



# NORDISKA KOMMISSIONEN FÖR GEODESI

**Chairman**  
NIELS ANDERSEN  
DTU Space  
National Space Institute  
Elektrovej  
Building 327  
DK-2826 Kgs. Lyngby  
Danmark

**Secretary**  
MIKAEL LILJE  
Lantmäteriet  
Geodesienheten  
SE-801 82 GÄVLE  
SVERIGE

## MINUTES

### 58<sup>th</sup> NKG PRESIDIUM MEETING

Time: 25-26 November, 2014  
Place: FGI, Masala, Finland

Item 1) Opening of the meeting

Niels welcome us to the meeting and thanked everyone who has come. He gave a special thank first to the host FGI and then to Anna Jensen, who is the new Professor in Geodesy at KTH, Sweden. Niels also welcomed Mathew Simpson as new member of NKG Presidium. This will also be the last NKG meeting at FGI. The organisation will by the first of January merge with National Land Survey. FGI invited us all to dinner at Hotel Majvik at 7pm.

Item 2) Approval of the agenda (All)  
Added a new item (item 6 in the agenda)

Item 3) Approval of the Minutes from NKG Presidium meeting No 56 and 57 (All)  
The meeting accepted the minutes of the two previous meetings. As soon as the new website is running they will be available from on the web.

Item 4) Brief reports on financial and organising issues at the organisations (All)

**Finland:**

For FGI the main question at the moment is the merging with Land Survey of Finland. There are many practical and administrative issues that needs to be solved. The main reason behind the merge is political decisions to create bigger organisations and thus less vulnerable. However, the both organisations are very different and this creates several administrative challenges. FGI is e.g. dependent of external funding and have a huge international cooperation. Currently, the National Land Survey do not have science but this is something that FGI brings in to the new organisation. FGI moves in to the National Land Survey more or less without structural changes and missions. This means e.g. that the same tasks and core competence will be needed. The major organisational change will be that the current FGI will also include Spatial Data infrastructure services (e.g. Inspire secretariat). In the new organisation FGI will still have some 50% PhD among the staff as well as that 60 % of the budget is funded with external funds. High level of professionalism and expertise is needed also in the future. Currently, FGI have lots of international students and PhD studies, especially in laser scanning. FGI is a national centre in excellence on Laser Scanning, one of few centres of excellence in Finland.



Concerning more geodesy related issues as Finnref, FGI is developing a half metre service to be free of charge and is aiming at a free-of-charge cm-service in the future. Finnref has been extended this year with another 20 new stations. The functionality is fine even though FGI is not guaranteeing 24 hours service at the moment due to lack of manpower.

Concerning the renewal of Metsähovi, the SLR building will be ready by the end of the year. They are expecting to receive the telescope during 2015 and conducting the first observations in 2016. The new supra conducting gravimeter has been running in parallel with the old throughout the year. They are as close as 3-4 metres in between. The absolute gravimeter was upgraded to FG-5X earlier this year and it is going to Antarctica this winter to measure the Norwegian station Troll. VLBI is waiting on the green light for the purchase of the new telescope. The decision could come sometime next year and FGI will then send out the tender.

## **Denmark:**

Geodatastyrelsen. During recent year there has been major changes in management and this has been a challenge. There has been much focus on management and less on production. The open data policy has not made a big revolution in industry but an increase in use is notable. On geodesy matter, levelling is still done even after a change in staff generation, mainly in adjustment and analysis. As part of the NKG GNSS Analysis Centre, a fully automatic Bernese computation is set up and running. Geodatastyrelsen has completed 1/3 of Denmark's area with laser scanning. The result looks promising. The DTM is almost done.

DTU Space: Niels reported on the *Danish Continental Shelf Project* in which they are building a case for extending the outer limit of the continental shelf beyond 200 nautical miles for a submission to the UN. The Arctic Ocean Claim (NGM) is close to be technically ready and the DTU contribution includes Sea ice conditions, gravity and magnetic measurements and marine delineation.

Regarding *Arctic Space Infrastructure*, DTU Space is heading a delegation to describe future requirements on space infrastructure to fulfil sustainable development of the Arctic region. There is a close cooperation with the defence in Denmark. Preliminary conclusions are that the areas of mapping, navigation, situational awareness and communication needs to be addressed in the project.

There is a relatively new initiative at DTU Space creating a DTU Space DroneCentre. It was established in October 2014 to support and facilitate the use and development of unmanned technology as a platform for science, education and research based consultancy to strengthen and expand research at DTU. The DroneCentre is not only considering flying drones but also underwater drones. During this presentation, FGI reported on their extensive research and experience in drones since five years.

## **Sweden:**

Lantmäteriet:



Mikael started the brief report by announcing that the Geodesy Department is looking for new staff members and noted that this is a challenge since few graduates in Geodesy in Sweden. He also discussed the previous Strategic Plan for geodesy in Sweden (Geodesy 2010) and that they are now looking into key activities for the coming years in order to fulfil the goals. He also presented the current status of SWEPOS and its services as well as the national transition to SWEREF 99 and RH 2000. Lantmäteriet, SP and Chalmers have started Close III in which there will be focus on:

- Comparison and evaluation of VRS, MAC and PPP with the focus on how SWEPOS in the future should be developed.
- Finalize the calibration of the SWEPOS stations that started a few years ago, develop the strategy on how to conduct the calibration.
- What is a good CORS station? Develop/Improve criteria on how a stations should be established to ensure stability and quality.

Lantmäteriet has also been ask to participate in several international projects lately and Mikael mentioned FAMOS (Finalising Surveys for the Baltic motorways on sea), Eurogeographics Knowledge Exchange Network PosKEN, EPOS (European Plate Observing System) and EGSIM (European Gravity Service for Improved emergency Management). Also they are participating as lecturer at a EuroSDR organised One-week Course in Gravity and Height for National Mapping and Geodetic Surveying to be held in Dublin first week of February.

KTH:

Anna Jensen has been appointed new professor in Geodesy at KTH and she started the first of September, 2014. Traditionally, the Section of Geodesy has been strong in physical geodesy and her intention is to try to keep up the level in this area but also strengthen on GNSS. The Section of Geodesy is organized in the Division of Geodesy and Geoinformatics, a division that will be split the 1<sup>st</sup> January, 2015. Currently the section has three full time staff, four part time staff and four PhD students. They are teaching mainly in the programs of B.Sc. in the Built Environment and B.Sc. in Constructional Engineering and design as well as M.Sc in Transport and Geoinformations Technology. The research areas currently are Physical geodesy, Gravity inversion, Geodynamics, Applied geodesy, Measurement science and theory of errors, Determination of the geodesic line and areas on the ellipsoid, Integration of GNSS and terrestrial survey methods, Laser scanning, Determination of 3D coordinate transformation parameters, GNSS-based positioning and navigation and Atmospheric effects on GNSS satellites signals

Onsala:

Jan Johansson said a few words regarding the preparations for the new twin telescopes that are under way. There are four companies that made bid on the building of the telescopes of which two did not meet the specifications and the other two are initially too expensive. Negotiations have started with these two companies to see if the price to meet the specified price. Hopefully the building will start early 2015. After the constructions starts it needs to be finished within two years. The existing 25 metre VLBI telescope celebrates 50 years today. The GNSS test net is under installation and it will be a test field for two years and part of Close III. Jan also presented Tomas Hobinger who is a new scientist at Chalmers focussing on VLBI and GNSS and the combination



between the observations. He was also pleased to notice that the number of students undertaking the GNSS-course has increased in the last couple of years.

## **Norway:**

Per-Erik presented the new vision for Kartverket called *Destinasjon2025 - The new landscape*. The vision presents thoughts about global trends, technology development, globalization, urbanisation and internationalization. The vision states that the evolution of the modern urban society needs accurate location information. It covers also subjects as resources for the future, globalization of the geomatic industry, support for decisions, new sensors – big data and real time location information.

In Geodesy we are used to work with time series but other disciplines within geospatial normally do not. Geospatial data is crucial for the future and there is/will be a need to archive everything that happens. The archive will form a virtual model of the Earth.

One important contribution to the future is the contribution from Geodesy and that is the Global Geodetic Reference Frame. We need to be more accurate and sustainable (going from best effort to ...). We must be global and in the future there is a need to replace the national focus. Everything will be turned into dynamic. The Global Geodetic Reference Frame consist of the user segment (Positioning, Studies of the changing world, Development in developing countries), space segment, ground segment (e.g Ny-Ålesund) and the analysis segment (Geosat; a new way of combining different geodetic techniques as VLBI+SLR+GNSS. The first combined results are expected by end of 2015). In the future we can also for see a common geodetic reference frame for sea, land and air. Supporting a digital world in four dimensions.

In 2015, the financing of the geodesy department comes 60 % from internal sources and 40 % from external. The external funding is increasing and currently the division is involved in ESA and NASA projects increasing the budget. To follow the developments at Ny-Ålesund we are recommended to follow the following blog: <http://veidekkearctic.no/>

## Item 5) NKG General Assembly 2014 and NKG 2014-18 (All)

The proceedings and especially the *Special issue in Journal of Geodetic Science* were discussed. Very few submissions so far and the general thought is that people expect that the deadline is extended. The Presidium decided to set a new date and to postpone the submission to the 15<sup>th</sup> of January.

The meeting went through the resolutions from the General Assembly and noted that the first resolution that deals with outreach, is not valid for any working group but will go to the presidium. Since we are planning to have a more strategic discussion at the next presidium meeting we decided that this is one item that we should discuss.



Concerning the working groups for the period 2014 – 2018 it was asked that each national contributed with members. The working group chairs will approach the presidium members if necessary.

Item 6) Future challenges and the role of NKG in this context

This item reflects very much on what we would like NKG and especially the presidium to focus on in the coming four years. We decided to prolong the next presidium meeting with one more day to have more time to discuss strategic issues. Until then each member of the presidium is expected to bring some ideas on strategic areas to discuss. We are asked to be proactive to start the discussions. Some ideas mentioned were Global Geodetic Reference Frame, Outreach and positioning indoors/outdoors.

Item 7) UN-GGIM and UN Resolution on Global Geodetic Reference Frame

Per-Erik reported that the draft resolution that is prepared by the UN-GGIM working group on Global Geodetic Reference Frame was approved at the ECOSOC meeting in November. It is now expected to come up to the UN GA during spring 2015. Preparations on a road map and what conclusion it should have.

Item 8) Reports from the working groups.

Positioning and Navigation (Anna on behalf of Per):

This is a new group. Unfortunately Per could not attend the meeting but Anna reported on behalf of Per. There has been email discussions on the content between some of the members based on the keywords for the working group from the NKG General Assembly. The working group also includes NKG Resolution nr. 3 (Positioning and Navigation) as a task for them. The group do have members from almost all countries but are missing Iceland at this point. A first meeting is to be held early in 2015.

Geodynamics (Matthew):

Matthew started by discussing the AG project and its two basic purposes that are i) to ensure that the observations are preserved for future use and are not lost or destroyed due to technical or administrative circumstances and ii) to ensure that the complete set of observations is made available for scientific work among the parties, which is considered advantageous for society. The agreement was signed in 2012 by all parties and by 2014 all data is shared. A joint publication has been discussed for a long time. In March 2014 it was decided not continue with this publication but urge each party to publish their own data. Finland, Norway and Sweden have plans to submit papers latest during 2015. Next step will be the joint publication and try to find the candidate to lead the process. This will be discussed at the next working group meeting.

He continued to discuss the GIA activity and the NKG201xGIA model. The activity was established at the WG meeting on Iceland 2013 and is led by Holger Steffen. Currently the group has a good



cooperation with Lev Tarasov and a new GIA model solution tested against new empirical and uplift model (Vestøl and Ågren).

The next working group meeting is planned to be held in combination with the Geoid and Height systems working group 11-13 March 2015 in Oslo.

Geoid and height systems (Jonas):

The next working group meeting is planned to the 11-13 March, 2015 in Oslo together with Geodynamics. During the last period, the meetings have been very much project oriented but Jonas hopes that it can be changed to have more scientific presentations. The Presidium members are asked to encourage the national delegates to prepare more presentations to the various working group meetings.

New in the term is that tide gauges are included in the working group which is positive. The intention is also to start a new study project concerning future height systems and techniques. Besides this Jonas reported on the following;

- i. NKG2014LU\_test; the land uplift model was sent out for evaluation in October, 2014. The evaluation period ends latest at working group meeting in March, 2015. The differences between this model and the ice model varies over the Fennoscandia area and differences up to 2 mm/year can be noted. The differences between NKG2014LU\_test\_ABS and NKG2005LU\_ABS shows differences up to 1 mm/year but varies over the area. However, we need to take into account the reference frame differences used in the both solutions. Comparing Halfdans GNSS solution and NKG2014LU\_test\_ABS shows that GNSS need long time series to be able to contribute, even though there are some stations that anyway shows outliers.
- ii. NKG2014 geoid model project; the project started in 2011. The project have a number of phases as the Specification phase, Data update phase (Gravity database, DEM, GNSS/Levelling), Computations phase (five computation centres (Sweden, Estonia, Finland, DTU Space and Norway). A preliminary version was presented at the NKG GA. The Geoid project is dependent on the NKG 2008 transformations but these are not available at the moment, see below under the working group on reference frame. Some preliminary evaluations of the preliminary model is that the model agrees well with GNSS/levelling. It is a considerable step forward compared to previous model. The continuation of the work was discussed (Update of the gravity database, GNSS/Levelling, DEM, Ice thickness). The other computation centres are ready to start but waiting for the data etc. to be corrected and available. A new deadline is suggested for the data update phase and the new date is January 15, 2015. Final publication submitted October 1, 2015.

Reference frames (Pasi):

The working group is missing members from Iceland and Norway. Pasi presented the keywords for the working group and the NKG Recommendation No 4 and discussed that these gives valuable input to the working group of the coming period. The next meeting is planned to be held in Gävle



and probably during week 11. Topics to be discussed concerns WG related issues as well as project related issues. There are currently two ongoing projects;

- i. NKG GNSS AC: Draft guidelines for the processing and submitting solutions are developed and accepted by most of the LACs. It can be noted that five LACs regularly contribute with daily and weekly solutions every week. These are EST, FGI, LAT, LM\_ and SK\_ + NKG EPN solution as backbone in combination. Three more LACs are interested to contribute but not ready yet due to various reasons. There are ISS (Iceland), GST (Denmark) and LIT. The EPN-model is used as model for the combination routines. Next step will be re-processing of data back to 1997 (GPS-only). In total, the current network consists of 230 stations.
- ii. ITRS-ETRS89 transformations: The aim is to determine transformations parameters from NKG2008 solution to national ETRS89 realization. Several different approaches are tested but there are still some open questions. The groups is discussing how it should be done and currently not agreeing on how this should be done. Pasi continues the discussion with the group and reports to the Presidium.

## Item 9) EUREF (Markku)

Markku presented some information from previous EUREF TWG meeting. Since Markku was not present at that meeting he used some inputs from Martin Lidberg for this. The "European Dense Velocity Field" project (chaired by Ambrus Kenyeres) expects to have its first results out before EGU 2015. The project on "multi GNSS" is doing some progress and spending some time on differences between satellite systems and biases etc. The IGS do have plans to switch to RINEX 3 during 2015, but timetable etc is not yet clear. EPN will be somewhat later (at least a year from now). A critical issue is not only the file format, but also the naming of the files. Important for the future is the development of EPOS (European Plate Observing System) and its future relation to EUREF and EPN. EPOS PP is practically completed, and there is a H2020 call out for a EPOS-IP (Implementation Project) with approximately 18M€ (over 3 years) dedicated for EPOS if a good application is submitted. The deadline for submission is January 15. Currently EUREF and EPN are well recognized in the plans for the GNSS part of EPOS. Carine Bruyninx (ROB) will work on the governance (setting up the structure) for the EPOS GNSS, and Ambrus Kenyeres (FOMI) will be an important partner for estimating station velocities. So far EPOS GNSS will focus on the basic products as station velocities and time series and possibly strain rate maps, including data flow needed to get this to happen. The more advanced development will be done later (including high rate (1s) data and products).

There are major organizational changes within EUREF next year as Johannes Ihde, Carine Bruyninx and Allesandro Caporali all will step down from their positions.

## Item 10) NKG Web site (Thorarinn and Niels)

Niels presented a proposal for a new NKG website. The technical platform is prepared will be maintained at DTU and Thorarinn has said that he is available as editor of the webpage. The webpage will be published by the end of the year. Niels will meet Thorarinn shortly to discuss the



current layout and help Thorarinn to get started. The Presidium thanked DTU for doing this and wish Thorarinn good luck as editor of the NKG web site. The current website will only include a direct link to the new one as soon as it is up and running.

Markku will make a note on the existing FGI-website mentioning that the website is obsolete and that a new website is on the way.

Item 11) Other Business (All)

There is a meeting in Oslo 3-4 December to discuss next steps regarding Bifrost. Jan Johansson, Martin Lidberg, Halfdan and more will meet. Jan to report at the next meeting

Item 12) Next meeting of the Presidium (All)

A proposal is to arrange the next Presidium meeting on Iceland and the dates 20-22<sup>nd</sup> of April, 2015. One day will be dedicated on strategic issues and all members are encouraged to send in suggestions on items to be discussed and share between us before the meeting.

Current order; Finland – Iceland – Denmark – Norway - Sweden



# NORDISKA KOMMISSIONEN FÖR GEODESI

## Present:

Denmark: Niels Andersen, DTU Space (Chair)  
Per Knudsen, DTU Space  
Kristian Keller, GS

Finland: Markku Poutanen, FGI  
Jarkko Koskinen, FGI (day 1)  
Pasi Häkli, FGI

Norway: Torbjørn Nørbech, Kartverket  
Per Erik Opseth, Kartverket  
Matthew Simpson, Kartverket

Sweden: Mikael Lilje, LM (Secretary)  
Jan Johansson, Chalmers (day 2)  
Jonas Ågren, LM  
Anna Jensen, KTH (invited)

## Apologies

Per Knudsen, Thorarinn Sigurdsson, Gudmundur Valsson