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Author: Mr. Said Haouchine
Centre National d'Etudes Spatiales (CNES), France

# SURFACE WATER OCEAN TOPOGRAPHY LEOP : A VERY EXCITING CNES/NASA EXPERIENCE OF OPERATIONS

**Abstract**

We share here our joint CNES/NASA experience of LEOP for SWOT mission with very critical operations during 9 days in 24/7.

Launched December 17th, 2022, Surface Water and Ocean Topography (SWOT) is being jointly developed by NASA and Centre National D'Etudes Spatiales (CNES) with contributions from the Canadian Space Agency (CSA) and United Kingdom Space Agency. SWOT performs for the first time global survey of Earth's surface water as lakes, observes the fine details of the ocean's surface topography, and measures how water bodies change over time.

SWOT is an earth observation satellite, operating in a nearly circular non sun-synchronous orbit at an altitude of 890 km and an orbital inclination of 77.6

The SWOT flight system is the spaceborne element of the mission. It is composed of the spacecraft bus supplied by CNES, and the two payload modules (KaRIn and nadir). The bus provides basic services to the payload modules and includes AOCS, Electrical power, data handling and radio frequency communication subsystems. The spacecraft's mass at launch was roughly 2000 kg.

SWOT is operated together by CNES and NASA/JPL space agencies. CNES, from its control centre in Toulouse, operates the spacecraft platform (including flight dynamics operations); while JPL, from its premises in Pasadena CA, carries out Karin payload operations to be uploaded by CNES. CNES mission center is in charge of science data product and delivery to the science community and JPL ground data segment in charge of re-processing campaigns.

This paper is going to describe our experience starting from system tests phases, dress rehearsals, LEOP and commissioning operations jointly between CNES and NASA/JPL. It especially examines an innovative concept of operations based on a high level of automation, a system chronology using cleverly the timeshift between Toulouse and Pasadena to optimize the timeline during very early ops, commissioning and "routine". Last, it shows some mission results giving meaning to this space adventure.