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Susceptibility of Climate to the Formation of Cloud Condensation Nucleus and Solar Influence to Climate

Kanya Kusano[1*]

[1]STEL, Nagoya University

How the solar activity affects the climate is a crucial issue for the understanding of long-term climate variability. Although the two major hypotheses, those proposed that the changes in solar irradiance and cosmic ray may affect the climate, have been proposed, the correlative analyses of the proxy data have not been able to discriminate them. In this paper, we focus on the Dickinson's hypothesis (1975) that the ionization due to galactic cosmic ray may affect the formation of cloud condensation nucleus (CCN), and discuss about the susceptibility of climate to the formation of CCN. In particular, we study the possibility that the feedback interaction between the CCN formation and the precipitation efficiency enhances the influence of cosmic ray, and discuss the mechanism of solar influence to the climate by comparing the theoretical analysis and the multi-scale simulation study performed recently by our group.

Keywords: climate, cloud, CCN, the sun, cosmic ray, sunspots