# NORDISKA KOMMISSIONEN FÖR GEODESI
# Nordic Geodetic Commission

**Working Group for Geodynamics**

## Minutes of the 31st meeting of the Working Group for Geodynamics within the Nordic Geodetic Commission.

The Estonian Land Board, Tallinn, March 28-29, 2007

**20 Participants:**

| | | | |
|---|---|---|---|
| Belgium | Michel van Camp | MvC | Royal Observatory of Belgium |
| Denmark | Gabriel Strykowski | GS | DNSC |
| Estonia | Tõnis Oja | TO | Maa-amet (Estonian Land Board) |
| | Karin Kollo | | Maa-amet |
| | Priit Pihlak | | Maa-amet |
| | Ants Torim | | Maa-amet |
| | Aive Liibusk | | EMÜ |
| | Harli Jürgensen | | Eesti Maaülikool (EMU) |
| | Andres Rüdja | | Planserk |
| | Artu Ellmann | | TTU |
| Finland | Hannu Ruotsalainen | | FGI |
| | Jaakko Mäkinen | JaMa | FGI |
| Germany | Olga Gitlein | | IfE, Univ. Hannover |
| | Jürgen Müller | JM | IfE |
| | Ludger Timmen | LT | IfE |
| | Johannes Ihde | JI | BKG |
| Latvia | Janis Kaminskis | | LGIA |
| | Atis Vallis | | LGIA |
| Norway | Ove Omang (secr.) | OO | SK |
| | Bjørn Ragnvald Pettersen | BRP | IMT/UMB |
| Sweden | Martin Lidberg (chair.) | ML | Lantmäteriet/OSO |
| | Andreas Engfeldt | AE | Lantmäteriet |
| | Jonas Ågren | | Lantmäteriet |

## 1 Opening

Priit Pihlak, Head of Geodesy Department, welcomed everyone to Estonia and Estonian land Board. The chairman Martin Lidberg opened the meeting and Ove Omang was appointed as the secretary. The agenda was approved. Tonis Oja (local organizer) informed about local facilities.

## 2 Institute reports

The institute reports will be available at the home page of the meeting and are therefore in general not summarised here (see the NKG home page, http://www.nkg.fi/ and follow the link to WG for geodynamics, or http://www.oso.chalmers.se/~hgs/NKGWG/M2007)

- Danish National Space Center, www.dnsc.dk (Gabriel Strykowski)
  - Absolute gravity campaigns by BKG and IFE
  - Big challenge in the future: Greenland
  - DNSC is now a part of the Danish Technical University (DTU)
- Estonian Land Board, www.maaamet.ee (Tõnis Oja)
  - Established geodetic system (since 2004)
  - Uplift ~0 – 3 mm/year
  - GPS show changes with time (land uplift)
  - Future:
    - co-location of absolute gravity and GPS
    - scientific geodynamical researches needed (study groups)
    - national, international cooperation and help
- Finnish Geodetic Institute, FGI, www.fgi.fi (Hannu Ruotsalainen)
  - Absolute gravimetry in Antarctica, South Africa, Finland
  - Superconducting gravimetry, Relative gravimetry, VLBI
  - Heikki Virtanen defended his PhD work "Studies of Earth Dynamics with the Superconducting Gravimeter" in spring 2006
  - EUREF-FIN was re-measured in 2006 (100 points)
- Latvian Geospatial Information Agency, www.lgia.gov.lv (Janis Kaminiskis)
  - LGIA since 2006-01-01.
  - LatPOS – permanent GPS with RTK service, levelling, gravity, magnetometrical measurements for airports, preparation of law.
  - Status of levelling, gravity data (4250 points since 1999, Scintrex CG3). The levelling need 2 more years to be finished and the gravity surveys some 3 years.
  - VLBI possible at Latvia radio telescope RT-32 and RT-16 at Irbene near Ventspils (fibre optic connection to Internet).
- Norwegian Mapping and Cadastre Authority, www.statkart.no (Ove Omang)
  - Statens Kartverk will take over the Superconducting Gravimeter at Ny-Ålesund, first the operation: 2007-04-01, then the ownership: 2010-04-01.
- University of Life Sciences, UMB, www.umb.no (Bjørn Ragnvald Pettersen)
  - Applies for a superconducting gravimeter ~ 2007-04-15. Location is up for discussion.
  - Ocean loading: An ocean loading signal is still left in coastal absolute gravity stations, even if the ocean loading model is removed.
  - Absolute gravimetry campaigns throughout the year.
    - Typical rms ~ 2-3 µGal. In strong wind ~ 3-4 µGal.
- Lantmäteriet (LMV), www.lantmateriet.se (Andreas Engfeldt)
  - "Greta" --- new absolute gravimeter (FG5-233).
  - Relative gravimeter Scintrex CG-5.
  - Measurements at their new site LMV (2 km from coast), compared to tide gauge data.
  - Absolute gravity measurements by external partners; IfE and UMB.

- Onsala has got money for a superconducting gravimeter!

## 3 Scientific presentations

No summary is given of each individual presentation. Most of them will be available at the website of the working group (http://www.oso.chalmers.se/~hgs/NKGWG/M2007).

- ***Hannu Ruotsalainen,*** *Present status on Water Tube Tilt Meter development*
- ***M. Lidberg,*** *New preliminary 3D velocity results from BIFROST*
- ***Tõnis Oja,*** *Calibration of relative Scintrex gravimeters.*
- ***Karin Kollo and Tõnis Oja,*** *Planning new co-located absolute gravity and permanent GPS stations in Estonia*
- ***Olga Gitlein and Ludger Timmen,*** *Absolute gravimetry campaigns of IfE in Fennoscandia: 2003-2006.*
- ***Ludger Timmen,*** *Remarks about varying gravity disturbances and loading effects.*
- ***Michel van Camp,*** *Intraplate Vertical Land Movements Constrained by Absolute Gravity Measurements*
- ***Jürgen Müller, H. Steffen, and Heiner Denker,*** *Mass variations in areas of glacial isostatic adjustment on the Northern hemisphere from GRACE data.*
- ***Johannes Ihde,*** *The Future Plans of ECGN and EVRS, and Absolute Gravity Activities of BKG*
- ***J. Mäkinen and H. Ruotsalainen,*** *The Fennoscandian Land Uplift Gravity Lines - summary of results*
- ***Björn Pettersen,*** *The postglacial rebound signal of Fennoscandia - observed by absolute gravimetry, GPS, and tide gauges*

### *Review of terms of references (TOR)*

Martin Lidberg (ML) went through the Term of references/activities for the working group. Comments from Presidium: "are you going to do all that?!" The "coarse list of activities" is however more focused on what will be done during this 4 years period. ML stressed the importance of long-term monitoring (5 year is not long-term). Please, keep in mind the long-term monitoring when building stations, etc.

*End of day 1 and start of day 2:*

Martin Lidberg opened day 2 by thanking Maa-amet for a very delicious dinner!

## 4 Business matters

### *The Fennoscandian Land Uplift Gravity Lines*

Jaakko Mäkinen (JaMa) presented a status report of the Fennoscandian Land Uplift Gravity Lines. The upcoming publication will contain all measurements up to 1996. Computational details, statistics and sketches will be given. A CD with raw data will

also be produced. Publication of the book will be in the series of "Reports of the Finnish Geodetic Institute" and is scheduled this year or early next year.

Discussion about how the absolute gravimeter (AG) sites should be considered in the perspective of the relative gravity lines – are they the new "eccentric sites"? JaMa says: Keep the AG outside the relative gravimeter data.

### *Report from the Presidium*

Martin Lidberg (ML) presented a short report from the presidium. The presidium wants the working group to continue coordinate the absolute gravity campaigns.

*NGOS meta data on geodetic observations*

1. ML asked if it is OK to publish metadata (no observations!) about AG on the web?
   - **Conclusion:** Yes, no group objected.
2. What kind of meta-data would this group needed from other groups?
   - Johannes Ihde (JI): Suggested exchange of meta-data between ECGN and NGOS. Suggests a meeting between NGOS and ECGN before GGOS meeting, so we speak with one voice.
3. Contact person regarding meta-data NGOS? Suggestions?
   - Contact person: For the moment ML will act as the link. (This may however change in the future.)
4. Jaakko Mäkinen (JaMa): Who will update the WG geodynamics web page?
   - ML: Hans-Georg Schernek (HGS) has agreed to continue updating the NKG WG geodynamics web page.

### *Update of campaign database and the Absolute Gravity Plan*

1. ML reported that the update of database is going quite well.
2. ML will update the Absolute Gravity Plan and send it for review to JaMa, Bjørn Ragnvald Pettersen (BRP), LMV, Gabriel Strykowski (GS), Michel van Camp and Olga Gitlein.

### *Status of the NEOgLID proposal (Michel van Camp (MvC))*

- MvC presented a proposal of scientific cooperation. This is framework of general working. Name (NEOgLID) with only ONE hit at www.google.com. MvC has no plans for going with their FG-5 to the Nordic countries. MvC have checked the possibilities for a EU 7th Frame Work project; closest subjects seems to be *Global change and ecosystems*, *mean sea level*, *changes in ice thickness*, and *seismic hazard*. Apparently there are no place where the project could fit.

Need to lobby to get our idea into the Framework. Each country/person should lobby for adding the "PGR" to list of subjects.

- Ludger Timmen (LT): A good idea. We need a common plan.
- GS: Building a network (of peoples). We can always refer to NEOgLID.
- Jürgen Müller (JM): do you know about TopoEurope? Idea of TopoEurope: give a 4D monitoring of geophysical data. It focuses on modelling not observations. Geophysicists drive the show. Projects must have at least 3 countries. Is it possible to relate it to NEOgLID? Outline a project of 2-3 pages, then give it a first screening, and finally decide to go or not to go for a full applications. Possible position for each country: No: 8 Ge: 10: Bg: 1-2, Dk:1-2, Ee:1. Finland and Sweden have not signed! How to proceed? Who wants to lead?
- JM: At EGU a session about similar topics as TopoEurope exists. About litosphere and the mantel.
- JI: I don't think we will get money from TopoEurope. Better changes for the NEOgLID through the EU 7FP.
- GS: Will contact one of the Danish peoples in TopoEurope and ask about his ideas of the litosphere. Will provide info.

**Conclude:**

**All should check possible partners and ideas.**

**MvC: propose to EGU2008 a session on our subjects (gravity, GRACE, ...) Chair: MvC, Co-Chair: tbd.**

***Any Other Business.***

None.

## 5 Planning of the AG field campaigns 2007.

***This years' campaign:***

- Lithuania: Three sites observed in 1994 and 2002 (JaMa)
- Latvia: Three sites observed in 1995. To be re-observed in 2007 (FGI)
- Estonia: Three sites observed in 1995. To be re-observed in 2007 (IfE/FGI)
- BRP:

  - Good reason for observations at same points within same season (cross-points). Standard deviation increases with time between comparisons at same point.
- LT. Suggests everyone to stay a day longer at AG comparison in Luxembourg this autumn. All said staying one more day was no problem.
  - **Conclusion. LT will ask the local organizer for a day longer.**
- BRP: No detailed plan. Plans to go to Tromsø, Ny-Ålesund, Honningsvåg, and maybe Kautokeino. Then go south into Sweden, maybe one or two swedish stations (Kiruna and Arjeplog), then to Bodø. Trysil in end of Juli (comparison with LMV). Onsala in May. Luxembourg in November. Maybe Stavanger, Bergen area (glacier related), Kolsnes, possibly Vågstranda, Ålesund (not likely). Trondheim has a larger slope than expected, floor has been added. This year, or maybe wait for next year.
- Andreas Engfeldt (AE): Swedish plan. Luxembourg in November. Østersund and Kranfors in week 46. Trysil in end of Juli. Mårtsbo in week 22. Room for one more instrument in Mårtsbo. Visby in week 21, almost set. The rest is "could be". Ratan and Lycksele will also be measured. Örebro will be measured together with people from Serbia. Skellefteå and Arjeplog will be measured. 4 "Core stations": Kiruna, Skellefteå, Mårtsbo, Onsala will be measured every year, the rest not so often (2-3 year).
- JaMa: 10 stations in Finland (Metsahovi, Virolathi, Kivetty (tent)) and Iceland.
- Suggestions to BRP: Sweden: Kiruna, Arjeplog, Østersund. Norway: as many as possible. Kautokeino: measured the last two years by UMB and last year by IFE, UMB. Needed to do this year?
- LT: In general we need more stations. There are quite many over-lapping.

### *Plans for the Future*

- Measurements plans
  - ML: Sweden: some stations will be measured often and some stations much less. 2010-> we may need external help to do observations.
  - LT: money ends 2008. Half program next year (south of Skelleftå). 2009 -> need money. Copenhagen and Onsala is easy and southern stations of Sweden are possible, however, a lot depends on money.
  - JI: no measurements this year (in Nordic/Baltic countries). Next year: will try to have a campaign.
  - BRP: Money for measurement 2007-2009. Will lose 2 people (one PhD student during this year). Training of Master students. Plan is to measure 15-20 stations every year, however it depends on money.

- New stations
  - Ratan (also tidegauge) and Lycksele (inland) in Sweden added in order to strengthen observations close to land uplift maximum.
  - Maybe a new station in the Mo I Rana/Brønnøysund area in Norway.
- Discussion on additional equipment at AG stations:
  - BRP: Request for additional equipment to the stations owner or not? Automatic water level measurements? Co-location with GPS? What do we have to correct for to get the best results? More groundwater wells? Humidity sensor (€2000 pr station)?
  - LT: May have up to 5 km distance between GPS and AG site. Maybe OK as long as levelling at 1mm level.
  - **Conclusion:** for the future maybe of interest with GPS, depend on geological situations.
  - Special study group (SSG)
    - ML: Do research to find out what's needed of extra stuff around a station, both locally and further away.
    - **Conclusion.** Study Group Members: JaMa, Herbert-Wilmes (BKG), LT, BRP, Per-Anders Olson (Lantmäteriet), Hans-Georg Scherneck (Onsala). BRP leads the group. The SSG will give recommendations for additional observation equipment at AG stations. The SSG may also give recommendations on other related topic the group finds important in order to achieve useful AG observations.

## 6 Next meeting

The next working group meeting will be held during the spring 2007.

**Decision:** Gabriel will check if the next meeting can be held in Copenhagen next March.

## 7 Closing

Many thanks to Tõnis Oja for organizing this meeting, and the Director General of Maaamet are thanked for supporting the meeting financial.

Meeting ended 2007-03-29 at 12.00.
End of minutes.