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OPERATIONAL HIGHLIGHTS OF SOLAR ORBITER'S TWO YEAR CRUISE TO THE SUN

Abstract

The ESA/NASA Solar Orbiter launched on 10th February 2020, to start its mission to obtain detailed measurements of the inner heliosphere and the nascent solar wind, will also perform close observations of the polar regions of the Sun. It is equipped with a suite of ten payload instruments comprising both remote sensing and in-situ sensors. A two year “cruise phase” was planned, during which two gravity-assist manoeuvres of Venus and one of Earth would be used to bend the trajectory towards the sun. It was intended that the cruise phase be operationally light, however this has not been the case. This paper will cover the main challenges faced by Solar Orbiter during this period, and the innovative operational solutions. The challenges originate in the parallel operation of the ten payload instruments, the complex spacecraft platform, a novel operations concept and the first Earth fly-by to have to deal with space debris. The solutions have variously required modifications to the on-board autonomy functions and software patches, and an operations implementation that uses file based-operations to achieve a dynamic handling of spacecraft pointing requests and payload calibrations.