

Intraseasonal variability in the initialization of a seasonal prediction system simulated by a new convection scheme

*Yuya Baba¹

1. JAMSTEC Japan Agency for Marine-Earth Science and Technology

Capturing interannual variability originating from coupled-mode phenomena such as El Nino Southern oscillation is important for seasonal prediction system, since the variability has great impact on seasonal variability. To obtain better prediction skill, recent prediction systems employ various assimilation techniques, but not only the assimilation but also improvements of physical parameterization is necessary, because the fidelity of the simulated variability significantly depends on model's physical performance. Large uncertainty is known to exist in the atmospheric component of the system, especially in the representation of clouds. Therefore, improving the parameterization of clouds is considered a key to improve model's performance, and also further improve the prediction skill. We implemented a new convection scheme in a seasonal prediction system (SINTEX-F2), and evaluated the impact of convection scheme in the initialization of the system which was done by SST nudging. In this study, we especially focused on the fidelity of the simulated intraseasonal variability (i.e., MJO) which can be influential to the formation of interannual variability. The first evaluation revealed that the model using different convection schemes simulated similar climatology and atmospheric response to interannual variability, with acceptable small climatological error difference. Qualitative analyses on MJO were conducted using the MJO diagnostics, and the analyses revealed that the new scheme outperformed the original scheme of the system. By using a composite analysis on the organized convection, it was found that the new scheme simulated moisture increase originating from shallow clouds in the advance of the organized convection, which indicated the original superiority of the new scheme (which has been already revealed in preceding studies) was obtained even in the present model. Statistical and quantitative evaluations were finally performed, indicating that the new scheme captured statistical behaviors of MJO better than the original scheme. In conclusion, the new convection scheme outperformed the original convection scheme of the system in terms of intraseasonal variability from various perspectives. The new scheme is therefore expected to improve the seasonal prediction skill, in particular, for the interannual variability which may be affected by the intraseasonal variability. The influence of the convection scheme in practical seasonal prediction should be studied and will be presented in our future study.

Keywords: Intraseasonal variability, Convection scheme, Seasonal prediction system