

ASTRODYNAMICS SYMPOSIUM (C1)
Guidance, Navigation and Control - Part 1 (7)

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THE GNC EXPERIMENTS ON THE PRISMA FORMATION FLYING MISSION: SUMMARY OF
RESULTS FROM THE NOMINAL MISSION**Abstract**

The PRISMA in-orbit testbed 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 (SNSB) with additional support from the German Aerospace Center (DLR), the French National Space Center (CNES), and the Technical university of Denmark (DTU). By the fall of 2011, PRISMA will have completed its nominal mission and will be well into a series of extended mission tasks.

The PRISMA mission consists of two spacecraft: Mango and Tango. The Mango spacecraft is 3-axis stabilized and is equipped with a propulsion system that provides full 3D orbit control. Tango is 3-axis stabilized with a solar magnetic control system and does not have any orbit control capability. The two spacecraft were launched clamped together into a 700 km sun synchronous orbit and Tango was successfully separated from Mango on August 11, 2010 after which the nominal mission could begin.

PRISMA includes the flight qualification of a series of sensor and actuator systems as well as 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) as well as the participating organizations DLR, CNES, DTU act as experimenters. In particular DLR and CNES both have GNC-experiments for which their software has been integrated into the over-all PRISMA on-board software.

The GNC experiments conducted by SSC can be divided into three main groups: GPS based Autonomous Formation Flying in passive orbits, GPS as well as Vision Based Proximity Operations and Final Approach/Recede in different aspects of forced motion, and Autonomous Rendezvous using Vision Based measurements only.

This paper will focus on the results from SSC's GNC experiments at completion of the nominal mission. An overview of the different experiments will be given together with a summary of the associated flight results. The paper will also present extended mission objectives from a GNC perspective.