

Global and National Geodesy, GNSS Surveying, and CORS Infrastructure

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SUMMARY

Geodesy is the science of measuring and mapping the geometry, orientation and gravity field of the Earth including the associated variations with time. 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 recently constructed 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’. Global reference frames such as ITRF2005 (and its predecessors) is now the basis for 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 Continuously Operating Reference Systems (CORS) receivers attempts to address the needs of both geodesists and other positioning professionals. Currently there are several specifications for CORS stations that address the highest accuracy needs of geoscientists. These include those of the International GNSS Service (IGS), which may be viewed at the ‘uber-network’ of geodesy. There are also regional and national networks that have been built with state-of-the art stable monumentation, receiver technology, power and communications sub-systems. The IGS and the regional densifications may be considered as ‘Tier 1’ and ‘Tier 2’ stations. Other CORS established by state governments and industry may use less expensive (and hence less stable) monumentation. These may be referred to as ‘Tier 3’. However there are many other distinctions between these classes of stations, such as data access, role in commercial real-time services, ownership/custodianship, and so on. This paper describes the multi-facteted nature of this infrastructure and speculates on future trends of “next generation GNSS CORS”.

BIOGRAPHICAL NOTES

Chris Rizos is a graduate of The University of New South Wales (UNSW), Sydney, Australia; obtaining a Doctor of Philosophy in Satellite Geodesy in 1980. Chris is currently the Head of the School of Surveying & Spatial Information Systems at UNSW. Chris has been researching the technology and applications of GPS since 1985, published over 450 journal and conference papers, and established over a decade ago the Satellite Navigation and Positioning group at UNSW, which is today the largest and best known academic GNSS and wireless positioning technology research laboratory in Australia. Chris is the Vice President of the International Association of Geodesy, a member of the Executive and Governing Board of the International GNSS Service (the IGS), and a member of the IAG's Global Geodetic Observing System Steering Committee. Chris is also a Fellow of the IAG, a Fellow of the Australian Institute of Navigation, is a member of a number of Australian geodesy and GNSS committees, and is an Honorary Professor of Wuhan University, China.

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