

SPACE OPERATIONS SYMPOSIUM (B6)
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WHAT HAPPENS ABOVE THUNDERSTORMS: FIRST OPERATIONAL CONCEPT AND LESSONS
LEARNED FROM THE THOR EXPERIMENT DURING THE SHORT DURATION MISSION
ON-BOARD THE INTERNATIONAL SPACE STATION

Abstract

The European Space Agency (ESA) experiment, THOR, named after the god of thunder, lightning and storms in Norse mythology, was proposed by the National Space Institute of the Technical University of Denmark (DTU Space). It aims at imaging atmospheric and electric activity happening above thunderstorms using optical cameras from aboard the International Space Station (ISS). The events of interest are Clouds Turrets (CTs), Gravity Waves (GWs), and Transient Luminous Events (TLEs). The first THOR observations were conducted in September 2015 by the Danish astronaut Andreas Mogensen during his Short Duration Mission: IRISS (SDM). The Belgian User Support and Operations Centre (B.USOC) was contracted by ESA to develop the THOR operations concept and was responsible for the operations preparation and execution of the experiment. After describing the scientific objectives of the THOR experiment, this paper will present the operational concept adopted during the SDM, the challenges encountered, the results and the operational lessons learned from the activities. The development of the operational concept for the SDM was challenged by the different International Partners involved, by the time constraints limiting the options for technical feasibility studies and by the shipping and budgetary constraints allowing only available on-board equipment to be used (the commonly used camera Nikon D4). Consequently, compared to the initial scenario the experiment was strongly restricted in terms of the operational setup, making observations more difficult and impacting the field of view. Despite these challenges the results obtained were above expectations. Among many observations of CTs and regular lightning, Andreas Mogensen managed to capture on film a C-Sprite and for the first time a pulsing Blue Jet. This paper finally investigates on alternate operations concepts as for future use of THOR.