Three LSE Space engineers present their papers at SpaceOps 2014.


Ivano Verzola (LSE Space GmbH, Wessling, Germany)
Anne-Emmanuelle Lagny (CAM Space GmbH, München, Germany)
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Abstract:
In this work an intelligent agent to predict future failures occurrences is presented. The agent is intended to support the Columbus Flight Control Team real-time operations. The first step is the selection of the object of the study: the occurrences of Single Event Upset caused by radiation on Columbus Orbital Laboratory Mass Memory Units. An exploratory analysis is performed to determine the metrics used by the agent to foresee the future failures. The exploratory analysis results constitute an interesting set of measurements consistent with the literature on the matter. To compute probabilities, a probabilistic model is created to support the algorithm of the agent. The implementation strategy includes elements of incremental machine learning techniques, scalability and real-time interfaces. The results obtained from an analysis of about two years of data are evaluated, showing that the intelligent agent can effectively support decision on preventive maintenance operations to reduce the occurrences of failures.

Date and Time: Tuesday 06 May: 5:00 PM - 5:30 PM
Place: Pasadena Convention Center, Room: Ballroom A
Session: OCMSA-01 - Operations Technologies I.

A Simulated Journey to Mercury: the Challenges of the BepiColombo Simulator Development for the Flight Control Team

Ignacio Clerigo (LSE Space GmbH)
Elisa Montagnon (ESA)
Daniele Segneri (Telespazio Vega)

Abstract:
BepiColombo is a mission to Mercury of the European Space Agency, in collaboration with the Japanese Space Agency, due to launch in July 2016. A spacecraft simulator is being developed by the European space industry for the European Space Operations Centre (ESOC) to support the operations. An Agile software methodology, based on iterative and incremental reviews and frequent prototype versions called sprints, has been applied for the first time in the development of a simulator at ESOC. This paper analyses the benefits and the impact of such dynamic process from the Flight Control Team perspective. It also presents the key innovations introduced in the BepiColombo simulator and in particular the use of a generic payload model that can be customized directly by the Flight Control Team to simulate the behaviour of the spacecraft’s payloads. How this generic approach to payload modelling can help to reduce the simulator development cost while providing more flexibility to the operations team and the capability to improve the models at a later stage of the mission is also the subject of this paper.

Date and Time: Wednesday 07 May: 5:00 PM - 5:30 PM
Place: Pasadena Convention Center, Room: Ballroom A
Session: Mission Execution - Fault management and recovery 2

Thermal Control in SMOS Payload Operations: Anomalies, Seasonal Effects, Failure & Recovery Issues

Mariano Kornberg (LSE Space GmbH, Darmstadt, Germany)
Elena Checa, Silvio Dolce, Manuel Martin-Neira (ESA, ESTEC, European Space Research and Technology Centre, Noordwijk, Netherlands)
Pilar Rubiales, Josep Closa (EADS-CASA Espacio, Madrid, Spain)
Guillermo Buenadicha, Jorge Fauste (ESA, ESAC, European Space Astronomy Centre, Madrid, Spain)

Abstract:
The SMOS satellite, launched on 2nd November 2009, is the second Earth Explorer Mission of the
European Space Agency. Its Payload is a two-dimensional aperture synthesis radiometer called MIRAS (Microwave Imaging Radiometer using Aperture Synthesis) dedicated to obtain images of Soil Moisture and Ocean Salinity that comprises novel applications. To ensure the proper operation of the Payload, specific thermal requirements were set for the receivers of the 69 antennas of MIRAS in order to guarantee the validity of the scientific data. This paper summarizes some features of the Thermal Control Subsystem of MIRAS observed during more than four years in orbit: fulfilment of target temperature requirements, seasonal effects, anomalies seen in-flight and recovery from failure states.

Date and time: Thursday 08 May: 3:00 PM - 3:30 PM
Place: Pasadena Convention Center, Room: Ballroom A
Session: FSMC-07. FSMC - Fault Management and Recovery