Monitoring and forecasting of radiation dose from great SEP events by using CR data, 1. For aircrafts in dependence of altitude and cutoff rigidity

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On the basis of one or several NM one min data our system automatically determined the start of 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 range of small energies. On the basis of obtained parameters for SEP generation and propagation we forecast the expected time variation of SEP fluxes in dependence of energy in the interplanetary space, and then by method of coupling functions – expected variations in counting rates in NM and on satellites; 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 forecast became more and more precise. From other hand we use determined in paper [1] integral multiplicity and coupling functions for radiation doze inside aircraft in dependence of shielding, altitude, cutoff rigidity, and particle energy. By using the method of coupling functions for radiation doze inside aircraft we determine at each step the expected differential (per unit of time) radiation dose for crew, passengers, and electronics inside aircrafts in dependence of shielding, altitude and cutoff rigidity, as well as expected integral (during full interval of SEP event) radiation dose in dependence of aircraft trajectory in special 3D-space (pressure of residual atmosphere, cutoff rigidity, and time). If the integral radiation dose is expected to be dangerous, may be formatted and send corresponding Alert with advice to decrease the integral radiation doze (e.g., by increasing of residual atmosphere pressure, decreasing of aircraft altitude).

Reference:

[1]. Lev I. Dorman, 'Radiation hazard from galactic cosmic rays: integral multiplicity and coupling function for radiation dose, monitoring and forecasting, 1. For aircrafts

in dependence of shielding and airline parameters', Abstract on COSPAR-2006, A-01678, session PSW1.