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DESIGNING RADIATION BELT ENVIRONMENTAL INDICATORS FOR THE SAFETY OF SPACE

Abstract

SafeSpace, an EU Horizon2020 Leadership in Enabling and Industrial Technology (LET) project that was recently launched, aims at advancing space weather nowcasting and forecasting capabilities and, consequently, at contributing to the safety of space assets through the transition of powerful tools from research to operations (R2O). This will be achieved through the synergy of five well-established space weather models (CNRS/CDPP solar disturbance propagation tool, KULeuven EUHFORIA CME evolution model, ONERA Neural Network tool, IASB plasmasphere model and ONERA Salammbô radiation belts code), which cover the whole Sun – interplanetary space – Earth magnetosphere chain. The combined use of these models will enable the delivery of a sophisticated model of the Van Allen electron belt and of a prototype space weather service of tailored particle radiation indicators. Moreover, it will enable forecast capabilities with a target lead time of 2 to 4 days, which is a tremendous advance from current forecasts that are limited to lead times of a few hours. SafeSpace will improve radiation belt modelling through the incorporation into the Salammbô model of magnetospheric processes and parameters of critical importance to radiation belt dynamics. Furthermore, solar and interplanetary conditions will be used as initial conditions to drive the advanced radiation belt model and to provide the link to the solar origin and the interplanetary drivers of space weather. This approach will culminate in a prototype early warning system for detrimental space weather events, which will include indicators of particle radiation of use to space industry and spacecraft operators. Indicator values will be generated by the advanced radiation belt model and the performance of the prototype service will be evaluated in collaboration with space industry stakeholders. The work leading to this presentation has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870437 for the SafeSpace (Radiation Belt Environmental Indicators for the Safety of Space Assets) project.