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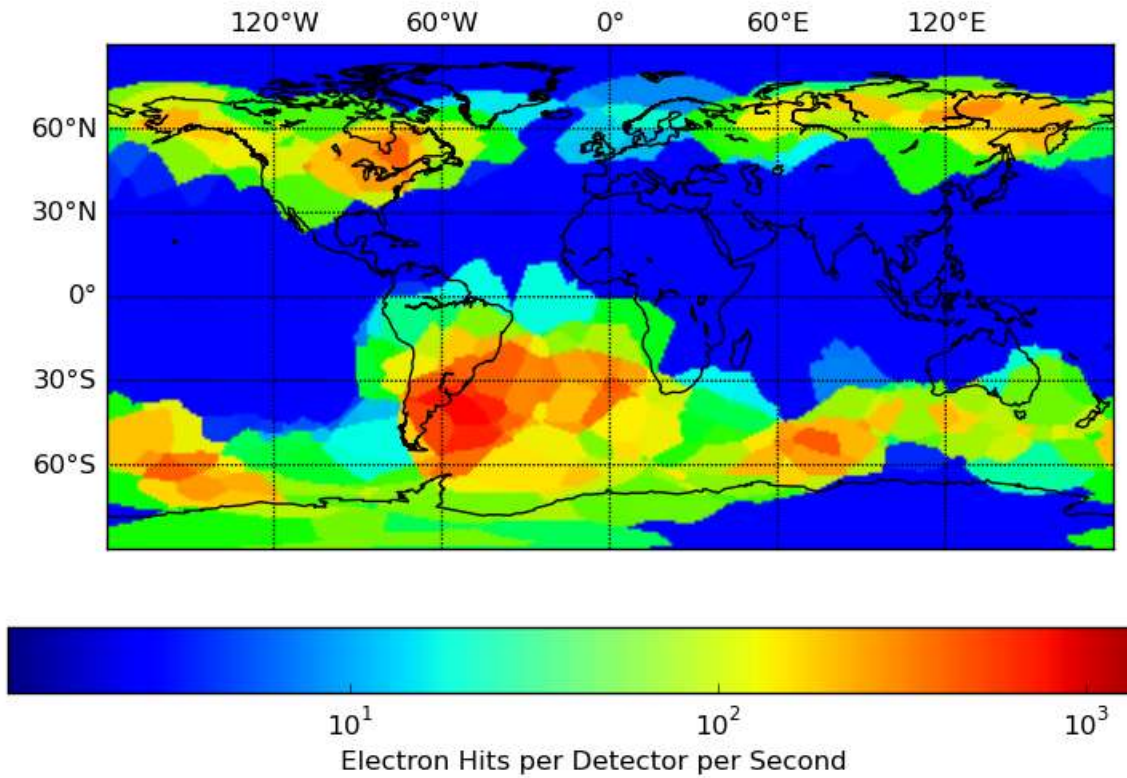

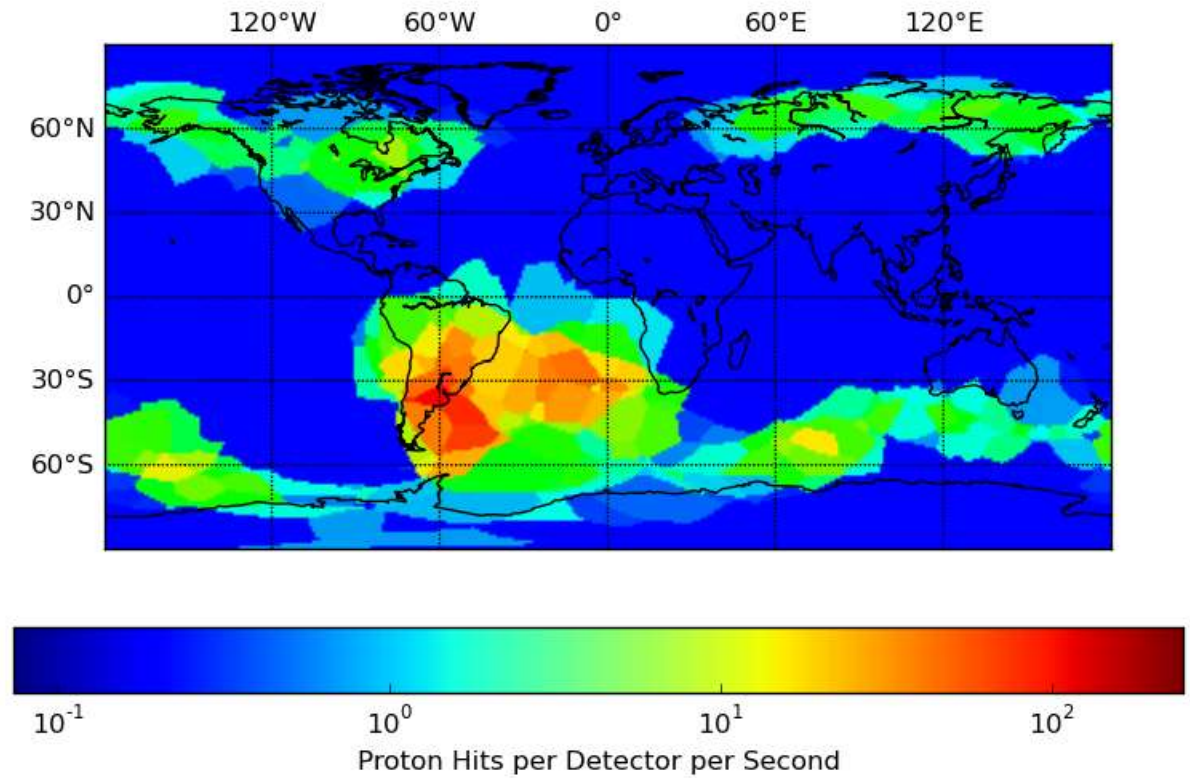

LUCID Results: Electron and Proton Counts

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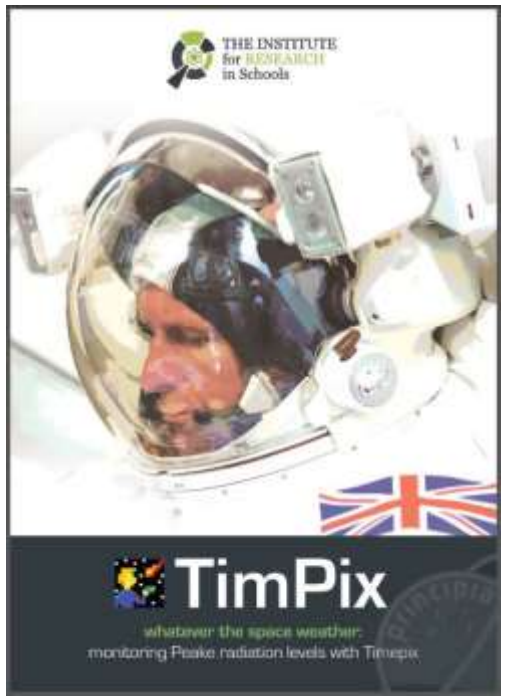

Simulation and analysis of the LUCID experiment in the Low Earth Orbit radiation environment

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Abstract. The Langton Ultimate Cosmic ray Intensity Detector (LUCID) experiment is a satellite-based device that will use five Timepix hybrid silicon pixel detectors to make measurements of the radiation environment at an altitude of approximately 635 km, i.e. in Low Earth Orbit (LEO). The experiment is due to launch aboard Surrey Satellite Technology Limited's (SSTL's) TechDemoSat-1 in 2014. The Timepix detectors, developed by the Medipix Collaboration, are arranged to form the five sides of a cube enclosed by a 0.7 mm thick aluminium "dome", and will be operated in Time-over-Threshold mode to allow the flux, energy and directionality of incident ionising radiation to be measured. To estimate the anticipated data rates with respect to these measurements, the LUCID experiment has been modelled using the GEANT4 software framework. As an input to these simulations, SPENVIS, ESA's Space Environment information system, was used to obtain the estimated flux of trapped protons and electrons in TechDemoSat-1's orbit with NASA's AP-8 and AE-8 models. A web portal, LUCIDITY, was developeded to allow school students from the LUCID Collaboration to manage SPENVIS flux spectra and GEANT4 input cards. The initial results reported here confirm that the LUCID's data transmission allowance is sufficient, and further work applying the techniques to more specific space radiation environments with a more sophisticated simulation is proposed.

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