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Titulo: Analysis of the fluence of large solar energetic particle events in the period 2010-2013

Nombre (Autor que presenta): Daniel

Apellidos (Autor que presenta): Pacheco Mateo

Apellidos y nombre de otros autores: Daniel Pacheco, Neus Agueda, Angels Aran, Blai Sanahuja, Piers Jiggens

Resumen:

In order to specify the radiation environment due to solar energetic particle (SEP) events, for interplanetary missions, it is necessary to use simulations of the particle intensity-time profiles measured by virtual observers located at different positions in the heliosphere. At present, the physics-based models applied for such a purpose including a moving source of particles are not able to model the portion of the SEP intensity enhancement occurring after the coronal/interplanetary shock crossing by the observer (i.e. the downstream region). This is the case, for example, of the shock-and-particle model used to build the SOLPENCO2 code. SOLPENCO2 provides with synthetic SEP event simulations the statistical modelling tool developed in the ESA/SEPEM project for interplanetary missions (http://dev.sepem.oma.be/). This caveat from models may be addressed using SEP data. From observational studies, we know that the contribution of the downstream region of an SEP event to its total fluence can largely vary with the energy of the particles and from event to event. In this work, we present an analysis of several SEP events observed at 1 AU from 2010 to 2013. We identify the solar eruptive phenomena associated with these SEP events as well as the in-situ passage of interplanetary shocks. For each event, we quantify the amount of fluence accounted in the downstream region, i.e. after the passage of the shock. We discuss our results in terms of the heliolongitude of the observer with respect to the solar source site.