Using the LAGEOS Satellites to Assess the Accuracy of ILRS stations' Observations During The Last Decade.

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The intrinsic high accuracy of the laser ranging technique may in practice be compromised at a level of several mm by several factors: time-of-flight counter error, calibration target survey error, centre-of-mass model error, etc. Here we describe our efforts to estimate the intrinsic *accuracy* of range measurements made by the major satellite laser ranging stations of the ILRS using normal point observations of LAGEOS and LAGEOS-II. In a novel approach we carry out weekly reference frame solutions for the satellites' initial state vectors, station coordinates and daily EOPs (X-pole, Y-pole and LoD), as well as estimating range bias for each of the stations. We apply known range errors a-priori from the table developed and maintained through the efforts of the ILRS Analysis Working Group and apply station- and time-specific satellite centre of mass corrections, both corrections that are currently implemented in the standard ILRS reference frame products. Our new approach, to solve simultaneously for station coordinates and range bias for all the stations, has the strength that such bias results that are discovered are independent of the coordinates taken for example from ITRF2008; thus this approach has the potential to determine range errors that may have become absorbed primarily in station height had the coordinates been determined on the assumption of a zero bias. We find that, for the major stations of the ILRS, and using LAGEOS and LAGEOS-II observations simultaneously to determine a single mean bias for each station in the weekly solutions, we do perform a partial separation between these parameters at the expense of an increase in the variance of the stations' height time series. Here we discuss the results in terms of systematic features at individual stations, impact on coordinate solutions and effect on the scale of the reference frame.