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THE PRISMA FORMATION FLYING MISSION: SUMMARY OF THE NOMINAL MISSION AND
OVERVIEW OF THE EXTENDED MISSION

Abstract

PRISMA was launched on June 15, 2010 to demonstrate strategies and technologies for formation flying and rendezvous. The Swedish Space Corporation (SSC) is the prime contractor for the project which is funded by the Swedish National Space Board with additional support from DLR, CNES, and DTU. By the fall of 2011, PRISMA has completed its nominal mission and is well into its extended mission.

The PRISMA mission consists of two spacecraft: Mango and Tango. The Mango spacecraft is 3-axis stabilized and has a propulsion system providing full 3D orbit control. Tango is 3-axis stabilized with a solar magnetic control system and does not have orbit control capability. The two spacecraft were launched clamped together into a 700 km SSO and Tango was successfully separated from Mango on August 11, 2010.

PRISMA includes the flight qualification of several sensor and actuator systems and the in-flight execution of a range of GNC experiments using this equipment. The spacecraft are equipped with Vision Based, GPS, RF-sensor navigation systems and have three different propulsion systems. As a result of this variety of interests in the mission, the operational timeline is packed with different experiments and the short mission time requires a high degree of flexibility from mission control as well as the experimenters themselves. Apart from SSC's GNC experiments, the propulsion manufacturers (ECAPS, NanoSpace) and the participating organizations DLR, CNES, DTU act as experimenters. DLR and CNES both have GNC-experiments for which software has been integrated into the over-all PRISMA on-board software. Execution of these experiments includes the handover of closed loop orbit control of the spacecraft.

By mid March, operation of PRISMA will be handed over to GSOC for a limited four-month period. The purpose is to provide an opportunity to gather experience in operating multi-spacecraft missions while completing the experiments from the nominal PRISMA timeline. A complete operational environment based on SSC's command and control software RAMSES has been installed at GSOC and operators have been trained during PRISMA operations at SSC.

By the end of the nominal mission, it is expected that a significant amount of delta-V still is available. This has enabled SSC to announce the opportunity to define additional experiments for anybody interested. At completion GSOC's operations, PRISMA will be handed back to SSC for extended mission experiments.

This paper gives an overview of the PRISMA mission, the nominal mission experience, and brief results from the extended mission.