

Concept of sister-satellite SLR observations for accurate scale parameters of the Earth

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Satellite laser ranging (SLR) is a powerful technique for the scale parameters of the Earth, that is, the scale of a terrestrial reference frame and the gravity constant GM. Thus, the IERS Conventions and the ITRF adopt SLR analysis results for these parameters.

On the other hand, the progress of SLR measurement precision does not always help the determination of these parameters. The main SLR satellites for this purpose are LAGEOS-1 and -2 bring a systematic error up to 1 cm due to the spread of retroreflected pulse (Otsubo and Appleby, JGR, 2003). The other issue is a systematic range bias - it is very difficult to reduce the systematic range measurement error below a few mm. Therefore, it is realistic to solve for station-dependent range bias in order to reach the mm accuracy.

The GM, the scale of TRF, and the range bias have to be solved without high correlation. Rather than the same altitude combination like LAGEOS-1 and -2, we devise the combination of different altitude, what we call a sister-satellite system.

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