HIGH RESOLUTION GLOBAL CLIMATE MODELING

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A high-resolution global climate model with a horizontal resolution of about 20 km has been developed and utilized to simulate seasonalmean anomalies, Madden and Julian oscillation(MJO), synoptic transients, and diurnal cycle. Because CES climate model is required to huge computing resources, we have developed the fast and reliable high resolution climate model through replacing spectral dynamical core with finite volume dynamical core and applying parallelization techniques. The tropical seasonal mean anomalies such as the difference between El-Nino and La Nina means arenot much affected by the change of horizontal resolution, which indicates that the seasonal means are mainly controlled by the physics. However, shorter-term variations with time scales shorted than a month appear to be very much affected by horizontal resolution of the model. The intensity of MJO is reasonably well simulated by the high-resolution model, although the phase relationship between the SST and precipitation of MJO time scale is not close to the observation. It is suggested that the failure of the phase relationship is mainly by lacking of air-sea interaction in the western Pacific. The transients are very well represented by the high-resolution model and the streamfunction tendency due to transient vorticity flux divergence is greatly improved by increasing the resolution, which affects the seasonal mean anomaliesin the extratropics. Although the diurnal cycle is somewhat improved by increasing the resolution, there is still difficulty in simulating the diurnal cycle properly with the high-resolution GCM, mainly due to problems of current convective parameterization.