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MOF: the Ground Support to Metis Operations

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Metis is the coronagraph of the scientific payload of Solar Orbiter, an ESA-NASA mission which aims to study the Sun poles and the circumsolar region. The activities necessary to operate Metis are implemented through the Metis Operations Facility (MOF). The MOF is the collection of functionalities and subsystems which allows to plan the instrument observation, validate the observation command sequence, process the data, distribute the data and make them available. It is built, run, and maintained by ALTEC in close collaboration with INAF, and funded by Italian Space Agency in the frame of the industrial contract n. 2020-10-I.0.

The MOF can be divided into 5 subsystems: Data Processing, Mission Database, TM/TC Monitoring, Observation Planning (which contains the Metis Reference Model - MRM) and Infrastructure. The Data Processing runs the pipelines for the data processing, and interacts with other components of the MOF and with external interfaces. The Mission Database, besides storing all the Metis data products, provides a set of functions to enrich products metadata and make them accessible to the scientific team. The TM/TC Monitoring is the subsystem responsible for monitoring the telemetry incoming from Metis and, partially, from the spacecraft. It is based on the ESA SCOS-2000 suite. The Observation Planning S/S integrates the MISO software (Multi Instrument Sequence Organizer) developed for creating the Command Request Files (CRF) to be delivered to the MRM and to MOC. The former is an electronic model which provides a test bench for the generated CRF, and is used to validate TC sequences in IOR preparation before sending them to the actual instrument.

The MOF interfaces with two external entities: the Mission Operation Centre (MOC), from which the TM/TC packets are downloaded, and the Science Operations Centre (SOC), from which planning and auxiliary data are retrieved. Metis data products are finally uploaded to the Solar Orbiter Archive (SOAR) after validation by the scientific team via the Mission DB S/S.

In 2023, the MOF was upgraded from v3 to v4; new processing pipelines for levels L1 and L2, and workflows for data validation and data quality have all been tested and integrated. Generation of L2 data is underway for both VL and UV images. Finally, activities for migration to a new and more efficient infrastructure have started with the installation of new hardware components.

In the talk, MOF architecture will be presented in detail, as well as the interfaces with external facilities. The current state and the execution of daily and cyclic operations will be discussed, together with exciting upcoming evolutions enabled by Metis data availability and new technologies.

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