

Heliospheric Modulation of Galactic Cosmic Rays on Different Time Scales

ILYA USOSKIN¹, GENNADY KOVALTSOV²

¹*Sodankylä Geophysical Observatory, University of Oulu, Finland*

²*Ioffe Physical-Technical Institute, St. Petersburg, Russia*

Galactic cosmic rays are subject to modulation in the heliosphere because of different processes, e.g., diffusion/convection and adiabatic deceleration in solar wind with frozen-in magnetic field, as well as charge-dependent drift effects. Sophisticated theoretical models have been developed corresponding to advanced understanding of the modulation process, which has been verified by recent space missions. On the other hand, these sophisticated models can be hardly applied to the past because only very limited, and mostly indirect, information exists on the solar/heliospheric parameters before the era of in situ space probes. In this case, special efforts should be taken to study the modulation. We apply such methods, based on reasonable simplification and coarsening of full models, to the study of heliospheric modulation at different time scales. We present some results of the long-term modulation study covering the time scales from a solar cycle to the millennial scale.