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VLBI tracking of GNSS satellites: recent achievements

Li Liu (1,2), Robert Heinkelmann (1), Vincenza Tornatore (3), Jinling Li (2), Julian Mora-Diaz (1), Tobias Nilsson (1), Maria Karbon (1), Virginia Raposo-Pulido (1), Benedikt Soja (1), Minghui Xu (1), Cuixian Lu (1), and Harald Schuh (1)

(1) Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, 14473 Potsdam, Germany, (2) Shanghai Astronomical Observatory, Chinese Academy of Sciences, 200030, Shanghai, China, (3) Politecnico di Milano, DIIAR,Sezione Rilevamento, Piazza Leonardo da Vinci 32, I-20133 Milano, Italy

While the ITRF (International Terrestrial Reference Frame) is realized by the combination of the various space geodetic techniques, VLBI (Very Long Baseline Interferometry) is the only technique for determining the ICRF (International Celestial Reference Frame) through its observations of extragalactic radio sources. Therefore, small inconsistencies between the two important frames do exist. According to recent comparisons of parameters derived by GNSS (Global Navigation Satellite Systems) and VLBI (e.g. troposphere delays, gradients, UT1-UTC), evidences of discrepancies obtained by the vast amounts of data become obvious. Terrestrial local ties can provide a way to interlink the otherwise independent technique-specific reference frames but only to some degree. It is evident that errors in the determination of the terrestrial ties, e.g. due to the errors when transforming the locally surveyed coordinates into global Cartesian three dimensional coordinates, introduce significant errors in the combined analysis of space geodetic techniques. A new concept for linking the space geodetic techniques might be to introduce celestial ties, e.g. realized by technique co-location on board of satellites. A small satellite carrying a variety of space geodetic techniques is under investigation at GFZ. Such a satellite would provide a new observing platform with its own additional unknowns, such as the orbit or atmospheric drag parameters. A link of the two techniques VLBI and GNSS might be achieved in a more direct way as well: by VLBI tracking of GNSS satellites. Several tests of this type of observation were already successfully carried out. This new kind of hybrid VLBI-GNSS observation would comprise a new direct inter-technique tie without the involvement of surveying methods and would enable improving the consistency of the two space geodetic techniques VLBI and GNSS, in particular of their celestial frames. Recently the radio telescopes Wettzell and Onsala have successfully observed a GNSS satellite for the first time, using also new receiver developments, done at Wettzell. In this contribution we want to develop the motivation for this kind of innovative observation and we will show first results of the test observations.