



NORDISKA KOMMISSIONEN FÖR GEODESI Nordic Geodetic Commission

Working Group for Geoid Determination

Report on the future of the NKG Working Group for Geoid Determination

Based on a discussion held at the Finnish Geodetic Institute, Masala, Finland, March 11, 2010

The geoid has never been of more importance and relevance than today. The geoid has become indispensable for height determination by GNSS satellites. The marine geoid will be facing a similar development when combining the geoid with satellite altimetry in order to derive the oceanographically interesting (Mean) Dynamic Topography. The importance of the North Atlantic Current for the climate in our region is well known. The marine geoid will assist in monitoring not only this current but also contribute to an improved knowledge about the ocean circulation in general. Significant improvements with respect to geoid determination have been made the last decade, but the challenge of the 1 cm geoid has not quite been met and much work remain to be done before this objective can be achieved.

The WG recognises the need for change. It is also quite clear that some of the activities within the WG can be organised as projects. The WG members do however feel that the WG should continue and that a project organised structure has some severe drawbacks which limits it's usability compared to the current WG, and here is a summary of these:

As stated above there is still a need to improve the geoid. This can generally be achieved through enhancements in theory and the methods used in deriving the geoid and by getting access to improved data sets.

The theoretical challenges and the task of improving the existing methods are typically addressed by PhD students, Post. docs or a few people within NKG. Projects can of course lead to theoretical breakthroughs, but there is no guarantee that this will happen even though there is a milestone requesting this. Real progress is often made when clever people get the right ideas (like when Archimedes took a bath or Newton, whether a myth or not, observed the falling apple), and are able to investigate into these. This does not happen on command and is impossible to predict. Theoretical work is an ongoing process where small and big advances happen from time to time. Much work is done on an international level and the WG members do of course monitor this progress and continuously work on implementing these, when applicable, in their own methods. This continuous activity obviously belong in a WG.

The best methods and theories are of no use without access to data. Gravimetric data have been collected and stored in the NKG Gravity Data Base for more than 20 years by our Danish colleagues. Access to these data is a requirement for computing the NKG geoid. The computation of the NKG geoid would have been severely hampered without access to this data base. Like theory this is a continuously ongoing task that belong in a WG.

The number of persons working with gravity and geoid is very limited. They do however face similar problems and challenges like what to do with the traditional relative gravity measurements, their epoch, datum and height system, identification of errors etc. The ability to meet and discuss how to address these challenges in a forum like the NKG WG is highly valued and almost indispensable for the members. The WG members do not only want to continue this cooperation, but in fact to extend it and meet more often than today. This network of colleagues with whom you can meet regularly and discuss common problems, must be maintained and a WG is the ideal way of doing so. This kind of cooperation is very valuable for all of the NKG and is of course not limited to the geoid WG only.

The WG can be regarded as forming a sort of basis on which all of the activities and projects within the WG relies upon. Through the work done within the WG, different methods for computing the geoid can be investigated and compared in order to select the optimal method for deriving the NKG geoid. Through the NKG gravity database access to the currently best gravity data sets for our region can also be secured. Without this continuous work it will be much harder to organise and run activities like the computation of the NKG geoid.

It is not only the Nordic countries that benefit from this cooperation. The NKG and the geoid WG forms the obvious point of contact for other scientists working on similar problems on a regional (European geoid, North Sea geoid) or global scale (EGM08). Without this point of contact (i.e. without the WG), access to data would be harder and the regional/global products derived might very well be affected by this in our region. We clearly benefit from this ourselves by having access to improved global geopotential-models.

The WG can be included as part of another WG, but since the task of geoid computation is a very specialized one, this is probably not the best way to proceed. The members of the NKG WG for Geoid Determination therefore recommends the WG to be continued and to increase the activity level and meet more regularly.