Space Debris Laser Ranging – Challenging and Rewarding – Update of the Izaña-1 station

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The Izaña-1 station (IZN-1) is located at the Observatorio de Teide on the Spanish island of Tenerife. It is a multi-purpose optical ground station for satellite observation, position measurements and communication. The telescope carries the Satellite Laser Ranging (SLR) laser package for ranging to cooperative targets equipped with retro reflectors. Currently on the two Nasmyth foci the laser ranging detector package and the laser communication terminal is installed. Additionally on one of the 2 optical ports a space debris observation camera is installed for passive optical space debris observations.

As part of the upgrade of the IZN-1 (ESA project S2P S1-SC-06 - Laser Ranging - Evolution Towards Active Sensor Networking for Debris Observation and Remediation), it is planned to extend the functionality of the system with a space debris laser ranging transmitter for ranging during nighttime as well as daytime to uncooperative targets. The space debris laser system will be installed in a separate structure, on its own mount. Such a system can be installed adjacent to any SLR station, enabling it to perform Space Debris Laser Ranging (SDLR) without modifying the main SLR system.

In order to improve the aircraft detection of the laser safety system, an additional thermal IR camera will be installed onto the telescope.

The integration of a single-photon detector as light curve detector in the existing laser ranging detector package will enable high temporal resolution light curve recording simultaneously to the ranging measurements.

The additional stare & chase functionality will allow the ranging to targets with worse predictions. Based on passive optical observations an orbit improvement will be carried out for increasing the accuracy of the orbit predictions and assists the SDLR system.