

Solar modulation of galactic cosmic rays during grand minima: A hybrid simulation

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In the current and next weak solar cycles, we expect higher flux of galactic cosmic rays than that in the previous solar cycles because of the decreasing trend of the solar activity. It is important to quantitatively evaluate the high flux of galactic cosmic rays because it leads to the increase in the radiation exposure of aircrews and the increasing rates of single event upset events at spacecraft. However, reliable prediction of the increasing galactic cosmic rays in upcoming weak solar cycles is a challenges topic in the field of space weather forecast. We introduce a new project called Grand Minimum 7 (Gm7) for developing a hybrid simulation of galactic cosmic rays in such a weak solar condition, solving the stochastic differential equations of energetic particles in the MHD solar wind resolved by adaptive mesh refinement technique. We also discuss the possible situation of galactic cosmic rays and the radiation dose during the grand minima such as Maunder Minimum.

Keywords: galactic cosmic ray, solar wind