# To the problem on the reliability of solar energetic proton flux models

R.A. Nymmik

Skobeltsyn Institute of Nuclear Physics, Moscow State University, 119992, Moscow, Russia
(nymmik@sinp.msu.ru / Fax 7-495-9390896)

At present, widely known are three computation models intended for predicting the probability of occurrence of cumulative fluences of SEP event protons during the future space flights. These models are: JPL-91 (Feynman et al.), SPE (Xapsos et al.) and MSU (Nymmik).

Two first models are based on the fundamental assumption, that during the 4-year quiet Sun periods the SEP proton fluxes can be neglected, and in the remaining time the fluxes of protons can be assumed to be identical in all years. These models differ from each other, in principle, only in the form of used distribution functions; the output data of these models represent the probabilities of occurrence of any integral fluxes of protons for some discrete values of energy and flight duration.

The third model is based on the assumption, that the probability of occurrence of events and cumulative SEP fluences depends only on the total number of monthly average numbers of Sun spots (Wolf numbers), and at the identical sum of these numbers is the same for any period or any phase of solar activity (maximum or minimum, growth or falling branch). The output data of the MSU model represent the probabilities of occurrence of differential power spectra of fluences (and also of peak fluxes) for a flight of any duration under the conditions of any level of solar activity, including the solar activity minimum.

It is shown, that the experimental data and, first of all, the data on SEP events in 2005 have revealed the inaccuracy of the fundamental assumption of JPL-91 and SPE models, namely, that within the quiet Sun periods the fluxes of SEP protons could be neglected and that they are identical in all active Sun years.

It is shown that a significant number of events, including extremely large ones, could also occur, in full conformity with MSU's model, within so-called quiet Sun years, when the fluxes of protons in the energy range of 10 to 200 MeV sometimes tens thousand times exceed the background fluence of protons in galactic cosmic rays.