

Training Opportunity for Belgian Trainees

Reference	Title	Duty Station
BE-2019-OPS-SW(2)	Machine Learning for Space Weather Prediction	ESOC

Overview of the unit's mission:

ESA's Space Safety Programme Office is aiming to detect, predict and assess threats from space and their potential risk to life, property and infrastructure. The Space Weather Office under Space Safety Programme Office is addressing those risks associated to the activity of our Sun with the goal of providing owners and operators of critical spaceborne and ground-based infrastructure timely and accurate information that will enable mitigation of the adverse impacts of space weather. ESA's Space Weather Office is responsible for defining and implementing European space based observation systems to enable operational space weather services. It is also responsible for pre-operational developments and R&D activities geared towards fulfilling the needs of European space weather service users.

Overview of the field of activity proposed:

The field of space weather encompasses both the dynamic state of the space environment and its interaction with technologies as diverse as spacecraft hardware on-orbit and power distribution networks on ground. Space weather services aim to translate our knowledge of these phenomena and their interactions into actionable information for system operators about space weather and its possible effects.

Machine learning as a field of computer science applies statistical inference techniques to the task of complex data mining, prediction, and decision making. In the field of space weather, machine learning techniques may be applicable to prediction problems as diverse as solar activity onset, geomagnetic storm strength, and the occurrence and characteristics of solar energetic particle events.

The project will start with a review current practices in the field of machine learning, analysing lessons learned from recent initiatives which have applied machine learning techniques to space weather problems.

The project will then continue to including testing and validation of those techniques showing the most promising results in order to assess their applicability in different space weather scenarios. Testing and validation will be carried out utilising real space weather data and the results will be compared to those achieved utilising existing prediction techniques implemented within the ESA SSA Space Weather Service Network (<http://swe.ssa.esa.int>).

Required education:

Applicants shall have a degree in computer science or physics preferably with a background and interest in machine learning and/or space physics.

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.