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Hl-SST and SLR - bridging the gap between GRACE and GRACE Follow-On

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GRACE has been undoubtedly one of the most important sources to observe mass transport on global scales. Numerous applications have shown the validity and impact of using GRACE data and products. Within the EGSIEM project, GRACE gravity field solutions from various processing centres have been processed and combined to further increase the spatial and temporal resolution. However, the nominal science operation of GRACE terminated in June 2017 and its successor GRACE Follow-On is due for launch in spring 2018, i.e. a data gap emerges until GRACE Follow-On becomes operational. Obviously, there is a need for an intermediate technique that bridges the gap between the two missions and that allows 1) for a continued and uninterrupted time-series of mass observations and 2) to compare, cross-validate and link the two time-series. Here we will focus on the combination of high-low satellite-to-satellite tracking (hl-SST) of low-Earth orbiting satellites by GNSS in combination with satellite laser ranging (SLR). SLR is known to provide highest quality time-variable gravity for the very low degrees (2-5). Hl-SST provides a higher spatial resolution but at a lower precision in the very low degrees. Thus, it seems natural to combine these two techniques and their benefit has already been demonstrated in the past. Here we make use of the lessons learned within the EGSIEM project and focus on various aspects of combination such as the optimal strategy and relative weighting schemes. We discuss also the achievable spatial and temporal resolutions and possible applications in hydrology and glacial isostatic adjustment.