Geophysical Research Abstracts
Vol. 16, EGU2014-4396, 2014
EGU General Assembly 2014

Designing the Next Generation Global Geodetic Network for GGOS

Erricos C. Pavlis (1), Magdalena Kuzmicz-Cieslak (1), Daniel König (1), and Daniel S. MacMillan (2)

(1) Goddard Earth Science and Technology Center (GEST/UMBC), GEST - Goddard Earth Science and Technology Center, Baltimore, MD, United States (epavlis@umbc.edu, +1 410 4555868), (2) NVI, Inc., Maryland, USA

The U.S. National Research Council report “Precise Geodetic Infrastructure: National Requirements for a Shared Resource” (2010) recommended that we ‘make a long-term commitment to maintain the International Terrestrial Reference Frame (ITRF) to ensure its continuity and stability’. It further determined that to ensure this, a network of about ∼30 globally distributed “core” observatories with state of the art equipment was necessary and should be deployed over the next decade or so. The findings were based on simulation studies using conceptual networks where Satellite Laser Ranging (SLR) and Very Long Baseline Interferometry (VLBI) equipment of the next generation quality were deployed and operated 24/7. Since then, GGOS—the Global Geodetic Observing System, has embarked in an international effort to organize this future network, soliciting contributions from around the world, through an open solicitation “Call for Proposals—CfP”. After a critical number of proposals were received, the results were evaluated and a data base was established where the likely sites are ranked in terms of the available equipment, local environment and weather, probability of completion and the relevant date, etc. The renewal process is expected to evolve smoothly over many years, from the current (legacy) state to the next generation (“GGOS-class”) equipment. In order to design the optimal distribution of the proposed sites and to determine any gaps in the final network, simulations have been called for again, only this time the site locations are identical to those listed in the compiled data base, and the equipment at each site is in accordance to what is described in the data base for each point in time. The main objective of the simulations addresses the quality of the ITRF product from a network we expect to have in place about five and ten years after the NRC report (2016/2020). A secondary but equally important simulation task is the study of trade-offs when deploying new sites, e.g. comparing possible alternatives from several proposed sites in a region, or the order in time of deployment of future sites so that the transition is seamless and the ITRF suffers no degradation. As a first step, the simulation process was validated against the prior realization of the ITRF, using simulated SLR, VLBI and GNSS information based on two years of real data contributing to ITRF. We present the results of these simulation studies and examine the likelihood that the designed networks will successfully meet the GGOS goal of 1 mm or better accuracy at epoch and a temporal stability on the order of 0.1 mm/y, with similar numbers for the scale and orientation components of the ITRF.