

Combination of GNSS and geodetic VLBI on the observation level using Kalman filter: a study case for CONT17

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Kalman filter (KF) in geodetic Very Long Baseline Interferometry (VLBI) data analysis tends to improve station position repeatabilities and the accuracy of target parameters like Zenith Wet Delay (ZWD), compared to Least Squares methods (LSM). When combining VLBI with other space-geodetic techniques like Global Navigation Satellite Systems (GNSS) or Satellite Laser Ranging (SLR), KF allows for a consistent estimation of common geodetic parameters or co-location of these techniques on the ground and in space. In addition, such approach is also useful for studying potential technique-specific biases.

In order to address the challenge of an integrated parameter estimation, we developed a KF module within the c5++ analysis software with the aim of combining VLBI and GNSS on the observation level. Based on the developed KF module, we perform one continuous solution where 15 days of VLBI CONT17 data are combined with GNSS measurements from co-located sites. The obtained results are compared to an equivalent combination using LSM as well as single-technique solutions. We present our combination strategy and assess its performance for multi-day continuous estimation of geodetic parameters. We also discuss how our analysis approach can be further used in the context of the CONT17 campaign.