Geophysical Research Abstracts
Vol. 21, EGU2019-8387, 2019
EGU General Assembly 2019

Dynamic reference frame on Iceland

Halfdan Pascal Kierulf (1,2), Guðmundur Valsson (3), Kristian Evers (4), Martin Lidberg (5), Pasi Häkli (6), Dalia Prizginiene (3), Geir Arne Hjelle (1), Olav Vestøl Vestøl (1), Martin Håkansson (5), Per Knutsen (7), Markku Poutanen (6), and Þórarinn Sigurðsson (3)

(1) Geodetic institute, Norwegian Mapping Authority, Hønefoss, Norway, (2) Department of Geosciences, University of Oslo, Oslo, Norway, (3) National Land Survey of Iceland, Iceland, (4) Agency for Data Supply and Efficiency, Denmark, (5) Lantmäteriet, Gävle, Sweden, (6) Finnish Geospatial Research Institute, National Land Survey of Finland, Kirkkonummi, Finland, (7) Geodesy, National Space Institute, Technical University of Denmark, Denmark

There is a general growing need for geodetic reference frames that on national level supports the increasing use of global positioning services. As of today, most countries have developed and are maintaining their own national reference frame. Global satellite systems, such as GPS and Galileo, and global positioning services may not be directly compatible with national geospatial data in those national frames.

How to take full benefit of global services in practice is a subject for discussions and considerations. The current situation in Europe is that most countries have a regional static reference frame aligned to ETRS89. As ETRS89 is defined to be co-moving with the Eurasian plate, such reference does not enable a direct access to the reference frame through the GNSS system without some kind of time-dependent transformation.

An alternative approach is to align the national reference frame directly to a global reference frame e.g. ITRF 2014 and to follow this global frame instead of the tectonic plate. Consequently, the coordinates of a point fixed to the ground, will have coordinates changing with time and coordinates of a point is given as its position and epoch (X, Y, Z, t). Such a frame is often named a dynamic reference frame (DRF).

To be prepared for the future challenges and opportunities, the Nordic Geodetic Commission (NKG) initiated a pilot-project on dynamic reference frame in Iceland. Iceland is selected due to its very active and complex geodynamic deformation. It is located at two tectonic plates and additionally affected by deformations caused by active volcanoes, melting glaciers, and glacial isostatic adjustment (GIA). Due to this situation, the traditional concept of static geodetic reference frame is difficult to maintain at the uncertainty level required by modern applications. Iceland was therefore a natural place to investigate the concept of DRF.

We have developed the DRF concept including 10 pre-conditions for its implementation and a methodology for a first model of the crustal deformations on Iceland. This presentation will focus on the outcome and conclusions of the DRF-Iceland project and the future activities regarding DRF in Iceland and the other Nordic countries.