Monitoring the Time Biases in laser ranging stations thanks to the Time Transfer by Laser Link T2L2 experiment

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Systematics error in laser ranging technology, such as Time-biases and Range biases need to be evaluated and reduced in the context of the Global-Geodetic-Observing-System (GGOS) recommendations to improve the accuracy and stability of the International-Terrestrial-Reference-Frame (ITRF), which are to have a reference frame accurate at the level of 1mm and stable at level of 1mm/y.

The multitude of technologies used and their evolutions, inside SLR stations, make this a complicated endeavor.
However, for almost ten years, the Time-Transfer-by-Laser-Link (T2L2) experiment on-board the Jason-2 satellite, launched in June 2008, was able to determine the Time biases and their evolution for more than 30 stations in the ILRS network, with an accuracy of 2-3 ns w.r.t. UTC.

The conclusions and results obtained with T2L2 are the following:
The time transfer technique is a powerful tool (direct and independent) to determine time biases in the SLR technology.
The timing systems of SLR stations do not necessarily adhere to the ILRS requirement to maintain timing to within 100 ns of UTC and can even reach several microseconds.
Time biases evolve rapidly and are correlated to particular station events.
Microsecond-level time biases lead to millimeter effects on geodetic products.

We will show that we are able to monitor the Time-Bias almost directly, and see equipment changes in SLR stations by observing the time bias evolution.
We will present a list of requirements to reduce time biases at SLR stations, and provide a list of the possible sources of the time bias systematic error.