

Radiation environment in the inner Heliosphere from great SEP events: monitoring by using CR data and forecasting of radiation dose for space-probe missions

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On the basis of one or several NM one min data our system automatically determined the start of Solar Energetic Particle (SEP) event, and then by the method of coupling functions are determined the SEP spectrum out of the atmosphere. We show that the determining of energy spectrum at different moments of time gave possibility to determine preliminary main parameters of SEP generation and propagation in dependence of particles energy. We use also available from Internet some satellite one minute data of energetic particle fluxes to extrapolate obtained results to the small energy range. On the basis of obtained parameters for SEP generation and propagation we determine the radiation environment from SEP in the inner Heliosphere and forecast the expected time variations of SEP fluxes in dependence of energy, distance from the Sun, and helio-latitude. For continuously checking and correcting main parameters of SEP generation and propagation, by method of coupling functions we determine expected time-variations in counting rates in NM and on using satellite; by comparison with really observed data we correct the found parameters of SEP generation and propagation in dependence of particles energy. By this way with new data of observation the monitoring and forecast of radiation environment from SEP in the inner Heliosphere became more and more precise. From other hand we use checked in paper [1] method of integral multiplicity and coupling function for radiation dose inside space-probe in dependence of primary particle energy (in [1] it was made in application to galactic CR, but is applicable also for SEP). By using the method of coupling functions we determine the expected differential (per unit of time) radiation dose for astronauts (e.g., missions to Moon or to some planets) and electronics inside space-probe, as well as expected integral (during full interval of SEP event) radiation dose in dependence of in dependence of their trajectories in the Heliosphere. If the radiation hazard is expected to be dangerous for some type of space-probes, may be formatted special Alerts.

Reference:

[1]. Lev I. Dorman, 'Radiation environment in the Heliosphere from galactic cosmic

rays and radiation hazard for space-probes in dependence of their trajectories: integral multiplicity and coupling function for radiation dose, monitoring and forecasting', Abstract on COSPAR-2006, A-01676, session D2.4/E3.4.