



On the frame tie between VLBI and GNSS established by VLBI observations to satellites

Lucia Plank (1), Johannes Boehm (2), and Harald Schuh (3)

(1) University of Tasmania, Australia, (2) Vienna University of Technology, Department of Geodesy and Geoinformation, E 120/4, Vienna, Austria, (3) GFZ Potsdam, Germany

Very Long Baseline Interferometry (VLBI) and Global Navigation Satellite Systems (GNSS) are two of four space geodetic techniques contributing to the International Terrestrial Reference Frame (ITRF). For observing natural radiation of extragalactic radio sources with large radio telescopes on the one hand, and receiving artificial radio signals emitted by satellites with compact GNSS antennas on the other hand, both systems use different hardware. If we want to generate combined products in terms of station coordinates or Earth Orientation Parameters, the systems have to be referenced to each other carefully. Today, the determination of this so-called frame tie is the limiting factor for the establishment of precise reference frames. Plus, for a consistent multi-technique combination in the sense of GGOS, new strategies and ways of observation need to be identified.

In this presentation, we discuss the derivation of the frame tie between VLBI and GNSS by using VLBI observations to satellites of the GNSS. Therefore, such observations are simulated and analysed in the standard VLBI method, solving for station coordinates. In the analysis, common troposphere delays and common clocks are determined at the stations. The accuracy of the frame tie is finally assessed by comparison of station coordinates of the observing sites in the quasar and the satellite frame. Monte Carlo simulations allow us to give estimates of the expected accuracies of the products, namely the station coordinates and the frame ties in terms of Helmert parameters.

Our results are generated using different ways of including VLBI-GNSS observations in routine 24h VLBI experiments as well as changing analysis strategies.