Characterization and monitoring of space radiation in LEO orbit by the SATRAM/Timepix payload on board the ESA Proba-V satellite

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The compact spacecraft payload SATRAM, operating in LEO orbit since 2013 on board the Proba-V satellite from ESA, provides comprehensive and high resolution radiation monitoring in the satellite environment. Equipped with the hybrid semiconductor pixel detector Timepix, the technology demonstration payload determines the composition and spectral characterization of the mixed radiation field with quantum imaging sensitivity, charged particle tracking, energy loss and directionality capability. With a polar orbit (sun synchronous, 98° inclination) and altitude of 820 km the space radiation field is visualized and continuously sampled essentially over the entire planet. In this contribution we present the resulting spatial and time distributions of dose rates and particle fluxes produced in wide dynamic range.

Fig. 1. Earth map of space radiation in LEO orbit at 820 km measured by SATRAM/Timepix payload on board the Proba-V satellite. The total dose rate is shown (in units uSv/h displayed in color in log scale) for the Northern (a) and Southern (b) hemispheres. The polar horns of the radiation belts are revealed together with the South Atlantic Anomaly (b). Data displayed for the period January-July 2015. Regions and bins in black correspond to locations not covered by the satellite, or where data was not collected, respectively.

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