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The scientific results of the optional laser tracking campaigns to the defunct satellites Envisat and Topex

The inactive environmental satellites Envisat and Topex are tracked by a number of SLR systems interested in the observation of the space debris objects. The collected laser range measurements are used to determine the spin parameters of the defunct satellites and analyze their interaction with the space environment. The SLR full rate data allows calculation of the inertial orientation and the spin rate of the satellites and indicates that the orientation of Envisat is stable within the orbital coordinate system (stable offset from nadir) while Topex points towards its orbital perigee. The laser data provided by the participating SLR systems reveals different development of the spin rates of the two satellites: Envisat loses its rotational energy due to the eddy currents induced in the body by the Earth's magnetic field, while the spin rate of Topex slowly increases due to the solar radiation pressure. This presentation will summarize the contribution of the SLR systems to measure the spin dynamics of the defunct satellites, and will give information on how the SLR data is used to determine the forces and torques acting on the cooperative space debris objects.