

SPACE OPERATIONS SYMPOSIUM (B6)
New Operations Concepts (2)

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SPACE ENVIRONMENT INFORMATION SYSTEM TO SUPPORT SATELLITES OPERATIONS

Abstract

Safe and productive operations of space systems are the code words at the European Space Operations Centre of ESA. Space and ground system assets are exposed to hazards from space environmental conditions that can influence systems' performance and reliability as well as lifetime. Space weather, mainly influenced by solar activity, is one of the major sources of spacecraft abnormal behaviour and aging. Space weather can also have lethal consequences for astronauts.

The main concern of the satellite operators is to keep the system healthy and running; whereas the main concern of airline operators and manned space mission operators is to keep humans healthy and safe. The accomplishment of these objectives can be very complex, considering that it is hard to detect when the space environmental conditions are safe and when they are hazardous. It is therefore imperative to raise the awareness of the impact of space weather in mission operations and update procedures accordingly.

ESA and its research and industrial partners have studied, designed and deployed a space weather monitoring and warning tool called SEIS (Space Environment Information System). SEIS has been supporting INTEGRAL gamma-ray telescope operations in Darmstadt since 2005. Through SEIS ESA has gained unique operational experience in using a real-time space weather monitoring system in operations. This experience, combined with the engineering of the second prototype SESS, has driven the concept and the user requirements for the implementation of an advanced system called SEISOP (Space Environment Information System for Operations), currently under implementation.

SEISOP's main goal is to provide satellite operators, science teams, launch teams and project teams with a multi mission, modular and expandable tool for space weather support. SEISOP will supply users with information and extracted knowledge related to the space environment and its effects on their spacecraft. It will support satellite critical and routine operations and as a consequence contribute to improving their reliability.

This paper presents the roadmap that culminates with SEISOP. It will discuss the operational experience of SEIS so far matured, the benefits and lessons learned. The second part, looking to the future, will include a summary of the expected services from SEISOP, a high level description of the architecture and the exploitation of new technologies – such as data warehousing and data mining - to adequately support the users in optimizing satellites operations strategy. Finally the matching between SEISOP service and the Space Situation Awareness framework will be discussed.