

Report of the International Workshop on Height Systems, Geoid and Gravity in the Asia-Pacific Region

A geoid, gravity and height workshop was held in Ulaanbaatar, Mongolia, on June 6-8, 2006, in order to focus efforts on coordinating activities on height system unification and geoid knowledge in the Asian region. With the advances in GPS, with all countries establishing new national GPS-based reference networks, a precise geoid is needed for height determination, and knowledge of offsets in local vertical datums are needed for cross-border projects. With the new initiatives in geodesy to establish GGOS – the Global Geodetic Observing System – a unified geoid and height system is needed as an important basic component, and coordinated efforts in not just geoid, but also absolute and superconducting gravimeter networks, are the basic contributions to the GGOS efforts from the gravity field science.

The workshop was sponsored by the The International Association of Geodesy (IAG) and the International Gravity Field Service (IGFS). The local organizers were MonMap Engineering Surveys and the Mongolian Administration of Land Affairs, Geodesy and Cartography. The workshop was sponsored by the IAG, the Danish National Space Center (DNSC), Swedesurvey and the National Geospatial-Intelligence Agency (NGA), USA. The workshop was held on the occasion of completion of the Mongolian airborne gravity project, a two-year effort to cover the territory of Mongolia with airborne gravity, for both global gravity field model and local geoid applications. The field project was carried out in a Mongolian-DNSC-NGA cooperation in two 2-month field seasons fall 2004 and 2005.

A total of 37 scientists from 12 countries participated in the workshop, with 25 presentations given. Unfortunately a number of late cancellations due to visa/travel/funding problems made some last-minute program changes necessary. The workshop included a field trip to the Hurel Togoot Astronomic Observatory (IGS station) of the Astronomical-Geophysical Center of the Mongolian Academy of Science.

The workshop was opened by Mr. J. Narantsatsralt, Mongolian Minister for Construction and Urban Development, stressing in his opening address the importance of international cooperation for developing the geographic infrastructure of the region.

The workshop was organized into three sessions: “Global gravity field and airborne gravity”, “geoid determination”, “and height systems, gravimetry and GPS”. In addition special overviews were given of IGFS and GGOS on behalf of IAG (H. Schuh, Austria, and R. Forsberg, Denmark).

First technical session included an overview paper of the status of the EGM06 project, an NGA initiative to make a new ultrahigh spherical harmonic model of the earths’ gravity field to degree 2160, based on all available satellite, airborne and surface gravity data. For improving the quality of this model, more data are needed over much of the Asia-Pacific region, and IGFS actively support the release of such data as well as the validation of EGM06, which would form an important contribution to GGOS. In the session additionally results of airborne gravity campaigns in the region were presented, including recent aerogravity surveys in Mongolia, Japan and Taiwan, as well as some gravity and geoid results from China (Hainan Island).

Second session focused on regional geoid initiatives. Korean scientists reported on geoid modeling for the Korean peninsula as well as use of cm-geoid for local bridge construction projects, and other presentations reported on geoid and vertical datum

in Indonesia, Taiwan and Mongolia, as well as South-East Asia in general (W. Kearsley, Australia; IAG working group on SE Asian geoid).

Third session included presentations of Russian project with GPS observations on the very large Siberian leveling network (more than 400.000 km line length) and associated geoid modeling and comparisons of sea levels, talks on boundary value problems and special test areas in China with dense gravity and GPS-leveling data, problems in precise height determination with GPS related to different atmospheric mapping functions, and a presentation of the Japanese activities of GPS and gravity networks in the Asian region. The session included a number of presentations of the Mongolian reference networks (GPS, leveling and gravimetry), ongoing plans for modernization of the Mongolian geodetic infrastructure, as well as a presentation of a major commercial mining gravity project (K. McNabb, USA).

The workshop concluded with a panel discussion on initiatives to strengthen cross-border projects in the region, including additional cross-border leveling ties, new regional multi-national airborne gravity projects, and a specific proposal on establishing an official IAG "Eurasian Geoid Project". It was recognized that cooperation in the region is made difficult by political problems mainly, with many countries still treating gravity and height-related information as classified. Realizing the proposed projects therefore would take time, with the maturing of the GGOS a good catalyst for increasing future cooperation, and the established cooperation under the UN Committee on Geographic Infrastructure of the Asia-Pacific the natural body for making such such cooperation decisions.

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