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Weekly SLR series of 'TRF origin'-geocenter variations

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Satellite Laser Ranging (SLR) contributes to the realization of the International Terrestrial Reference Frame (ITRF) for over two decades. Since the first ITRF realization, its origin, defined to coincide with the geocenter, has been realized through the estimated coordinates of its defining set of positions and velocities at epoch. Over the past decade, the focus extended beyond the accuracy at epoch to include the stability of these realizations, given the increasingly more accurate observations of geophysical mass redistribution within the Earth system. Driven by numerous geophysical processes, the continuous mass redistribution within the Earth system causes concomitant changes in the long-wavelength terrestrial gravity field that result in geometric changes in the figure described by the tracking station network. The newly adopted ITRF development approach allows the simultaneous estimation of origin variations at weekly intervals through a geometric approach during the stacking step, and for the first time in the history of the ITRF accounts to some extent for these effects. Our dynamic approach has been used since the mid-90s, delivering, initially biweekly and later on, weekly variations of an "origin-to-geocenter" vector, simultaneously with an SLR-only TRF realization. Over the past year, the International Laser Ranging Service's (ILRS) Analysis Working Group adopted significant modeling improvements for the SLR data reduction of future as well as the historical SLR data. Based on this new standards, we have reanalyzed the LAGEOS 1 & 2 SLR data set up to present, and developed a uniformly consistent set of weekly variations with respect to a frame realized simultaneously by the ensemble of the data, closely approximating the current (scaled) ITRF2005. These series can complement the precise application of the ITRF when used as Cartesian offsets or the GRACE-derived monthly gravitational models, when converted to degree-1 harmonics. A simple model based on the dominant frequencies decomposition of the series can be easily used to account for the

most significant part of the signal in various applications (examples).