Training Opportunity for Belgian Trainees

Reference	Title	Duty Station
BE-2015-OPS-L(3)	**Space weather space instrumentation**	**ESOC**

Overview of the unit's mission:

The objective of the SSA programme is to support Europe's independent utilisation of, and access to, space through the provision of timely and accurate information, data and services regarding the space environment, and particularly regarding hazards to infrastructure in orbit and on the ground.
The SSA programme will, ultimately, enable Europe to autonomously detect, predict and assess the risk to life and property due to remnant man-made space objects, re-entries, in-orbit explosions and release events, in-orbit collisions, disruption of missions and satellite-based service capabilities, potential impacts of Near Earth Objects, and the effects of space weather phenomena on space- and ground-based infrastructure.
The programme is active in three main areas:

- Survey and tracking of objects in Earth orbit - comprising active and inactive satellites, discarded launch stages and fragmentation debris that orbit the Earth
- Monitoring and forecasting space weather - comprising conditions originating from the Sun that can affect communications, navigation systems and other networks in space and on the ground
- Watching for near-Earth objects - comprising natural objects that can potentially impact Earth and cause damage and assessing their impact risk and potential mitigation measures

Overview of the field of activity proposed:

Within the SSA programme ESA has initiated industrial studies with the aim of identifying and defining the space segment architecture, which is needed for a now-cast of space weather events by monitoring the Sun and its interaction with the Earth. The system shall enable an early warning system to mitigate the impact on satellite systems and infrastructures in space and on Earth, which are vulnerable to those events. Such systems currently consider in particular observations from orbits around the Lagrange points L1 and/or L5 or from drifting orbits around the Sun.
The formulation of an effective system architecture is currently underway in which the preliminary design of the satellite system and the required instrumentation are iterated and optimised with respect to the requirements of the system. The result of this study will be the establishment of the mission assumptions, its preliminary design, the budgets and the technical and mission requirements.
This training opportunity will target the link between space weather environment and its monitoring by space instrumentation currently planned and assessed as part of the industrial studies. In order to mature the system and its requirements, it is necessary to investigate the interaction of the instrumentation with the environment and to analyse the performance of the instrumentation in order to consolidate the system requirements and assess its capabilities. The instrumentation consists of two groups, targeting insitu measurements at the satellite location and remote sensing of the Sun and the Sun-Earth environment.
The objective of this challenging project is review the ESA SSA space weather system requirements, the available instrument requirements and to analyse or model, where necessary, the instrument response to support the consolidation of the requirements and their formulation. Simulation of selected instrument responses maybe be needed to assess their impact on the overall system performance. This work will focus on SSA Distributed Space weather Sensor System (D3S) that will utilise hosted payload missions and small satellites to establish a monitoring system in LEO, MEO and GEO orbits.
Analysis of the D3S instrumentation and satellite systems will include the effect of space weather events on the operation of the instrumentation, the related data quality and possible acquisition and design features, which may allow to guarantee operation also during times of high solar activity.

Required education

Applicants shall have a degree in engineering or physics preferably with a background and interest in satellite systems, optics and interaction of energetic particles and radiation space systems and related detection methods.
Applicants should have just completed, or be in their final year of a University course at Masters Level (or equivalent) in a technical or scientific discipline.
Applicants should have good interpersonal and communication skills and should be able to work in a multi-cultural environment, both independently and as part of a team.
Applicants must be fluent in English and/or French, the working languages of the Agency. A good proficiency in English is required.