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Important aspects of a rigorous combination of space geodetic techniques

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A careful and rigorous combination of space geodetic techniques is of fundamental importance for the generation of highly accurate geodetic and geophysical products including Terrestrial Reference Frames (TRF), Celestial Reference Frames (CRF) and Earth Orientation Parameters (EOP), but also global gravity field models, satellite orbits, and atmospheric products.

In this contribution we focus on technique-specific biases on the one hand and ties between the observation techniques on the other hand.

The accuracy of the combined geodetic products of today is mainly limited by technique-specific biases. Therefore, it is of utmost importance to understand and mitigate such biases. One of the most interesting approaches to get a better insight into these biases, is the analysis of data from fundamental sites with co-located and/or multiple instruments of the different techniques. We demonstrate that, with three VLBI and two SLR telescopes, a DORIS antenna, a couple of GNSS receivers and a lot of additional instrumentation, the Wettzell Geodetic Observatory in the Bavarian forest is one of the best places to study both, intra- and inter-technique biases.

Ties between the different observation techniques, be it ties on ground or in space, are realized by parameters that are common to more than one space geodetic techniques. We will have a closer look at the parameter space available to establish such ties between techniques (including not only site coordinates and EOPs but also satellite orbits, tropospheric zenith delays and clock corrections) and we will show, how these parameter types contribute to a more rigorous combination.