Geant 4

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G4MRES A Geant4-based operational tool to evaluate space weather effects on satellites

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G4MRES (Geant4 for Mission Radiation Effects Simulation), developed under the framework of SEISOP (Space Environment Information System for Operations) project, is designed, as an advanced tool, to cover the lack of data linking the Space Weather conditions and the direct effects on S/C sensitive components.

The final objective of G4MRES is the design of an operational tool capable to retrieve real-time SW information from a selected data provider and S/C orbital parameters from mission control centers, perform a realistic radiation analysis, and return the resulting effects estimations to mission operators and payload teams in order to provide them with useful information to understand possible anomalies induced by energetic radiation.

G4MRES core is based on Geant4 particle transport code, as it covers all the required capabilities in terms of radiation propagation and effects analysis and in particular, common radiation effects of interest for mission engineers, such as Total Ionising Dose (TID), Displacement Damage Dose (DDD), Linear Energy Transfer (LET), etc.

In terms of Geant4 code, G4MRES makes use of GRAS tool as main simulation and analysis engine, and MAGNETOCOSMICS as effective tool to estimate geomagnetic attenuations of particle fluxes for magnetically-shielded real orbits.

G4MRES is the next generation of a previous prototype, G4SESS, developed for SESS (Space Environment Support System) project and succesfully tested in ESAC. Currenlty G4MRES, together with SEISOP system, is under installation and testing phase at ESOC and it is expected to be ready for operations in the next months, providing support to current and future ESA missions.

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