Modern Geodesy, GNSS Surveying, and Their Contribution to a Greater Understanding of "System Earth"

Chris RIZOS, Australia

Keywords: Deformation measurement;GPS;Positioning; geodesy; IAG; GGOS

SUMMARY

Geodesy is the science of measuring and mapping the geometry, orientation and gravity field of the Earth including the associated variations with time. Geodesy has also provided the foundation for high accuracy surveying and mapping. Modern Geodesy involves a range of space and terrestrial technologies that contribute to our knowledge of the solid earth, atmosphere and oceans. These technologies include: Global Positioning System/Global Navigation Satellite Systems (GPS/GNSS), Satellite Laser Ranging (SLR), Very Long Baseline Interferometry (VLBI), Satellite Altimetry, Gravity Mapping Missions such as GRACE, CHAMP & GOCE, satelliteborne Differential Interferometric Synthetic Aperture Radar (DInSAR), Absolute and Relative Gravimetry, Precise Surveying (Levelling & Traversing). A variety of 'services' have been established in recent years to ensure high accuracy and reliable 'geodetic products' to support geoscientific research. The reference frame defined by Modern Geodesy is now the basis for most national and regional datums. Furthermore, the GPS/GNSS technology is a crucial geopositioning tool for both Geodesy and Surveying. There is therefore a blurring of the distinction between geodetic and surveying GPS/GNSS techniques, and increasingly the ground infrastructure of CORS receivers attemtps to address the needs of both geodesists and other positioning professionals. Yet Geodesy is also striving to increase the level of accuracy by a factor of ten over the next decade in order to address demands of "global change" studies. This will impact on Surveying in ways not yet clearly defined. The Global Geodetic Observing System (GGOS) is an important component of the International Association of Geodesy (IAG). GGOS aims to integrate all geodetic observations in order to generate a consistent high quality set of geodetic parameters for monitoring the phenomena and processes within the 'System Earth'. Integration implies the inclusion of all relevant information for parameter estimation, implying the combination of geometric and gravimetric data, and the common estimation of all the necessary parameters representing the solid Earth, the hydrosphere (including oceans, ice-caps, continental water), and the atmosphere. This paper will describe the background to the establishment of GGOS, and discuss the important role played by GPS/GNSS infrastructure in realising the GGOS vision.

CONTACT

Dr.Chris Rizos
Professor & Head of School
School of Surveying & Spatial Information Systems
University of New South Wales
2052 Sydney NSW
AUSTRALIA
Tel.: 61-2-93854205
Fax: 61-2-93137493
Email: c.rizos@unsw.edu.au