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Improved modeling approaches towards the mm SLR

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Accuracy requirements for the International Terrestrial Reference Frame (ITRF) are becoming increasingly more stringent, especially with regards to its origin definition and its scale stability. The precise monitoring of the geocenter and its variations over increasingly shorter intervals is a priority goal in order to meet the requirements of the Global Geodetic Observing System (GGOS) of 1 mm for the definition of the TRF origin at epoch and the 0.1 mm/y limit in its temporal evolution. Satellite Laser Ranging (SLR) contributes unique information on the origin, and along with VLBI, for its absolute scale. Advances in our understanding of the coupling between the sub-components of system Earth require that we revisit our current modeling used in the reduction of SLR data. For example, GRACE monthly fields are now available for over six years and provide a reasonably stable basis to derive accurate and robust estimates of the annual, semi-annual and seasonal signals in temporal gravity variations for the low degree harmonics of the field. Alternatively, global atmospheric and hydrological fields can be used to determine the equivalent gravitational variations due to mass redistribution at as short periods as 3 hrs. The deduced variations can in turn be used to reduce with higher accuracy the precise SLR data from geodetic targets like the LAGEOS satellites for the definition of the ITRF. Over the past few years, the inclusion (or not) in our models of high frequency effects of the temporal gravity signals due to mass redistribution in the terrestrial system, has been a topic of heated discussions at venues such the EGU, AGU and various workshops. With the recent release of numerous products from global circulation models and, satellite and terrestrial observations, we are able now to examine the effect of such improved modeling in the analysis of several years of SLR data. We will present initial results from such analyses and compare them to our nominal products, based on the currently accepted IERS and ILRS standards. Depending on the outcome of these tests, we anticipate that in the near future, ILRS will formulate a proposal to IERS for modification of the analysis standards related to products contributing to the establishment of future ITRFs.