

Estimation of GNSS orbits by combining microwave and SLR observations

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The combination of space geodetic techniques is considered as a major contribution for improving the accuracy and consistency of the resulting geodetic products. We estimate GNSS orbits by combining microwave and SLR observations. The combination is done on the level of observations, implying that all parameters common to both techniques are derived from both observation types. We compute combined orbits for the two GPS satellites equipped with retroreflector arrays and for three GLONASS satellites that are currently tracked by the ILRS network. Different orbit solutions are processed with different observation weighting strategies. One-day arcs as well as three-day arcs are computed. Additional range bias parameters and satellite reflector offsets are set up in the parameter adjustment process. The different combined orbit solutions are compared with each other in order to analyze deformation or translation effects as a function of the technique-specific weighting of observations. We study the residuals of long-arc fits as well as the orbit overlaps of two subsequent arcs at the day boundaries to investigate the capability of the combination of microwave and SLR measurements for improving the orbit accuracy.