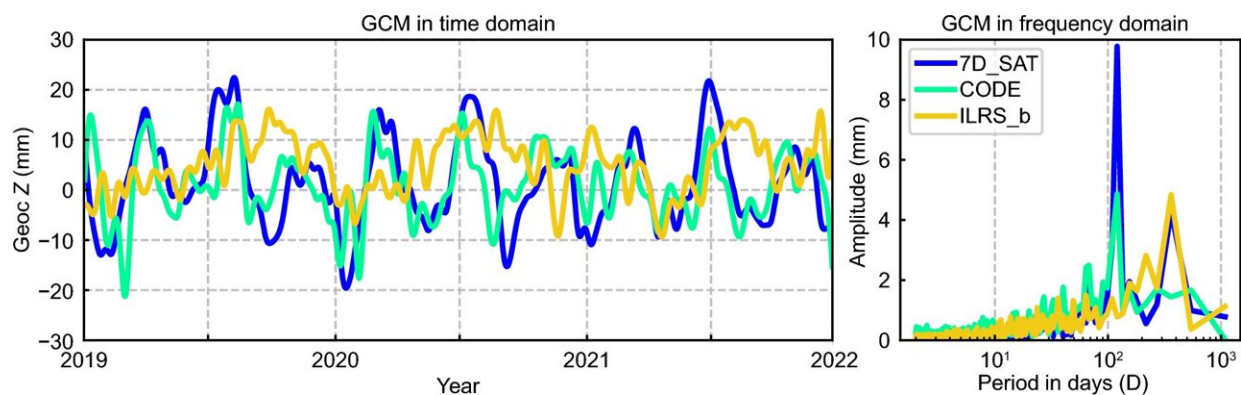


Global geodetic parameters determination: Using satellite laser ranging observations to GNSS satellites

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Geocenter motion from the 7-day solution, CODE series, and ILRS series, the lines represent the result smoothed with Vondrak filter. Credit: *Satellite Navigation* (2024). DOI: 10.1186/s43020-024-00132-x

Satellite laser ranging (SLR) is one of the space geodetic techniques that uses lasers to measure the distance between ground stations and satellites with retroreflectors. This precise measurement provides critical data for determining the geocenter motion, terrestrial scale and Earth Rotation Parameters (ERP)—parameters fundamental to the International Terrestrial Reference Frame (ITRF).

In an innovative study [published](#) in *Satellite Navigation* in May 2024,

researchers from Wuhan University realized the estimation of global geodetic parameters using SLR observations to BeiDou, GLONASS and Galileo satellites, the potential of these observations are vital for the future development of Earth science research and navigation systems.

Through a [comparative analysis](#) of five different strategies for handling range biases, the study demonstrated that estimating range biases for each satellite-station pair resulted in more accurate and reliable results. This approach effectively absorbed satellite-specific errors, leading to smaller Root Mean Square Errors (RMSE) in post-fit SLR residuals.

The study also analyzed the impact of arc length on the estimation of ERP, geocenter motion, and terrestrial scale. It was found that extending the arc length from one to seven days significantly improved the formal error of ERP, with the seven-day strategy providing the smallest RMSEs for pole coordinates and length-of-day estimates.

Prof. Xingxing Li, the study's lead researcher, stated, "Through our research, it is feasible to estimate the global geodetic parameters using GNSS SLR observations. In the next step, we plan to combine the L-band and the SLR observations, to see what benefits it will bring to the estimation of global geodetic parameters."

More information: Xingxing Li et al, Determination of global geodetic parameters using satellite laser ranging to Galileo, GLONASS, and BeiDou satellites, *Satellite Navigation* (2024). [DOI: 10.1186/s43020-024-00132-x](#)

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