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A Modeling of the Solar Energy Particles in NICT

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Solar energy particles (SEP) are one of the most important problems for the space weather research because these phenomena cause the obstacles of the satellites and the radiation exposure to astronauts. However these generation and propagation processes mainly depend on the occurrence of the solar flares, shock wave derived from coronal mass ejections (CMEs) propagating in the interplanetary and the magnetic field in the solar wind. Therefore, it is very difficult to perform a numerical modeling to need the cover region from the sun to earth. Recently, Kataoka et al. are developing a unified model from an occurrence of the CME in the solar corona and the particle acceleration derived from shock wave in the interplanetary to a calculation of the radiation upper atmosphere. This goal is to develop a prediction system for GeV particles.

In this study, we will introduce an overview of a modeling for the solar energy particles (SEP) developed by NICT. This model will be co-development with warning system of aviation exposure to SEP (WASAVIES) developed by Kataoka et al. Our goal is to develop a unified numerical model that is able to reproduce not only GeV particles but also MeV particles and then to operate on the Science Cloud developed by NICT.The developments by NICT are as follows. (1) Developing an automatic detection of Type II burst from HiRAS data to determine the CME parameters. (2) Developing a numerical code for MeV particles that are not yet applied to WASAVIES. (3) Developing the global coronal magnetic field. In this study, we will introduce the method and current results for a modeling of the coronal magnetic field including the solar active region as well as an overview of our project, and also the relationships between the coronal magnetic field and SEP.

Keywords: solar Energy Particles, Numerical Modeling, Solar Coronal Magnetic Field