



NORDISKA KOMMISSIONEN FÖR GEODESI

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MINUTES

64th NKG PRESIDIUM MEETING

Time: 13-14 December, 2016 Lunch - Lunch
Place: National Land Survey, Helsinki, Finland

Item 1) Opening of the meeting

Niels welcomed us to the meeting and was hoping for fruitful discussions. Markku also welcomed us and invited us for dinner at the hotel at 18.30.

Item 2) Approval of the agenda

We went through the agenda and decided in which order we needed to discuss the agenda items. These minutes does not reflect the order in which the agenda items were discussed. Søren noted that at the meeting No 62 (August, 2016) we discussed on Nordic educational issues. It is not on the agenda this time and since this was raised by Norway, Per-Erik will check with Laila and, if needed, bring it to the agenda for the next meeting.

Item 3) Approval of the Minutes from NKG Presidium meeting No 62 and 63

At the NKG Presidium meeting No 62 there was a discussion on the Chinese interest in IAG and other countries concern on this. It was not directly noted in the minutes and we agreed that it would be sufficient if we note it here.

The minutes were approved with these notes. They will also be published on the website in due time.

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

Denmark:

SDFE: Søren started with mentioning that GST moved to Ålborg on 1st of November 2016. SDFE is based in Copenhagen. They have presented a new strategy in which the word geodata is not mentioned specifically, but have been expand to 'data', which include much more than geodata. Financially the organisation has this year had the delicate problem in spending money but can foresee a deduction of 2% coming years (what is normal in Denmark). Søren noted that he has 17 hardworking people in Geodesy Department and that he will have the possibility to employ three more next year. The infrastructure project building a bridge between Rødby - Fehmern has been delayed and because of that SDFE is now taking over two CORS stations. He also noted that the vehicle driven robot total stations for trigonometric precise levelling is very fast and efficient. Søren



promised to send details on the accuracy and efficiency of the trigonometric precise levelling to Finland and Iceland.

DTU: Niels continued the national report from Denmark by mentioning about the external evaluation on the research at the institute that took place earlier this year. The result was very good and concerning the six areas of interest that was evaluated, DTU is considered to be world leading in all of them. This includes the geodesy part. Financially they expect a decrease in budget by 2 % next year meaning that they need to continue to find more external funding.

Concerning geodesy and geodynamics at DTU, they are moving into some interesting areas such as sensors on autonomous vehicles. This is done at the successful DTU Drone Centre. They have also started with strategic cooperation with the Danish Defence looking at the Polar and Arctic regions. Niels ended by mentioning some concerns and uncertainty when it comes to the cooperation they have with NASA due to the new government there but noted also the successful cooperation they have with ESA.

Finland:

Jarkko mentioned that the financial situation for FGI is fine and that they succeeded in attracting some 2.9 mEuro from government and 7 mEuro from external finances. The positioning services are not run by FGI but by the ICT services within NLS. Finland is very much discussing and promoting dynamic datum and the use of global reference frames. They have started a discussion on issues concerning legislation on spatial data and spatial data infrastructure. The expectation is a new law early 2018 and this could change the role of FGI on what responsibility they can have. The office at Masala will be renovated and will start during 2017. They will still work at FGI during the renovation. Concerning the upgrading of Metsähovi, they ordered the new radio telescope two weeks ago. They expect delivery in two years from now. The cost is estimated to 2 mEuro per telescope and it will be the same telescopes as Onsala has ordered. The SLR installation is expected to be finalised during the winter 2017. Two new supra-conducting gravimeters are operational. Currently they are working a lot on the local ties, something that we learnt at this meeting that Norway and Sweden also are looking in to. A Nordic cooperation can be foreseen, especially related to the new radio telescopes in Metsähovi, Onsala and Ny Alesund.

Iceland:

Iceland reported that budget is more or less the same for next year. This year they had extra funding for the re-measurements and they are hoping for some extra funding also for certain project. They are focusing on the publishing of a new datum.

Norway:

Norway discussed that the budget for next year is more or less then same as 2016. However, for 2018 they already can see more challenges. Organisational, the Geodetic institute has up till now been divided in three section. From the 1st January, the department of Geodetic Science will be split into two sections, namely *GNSS development and research* and *Geodetic research and development*.



Regarding the development of Ny-Ålesund, the first twin-telescope test operation is planned for May 2017 and that the VLBI goes into operational in the beginning of 2018. Kartverket is in discussions with NASA regarding the contract for the SLR equipment. It looks as if there will be an agreement before the end of the year. Local tie is something that is discussed at the moment since it will be a limiting issue if it is not solved. Kartverket will put a lot of effort into this in coming period with cooperation with Sten Bergstrand on the issue. This could/should be a joint project in the Nordic countries with Ny-Ålesund, Onsala and Metsähovi.

Sweden:

Lantmäteriet described the present financial issues were the cadastral procedure is ineffective, costs too much and the income is too low. Together with this we are also experiencing a low demand of real estate information meaning that the income is lower than expected. This situation will have effect also on geodesy at Lantmäteriet.

Lantmäteriet released a new National Geodata Strategy with the four goals

- Geodata should be open,
- Geodata should be user friendly
- Geodata should be available
- Collaboration is well developed

Concerning open geodata, we have been promised a reply from the government during 2018 so there is no news on this at the moment. Lantmäteriet is also involved in a Government enquiry regarding self-driving vehicles. An interesting question is what role Lantmäteriet will have in this in the future when e.g. the car industry build up their own road databases. Perhaps RTK will be used for navigation only and not for positioning.

Discussing Geodesy related issues;

- o Geodetic infrastructure will start the work on a new Geodetic Strategy with the ambition to release it by the end of 2017.
- o A Marine Gravimeter is ordered and will be delivered in May 2017
- o Lead the project on the NKG Geoid model
- o Organised the NKG Work shop on Land Uplift
- o A new Horizontal velocity model was released

Onsala:

The Department of Earth and Space Sciences will the 1st of May merge with the Department of Energy and Environment. There will be a new director after May next year. Gunnar Elgered will be in office until then but after that Gunnar will join the research group. The two twin telescopes are presently being built in China. Hans-Georg Scherneck is to retire soon. He will still work for another two years but the department is to employ his replacement soon.

Item 5) 3rd NKG Joint WG Workshop on Postglacial Land Uplift Modelling

The workshop was held at Lantmäteriet, Gävle, Sweden, 1st – 2nd of December 2016. The decisions and recommendations from the meeting were as follows;



Short term (up to next General Assembly)

The main short term recommendation is to publish/release a **full land uplift model package** consisting of a new three-dimensional NKG_RF17vel, NKG2016LU_lev and NKG2016LU_gdot. The following was decided related to this:

- The already released NKG2016LU_abs/lev models included exactly as is (Vestøl et al. 2016).
- No apparent land uplift model. (It is better that the user computes the apparent uplift based on NKG2016LU_lev for his/her area and time interval.)
- The horizontal model computed in a suitable way based on the new NKG2016GIA_prel0907 model computed by Holger. Method decided by WG of Reference Frames.
- WG of Reference Frames also decides whether NKG_RF17vel is to be transformed to other reference frame (and if so, to what frame). Follow the EUREF developments regarding conventional ETRS89 realisation
- A gravity change model included based on NKG2016LU_abs and a linear relation. *The* linear relation recommended by Olsson et al. in the work with Nordic AG time series. Standard uncertainties included - of course.
- Uncertainty estimates by least squares collocation plus a systematic term. Maybe constant uncertainties in a smaller number of regions. Uncertainties for the GIA models NKG2016GIA_prel0306 and NKG2016GIA_prel0907 required for this, to be provided by Holger and the GIA modellers.
- Release date for the whole kit? 2018 General Assembly **at the latest**.
- All this will be published. The following publications are planned:
 - NKG2016LU (including the 1D GIA modelling leading to NKG2016GIA_prel0306)
 - The BIFROST Gamit solution used for NKG2016LU and subsequently for the horizontal model.
 - Absolute Gravity publication (Olsson et al.)
 - NKG_RF17vel (including horizontal model based on NKG2016GIA_prel0907)

Long term

Take another turn on the wheel/spiral (cf. 2nd LU WS). Stepping back and concentrating on improving the data, empirical modelling and GIA modelling. This should lead to both deepened physical understanding of the GIA phenomenon as well as to better models. More concretely, the following steps should be taken on a long term basis:

- Updating the different time series,
 - Focus on reference frame issues.
 - Assess errors, systematic errors especially.
- Characterize sea level trends and tide gauge data vs GIA/LU. No apparent NKG land uplift models to be computed (as decided at the Workshop), but sea level trends needed for assessment also in the future.
- Improve empirical models and uncertainty estimates (also in the horizontal)



- Empirical modelling method should be improved, including method for uncertainty estimation.
- Improve GIA modelling,
 - 3D modelling (also lateral varying earth model).
 - Uncertainties revisited and improved,
 - How to deal with other processes, like tectonic, (erosion/sedimentation?)
 - Assess GIA models using updated data sets and empirical models.
- Time schedule: The first GIA model to be released without the “_prel” planned for year 2020.
- From semi-dynamic to dynamic systems – communication issues,
- Use/implementation of NKG_RF17vel – How to use it in improved transformations between ITRF and national reference frames.

Coordination

The coordination is important. The working groups are working very well together at the moment. The coordinator should be part of the Presidium to fully be able to include this also together with the Dynamic Datum discussion. Pasi agreed to take the role to coordinate but expect support from the involved countries, especially the working group chairs. Everyone agreed on this. He will have strong support from the other working group leaders (Jonas, Matthew and Per). Søren mentioned that he would like to include someone from SDFE and will return with a contact person before Christmas.

The Presidium noted that it is difficult to understand the amount of work needed to accomplish the suggestions above. However, we decided based on the belief that the group preparing the recommendations believe that this is realistic and achievable.

A Project proposal / Road map is to be presented at Lill-chefsmöte in spring 2017 as a work package in conjunction with Dynamic Datum. It should be implemented in the Dynamic Datum proposal as a very important issue and as an agreement among the members of the NKG Presidium.

Item 6) NKG Web site

Since Thorarinn was not present, Gudmundur presented the status on the webpage. Thorarinn has sent information on the status and questions to the working group on how the webpage should be managed. The working group would like to be in charge of their respective space on the webpage, meaning that they can update and upload information without having to involve Thorarinn. Mikael and Thorarinn will take care of the Presidium material to be on the webpage. Markku will also check what material that was in the “archive” and send it to Thorarinn. The Presidium discussed on the possibility to have closed areas only for the working groups and Gudmundur will bring that back home for further discussions. As decided before. Thorarinn will be the webmaster of the webpage. He will present a main structure as well as guidelines to working group chairs and NKG presidium on how to upload / update the webpage.



DTU Space has been kind to pay for the website and will continue to do so. The Presidium thanks DTU Space for this.

Some thoughts on improvement from the discussions were e.g. to change science week to “NKG workshops” or something similar. We can then add workshops and other important cross-working group events there. Concerning the Event column, we need to check if WG chairs and NKG Secretary also can upload information. This would make it easier for e.g. working group meetings, NKG General Assembly and NKG Summer schools.

All presidium members are asked to add information to the webpage.

Item 7) Reports from the working groups.

Positioning and Navigation (Per, absent but Hannu Koivula will replace)

The working group will have its next meeting in Riga the 25-26 January, 2017. The working group has been working on three project proposals that Hannu presented

- Experiences with RTK/PPP/DGNSS services
- High level guidelines for GNSS-based real-time positioning services and RTK/GNSS surveying
- Recommendations for procedures to monitor GNSS positioning services.

The NKG Presidium believes that these projects are important and encourage the working group to continue on the work.

Geodynamics (Matthew, absent, no report will be given)

Unfortunately, Matthew was not present and no report was given at this meeting.

Geoid and height systems (Jonas, Absent)

Unfortunately, Jonas was not present but he sent a report that Mikael presented;

- The new land uplift models **NKG2016LU_abs** and **NKG2016LU_lev** were released June 30, 2016.
- The new **NKG2015 geoid** model was released October 6, 2016
- NKG joint WG land uplift **workshop** in Gävle December 1-2, 2016
- Much geoid and height related work is now going on in the **FAMOS** project, but this is limited to the Baltic Sea. All the permissions to use Nordic, Baltic and German data in FAMOS are now in place. New Swedish marine gravimeter will be delivered next year.
- A (in some ways) similar project is going on in Norway, namely **Felles referanseramme for sjø og land**
- Next **WG meeting in Riga**, Latvia, week 11, as always together with the WG of Geodynamics.



Reference frames (Pasi)

Last meeting was held in Vilnius, Lithuania in April 11-12, 2016. The next WGRF meeting in Helsinki, week 14/2017 with a Time series analysis workshop in conjunction. Pasi reported on the two ongoing projects.

- i) ITRF – ETRS 89 Transformations. (Pasi)
 - New NKG transformation and parameters were published in the beginning of 2016, detailed description and results can be found:
<http://www.degruyter.com/view/j/jogs.2016.6.issue-1/jogs-2016-0001/jogs-2016-0001.xml?format=INT>
 - Project (among other NKG activities) is strongly linked to (semi-)dynamic datums
 - Next step (see also item 5 in the minutes): WGRF will develop a new horizontal PGR model to accomplish a new updated 2D+1D PGR model (new vertical model NKG2016LU_abs/lev already released by the WGGHS, will replace NKG_RF03vel).
 - After this, WGRF will start looking GNSS time series to be used for estimating transformation parameters (current parameters based on the NKG2008 campaign)
- ii) NKG GNSS AC (Pasi)
 - Operational processing (started in mid-2014, weekly solutions with roughly 2 weeks delay) by all except one LAC (Lithuania will focus on re-processing for now and start later)
 - NKG repro1 (re-processing of historical GNSS data) on-going. Data span begins from 1997-2007 depending on each country's data. Reprocessing estimated to be ready by the next WGRF meeting/time series analysis workshop. Next step after repro and the coming workshop is to elaborate time series to station velocities and uncertainties.

Item 8) Dynamic datum (Per-Erik)

Per-Erik, together with colleagues from all Nordic countries and as well an in-house group has discussed Dynamic datum and using Iceland as a test bed. It was noted that there are many different views on what a dynamic datum is and how to implement.

Since this is also of interest to our Director Generals, we decided that the working group to have some sort of outreach material ready by Lill-chefsmötet (May 2017) and to have a project plan ready by Stor-chefsmötet (August, 2017). The outreach material is to be presented to the DGs so that they understand the "why". It will also help us in having a better understanding on how we see a Dynamic Datum. Per-Erik also mentioned that he hopes to start with a workshop on Iceland in the end of January.



Iceland is introducing a new datum 2017 but we need to have a common understanding first on the concept. It was recommended that Iceland introduces the new datum in a step-wise approach as Australia is doing. Going into dynamic datum is not only a geodetic issue, it is also very much a geospatial issue affecting all our geospatial databases, products and procedures.

Per-Erik asked for people to the working group that are also involved in geospatial information and not just geodesists.

Item 9) National Geodetic Strategies (Mikael)

At Stor-chefsmötet in August 2016, the Director Generals asked NKG to prepare a summary on present Geodetic strategies in the various countries and present it to them by May 2017. Mikael gave a presentation on the situation on Geodetic strategies in the Nordic area, gathered from information from the various countries.

Denmark:

"Strategi for Danmarks geodætiske infrastruktur 2015-2025" – should be published soon, but only in Danish. Brings focus on the geodesy in the organisation/Ministry and in the geodata/land survey community, local authorities etc.

Main key areas:

- 5 mm geoid model
- new height system
- a national infrastructure supporting Galileo
- possibly a free national positioning service
- modernization of the in house geodetic programs

Agency strategy "Strategi 2020" available at www.sdfе.dk

- Short without details; no specific geodetic details, but our geodetic strategy match the focus areas in the agency's strategy well

Sweden:

Geodesy 2010 is our third "10 year plan". Our vision is to be able to meet Swedish society's needs for a homogeneous, sustainable geodetic infrastructure and to guarantee its availability and use.

Geodesy 2010 focusing on to ensure the long-term sustainability of our reference systems SWEREF 99, RH 2000 and RG 2000

- More accurate heights from Network-RTK
- Complete transition to SWEREF 99 and RH 2000
- R&D work concerning the maintenance of reference systems and their sustainability
- A better model (3D) for the Fennoscandia land uplift

A new strategy will be developed during 2017 because of/due to that a new national Geodata strategy was released during 2016. Focusing on the following four goals

- Open geodata
- Geodata is user friendly



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- Geodata is available
- Cooperation between governmental agencies as local authorities

Finland:

A Geodetic strategy is under preparation. The goal is to have it ready before end of 2016/early 2017. The basis is on reliable spatial information for the society

FGI aim for modern, reliable, accurate reference systems which fulfils both scientific and practical requirements and which are seamlessly available for users. We work for the national realization of the UN resolution on global reference frames.

The vision 2026:

- Metsähovi is the top class global geodetic research station
- Accuracy and reliability of reference systems fulfils needs of the most demanding users
- Our staff is motivated and skilful, and well known both on national and international level
- Our expertize is widely used in society

Norway:

The geodetic strategy is under revision and will be published in April 2017 – in Norwegian only.

Ongoing outreach activities

- Internal event for sharing of geodetic knowledge to all employees
- Geodesy on the agenda of the monthly senior management meeting
- Geodesy to the public via NRK – 40 minutes “Quest for the exact position” in February 2017
- Public conference “positioning services for the future”
- Annual meetings on Geodesy with the Ministry
- Taking part in the UN-GGIM working group on GGRF

Current focus areas:

- Geoid model
- Contribution to the global geodetic reference frame
- Positioning services
- GNSS monitoring
- Agency strategy “Kartverkets strategisk handlingsplan” available [here](#)
 - Geodetic activities is only indirectly included

Iceland:

Geodesy part of the strategy of the National Land Survey (http://www.lmi.is/en/wp-content/uploads/2016/09/Stefna_ens1.pdf)

The things concerning geodesy are.

- Vertical- and Geodetic Reference Systems
- Vertical- and geodetic reference systems for Iceland are among the basic systems of our community. They are used for precise positioning and in land surveying, for instance in



connection with research, nature monitoring, construction work, planning projects and tourism.

Main Objective

- Maintain and ensure the best accuracy for the versatile needs of the community in the vertical- and geodetic reference systems of Iceland.

The Presidium decided that Mikael will discuss the summary with his DG (Bengt Kjellson) to see if the report is sufficient for Lill-chefsmötet. Mikael to report after that.

Most Nordic countries are planning to release Geodetic strategies during 2017. The Presidium decided to have a discussion on the national strategies during spring 2018 to ensure that we are well prepared to the NKG General Assembly later that year to ensure that the coming working groups are focused on issues that will help us securing the implementation of the strategies.

Item 10) UN-GGIM and UN Resolution on Global Geodetic Reference Frame (Per-Erik), UN GGIM Europe: Geodesy (Markku)

Per-Erik and Markku presented the status regarding the development of the UNGGIM Sub-Committee on Geodesy (UNGGUIM SCoG) as well as UNGGIM : Europe GRF. Norway is co-chairing the UNGGIM SCoG and Markku is chairing the UNGGIM : Europe GRF. The members to the UNGGIM SCoG will come from its regional entities. Therefore we need to be active in the European entity.

Item 11) EUREF (Markku)

Markku reported on the current discussions in EUREF-TWG as well as ongoing activities within EUREF.

Technical working group meet last time in Vienna during the autumn. There were not many big topics on the agenda, more a number of minor and ongoing discussions as e.g.

- Status on long RINEX names and RINEX 3
- The re-analysis of EPN that is almost finished. The impact of individual antenna calibration to be investigated
- When installing new stations with new antennas it is not possible to do an antenna calibration with antennas that are ready for Galileo and Beidou.
- ITRF2014 was presented. It has been released. ETRF2014 was discussed at the meeting and the discussion on how to replace previous ETRFxx.
- Negotiations with EPOS about delivery of EPN data is still discussed. Carine is preparing a draft agreement and it will be discussed again at the next TWG meeting in February in Matera.
- EUREF symposium, 17-19 May in Wroclaw, Poland.



Item 12) Other Business (All)

- Data exchange between the Nordic Countries (Hannu)
 - o FinnRef will be densified and will also include services in the future. To be able to do so they would like to have data exchange with Norway and Sweden. The current agreement between Sweden, Norway and Denmark is based on the DG decision. We believe though that this should be easy to extend to also include Finland. Finland is asked to contact each individual country directly.

- Documentary on Geodesy (Norway)
 - o Kartverket showed a documentary on Geodesy that will be released in February. Norway asked all countries to advertise it in the respective countries.

Item 13) Next meeting of the Presidium (All)

We decided that the 65th Presidium Meeting will take place 3-4 May 2017 on Faroe Islands
There will be a GIA-workshop on Iceland in September and the plan is to combine it with a NKG Presidium meeting.

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



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Invited:

Denmark: Niels Andersen, DTU Space (Chair)
Per Knudsen, DTU Space
Søren Fauerholm Christensen, GST

Finland: Markku Poutanen, NLS
Jarkko Koskinen, NLS
Pasi Häkli, NLS
Hannu Koivula, 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 (joined parts of the meeting through Skype)
Jonas Ågren, LM
Anna Jensen, KTH

Faroe Islands: Stein Fossá

Apologies: Per Knudsen, Thorarinn Sigurdsson, Matthew Simpson, Jonas Ågren, Anna Jensen, Stein Fossá