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Operations in Space Debris Environment, Situational Awareness - SSA (7)

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A PAN-EUROPEAN EXPERT CENTRE SERVICE AND COORDINATION FACILITY IN SUPPORT
OF SPACE SURVEILLANCE

Abstract

Developed within ESA's SSA and Space Safety (S2P) programmes, the Expert Centre provides subject matter expertise and tests services to coordinate data acquisition by a multitude of diverse sensors. The architecture supports a variety of applications including tasked tracking (astrometry and photometry), survey, and characterization observations by means of passive optical, laser ranging, and radar techniques. The centre provides (under testing) extensive validation and qualification services for the mentioned applications and sensor types. These services include technical support to sensor operators by experts to achieve compliance with data calibration and quality, as well as data formatting requirements. All users and sensors interfaces used by the Expert Centre are based on internationally agreed standards and the data quality requirements are derived from the user community. The Centre is actively supporting standardisation activities.

Another core service of the Expert Centre under testing consists in coordinating observation campaigns for customers. Such campaigns may include very heterogeneous types of sensors operated by commercial companies, academia, government, and inter-governmental institutions. The Expert Centre covers the sensor planning, the data quality control, calibration and reformatting of the data if necessary, as well as the monitoring of key performance indices defined in service level agreements with the sensors.

The Expert Centre is hosted and operated by the Astronomical Institute of the University of Bern (AIUB) and serves as a reference for future national expert centres and the existing parallel deployment at ESA.

To demonstrate the operational capabilities and performance levels, more than a dozen optical and SLR stations participated in a comprehensive observation campaign. The campaign included qualification of sensors not previously involved in space debris observations, multi-static SLR and other focused observations and established the readiness to organise campaigns with a hybrid set of sensors. Two new campaigns are ongoing to provide a large test data set to ESA, to integrate Radar processing techniques, and to validate on-going developments at the Expert Centre.

In preparation of future services of the Expert Centre, research and development activities are being conducted in various domains, such as extending capabilities to derive attitude information from light-curves, foster day-light SLR measurements of non-cooperative targets through improving data processing techniques, develop statistical approaches to improve the exploitation of sub-catalogue space debris observations. Those additional services will be critical components in support of safe and sustainable operations in space.