



Rigorous combination of space-geodetic techniques on the observation level with c5++ - a case study at TIGO

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In a cooperation between several Japanese institutes the multi-technique space geodetic analysis software "c5++" has been developed over the last years. The software provides consistent geodetic and geophysical models which can be accessed by single technique space-geodetic applications or can be used to combine several techniques on the observation level. Satellite Laser Ranging (SLR) and Very Long Baseline Interferometry (VLBI) stand-alone applications have been realized in the last two years. With the introduction of an option to utilize local-tie information as well as the possibility to estimate common parameters (clock, troposphere, orbits) the software enables rigorous combination of space-geodetic techniques on the observation level. Moreover, the inclusion of GNSS as a third space-geodetic technique has increased the choice of analysis strategies tremendously.

We are going to discuss the advantages and drawbacks of combining space-geodetic data on the observation level and we reveal bottlenecks, which need to be handled properly in order to make this approach work well. We are going to show how single-technique based solutions at station TIGO differ from rigorously combined estimates and how this affects the interpretation of the underlying geophysical signal, especially post-seismic ground movement. In addition, it will be studied whether additional information from geometry-only techniques, like VLBI, impacts parameters that are solely related to the Earth's gravity field. Moreover, it will be discussed how common parameters have to be estimated and where biases/offsets need to be taken into account. An outlook on the future use of combination on the observation-level and the challenges that come with this approach will conclude our presentation.