

## **SCAR Report on Common Data Model for Antarctic Geodetic Data. July 14, 2001**

At the SCAR Working Group on Geodesy and Geographic Information held in Tokyo from 10-14 July 2000 LINZ agreed, as part of the Geodesy Programme, to develop a schema or model for a Geodetic Control Database. The parameters for the development of this database were:

- **Goal:** Develop a master index of Antarctic survey control points.
- **Key Activities:** Develop a control point website and template for the documentation of geodetic control and tide gauge records.

Organisations involved in geodetic activities in Antarctica hold records relating to control in their working areas. At present there is no coordinated reference site or index to facilitate the location of the available control. The user needs a prior knowledge of the organisations involved, the areas where these organisations are working and then undertake a little detective work before they can begin to track down details of what control may exist in an area.

Attempts have been made to index and describe available data sets by entering metadata records of Antarctic survey control in sites such as the Australian Antarctic Division's website, but there has not been a coordinated attempt to develop a facility to specifically reference available Antarctic survey control.

A secondary problem in searching for survey control is that although it may be possible to locate the data source the user still requires a detailed knowledge of available data to effect a search. E.g. a user may know that the LINZ geodetic database holds records on Antarctic control marks but to search the user requires some prior knowledge of data e.g. approximate coordinates of the location of control, a reference datum or mark codes/names.

This report provides an outline of two possible options for the design of a database to reference the available survey control in Antarctica. There are however two design criteria that should be included in any proposal:

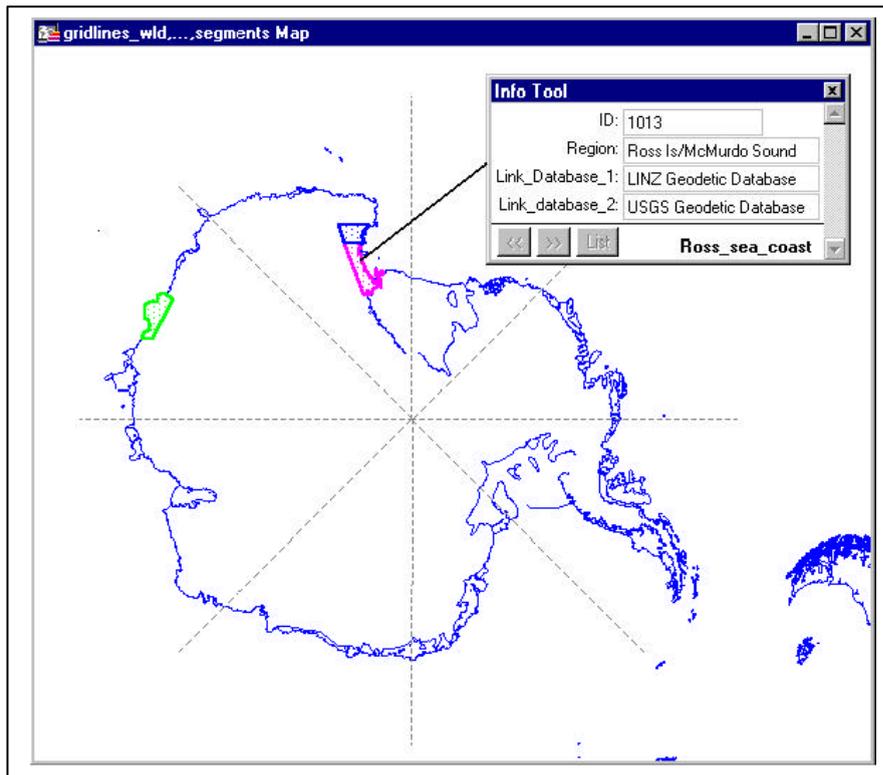
- The database must be able to be populated and maintained by the owners of the source data.
- The database should not replicate, to any great extent, data held in the source database - ie. at most the database need only supply the user with clear and concise information on the available control. If the user requires further information this is provided by links to the source database.

### **Option 1**

To provide base information on the location of Antarctic survey data and a pointer (link) to the source agency to obtain detail of the control. This would enable the user to click on an area of interest and this would result in a list of

sites where survey data covering this area is available with a link provided to take the user to the required source database. The area of interest could be a large area such as a longitude segment or broken down into more specific areas of control coverage (as displayed in the example).

If this database is also to provide tide gauge records the link to the source could be provided as another field in the “pop up” information record i.e. the record would provide links to all relevant source data sites for survey control and tidal data in the selected location.



The basic design principles and requirements of this database option would be:

- Database holds a general spatially referenced description of the areas where control is available. But it could also provide a general metadata description of the available control within the selected area e.g. type of information held on control, order, datum, how the coordinates were obtained, types of observations, details of control design etc.
- No details on specific control points would be held.
- Searching and selection from spatial view only i.e. clicking on the area of interest will bring up the available information details on that area.
- Provide link(s) to the source database(s).

- Provide a simple format for adding and editing data to facilitate ease of updating by owners of the source data.
- Options available to print or save details to a file. (Text and spatial details.) *At this level print and save to file options may not be necessary if information detail is kept to a minimum, the print screen function could be sufficient if a permanent record is required.*
- Does not to any great extent replicate data stored and freely available from other sources/sites.
- If areas of interest are small the design may require a second level of detail or a zoom function to go to a scale that can clearly display individual areas.

This option has the advantage of being simple and therefore (hopefully) easy to populate and maintain. Adding new areas where control has become available or where new source data sites have been developed shouldn't be that common and therefore updates would be infrequent. Because of the minimal information directly available though the site data incompatibility of data from source databases should not be an issue.

The disadvantage may be that it could require the user to flick between the SCAR database and the source databases to locate details on control in their area of interest which may make searching for and locating specific control a slow process.

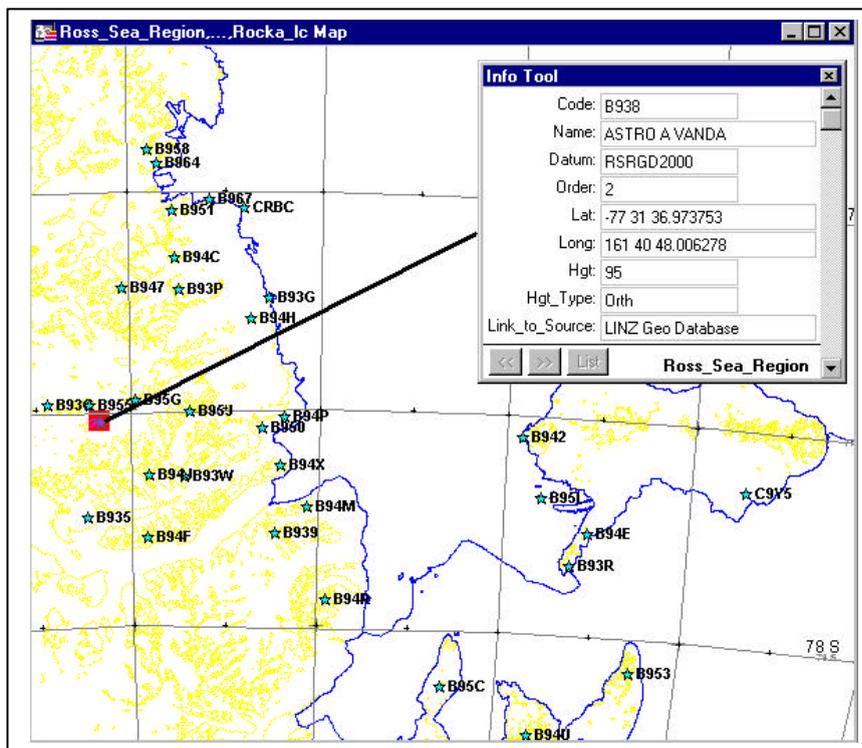
## **Option 2**

This option would retain the functionality as outlined in **Option 1** and would add a further level of search detail. If the user clicks or zooms in on an area of interest the view would be updated to show in more detail the extent of the area for which control is available and the location of individual control points.

The basic design principles and requirements of this more detailed data level could be:

- Simple, minimal data record: e.g. Code/Name/Datum/3 dimensional coordinate/Accuracy (class and order)/Link to source database(s). The 3 dimensional coordinate could be latitude, longitude and height with the height ordinate being an optional input. The data format could also include an optional height coordinate with order and datum parameters.
- The database must be able to be populated (and updated) by the owners of the source data.
- Ease of population (and update) of database. E.g. an automatic download from the source database at regular intervals.

- Simple structured data format for loading and updating the database e.g. table format. (Excel or comma delimited text file?)
- Tide gauge sites and links to source data could also be located from this search screen. The basic data provided via this database would be as for control marks but the data source link would take the user to the source tides/sea level database.
- Opportunity to go directly to the source database from the basic area level (Option 1) or to search for marks before going to the source database i.e. have the opportunity to go to the source database from any search level.
- Zooming in on an area of control will bring up the second level of detail displaying individual control marks.
- Spatial search functions. To start click on an area of interest to bring up the pointer to source databases covering that area e.g. clicking area of Ross Island/McMurdo Sound could bring up links to LINZ and USGS databases.
- Control points displayed with a key to give an indication of type and order of marks available (e.g. tide gauge or survey control displayed to indicate order).
- Major searching tools are spatially based but additional text search facilities could also be included to search for a mark name or to search and zoom in on an area of interest (based on a variety of criteria e.g. coordinates).



- Include common spatial functionality: zooming (+/-), panning, selecting (individually or with a box), information tool to display details, add to list (add to tree) option on selection.
- Option to display all control or subsets or layers of data (e.g. data is layered, based on type and order).
- When an object is selected the user has the option of downloading data to a printer or a file or going to that object in the source database.
- Downloading data options: Send to a printer or save to a file. Include the functionality to select and add to section before sending data to a printer or saving to a file (e.g. add to a tree). Control marks can be selected individually or by block selection.

This option does replicate much information detail that would be available from the source databases but there are a number of advantages in providing this level of detail on the location, extent and type of available control. A spatial representation of control is not always available from source databases (e.g. LINZ geodetic database). This view will give the user a better indication of the available data and whether this data may suit their requirements before they head off to the source database to obtain further detail.

The fact that this option does replicate in some detail information held in source databases does have some disadvantages. The database would require updates on a regular basis to keep the detail proposed by this option up to date and compatible with the source databases. Also there may be some design complications if source database details are incompatible or if some of the proposed details were not available from some sites e.g. mark code or coordinate order? An alternative would be to display marks but on selecting a mark this would take the user directly to the source database to obtain survey control mark details (if this requires going backwards and forward to the link it could make for a slow search). However this variation would simplify the design as it wouldn't be necessary to provide the facilities for displaying information detail, printing or down loading data from the SCAR database.

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09 July 2001