NORDISKA KOMMISSIONEN FÖR GEODESI

Chairman
NIELS ANDERSEN
DTU Space
National Space Institute
DK-2100 KØBENHAVN
Danmark

Secretary
MIKAEL LILJE
Lantmäteriet
Geodesienheten
SE-801 82 GÄVLE
SVERIGE

Proposal for Project within the Nordic Commission of Geodesy

Empirical land uplift modelling

Project

Version November 6, 2011
Proposal submitted to the NKG presidium, not yet accepted.

Aim/motivation

There is a long tradition among Nordic geodesists to compute empirical land uplift models, i.e. land uplift models directly derived in one way or the other from the observations. Notable examples are the hand-drawn model by Ekman (1996) and the NKG2005LU model (Vestöl 2006; Ågren and Svensson 2007), computed as part of the Baltic Levelling Ring project. This type of land uplift modelling should be contrasted with GIA modelling (GIA = Glacial Isostatic Adjustment) where the land uplift is computed based on physical principles and methods assuming an ice model and a model describing the mechanical properties of the earth.

The main purpose of this project is to compute an updated version of the empirical NKG2005LU model that includes levelling data also from the Baltic countries. Also levelling data from Denmark and some additional levelling from Norway will be included.

The updated model will be computed using exactly the same method as for the original NKG2005LU model. In the long run the computation method has to be improved and a new, high quality GNSS solution has to replace the old one. These developments are not included in the present project, contrary to the original decision at the WGGHS meeting in Gävle 2011. The main reason for this change is that the improvements should be planned after the joint land uplift workshop; see the last paragraph of this section.

It might be asked whether the WGGHS should continue to compute empirical land uplift models or whether NKG should concentrate instead on geophysical GIA models, which is something that should rather be included in the WG of Geodynamics. This question was carefully discussed at the WGGHS meeting in Gävle 2011. The conclusion was that empirical land uplift modelling will be needed also in the future, both as a method to compute good and practically usable land uplift models and as a way to check the GIA models. It is believed that it is wise to keep empirical and GIA modelling separate, since we otherwise will end up in a too large project, impossible to finish. The proposed empirical land uplift project is quite manageable.

Chairman
NIELS ANDERSEN
DTU Space
National Space Institute
DK-2100 KØBENHAVN
Danmark

Secretary
MIKAEL LILJE
Lantmäteriet
Geodesienheten
SE-801 82 GÄVLE
SVERIGE

Several of the NKG WGs are presently proposing projects that involve land uplift modelling. The NKG Presidium wishes to see coordination of these efforts and therefore plans a Joint Working Group Workshop on Postglacial Land Uplift Modelling in connection to the next presidium meeting in Norway, April 2011. Per Knudsen is responsible for the workshop and will send out invitations. The main reason for limiting the empirical land uplift project to an update of NKG2005LU (using Baltic levelling data) is to abstain from planning too far ahead before the workshop and without coordination with the other WGs. However, the present project includes formulating recommendations for how the WGGHS efforts concerning empirical land uplift modelling should continue.

Outcome /Deliverable

The main deliverables of this project are

- An updated Nordic land uplift model, computed as NKG2005LU but with Baltic levelling data included (April 2012)
- Recommendations concerning the continuation of empirical land uplift modelling in the WGGHS, well coordinated with the activities in the other WGs (May 2012).

Working Groups and Officers Involved

The project involves the NKG WG of Geoid and Height Systems.

Project leader: Olav Vestøl, Norway

Participants: Jonas Ågren, Sweden
Karsten Engsager, Denmark (?)
Casper Jepsen, Denmark
Jaakko Mäkinen, Finland (?)
Veikko Saaranen, Finland
Andres Rüdja, Estonia
Ivars Aleksejenko, Latvia
Eidmuntas Paršeliūnas, Lithuania

It should be emphasised that it is essential that the Baltic countries participate in this work.

Chairman
NIELS ANDERSEN
DTU Space
National Space Institute
DK-2100 KØBENHAVN
Danmark

Secretary
MIKAEL LILJE
Lantmäteriet
Geodesienheten
SE-801 82 GÄVLE
SVERIGE

Milestones, Completion Dates

Activity	Short Description	Responsible	Completed
1	Project preparation	Olav Vestøl	November 2011
2	Compilation of the available Baltic levelling data	Andres Rüdja Ivars Aleksejenko Eidmuntas Paršeliūnas (?)	February 2012
3	Computation of land uplift in the observation points with Least Squares Collocation using also Danish and Baltic levelling data.	Olav Vestøl	March 2012
4	Computation of the updated version of NKG2005LU starting from land uplift in the observations points.	Jonas Ågren	April 2012
5	Joint land uplift workshop in Norway	Olav Vestøl (Per Knudsen is responsible for the workshop)	April 2012
6	Preparation of recomm-endations for continuation with empirical land uplift modelling	Olav Vestøl	May 2013

Comments:

- The idea here is to present the new, updated version of NKG2005LU at the joint land uplift workshop in Norway.
- The time schedule of activity 2 has been accepted by Estonia and Latvia. Lithuania has not yet responded.

Proposed Meeting Schedule

- The WGGHS meeting in March 2012: Short meeting of the project group.
- Joint land uplift workshop in Norway, April 2012: Present and discuss the updated model and coordinate the land uplift related activities within the NKG.
- The WGGHS meeting in March 2013: Present the final model plus the recommendations for the whole WGGHS.

Project Monitoring and Reporting

- New model presented at the joint land uplift workshop in Norway, April 2012.
- The new model and a brief report including the recommendations are also presented at the WGGHS meeting in March 2013.

Chairman
NIELS ANDERSEN
DTU Space
National Space Institute
DK-2100 KØBENHAVN
Danmark

Secretary
MIKAEL LILJE
Lantmäteriet
Geodesienheten
SE-801 82 GÄVLE
SVERIGE

Resources required

Activity	Short Description	Estimation of resources
1	Project preparation	Olav Vestøl: 1 day Jonas Ågren: 1 day
2	Compilation of Baltic data	Andres Rüdja: 1 week Ivars Aleksejenko: 1 week Eidmuntas Paršeliūnas: 1 week
3	Least squares collocation step	Olav Vestøl: 1 week
4	Gridding and smoothing step	Jonas Ågren: 1 week
5	Joint land uplift workshop	Each participant: 2 days (including travel)
6	Recommendations	Olav Vestøl: 2 days Each active project participant: 0.5 days

Comments:

- The time needed to take part in yearly WG meetings or in more general e-mail discussions is not counted here.

Sent in by

Original version accepted by the NKG WGGHS at the meeting in Gävle, May 30-31, 2011. The content has now been reduced to the first part only (updating NKG2005LU with Baltic data).