

A New Cloud Modeling Approach to Understand the Cosmic Ray Impact on Global Climate

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<http://www.es.jamstec.go.jp/esc/research/Holistic/index.html>

Although the numerical simulation for climate change may strongly influence human society, our understanding of various complex processes related to the climate change is still severely restricted. In particular, since the most of the conventional cloud and aerosol models must be controlled by many empirical parameters, rather large uncertainty still exists in the evaluation of cloud impact on climate. In fact, also in the IPCC Fourth Assessment Report (2007), the uncertainty in the direct and indirect impacts of aerosols on Earth's climate was evaluated as large as the impact of the anthropogenic greenhouse gases. It is widely believed that this uncertainty might be caused by a lack of our understanding of the microphysics of cloud, which must mutually interact with atmospheric dynamics. Therefore, the conventional climate models are not capable to examine the hypothesis of the galactic cosmic ray and climate relationship, which has been proposed by Svensmark (1997). It indicates that, in order to improve the predictability of climate change, we have to progress the study of aerosol production as well as to develop a new model, which is capable to include the aerosol and cloud relationship with more first principle framework. In this talk, we will briefly review the conventional cloud models, and introduce a new approach, which is now undertaken in the Earth Simulator Center to develop a new cloud model. Finally, we will discuss about what we should do in order to correctly evaluate the cosmic influence on the global climate.