SLR station network improvements in the framework of simulated multi-technique reference frames

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Currently available global terrestrial references frames (TRFs) do not yet fulfill the requirements by the Global Geodetic Observing System (GGOS) aiming at 1 mm accuracy and 0.1 mm/yr long-term stability. Accuracy improvements of the TRF can be expected by an improved ground network, especially of the Satellite Laser Ranging (SLR) station network. In this study, we assess by simulations the effect of additional stations to the current SLR network on the TRF. We individually add some stations that are likely to be realized in future, partly already foreseen by the International Laser Ranging Service (ILRS). The individual station performance of the additional stations is set in such a way that it reflects as close as possible the real performance, particularly in view of weather conditions. In addition to the SLR-only solutions, we present multi-technique TRFs from a combination with simulated VLBI and GPS observations as well. The improvements induced by each site are assessed in comparison to the current networks in terms of coordinate and Earth rotation parameter precision with respect to the GGOS requirements. Finally, we demonstrate which SLR stations will be most beneficial for the TRF and which TRF improvements can be expected.