



Nordiska kommissionen för Geodesi Nordic Geodetic Commission

Working Group for Geodynamics

Minutes of the 33rd meeting of the Working Group for Geodynamics within the Nordic Geodetic Commission

Lantmäteriet, Gävle, March 10-11, 2009

Participants:

Denmark	Gabriel Strykowski	DTU Space
Finland	Mirjam Bilker-Koivula	FGI
	Jaakko Mäkinen	FGI
	Maaria Nordman	FGI
	Hannu Ruotsalainen	FGI
Norway	Dag Solheim	Statens Kartverk (NMCA)
	Bjørn Ragnvald Pettersen	UMB
Sweden	Hans-Georg Scherneck	Chalmers
	Andreas Engfeldt	Lantmäteriet
	Martin Lidberg	Lantmäteriet
	Mikael Lilje	Lantmäteriet
	Géza Lohasz	Lantmäteriet
	Per-Anders Olsson	Lantmäteriet
Jonas Ågren	Lantmäteriet	
Estonia	Tõnis Oja	Estonian Land Board
Germany	Heiner Denker	IfE, Leibniz Universität Hannover
	Jürgen Müller	IfE, Leibniz Universität Hannover
	Ludger Timmen	IfE, Leibniz Universität Hannover
	Walter Zürn	
	Herbert Wilmes	BKG, Frankfurt/M.

(For an html-cover sheet of the hyperlinks in this document, go to <http://www.oso.chalmers.se/~hgs/NKGGWG/M2009/Present/Present.html>)

1. Opening

Chairman Martin Lidberg opened the meeting and presented a preliminary [agenda](#). Per-Anders Olsson was appointed as the secretary.

2. Institute reports

The institute reports are available at the home page of the meeting and are therefore not summarised here.

DK: [DTU Space](#) (Gabriel Strykowski)

EE: [Estonian Land Board](#) (Tõnis Oja)

FI: [Finnish Geodetic Institute](#), FGI (Hannu Ruotsalainen)

DE 1: [BKG](#) (Herbert Wilmes)

DE 2: *Institut für Erdmessung* (Ludger Timmen)

NO 1: *Norwegian Mapping and Cadastre Authority* (no report)

NO2: [University of Life Sciences, UMB](#) (Bjørn Ragnvald Pettersen)

SE 1: [National Land Survey, Sweden](#) (Mikael Lilje)

SE 2: [Chalmers, Onsala Space Observatory](#) (Hans-Georg Scherneck)

3. Scientific presentations

The scientific presentations are available at the home page of the meeting and are therefore not summarised here (please follow the links below)

[Ludger Timmen: Results from 6 years measurements with FG5-220 in Fennoscandia.](#)

[Mirjam Bilker-Koivula: Absolute gravity measurements by the FGI in 2008 and an update on absolute gravity time series in Finland.](#)

[Jürgen Müller: Mass movements observed by GRACE.](#)

[Hannu Ruotsalainen: Geodynamics with the NSW Tilt Meter in Lohja, Finland.](#)

[Tõnis Oja: Status of the gravity network in Estonia, new absolute measurements by FGI and the nonlinear vertical gradient problem.](#)

4. Supplemental installations at AG sites

After a short introduction by Bjørn Ragnvald, about the purpose of the Special Study Group there were three presentations from Wilmes, Mäkinen and Pettersen about their experiences from supplemental installations/observations at gravity sites.

[Herbert Wilmes: Gravity Reference Stations Maintained by BKG](#)

[Jaakko Mäkinen: Hydrological notes](#)
and [Aboa gradient](#)

[Bjørn Ragnvald Pettersen: The effects of snow cover on gravimetric observations in Trysil, Norway](#)

There are two main alternatives on how to approach the environmental effects, of which hydrology is the most difficult one, at AG-sites (Mäkinen):

- *Do correlation of e.g. hydrological time series and gravity.* The purpose is to achieve the scale between gravity and the hydrological observations. The problem is how to do the (continuous) gravity observations (e.g. with the gPhone?) and what kind of hydrological observations to do (groundwater/soil moisture/snow/precipitation...).
- *Do physical modeling.* By hydrogeological investigations (determination properties and geometry of soil and rock) and local hydrological observations model the effect on gravity.

No decisions were made on how to proceed in this matter but Martin Lidberg concluded that this issue is complex and that further investigations are needed.

There is a “Workshop on hydrological and other local effects in gravity measurements” (COST ES0701), March 16-17, in Brussels. Our NKG WG is well represented there and information from that meeting will be distributed to institutions not attending the meeting.

5. Business matters

5.1 Report from the NKG Presidium

Martin forwarded a message from the presidium to the WG on Geodynamics to:

- archive AG-data, and make sure that all observations are stored at more than one institute
- coordinate the revision of national gravity systems (see paragraph 5.8 below) and
- encourage to compile a final report from the relative gravity lines (1966-2003).

He also noted that the working group on height determination has thoughts about updating the land uplift model, NKG2005LU (c.f paragraph 5.2 and 5.3 below) and that there will be a COST training school on GIA-modelling in Gävle, 1-5 June.

[See Martin's presentation here.](#)

5.2 NKG2005LU.

The NKG working group for height determination has thoughts of updating the land uplift model, NKG2005LU. For this reason Jonas Ågren gave a presentation [“NKG2005LU Revisited”](#) on how this land uplift model has been computed, and how well it agrees with GNSS-velocities and with modern geophysical GIA-models. Except for GNSS-velocities, for some stations, in ITRF 2005 he concluded that NKG2005LU agrees reasonably well with both GNSS-velocities and GIA-models and expressed his personal opinion that there is no hurry to compute a new land uplift model and that we should wait with that until we have a geophysical GIA model that is a considerably improvement and until the GNSS problems are well understood. His opinion was supported by the rest of the group. Jonas and Jaakko will take this message to the next meeting of the working group for height determination.

Concerning the deviating observed GNSS-velocities (in southern Norway), the time series in question are too short to say anything with certainty. Also, all aspects of GNSS velocity estimation are not yet completely understood, most notably the non-linear vertical position time series and reference frame problems; cf. paragraph 5.3 below.

5.3 On stability in GPS time series, and its impact on velocity estimation.

Martin Lidberg gave a presentation [On stability in GPS position time series and its impact on velocity estimation](#). He showed that the non-linear signature visible in vertical time series when relative antenna calibration values have been used in the GPS processing, is highly reduced when changing to the absolute antenna calibration values for the phase centre variation (PCV). Therefore, GPS-derived velocities at high latitude sites, based on the relative PCV-models may suffer from a systematic error. Also, there is a well documented difference between vertical velocities based on ITRF2000 and ITRF2005. Thus the true vertical velocities relative the earth centre of mass is slightly uncertain at the moment. Hopefully the announced ITRF2008 will resolve this soon.

5.4 The absolute gravity plan

Martin Lidberg described a situation with an increasing number of AG-stations at the same time as the capacity for observation is decreasing (IfE and UMB without or with decreasing founding). How should this situation be approached? Should we focus on a few stations to be visited more frequently or should we keep (and even

increase) the number of stations and visit them more rarely. After a fruitful discussion Martin concluded that:

- A good spatial coverage is important and all stations should be kept “alive”. Maybe some new stations are even needed.
- New stations should be observed every year for the first three years and after that they could be visited more rarely (every 3-5 years).
- There are more reasons for our AG-observation than to model the land uplift (climate studies, maintaining reference frames etc.), and that should be kept in mind.
- Stations in surrounding countries as Germany, Poland and the Baltic countries (Russia?) are important and should maybe be included in the plan.

Other things pointed out in the discussion were:

- Ludger: There should be stations every ~250 km and they should be measured every 3-5 years. When new stations are established or at times when there are special interests in a certain area, the capacity can be focused on that for a while. For the overall objective of stable reference frames we need some stations that are observed more often.
- Björn Ragnvald: Since the timescale is so important stations with “historical” data should be kept alive and observed every now and then. Also: spatial coverage is important since it is reasonable to expect that the scientific questions regarding glacial isostatic adjustment (GIA) may be different/developed in the future (20-40 years) compared to now.
- Herbert: BKG have thoughts about observing some stations in the northern part of Germany to on a regular basis to contribute to this project.
- Gabriel: Our Polish colleagues are interested in cooperation and could maybe contribute with observations (A10) in Poland and the Baltic states.
- Jaakko: FGI has contacts and some cooperation with Russia.
- Hans-Georg: The question on expanding the plan to incorporate countries outside the Nordic countries should be presented for the presidium.

Martin will start to write a new AG-plan and incorporate more people when needed.

5.5 Update on BKG/BGI database, and the AG working group

Herbert Wilmes gave a presentation [Working Group on Absolute Gravimetry](#) and the BKG/BGI database and encouraged everyone to try to upload some data and send some comments to him.

Ludger raised the question on who is responsible for the data in the database and the answer from Herbert was that it must be the owner of the data.

Martin recommended all station owners to upload their stations into the database. Then all observers are encouraged to upload meta-data on performed observations. Then it was concluded that it is free for all observers to upload observations/results at the level they like.

5.6 EGU poster

Jaakko Mäkinen gave a presentation, for scientific input, on some results to be shown on the [poster for the EGU2009-meeting](#).

5.7 The Fennoscandian Land Uplift Gravity Lines – status report on scientific publication, and FGI publication

Jaakko distributed a paper on *The Fennoscandian Land Uplift Lines 1966-2003*, presented at the IAG International Symposium "Gravity, Geoid and Space Missions", Porto, Portugal, 2004. He also informed that he is working on the "final" documentation of the land uplift lines and the rest of the group offered him support in that work whenever that would be suitable.

It was concluded that it is of high importance to finalise the documentation on the land uplift gravity lines during this NKG period (2006-2010).

5.8 New national gravity systems

Finland is about to establish a new gravity system. For that purpose about 50 stations will be re-measured with an A10 next year and then all old observations will be adjusted with the new ones.

Mikael Lilje gave a presentation with the title [The need of a new gravity system for Sweden?](#) reflecting the current thoughts in Sweden in this matter.

The representatives from DTU Space (DK) and Statens Kartverk (NO) had left when this point on the agenda was discussed so the situation in these countries could not be presented.

Martin summarized that work with new gravity systems is going on and that it would be a good thing to have all Nordic gravity systems in the same epoch. This issue will be addressed again on coming meetings.

6. Field Campaign Planning

Since the capacity to perform AG-observations has decreased this year (only Lantmäteriet and FGI will do extensive field campaigns), no detailed planning for the whole area was done. Comparisons are important though so the following information can serve as a basis for the planning of comparisons:

- FG5-233 (Lantmäteriet) will according to a preliminary plan measure 10 stations in Sweden (e.g. Onsala and Mårtsbo).
- FG5-226 (UMB) can go to Onsala in August or September
- FG5-226 (UMB) could also come to Mårtsbo in June (in connection to the COST GIA-school to be held in Gävle the first week in June).

- FG5-221 (FGI) is at the moment out of order but should soon be OK and ready for comparison.
- The plans for FG5-220 (IfE) were to go to Onsala and Borås this year (but since there seem to be so many other observations in Onsala this decision may be reconsidered).

7. Next Meeting

The next meeting will be held in Finland and the preliminary date is 9-10 March 2010.

8. Closing

The WGG thank their host, Lantmäteriet, for good organisation, service and treatment food-wise.