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TRITEL INSTRUMENT ON-BOARD THE EUROPEAN STUDENT EARTH ORBITER TO MEASURE SPACE RADIATION

Abstract

The development of the European Student Earth Orbiter (ESEO) started almost twenty years ago. ESEO is an educational hand-on project of the European Space Agency (ESA) Education Office, carried out as part of the ESA Academy programmes. The predecessor of the Centre for Energy Research, Hungarian Academy of Sciences (MTA EK) joined the project in late 2005 by developing the ESEO-TRITEL instrument for measuring the intensity and quality of space radiation in orbit, which is one of the primary objectives of the ESEO mission. The development of the original TRITEL 3D silicon detector telescope began at MTA EK at the beginning of the 2000s in order to determine the dose equivalent to the astronauts working on the International Space Station (ISS). Since 2012, several measurement campaigns have been conducted in the Russian Zvezda, as well as on the European Columbus module. ESEO, with TRITEL on board, was launched in December 2018 and injected to Sun Synchronous Orbit with an altitude of 600 km, higher than that of the ISS. At this altitude the protection by Earth's geomagnetic field is weaker and the spectrum of the radiation field is also different. In the ESEO-TRITEL experiment the anisotropies in the radiation field, the effects of the Earth shadow and the South Atlantic Anomaly (SAA) are studied. The present paper gives a brief overview of the ESEO-TRITEL payload and its final development phase in the frame of the ESEO project. The first measurement results from the ESEO-TRITEL instrument will be presented and briefly compared with similar ISS measurements using the TRITEL system. The measurement results will be compared with calculations based on space radiation environment models and Monte Carlo simulations using the Geant4 Radiation Analysis for Space (GRAS) tool.