

## Step-like flux variations of quiet-time low-energy protons and HE nuclei in 1978-90 near 1 AU

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**Abstract.** In the period of 1978-81 the galactic cosmic ray (GCR) intensity decreased in three steps whereas in 1989-90 one prominent GCR step was observed. At the same time, energetic (1-10 MeV/n) proton and He populations, based on monthly minima of quiet-time fluxes near 1 AU, exhibited a step-like variation as well, but in a phase opposite to GCR modulation. Each low-energy particle step ended with the yearly lowest proton and He intensity simultaneously with a temporary increase of GCR flux. Here five different particle steps observed during the ascending phases of the 21st and 22nd solar cycles are investigated, each of which appeared

following steps of GCR modulation. The analysis of the p/He ratio around steps yields a very low value (5 to 25) at the end of each step, while the intensities of low-energy proton and He fluxes exhibit the lowest values marking the presence of a proton population additional to background near modulation steps. Discussed are the possibilities that Global Merged Interaction Regions and variations of solar activity are responsible for the observed stepwise variations in the quiet-time fluxes of 1-10 MeV/n particles and simultaneous variations of galactic particles.