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SENTINEL-5P MISSION OPERATIONS – A SUCCESSFUL DLR/KNMI/NOAA/ESA COLLABORATION

Abstract

The Sentinel-5p mission launched on 13th October 2017, is the first Copernicus mission dedicated to monitoring of the Earth's atmosphere, using the TROPOMI instrument to measure the concentration of trace gases as well as cloud and aerosol distributions. Mission operations are conducted and executed by ESA's Operations Centre, ESOC, in Darmstadt, Germany in coordination with KNMI (Royal Dutch Meteorological Institute, De Bilt, Netherlands) and DLR (German Aerospace Centre, Oberpfaffenhofen, Germany). KNMI is responsible for the payload (TROPOMI) operations while DLR manages the science data downlink scheduling. In addition Sentinel-5p flies behind Suomi/NPP operated by NOAA and orbital information of both satellites is shared between NOAA an ESA to maintain a so-called loose formation flight. The Sentinel-5p mission operations concept is based on a collaboration between KNMI, DLR and ESA which provide the main elements of the Sentinel-5p ground segment: • KNMI: Operations Support Facility (OSF) monitors instrument health and provides TROPOMI instrument planning files to FOS. The scientific data are assessed by IDAF (Instrument Data Analysis Facility). • DLR: Payload Data Ground Segment (PDGS) conducts scientific data acquisition, processing, dissemination and archiving and provides S-/X-band ground station planning files to FOS • ESA/ESOC: Flight Operations Segment (FOS) performs monitoring and control (TM/TC) of Sentinel-5p platform and payload and generates mission operations planning increment files NOAA's Office of Satellite and Product Operations (OSPO) provides regular, up to date orbit state parameters (TLEs) and manoeuvre information for maintaining formation with S/NPP. This paper will describe how the generic mission operations concept for the Sentinel-1, 2 and 3 mission operations was adapted to the Sentinel-5p mission and its inter-agency ground segment. It will provide details of how the key operations concept drivers affected the ground segment design and describe the challenges addressed during the mission preparation and operations.