

Convective activity over Tibet in the global cloud resolving model, NICAM

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The Tibetan Plateau (TP) is the largest plateau on the globe, dynamical and thermal roles of which affect global-scale climate system considerably. In particular, TP is directly relevant to the North Asian arid climate and seasonal evolution of the summer monsoon. Diurnal variability of the convective systems over TP will affect the monsoon seasonal change through modifying the radiation balance above TP. In the conventional GCM, however, the convective activity over TP has been very limitedly simulated mainly due to their low horizontal resolutions. This study analyses the preliminary one-month simulation from the 3.5 km resolution global cloud-resolving model (GCRM), NICAM (Nonhydrostatic ICosahedral Atmospheric Model; Tomita et al., 2005). Experiment was carried out during April of 2004. Previously, most studies, which focused on the convective systems over TP, investigated intensively for the pre-monsoon/monsoon season. Recently, satellite observations have shown that the April is one of the pronounced periods of the cloud activity over TP.

The NICAM very well simulates the diurnal cycle of convective systems over TP in April. Convective clouds that are corresponding to the detail orographic structures are generated in the afternoon, which is consistent with the GMS observations. Well-developed convective systems tend to be organized over TP in relation to the diurnal cycle as the passage of synoptic disturbances. Monthly mean characteristics in diurnal variation of cloud height and distribution agree well to that analyzed by GMS although cloud top height from NICAM shows slightly higher than that can be estimated by GMS. The cloud systems generated during daytime tends to present until night in the low resolution NICAM. Such bias becomes much improved as the horizontal resolution become higher. These results indicate that the use of cloud resolving model is very beneficial to study convective activities over TP. Additionally, since the TP influences are not limited to the vicinal region, the GCRM will be useful to improve the seasonal variation of the Asian summer monsoon.