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VLBI observations of GNSS signals on the baseline Hobart-Ceduna – First results

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The observation of GNSS satellites with the geodetic VLBI system is an interesting approach which offers a variety of new possibilities. Promising applications can be found, among others, in the field of inter technique ties. Such observations provide possibilities to directly connect the dynamic GNSS and the kinematic VLBI reference frame, which may result in improved future ITRF realizations. In our research we are trying to apply observation strategies, which are commonly used in geodetic VLBI, i.e. the main observables are group delay values derived from direct observations and the subsequent correlations of GNSS satellite signals. However, data acquisition schemes for VLBI satellite observations are still at an experimental stage. Further research is required to establish an operational process chain, similar to that applied for standard observations of natural radio sources.

We successfully carried out several experiments in 2015 on the Australian baseline Ceduna-Hobart. During these sessions, with a few hours duration each, GNSS satellites (GLONASS and GPS) were observed in the L1 and L2 band along with natural radio sources for calibrations. All experiments were based on VEX-formatted schedule files created with the satellite scheduling module in the Vienna VLBI Software (VieVS). These control files implement a satellite tracking scheme which is based on stepwise antenna repositioning using sequences of discrete celestial coordinates. The recorded data were successfully correlated with the DiFX correlator software in combination with a suitable input model for near field targets. A preliminary analysis of the group delay measurements derived with the AIPS software suite was carried out with VieVS.

Within this contribution we will give an insight into the applied data acquisition schemes, from scheduling, over correlation to data analysis, and we will present latest results.

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