

The miniSLR®: A low-cost, high-performance laser ranging system for the ILRS

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The miniSLR® has been developed as a low-cost, high-performance alternative to conventional SLR systems. It is completely integrated into a movable container of less than 2 x 2 m² footprint. Using a 500 ps laser at 50 kHz repetition rate, it achieves sub-centimetre precision. Long-term stability has been considered as integral part of the design and is facilitated by a full encapsulation, air-conditioning, short cable lengths and a calibration target on the main support structure. While the focus is on LEO targets including Lageos, all targets including GNSS constellations can be ranged.

The main advantages of such a small, highly integrated system are rather obvious: Low production cost, reduced engineering effort, shorter commissioning times. The system can be constructed and validated at the factory, before it is transported to its final observation site. At the site, no civil works are required and no building permits need to be obtained. Yet the system can be connected firmly to the ground, and using an appropriate site survey, local ties can be established in the same way as for conventional systems.

At DLR in Stuttgart, tests with an improved miniSLR® prototype have commenced in March 2022. Minor modifications for improved stability and reliability are underway. In July 2022, the system has been accepted into the ILRS as engineering station. It is planned to regularly deliver data to the ILRS to validate the system performance and stability. Furthermore, DLR will use the system as a test platform for its own research, including experiments with smart retroreflectors which can be used for satellite identification.