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OPERATIONS IN PRISMA – A MULTI-SATELLITE TECHNOLOGY DEMONSTRATION MISSION

Abstract

Purpose: Swedish Space Corporation, SSC, have been running the PRISMA project since 2005 which consists of two spacecrafts flying in formation. The primary goal with PRISMA is to perform a number of different experiments to demonstrate new HW technology and new SW for autonomous formation flying and rendezvous. The spacecrafts were launched in June 2010 and have up until the writing moment been monitored and operated from the facilities of SSC in Sweden.

This paper focuses on the ground segment part of the PRISMA mission and how the spacecrafts are monitored and controlled using the in-house built RAMSES control system. The paper will also show methods currently used for validating control procedures, data sharing between experimenters and engineers within SSC and also lessons learnt up until the time of the paper presentation. Further the paper will describe a handover of the S/C operations to GSOC which is a part of the German Space Agency, DLR.

Methodology: The PRISMA ground segment consist of three primary parts; the Mission Control Center, MCC, performing the actual control of the S/C, the ground antenna site which also has a backup MCC facility and finally the Experiment Control Center, ECC, which allow the experimenters to monitor their currently ongoing experiment.

The validation of flight procedures is performed in a simulation environment called OpsSim and is located in the same facilities as the PRISMA MCC in Sweden. This simulator simulates the space environment and models the spacecrafts in this environment.

Results: In the writing moment most of the demonstration goals of the mission have been accomplished and also the major part of the ground segment planning that was laid out prior to the mission has shown to work very well. One deviation from the original plan is however a handover of the operations to DLR that will take place during Mars 2011 but so far this process has continued without major problems. The handover back to SSC will be taking place in August 2011 when the PRISMA extended mission will be started.

Conclusions: Thanks to the PRISMA mission SSC has been able to demonstrate advanced formation flying space technology with a budget constraint during both development and operations of the spacecrafts. The use of the supremely flexible RAMSES ground system has also facilitated a smooth handover to DLR who has cloned the entire SSC mission control concept with limited support from SSC.