.

2.2 Thematic Mapping (ANTCRC)

Vegetation Structure and Drainage – Macquarie Island

2.3 Bathymetric Mapping (AAD)

No bathymetric maps produced.

2.4 Digital Station Area Maps (AAD)

Macquarie Island, Davis, Casey and Mawson station area maps have been updated each year.

The maps can be viewed on the web at:

<http://www-aadc2.antdiv.gov.au/gis/areamap/areamap.html>

2.5 Photogrammetric Plotting (AAD)

Framnes Mountains - 1:25,000

Mawson Coast and islands in Holme Bay - 1:25,000

Béchervaise , Welch and Verner islands - 1:5,000

2.6 Orthophoto Maps (AAD)

1:5000 Béchervaise Island Limited printer run only.

1:5,000 Welch Island Limited printer run only.

1:5,000 Verner Island Limited printer run only.

3. GEOGRAPHIC INFORMATION ACTIVITIES

The Australian Antarctic Data Centre has continued to improve the infrastructure to make digital spatial data and maps readily available to scientists and other users.

Information can be found at the Australian Antarctic Data Centre's (AADC) web site:

<http://www.antdiv.gov.au/datacentre/index.html>

3.1 Digital Datasets (AAD)

A list of available digital datasets (not complete as yet) can be found by searching the metadata database at:

<<http://www-aadc.antdiv.gov.au/Metadata/>>

3.2 Digital maps

The AADC now has some 130 A4 maps on line. The majority of these maps have been produced in the last year.

The maps can be viewed at: <<http://www-aadc2.antdiv.gov.au/gis/areamap/areamap.html>>

Larger digital map products include A0 maps of Macquarie Island, Australia to Antarctica, Australian Stations and Heard Island.

3.3 Metadata (AAD)

Information on Australia's metadata records can be viewed at

<<http://www-aadc.antdiv.gov.au/Metadata/>>

Continued expansion and updating of the 'Spatial Model' can be viewed at:

<http://www-aadc.antdiv.gov.au/gis/spatial_data_model/model.html>

During 1999, the AADC moved from the ANZLIC metadata standard to the DIF metadata standard supplied to us by the Global Change Master Directory (GCMD). This is the internationally recognised metadata standard now in use by the Antarctic community.

3.4 SCAR map catalogue (AAD)

The Australian Antarctic Data Centre has developed an online SCAR map catalogue <<http://www-aadc2.antdiv.gov.au/maps/>>. The catalogue lists details of all SCAR maps. The ability to modify the database online by WG-GGI members is anticipated by the end of 2000.

4. SCIENTIFIC PAPERS PUBLISHED / PRESENTED

Brolsma H. A., Belbin, L. and Smith, D. (2000) "Australia's Antarctic Mapping Program", *ISCORD 2000 Symposium*, Hobart, Tasmania, Australia

Neilson, A., Brolsma, H. A. and Handsworth, R. (2000) "The Southern Ocean Sea Level Network: tide gauges in Antarctica". *ISCORD 2000 Symposium*, Hobart, Tasmania, Australia

5. PLANNED ACTIVITIES FOR THE NEXT TWO YEARS

5.1 Geodetic Surveys (AUSLIG)

(a) Field Surveys

In the 2000/2001 summer AUSLIG intends to carry out reconnaissance for a suitable site in the vicinity of Landing Bluff, for the future establishment of a temporary tide gauge. This would provide a mean sea level datum for studies on the Amery Ice Shelf and a reference point for the Antarctic geoid. AUSLIG would also extend and strengthen its Antarctic geodetic network by geodetic quality GPS observations in the Grove Mountains and in the vicinity of Mt Harding. Stable marks in solid rock will be used for these observations so that the resulting positions will be useful for both geodesy and geodynamics.

AUSLIG will also establish International Terrestrial Reference Frame (ITRF) positions on Heard Island and will extend and strengthen the existing survey control network.

The following year AUSLIG intends to collect geodetic quality GPS observations at Rossler and Burke Ridges in the SPCM and extend the Grove Mountains network commenced in 2000/2001. Geodynamic quality marks would also be established and geodetic quality GPS observations collected at Trost Rocks.

(b) Data base activities

AUSLIG and the Australian Antarctic Division (AAD) have already exchanged details on the structure of their respective survey control databases, with the intention of making the data available to web users in a similar style. Details of AUSLIG's Australian Antarctic Geodetic Network are already available on the Web, but they will be enhanced to add functionality and make it user-friendlier <www.auslig.gov.au/geodesy/antarct/antmarks.htm>

5.2 Remote Sensing (AAD & ANTARC)

Purchase of Landsat and Radarsat imagery of the AAT coastline and selected inland areas.

SAR data of Macquarie Island.

5.3 Topographic Mapping (AAD)

Large scale mapping of Heard Island

1:10 million map of Antarctica

Revision of 1:1 million map sheet SQ 45-46

Revision of 1:1 million Lambert Operations map

Production of three 1:2 million maps of the Amery Ice Shelf, Lambert Glacier, Prince Charles Mountains showing the water column, bedrock and surface elevation.

Vestfold Hills 1:50 000 topographic map

Macquarie Island 1:50,00 topographic map

5.4 Geographic Information Activities (AAD)

GIS of Law Dome to be completed by end of June 2001.

Windmill Islands GIS - inclusion of contaminated sites

Vestfold Hills GIS - inclusion of geological data and lake bathymetry

Heard Island GIS – ongoing.

Béchervaise Island – penguin colony information

Input of historical spatial data from sources such as publications, field books etc.

Increased granularity of metadata to include details of all GIS layers.

5.5 Bathymetry (AAD / RAN - HODSU)

Macquarie Island

Mawson - outer approaches to

Larsemann Hills – inner and outer approaches

5.6 Bathymetric Mapping (AAD)

Revision of bathymetric maps in the area from Prydz Bay to Mawson.

5.7 Tide Gauges (AAD)

(a) Bottom-mounted tide gauge to be installed at Mawson and Davis.

(b) Shore mounted gauge (Aquatrak) at Mawson.

(c) Repeat of connections from tide gauge sensors to nearby coastal bench marks.

5.8 Field Surveys (AAD)

Heard Island - photo control

Rauer Group – photo control

Larsemann Hills - photo control

Prince Charles Mountains – photo control

Bathymetric surveying of selected lakes in the Vestfold Hills

Vestfold Hills – lake levels

Windmill Islands – assistance with surveys of contaminated sites

5.9 Orthophoto maps (AAD)

Maps are planned for following areas (in order of priority)

Heard Island
 Rookery Islands
 Shirley Island

5.10 Photogrammetric Plotting (AAD)

Areas to be plotted include:

Heard Island – selected areas
 Giganteous Island
 Rookery Islands – eastern sector
 Larsemann Hills
 Rauer Group of islands
 Sansom Island

5.11 SCAR Projects (AAD & AUSLIG)

- SCAR Map Catalogue. Development of the map catalogue to on-line additions and modifications .
 Additions and corrections to the existing database.
- Symbology
 Symbols in digital format developed for inclusion in the SCAR symbology dictionary.
- Spatial Data Model
 The Australian Antarctic Spatial Data Model for both large scale and small-scale data sets has been further developed. Further development of the model, should be considered by the SCAR WG-GGI group in conjunction with the SCAR symbology dictionary.
- Gazetteer
 Geographic coordinates for places checked for correct location on satellite image maps. Corrections to the Australian gazetteer sent to Italy for inclusion in the SCAR catalogue.
- Survey control database
 The schema for the survey control database developed by the ANARE Mapping and Geographic Information Program presented to SCAR WG-GGI meeting in Heppenheim.
- Antarctic Geographic Data Integration (AGDI)
 There are two options for the project that require discussion at XXVI SCAR. Either
 1. fully resource the 1:5M scale digital data compilation product and maintain the data library on the AGDI web site; or
 2. not pursue the production of the 1:5M product and merely maintain the data library
 For further information see the updated web site at:
www.scar-ggi.org.au/geog/agdi/intro.htm