

Topics (T)
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MONITORING OF VOLCANIC ASH CLOUDS AND ICE FLOES BY THE CUBESAT FORMATION
MISSION TOM

Abstract

Satellite formations offer innovative potential to remotely observe three-dimensional processes in the Earth's atmosphere and on its surface. Examples include 3D-distribution of ash clouds after volcano eruptions, landslides or separation of large ice floes from glaciers into the sea. TOM (Telematics earth Observation Mission) describes a formation, composed of three 3U-CubeSats at a mass of 4 kg, addressing such 3D-observation capabilities by employing photogrammetric methods for camera data fusion from different perspectives.

The satellites will be placed in a Low Earth Orbit (LEO). Thus, at a baseline distance of about 100 km the cameras are to be oriented towards the same target area. The mayor challenge is self-organization of the formation for offering optimum observation conditions. Here the relevant data from each satellites' attitude and position are exchanged via inter-satellite links to form the basis for the networked control system to self-organize the appropriate satellite formation for observation. Details on the satellite system design will be provided, in particular on the attitude control system based on 6 miniature reaction wheels and the chemical propulsion system for orbit control. In addition, the scientific camera payload and its onboard data processing will be addressed. Performance results from intensive ground tests using hardware-in-the-loop simulations will be reported.

The 3 TOM satellites are currently completed and ready for launch. They are waiting in ZfT's cleanroom for a launch in 2023.