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Multi-technique combination at observation level with NAPEOS: combining GPS, GLONASS and LEO satellites.

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For the ITRF2008 call for participation ESOC reprocessed the historic data from the IDS, IGS, and ILRS. Our three solutions were computed with one and the same software package NAPEOS, running on the same machine and using, as far as possible, identical settings. Any systematic differences between the technique dependent reference frame solutions must therefore be caused by the technique itself, and not because of model differences or errors. Our three technique dependent solutions gave us a good understanding of the technique dependent effects, helping us to improve our models.

At ESOC we have now made a significant step forward by including all satellite geodetic techniques (SLR, DORIS and GPS/GLONASS) in one solution. This allows us to combine the ILRS, IDS and IGS reference frames by using "space-ties". Of course these space-ties are not perfectly known but nevertheless they allow for a rigorous combination of the different reference frames. And, very important for the GNSS technique, they allow for the direct estimation of the GNSS satellite transmitter phase centre offset. We solve not only for integer ambiguities of the GPS satellites but also for those of the Jason-2 satellite, which is also providing GPS phase observations on two frequencies.

In our presentation we will give an overview of this multi-technique combination approach at observation level. As part of our activities within the IERS COL working group we processed the data of the CONT11 and CONT08 periods. We included all observations provided by the following satellites in one and the same parameter estimation process: GPS,GLONASS, SPOT, Envisat, Jason-2, LAGEOS and Etalon satellites. We will show the benefits of such a rigorous approach compared to processing the various space geodetic techniques separately. We will also address the impact of resolving integer ambiguities for the LEO satellite Jason-2 on the global solution.