

GGOS-SIM

Simulation of the Global Geodetic Observing System

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Motivation

It is one of the main tasks in geodesy to define and realize reference systems. The International Terrestrial Reference Frame (ITRF) as a realization of the International Terrestrial Reference System (ITRS) is needed for the correct interpretation of geodetic observations to describe the geometry, the rotation and the gravity field of the Earth also in the framework of the Global Geodetic Observing System (GGOS) (Plag et al., 2009).

The currently used ITRF is at present the ITRF2008 (Altamimi et al., 2011). It is derived from a combination of the four space geodetic techniques: Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS), Global Navigation Satellite System (GNSS), Satellite Laser Ranging (SLR), and Very Long Baseline Interferometry (VLBI). Local tie vectors at co-located sites were used to tie together the station coordinates of the different techniques. The global distribution of the station networks of the techniques is given in Fig.1. Since the ITRF2005 also the Earth orientation parameters have been combined (Altamimi et al., 2007).

For many geodetic applications and for the requirements of GGOS the so far achieved accuracy is not sufficient. There is a need to investigate error sources of the ITRF and to give recommendations for future improvements of ITRFs. This is where the recently started project GGOS-SIM which is funded by the German Research Foundation (DFG, SCHU 1103/8-1) comes in.

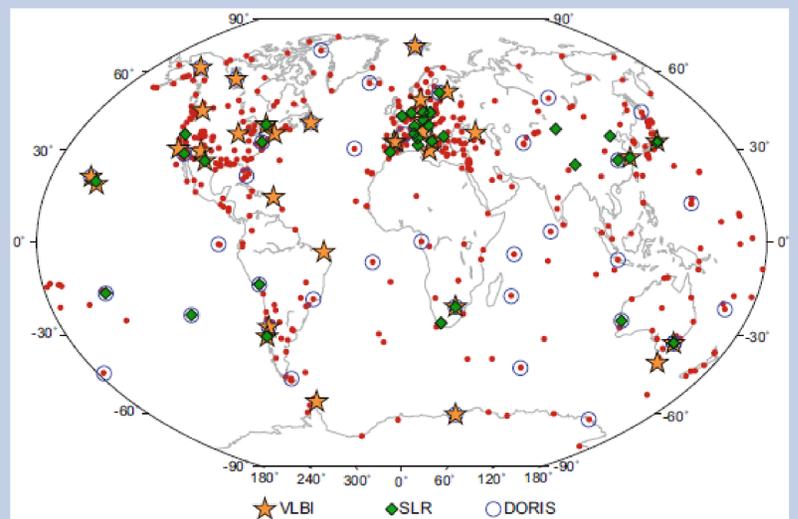


Figure 1. Station networks of the techniques included in the ITRF2008 (Altamimi et al., 2011). The red dots denote GNSS stations.

Objectives of the project

The overall objectives of GGOS-SIM are to create a tool to simulate

- the current ground network of the IAG technical services IDS, IGS, ILRS, and IVS,
- the current infrastructure of the space segments of the techniques,
- the impact of new co-location sites on the existing observing system,
- the effect of local ties for the combination, their required accuracy and the monitoring intervals needed,
- the impact of the various ongoing and planned technical developments of the techniques on the ITRF, and
- the effect of co-location in space.

Working plan

GGOS-SIM consists of the working packages (WP):

- WP1 Simulation of the existing infrastructure of the space geodetic techniques DORIS, GNSS, SLR, and VLBI
 - Simulation of local ties and error assessment
 - Simulation of combination and error assessment
- WP2 Test of the simulations against real observations and against the ITRF
- WP3 Simulations of technical system upgrades
- WP4 Simulation of additional terrestrial infrastructure
- WP5 Simulation of co-location in space

References

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