NORDISKA KOMMISSIONEN FÖR GEODESI

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MINUTES

59th NKG PRESIDIUM MEETING

Time: 20-21 April, 2015
Place: 20th April, Grand Hotel Reykjavik, Iceland and 21st April, Akranes

Item 1) Opening of the meeting
Thorarinn and Niels welcome us to the meeting and thanked everyone who has come. Niels gave a special thanks to our Icelandic host. NSI Iceland invited us all to their head office for the meeting the next day as well as for a joint dinner on Tuesday evening.

Item 2) Approval of the agenda (All)
The agenda was approved after minor additions. Jonas wanted to add a status report on FAMOS and Matthew included a report on a cooperation in Norway concerning Sea Level monitoring. Per asked if we could discuss follow-up-seminar on the land uplift workshop held a few years ago as well as considering a new Science week during this period.

Item 3) Approval of the Minutes from NKG Presidium meeting No 58 (All)
The minutes from the last meeting were approved.

Item 4) Brief reports on financial and organising issues at the organisations (All)
Iceland: LMI reported that they have the same budget as last year. However, a major change is that they nowadays need to pay VAT. The reason is that the organisation is no longer selling maps and that the tasks of LMI has consequently been changed. The change results that LMI is considered to be among companies forced to pay VAT. LMI is now trying to get increased budget to compensate for the higher costs. LMI has also been doing some international consultancy contracted by Kartverket (Albania and Slovenia), The GIS department at LMI has lately been involved in several new international initiatives and cooperation as Copernicus. Per-Erik noted here that Norway first said no to join Copernicus but due to media campaign the decision was changed. LMI expects a change in law this year so that LMI can make large scale maps and not restricted to maps with smaller scale than 1:50000.

Norway: Kartverket presented the latest status regarding the developments at Ny-Ålesund. The new station is under construction and the progress is good. The VLBI-telescopes are expected to be delivered next year with initial observations starting 2017. There are no decisions made yet concerning SLR. Neither of the three bids meets the requirements fully. Kartverket wants the SLR to be more remotely controlled in the future since it would be too expensive to have the number of staff necessary in Ny-Ålesund. Per-Erik also discussed the revised strategy for Kartverket to develop the national spatial infrastructure through developing the focus areas

- A complete digital virtual model of Norway – NSDI or "noden"
- innovation and analysis competence
- the role of Kartverket
- Improved data quality and more efficient processes internally

He also stressed the importance to develop a complete NSDI that links all national public data together including that it should be continuous updated in 4D which of course includes time series.

This overall goals also leads to a revised strategy for the geodetic institute and it includes

- Develop a high quality global geodetic reference frame (and make it operational as basis for the Norwegian NSDI). The quality should satisfy the need for precise positioning and monitoring the effect of climate change.
    - Complete the observatory in Ny-Ålesund with VLBI in 2018, SLR in 2020
    - Make Geosat operational in 2016
- Contribute to more precise climate monitoring within 2016, by analyzing sea-level and ocean currents using satellite data.
- Monitor GNSS services and cooperate with the Norwegian Space center to secure optimal use of space based satellite navigation in Norway and at high northern latitudes.
- Develop a common height reference for sea, land and air in Norway and improve the geophysical frame down to a precision of 1 cm for the Norwegian mainland.
    - *2015: To test space based gravity*
    - *2015/16: Complete the work on NN2000*

During the presentation it is also worth mentioning the successful work that Kartverket has contributed to as co-chair of the UN GGIM GGRF working group. The UN resolution on a Geodetic Reference Frame for Sustainable Development was accepted in February.

On a personal basis, Per-Erik is now also the chair of GIAC for the period 2015-2017. GIAC stands for GGOS Inter-Agency Committee as which he will be focusing on making "best effort" based contribution more sustainable.

Finland:

Markku reported that FGI merged as planned to the National Land Survey in January 2015. There are no major changes since the internal organisation remained the same. The external funding

concerning the former FGI is about 70% of the budget and it is clear that the budget coming from governmental funds will decrease in the future. The premises in Masala are in the need of renovation meaning that they need to move out this or next year. It is not clear if they will return since the renovation is extensive and the cost is high meaning also that the rent cost will be high probably too high. During the renovation the plan is to move to Otaniemi Campus.

The FinnRef network consist today of 20 stations and is up and running. The data from FinnRef is available for free to the users. Lantmäteriverket also offers a half metre service for free and the number of users is high! The plan is to offer all the FinnRef stations to the EPN by the end of this year. At Metsähovi, the new SLR observatory building is ready and now waiting for the new telescope that is expected to arrive during the autumn. If everything goes according to plan, observations will start during 2016. Regarding the new VLBI telescopes the decision is still pending but they welcome the UN Resolution as it was very timely as it will help them in the discussions.

Denmark:

Geodatastyrelsen: Kristian started by mentioning that GST is re-building its premises and it is supposed to be ready by 1st of September 2015. DTU takes care of most geodesy in Denmark according to the agreement between GST and DTU. However, he presented some information regarding GST and free data as well as the discussion on gathering all public data in a one server. The new Danish Height data is more or less ready by now where quality control is currently going on. https://bitbucket.org/GSTudvikler/gstdhmqc/wiki/Home. GST has also a tender out for cost/benefit-analysis of a national based positioning service. GST is also working on a strategy. Kristian ended by mentioning that the company Maersk is currently spending 2 MEuro to investigate on how to map Greenland (metre level scale) in an efficient way and is also prepared to sponsor even more if necessary in the future.

DTU: Niels reported that business is more or less as usual. They have a good co-operation with Geodatastyrelsen as well as others. They are active in the Arctic on several levels, e.g. through the Danish defence, self-governance Greenland, continental shelf project. They will also be present in the Antartica this season with airborne gravity. On areas of interest at the moment is the ESA mission SWARM and the UAV Drone centre at DTU. Concerning UAVs they specialize on technology and it is clear that by just being involved in the Drone industry, they manage to attract students. The students are interesting in working with geo-related information because they are interested in drones as technique. The Bachelor program is running with 60 students at the moment. Regarding the Master level, there are good cooperation in the Nordic five university agreement and in which different tracks have been developed

Sweden: Mikael reported that business is more or less as usual since last meeting. Sweden had a challenging period before Christmas when the new government's budget was not accepted and the country was on the verge of a new election. The new minister for Lantmäteriet is Mehmet Kaplan who actually has been studying at KTH. He is also the minister for housing, urban development and information technology. The agency also had to change department so we now

belong to the Ministry of Enterprise and Innovation. At Lantmäteriet, a minor reorganisation has taken place at the Unit were Geodesy belongs and we have now changed name to Geodetic Infrastructure. The unit also changed name to the Geodata Unit. The geodetic infrastructure department is currently hiring new staff and had several applicants.

Chalmers and Onsala: Jan started his presentation by reminding everyone that the ownership in Sweden regarding the core station is different from the other Nordic countries. Onsala is run by Chalmers and the running costs are payed by Vetenskapsrådet. Among the staff you can only note one "geodesists". Lantmäteriet do not have an ownership of Onsala. Unique situation at least in the Nordic area. He also noted that they have an increased funding for infrastructure and research but it is not easy to get the research money. The development regarding the twin telescopes is very much according to plan. It could also be noted that there is an increase interest in VLBI currently with a new senior scientist in Thomas Hobiger as well as two VLBI PhD-students. There will be a new Bifrost (1993 – 2015) and this project is a very good example of how the mapping authorities and the universities can cooperate to create a win-win-situation. The core network in Bifrost is based on stations from the mapping authorities and the project results in suggestions and actions to improve the infrastructure. Currently, the situation at Onsala could be summarized as positive both financially and regarding science.

Item 5) Strategic Discussions (All)

Based on some inputs, mainly from Per-Erik, Jan and Kristian, the Presidium had a lengthy and interesting discussion regarding issues on the future for NKG, both in short term and in long term. We also covered issues as reference systems and frames, education, science, production as well as NKGs role in a global world. The minutes only covers a few items and in very short form.

The discussions concerned

- Dynamic Datum – Global Dynamic Reference Frame (daily updated ITRF?) and the challenges for the users. We can see that we are moving towards a global geodetic reference frame, moving away from national solutions, moving towards positioning on a cm-level everywhere using e.g. mobile phones. The geodetic infrastructure is moving towards the ability of daily updated ITRF but the geodata in the databases in the various countries as well as the users are not prepared for this. The need and maturity varies significantly globally.
- The reference system for the Baltic Sea is currently moving to an EVRS-solution with the epoch 2000.0 but in the future (say 20 years from now) perhaps we are using dynamic datum also for the Baltic Sea. How can we encourage hydrographers to participate in NKG in the future?
- Jan noticed that the situation regarding the expertise that the mapping authorities have to day compared to 10-20 years ago has changed. All authorities today have international experts not only in the field of geodesy and space geodesy but also in e.g. general mathematics and physics. This leads to direct participation in basic research and sometimes also to teaching at universities. Where does this leave e.g. Onsala/Chalmers in

the future regarding NKG but also in the "UN-world". In Denmark it is the opposite more or less, DTU is "in charge" of research and development, not Geodatastyrelsen. The presidium noted that the discussions in the working groups are on a much higher scientific level today than for say 10 years ago even though we note that we have problems in attracting participation from universities.

- Kristian presented some thoughts from a discussion at GST that NKG and the Nordic Kartchefsmötet could/should be used to create *A common Nordic strategy for geodetic reference network* as we need to continuously focus on keeping the networks up-to-date and ready for future technologies; such as Galileo and its future CS in the cm-level, and other technologies of RTK and PPP and the augmentation of EGNOS. The strategy could/should cover the following main topics
  - Better positioning/navigation in the Arctic and Norwegian fjords
  - Coordination of tide gauge measurements and data processing
  - Cooperation on the education of master students in geodesy, especially with respect to the area of reference networks
  - A coordinated strategy in order to influence ESA to develop technical needs to be used in the Arctic and Nordic countries
- Matthew presented on *Projections of 21st Century sea level changes for Norway.* There is no national authority regarding sea level in Norway at the moment but Kartverket has been accepted as a key player on providing information on sea level change. The project should deliver in autumn 2015. Sea level involves many different disciplines but we (Geodesists) are key players.

- Research balance between Mapping authorities and Universities varies between the various countries. Denmark (annual "contract" between GST and DTU), Sweden (Research at Lantmäteriet), Finland (Research at Lantmäteriverket since 1st January) and Norway

Item 6) NKG Web site

Thorarinn and Niels presented the current status of the new NKG website. It is still under construction and the domain www.nordicgeodeticcommission.com will be used. The development will start shortly. The idea is to use the structure of the webpage of LMI and highlight the working groups on the webpage. There will of course be a possibility for the working groups and others to upload files. We will be given a notice when we can start using the webpage. Hopefully this can happen before June. Then we need to make sure that the information is up to date and that that the history is covered. We should also consider a NKG Product-page.

Item 7) Reports from the working groups.

During the presentations Markku noted that reviewed publication normally takes a long time and urge the working groups to consider a publication plan early in the process.

a) Positioning and Navigation (Per)

This new working group held its first meeting in Copenhagen in April this year. As it is new it spent time to discuss the scope of the working group, its key word and the resolutions from the General Assembly. From the discussions they started to plan the work needed to be done. Per and Pasi are currently also discussing the overlaps between their working groups. As opposite the other working groups, this working group does not have a specified product to deliver but instead currently focusing on knowledge exchange. The next meeting will be held the 3-4 November at KTH in Stockholm. This meeting will discuss mainly real-time positioning, positioning/navigation services, new GNSS and modernization, quality checking/monitoring and making reference frames and vertical reference systems. Per intend also to invite the Baltic countries to the next meeting. The working group meeting included some new members who are not familiar with NKG and the issue regarding funding mainly for travel expenses was raised, especially for persons from the universities. The respective countries are asked to review the situation in their country to increase the possibilities from universities to be present at the meetings.

b) Geodynamics (Matthew)

The working group held its annual meeting in Oslo in March, jointly with the Geoid and Heights Systems Working Group. The discussions concerned outcomes from General Assembly. The working group concluded that they would be satisfied to continue with the two focus areas/projects from the previous period. To the meeting they also invited Marie Keiding to give a talk on *A comparison of strain rates and seismicity for Fennoscandia*. This initiative was well received at the meeting and the Presidium encourages other working groups to consider to do the same at their coming working group meetings.

Regarding absolute gravity measurements in Fennoscandia and the joint publication, Matthew updated us that there will be a small group working on a joint publication. The countries are at different levels when it comes to preparedness of publishing a publication based on national observations but a smaller group will start its work with a kick-off meeting September 26 in Finland. Per-Anders Olsson from Sweden is responsible in coordinating the meeting. Timeline as well as first author is not decided yet.

The presidium was updated regarding the NKGF201xGIA-model. The ice model is identified as a weakness in traditional GIA models. This has led to a good and from time to time intensive cooperation with Lev Tarasov. In 1st round of testing new GIA model solution was tested against new empirical land uplift model by Vestøl and Ågren. In the 2nd round of testing, which is to start shortly, Holger has received 35 ice histories for Fennoscandia. Holger in close connection with Lev and they are planning a teleconference in the end of April. Regarding the new empirical land uplift model NKG2015LU_test, the new Bifrost solution must be included and it is anticipated that this work should be completed by IUGG in June this year. The underlying GIA model will be provided by Holger. This is also thought to be realized by IUGG in June. The Baltic countries have also presented their possibility to include tide gauge observations to this work as well as levelling data (from Lithuania).

c) Geoid and height systems (Jonas)

Working group had its annual meeting in Oslo in March jointly with the Geodynamics group. Again, Jonas noted the difficulties in attracting scientific presentations to the meeting as they have turned more into a project meeting. At the meeting they discussed general activities for the coming four years. There is a need to finalize current projects but also start discussing *Future height systems* as well as *Estimation of the apparent land uplift at tide gauges*. The next meeting is already planned to take place next year in week 11 in Estonia.

Regarding the computation of the NKG2014 geoid model, Jonas explained that they are currently still in the *Data collection and quality validation phase* but soon going into a computation phase. They experienced some problems with the DEM model but these are cleared now. The necessary GNSS/Levelling data was submitted in January, however there is still a discussion remaining concerning NKG2008 transformation for Lithuania and this working group is dependent on the reference frames working group. This problem seems at the moment to be problematic to solve. The Presidium encourage the working groups to find an effective way to move this issue further, e.g teleconference instead of email discussion. The working group/project agreed at their meeting on a new time line aiming on a final publication submitted (to Journal of Geodesy?) latest December 31, 2015. Currently, the discussion between the different computation centres regarding e.g. computation methods is lacking. The working group will try to arrange a session dedicated to regional geoid modelling of large areas at the EGU 2016 (call for sessions is usually in August). The working group noted the improvement regarding the data needed for geoid modelling during the last number of years and agreed to continue also after this project to improve the datasets continuously.

Concerning empirical land uplift modelling, the discussions were divided to happen both in the Geodynamic working group as well as the Geoid and Height working group. It was discussed if the model NKG2014LU_test was ready to be released but it was decided that there is currently so much going on as a new Bifrost solution, underlying GIA modelling, more new data etc so it is not recommended to release the model at this stage.

d) Reference frames (Pasi)

The Reference Frame working group held its meeting in Gävle in March. A number of scientific presentations were held. The WG see a need for a new horizontal model for intraplate deformation. There are a number of initiatives going on within NKG at the moment so the Presidium and Working groups recognised a need to start coordinating for a new horizontal as well as vertical NKG model. Pasi was asked to coordinate the task and Jonas and Matthew are asked to support.

Regarding the ITRF – ETRS 89 Transformations, the manuscript to the Journal of Geodetic Science is available and has gone through a review process. The reviewer's comments have been taken care of and a new version is almost ready. The transformation presented works

well for all countries except Lithuania and a discussion with Lithuania is currently taking place through email exchange as noted previous in the minutes

Concerning the NKG GNSS AC, Pasi presented that five of eight LAC are contributing at the moment. Two more are almost ready and only Lithuania is currently missing. In total we are handling 230 stations in the NKG network. Guidelines exists for the inclusion of EPN stations in the sub-network as well as for the processing and draft guidelines for the re-processing. The current two combination centres are using different software. LM is using Bernese and FGI is using Catref. It was noted that there is a need in near future to organise a work shop on time series and it would be important to include persons with experience on time series analysis as e.g. Halfdan Kierulf (Kartvekret).

Item 8) On the Harmonising Vertical Datum activity of the FAMOS project

Jonas updated us regarding the proposed FAMOS project where one focus concerns the harmonising vertical datum. The main focus is though the finalising of surveys for the Baltic motorways on sea. Benjamin Hell from the Swedish Maritime Administration is leading the project. Most countries around the Baltic Sea are involved. It is important to remember that this is not a research project, it concerns infrastructure and studies. Research is not allowed due to the financing EU-source. The project has been divided into three parts for the period 2015-2020. The first part is called FAMOS Freja and includes four activities namely;

- Hydrographic surveys
- Harmonising vertical datum
- Surveying infrastructure
- Data flow sounding to chart.

Item 9) UN-GGIM and UN Resolution on Global Geodetic Reference Frame (Per-Erik)

Per-Erik informed us that the UN Resolution was adopted in February and currently the same working group is focusing on the road map. The Presidium acknowledge the work that Kartverket has done together with Australia regarding the Resolution.

Item 10) EUREF (Markku)

Markku informed us about the discussions from the last EUREF TWG meeting that was held in March. He mentioned that there are two candidates for the position as EUREF and they are Markku and A. Caporali. There are also only two candidates for the EUREF TWG chair and they are A. Kenyeres and Martin Lidberg. Markku mentioned that EUREF is working on a project regarding velocities and for that need a densified network. There was a discussion regarding the purpose of the much densified network in Europe and the sparse network from the Nordic area. Besides this, the Presidium noted that heights and gravity is not much discussed at the TWG meetings.

Item 11) IUGG 2015 (All)

IUGG is organised in June including important elections within IAG etc. Brief each other regarding planned presentations and elections.

Item 12) Summer School 2016, Sweden (Mikael and Jan)
Scientific committee, send emails to Mikael before 15 May
Check with hotel. Summer school Monday afternoon to Thursday afternoon+ one extra day work a workshop on e.g. land uplift
75 participates

Item 13) Other Business (All)

- Decision on a Science week 2017 March.

Item 14) Next meeting of the Presidium (All)
17-18th November, 60th Presidium Meeting; Copenhagen, Denmark
Continuation regarding strategic discussions.
Current order; Iceland – Denmark – Norway – Sweden – Finland

Invited:

Denmark:	Niels Andersen, DTU Space (Chair) Per Knudsen, DTU Space Kristian Keller, GS
Finland:	Markku Poutanen, NLS Jarkko Koskinen, NLS Pasi Häkli, NLS
Iceland	Gudmundur Valsson, LMI Thorarinn Sigurdsson, LMI
Norway:	Torbjørn Nørbech, Kartverket Per Erik Opseth, Kartverket Matthew Simpson, Kartverket
Sweden:	Mikael Lilje, LM (Secretary) Jan Johansson, Chalmers Jonas Ågren, LM

Apologies
Jarkko Koskinen, NLS, Finland
Torbjørn Nørbech, Kartverket, Norway