



The Top of Thunderstorms Experiment Module (TOTEM) for the International Space Station (No 307)

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🔗 S01-D - Research and future missions

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TOTEM is a suite of five optical sensors proposed to be mounted on the ISS in a forward, slant-viewing geometry that resolves the altitude of clouds and their electrical activity. The sensors will measure the blue corona emissions at 337 nm and the atomic oxygen line of lightning leaders at 777.4 nm, common for all lightning detection cameras in space. The sensors are two cameras and three photometers. The third photometer measures in the VUV. TOTEM is similar to the optical module of the Atmosphere-Space Interaction Monitor (ASIM) on the ISS, adapted to a different viewing angle. ASIM has shown that the cloud structure often is revealed by internal lightning. Thus, TOTEM is expected to give valuable measurements of lightning, corona emissions and cloud structure resolved in altitude, which will allow for improved estimates of greenhouse gas perturbations by thunderstorms. With such understanding we may utilize the long-term, homogeneous, and almost global observations of lightning from the new geostationary monitoring satellites for understanding the regional and global impact of thunderstorms on the radiation balance of the atmosphere. We suggest that TOTEM data will be valuable for validation of the geostationary meteorological satellite data products of clouds and lightning, such as those from EUMETSATs MTG satellite.