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Radiation Fields, Effects and Risks in Human Space Missions (5)

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ERFNET – DH: ENHANCING THE SPACE RADIATION RESEARCH FOR FUTURE HUMAN SPACE TRAVELS

Abstract

Human space travel is entering a new phase of exploration beyond Earth. By 2030, we expect regular trips to the Moon's orbit and surface, along with increased preparations for sending humans to Mars. However, ensuring the safety of astronauts during these missions presents several challenges. One of the biggest hazards is dealing with the harmful effects of space radiation. There is an urgent need for quantifying, managing and mitigating the risks of tumours and degenerative diseases, as well as electronics damage, induced by space radiation exposure. Nevertheless, the scientific competences required to investigate this topic are broad and interdisciplinary, while the tools and methods needed in the radiation research efforts are subject to a global scientific community where the relevant knowledge is often scattered and difficult to reach, especially to the non-expert user.

The European Radiation Facility Network - Data Hub (ERFNet-DH) project, funded and coordinated by ESA and ASI and implemented by ALTEC (Turin, Italy), aims at providing an answer to these challenges and at supporting the coordination of ESA's radiation research and applications activities. The ERFNet-DH among its tasks will provide operational support to ESA's radiation payloads on Lunar Gateway (the new challenging space station will orbit around the Moon) collecting, processing, and distributing radiation data. The first two Lunar Gateway payloads involved in the Data Hub will be the European Radiation Sensor Array (ERSA) and the Internal Dosimeter Array (IDA). Moreover, the scientific environment will provide a data hub to be accessed by the worldwide research community working with space (space-related) radiation data, where users will be able to access a dedicated platform to retrieve data from other archives, perform data analysis, exploit data, develop their data processing algorithms, and run numerical simulations either in dedicated virtual areas or in batch execution environment. Indeed, the framework will host software tools or programming languages commonly used in this scientific community (e.g. GRAS, GEANT4, ROOT, python, etc.).

The ERFNet-DH aims to support space radiation research by providing platform for global data

sharing and cooperation among different experts of the international scientific community, and to provide an input to the development of an advanced Radiation Risk Model for space and Earth application.

The first Data Hub demo was presented to the ESA ERFNet Project Team in November 2023 and the first beta version is going to be released by the end of March 2024 for a limited group of test-users.