

## A Project for archiving and managing physical geodesy data in Antarctica

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Study of collecting and managing Physical Geodesy Data for the computation of Local and Regional Geoid in Antarctica.

It will be obtained starting from a global model of geoid and corrected by the use of geodetic, gravimetric measurements and density model.



### First Step

Archiving data from different researchers and countries, obtained with different methodologies.

Data could be provided in different reference frames.

The collection should be transformed in the same DATUM in order to perform an homogeneous datasheet



Essential data input for geoid computation in Antarctica:

- Geodesy (Classical, SAR, Sat. Altimetry, GPS, Tide Gauge)
- Bathymetry
- Gravimetry
- Radar Echo Sounding (RES)

•Global geoid model (EGM ??, OSU ??)

Note: Till today the only available Geoid Map of Antarctica was made by AUSLIG in 1990, based on Geopotential Coefficient set OSU89A

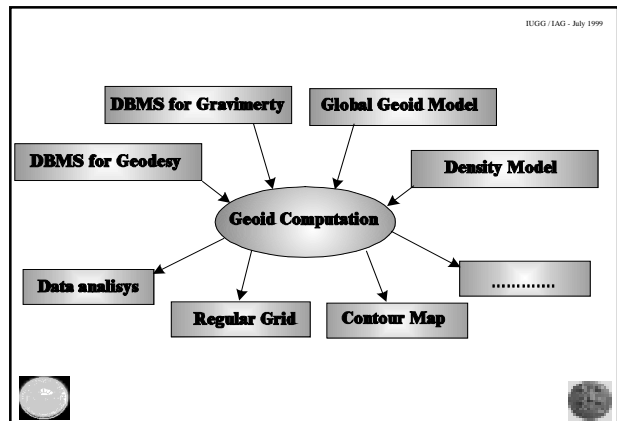


In Antarctica the ice-thickness is changing relatively quickly for many reason (ice movement and ice melting principally), so the ice topography should be computed periodically.

Regarding this point a closed data exchange should be made with BEDMAP (Bedrock Map Antarctica Project) and RAMP (Radarsat Mapping Working Group).

It is necessary to study a Data Base Management System for geodetic and gravimetric measurements.



This DBMS could allow an easier archiving of so different data in term of acquisition and precision. Moreover could allow a correct data analysis to establish the level of desired accuracy.



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**DBMS for geodetic Measurements in Antarctica requires for some particularity with respect to other kind of DBMS for Geodesy.**

- 1) The atmospheric, climatic and morphologic condition don't permit the easier development of classical measurements, especially in the inner part of Antarctica Continent.
- 2) Space geodesy will constitute the greater part of DBMS
- 3) Despite of the above consideration, some classical observation will be considered in particular in region close to tide gauges.

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**DBMS - For Geodetic Measurements in Antarctica**

**Typology of data considered:**

- a) GPS data (Static - DGPS - Kinematic)
- b) DORIS
- c) SAR
- d) Satellite Altimetry
- e) Tide Gauge
- f) Some Classical Survey

**Typology of data generally not available:**

- a) Spirit Levelling
- b) SLR
- c) VLBI



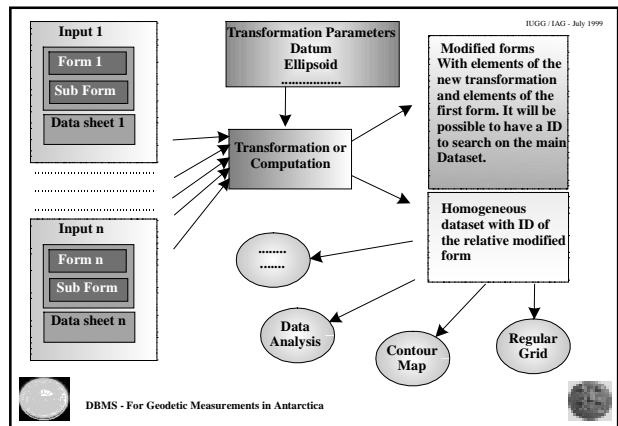



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**DBMS - For Geodetic Measurements in Antarctica**

**Each datasheet must be coupled with a Form (Main Form + Sub Form) as Identity Card of the Survey.**




**In the Main Form will be appear some information on Company, Year, Reference, Name of Survey, Location or Region and for each kind of survey a particular "Sub Form" permit to better understand modality, instrumentation, software, reference frame and every kind of information relative to the datasheet.**

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**DBMS - For Geodetic Measurements in Antarctica**

**Example of a Main Form**



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**DBMS - For Geodetic Measurements in Antarctica**

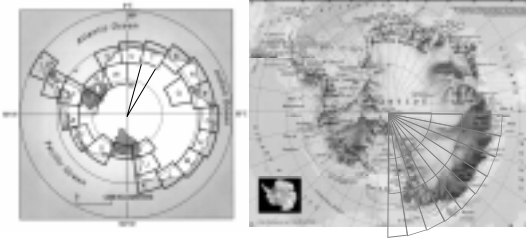
**Example of a Main Form: Location of the Survey**

The possibility to classify each survey with a associated label of the region where the survey has been performed, allows a faster selection for local data integration and processing.

A criteria should be, for coastal region, the use of INDEX map of the 24 planned 1:1.000.000 scale coastal change and glaciological USGS Antarctica Maps, while for the inner part should be used the limits in longitude of each map tracked to the geographic pole. Another criteria should be obtained furnishing the quadrant and the sector. The sector is delimited in Longitude (10 degrees of amplitude) and in three strips: 60° - 70°, 70° - 80°, 80° - 90° of Latitude South.

### Example of a Main Form: Location of the Survey:



### Example of a Sub Form for GPS Data



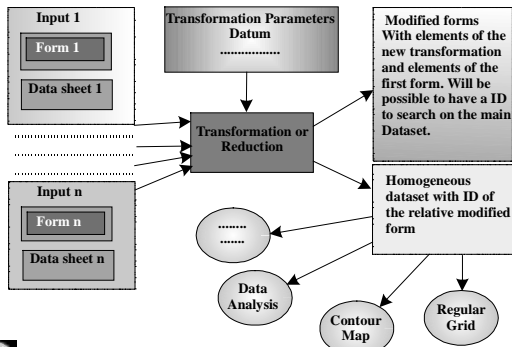
### Example of a Form for GPS Data input



### What's DBMS for Gravimetry ?

Some consideration and property of DBMS for Geodesy were applied also for DBMS for Gravimetry.

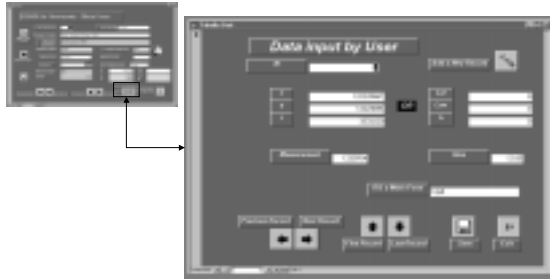
The structure is still in progress but something is already prepared.



### Example of The Main Form



### Example of Data input by User



### Conclusion:

- In Antarctica the ice-thickness is changing relatively quickly for many reasons so the ice topography should be computed periodically.
- It is necessary to study a Data Base Management System for geodetic and gravimetric measurements.
- Two DBMS (for Geodesy and for Gravimetry) could allow an easier archiving of so different data in term of acquisition and precision.
- The main structure of DBMS (especially for Geodesy) was performed.
- Now the DBMS for Geodesy and for Gravimetry are in progress.

### Next Steps:

The completion of the DBMS and the introduction of Physical Geodesy data for all the Researcher who want to collaborate.

It will be fundamental the data exchange with programs like BEDMAP, ADGRAV, RAMP etc..

### Bibliography

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- And:
- |   |                     |
|---|---------------------|
| <a href="http://www.nerc-bas.ac.uk/public/aedc/bedmap/">http://www.nerc-bas.ac.uk/public/aedc/bedmap/</a>               | BEDMAP program      |
| <a href="http://polestar.mps.ohio-state.edu/amm_web/begin.htm">http://polestar.mps.ohio-state.edu/amm_web/begin.htm</a> | Bird Polar research |
| <a href="http://ipmtf14.topo.polimi.it/~igev/">http://ipmtf14.topo.polimi.it/~igev/</a>                                 | IGeS                |
| <a href="http://www.scar-ggi.org.au/">http://www.scar-ggi.org.au/</a>   | SCAR                |