



# Nordiska kommissionen för Geodesi Nordic Geodetic Commission

Working Group for Geodynamics

## Minutes of the 42th meeting of the Working Group for Geodynamics within the Nordic Geodetic Commission

The meeting was hosted by NLS Finland on 13-14 March 2018 in Helsinki, Finland. The meeting was organized together with the meeting for the Working Group for Geoid and Height Systems. On Tuesday, 13 March, the meeting place was the Scandic Park Hotel, Mannerheimintie 46, Helsinki, and on Wednesday, 14 March, the Pasila Center for Government Agencies, Pasila, Helsinki.

### 1. Introduction

The Chair of the NKG Working Group for Geodynamics (WGG), Matthew Simpson, welcomed all participants to the meeting at the Scandic Park Hotel, Mannerheimintie 46, Helsinki, Finland.

The Chair began by thanking everyone for their efforts during this four-year period. Due to private reasons, the Chair cannot longer serve as Chair of the WGG from summer on. The Chair noted that this meeting will be used for discussion of the focus areas for the next four-year period suggested by the Presidium.

The agenda was approved.

Ove C.D. Omang, Kartverket, was appointed as secretary.

### 2. Minutes from the last WGG meeting

The participants of the meeting were invited to comment on the minutes from the last meeting in Riga 2017. There were no comments to the minutes.

### 3. Scientific Program

There were five interesting scientific presentations:

1. Andreas Engfeldt: “RG2000 - the new gravity reference frame of Sweden”
2. Ove C.D. Omang: “Comparison of two superconducting gravimeters located at Ny-Ålesund, Svalbard”
3. Heikki Virtanen: “Superconducting gravimeters during 2014-2018 at Metsähovi geodetic research station”
4. Kristian Evers: “Introducing the NKG Land Uplift model to a wider audience”
5. Hannu Ruotsalainen: “Baltic Sea loading in some ocean tide loading models – case Lohja”

### 4. National/Institute reports

Denmark – Gabriel Strykowski, DTU

Lithuania – Vytautas Puškorius, VGTU

Sweden – Andreas Engfeldt, Lantmäteriet

Finland – Maaria Nordman, FGI/NLS

Norway – Matt Simpson, Kartverket

Estonia – Tõnis Oja, Estonian Land Board

## 5. Project activities

### 5.1 NKG roadmap for land uplift for NKG2018GA

The participants went through the NKG roadmap for land uplift document prepared at the land uplift workshop in Gävle, December 2016. We briefly discussed the status of topics related to the WGG:

- 1e) uncertainties of NKG2016GIA\_prel0306: Holger Steffen  
Are calculated with different approaches, not yet decided which one will be used, see also item 5.2.
- 2f) uncertainties of NKG2016GIA\_prel0907: Holger Steffen  
Same as above.
- 3e and f) uncertainties of NKG2016LU\_gdot & publication of NKG2016LU\_gdot (Absolute Gravity publication by Olsson et al.): Per-Anders Olsson  
Uncertainties are dependent on uncertainties of NKG2016LU and will be part of the paper. To be submitted before the GA.
- 4a) publication: The BIFROST GAMIT solution used for NKG2016LU and subsequently for the horizontal model: Halfdan P. Kierulf/Martin Lidberg  
Martin Lidberg should be asked to clarify with about the status of this paper.
- 4b) updated BIFROST solution (GAMIT, GIPSY, Bernese): Halfdan P. Kierulf/Martin Lidberg/Lotti Jivall  
This will very likely not happen until the GA.

### 5.2 GIA modelling work

Holger Steffen presented “GIA model uncertainty estimation and 3D velocities”, where he introduced different possibilities to calculate uncertainties from a set of best fitting GIA models. He suggested that this can be used for uncertainty determination of NKG2016GIA\_prel0306 and NKG2016GIA\_prel0907. The method was discussed and acknowledged. It is suggested that this will part of the corresponding manuscript on NKG2016LU to be submitted to Journal of Geodesy.

### 5.3 Empirical land uplift work

Olav Vestøl presented “Continuing developments of empirical land uplift modelling and estimation of uncertainty”. He used the uncertainty from NKG2016GIA\_prel0306 and calculated together with the uncertainty from the empirical model a final uncertainty for NKG2016LU. He also presented a one-step approach where the semi-empirical model with corresponding uncertainty is calculated directly. This was discussed. It was agreed that the uncertainty of NKG2016LU as presented based on the two-step method is used to be consistent. The one-step approach should be preferred in future and its strategy and basics should be outlined in the NKG2016LU manuscript-

## 5.4 Status of the Absolute Gravimeter publication

Per-Anders Olsson presented the “Status of the AG publication and some results”. The manuscript presents and discusses all AG observations from 1976 till 2015. We discussed how all observers should be acknowledged (a general statement followed by all names that were suggested by the institutions of different countries). It is suggested that NKG2016LU\_gdot is introduced in the paper and clearly named. Further, it is suggested that all countries put their data into AGrav.

## 5.5 Next NKG period 2018-2022 – discussion

The NKG Presidium suggests the following focus areas:

- Dynamic Ref Frame
- Future height system
- Geoid 5 mm

Our comments are:

- The focus areas are very user-oriented. We miss research and development of models. The focus areas as proposed discourage most researchers to participate and contribute. NKG and the group meetings would benefit if more researchers attend the meetings.
- We would like to keep the groups and not swap to project meetings. Maybe we should change the name of the group. Suggestions are “Geodynamics and Gravimetry”, “Geoscience” or “Dynamic Earth”.
- A common conference or working week (in view of the success of the scientific week in Reykjavik 2013) should be installed. Multidisciplinary topics deserve more connection and links between the groups, i.e. opportunities where all groups meet, and discuss.
- We wonder if it is just a mm-system with all geodynamic processes going on.
- Modelling of dynamic system is mentioned, but should that not be a separate part? Research is also missing here.
- The proposed milestones look like tasks.

We further suggest:

- The land uplift lines as observed with relative gravimeters should be published within the next 4 years or so. Do all countries have all their data? Finland should clarify that and make a proposal.
- A new focus area on Geodynamics should be added. Especially as a dynamic reference frame needs continually new and better models and understanding of the Earth. There is already a keyword on land uplift deformation models with understanding of the Earth. This clearly relates to the WGG. Further, we all know that GIA is gradually coming into Earth system modeling. So, it is still scientific work to understand the Earth. Dynamics reference frames need knowledge about many fields such as: GIA models, land gravity uplift lines, AG, intraplate deformation, climate and sea level change, Baltic Sea loading, hydrological loading, investigations of the hydrology system.
- Models should be developed and updated for users. Hence, we need to continue to release new models every few years.

## **6. Business matters**

1. The EU call on H2020 with topic “The changing cryosphere: uncertainties, risks and opportunities” was recently announced and it was briefly discussed if someone is interested in participating. No strong interest from the participants, thus no decisions were taken.
2. The NKG General Assembly will be held in Helsinki September 3-6, 2018 (<http://www.nls.fi/nkg2018>). Everyone should consider participating and presenting. Deadline for the registration is 10.8.2018.
3. Status of the NKG website is still unclear.

## **7. Closing of the meeting**

The next meeting for the WGG will likely be in Denmark week 11 2019 together with the WG for Geoid and Height Systems. To be clarified during the GA.