

SPACE OPERATIONS SYMPOSIUM (B6)  
Human Spaceflight Operations (1)

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THE SOLAR INSTRUMENT: LESSONS LEARNT AND ON-ORBIT ENGINEERING  
IMPROVEMENTS

**Abstract**

SOLAR is an experiment of the International Space Station, externally installed on the European Columbus module and devoted to study the Sun irradiance to better understand the Sun physics and its impacts on the Earth environment and climate changes.

The SOLAR tracking system and its three scientific instruments SOLACES, SOLSPEC and SOVIM were launched in the Space Shuttle mission STS122-1E, the same delivering the Columbus module and started their on orbit operations on 15 February 2008.

Initial problems during commissioning were successfully solved by workaround and on orbit modifications allowed living and tuning immediately the complex and structured ground processes between engineering support and ground operations set for the Columbus module and its payloads.

A major failure few months later of one of the three instruments did not stop the SOLAR operations that, orbit after orbit, accomplished successfully both the 18 months nominal mission and the planned extension to 36 months. The payload performances and the important scientific results worldwide recognized, together with the favorable period in the Sun life cycle allowed getting approval of a another mission extension up to five years and, by the 2012, a further extension to 2017 could be confirmed!

SOLAR payload mission represents a great challenging and a great experience both from engineering and operational points of view also because, due to its external ISS location, SOLAR turned out to be one of the few payloads having strong interaction with space operations both at ISS and Space Shuttle level. This paper retraces the events so far experienced and the related lessons learnt hoping they will be useful for future payload development and engineering generations.