

The SINTEX-F2 seasonal prediction system

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The SINTEX-Frontier coupled general circulation model version 1 (SINTEX-F1) was developed within the EU-Japan collaborative framework to study global climate variability and its predictability. The seasonal prediction system based on the SINTEX-F1 has demonstrated its outstanding performance of predicting El Niño/Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) since 2005. However, there is much room for improvement in predicting mid-latitude climate variations. To deal with this, we have developed a prototype of a new high-resolution version of SINTEX-F embedded with a dynamic sea-ice model, which we call SINTEX-F2. Similar to the SINTEX-F1 system, we have adopted the SST-nudging coupled initialization scheme as in the SINTEX-F2 system; model SSTs are strongly nudged toward daily observations by applying three large negative feedback values to the surface heat flux. Concerning large uncertainties in ocean vertical mixing estimations, ocean physics is perturbed in two different ways by considering or neglecting ocean vertical mixing induced by small vertical scale structures (SVSs) within and above the equatorial thermocline. Therefore, our ensemble prediction system takes into account uncertainties of both initial conditions and model physics. Preliminary analysis has shown that the SINTEX-F2 system shows the high skill in predicting ENSO just like the SINTEX-F1 system. In addition, we have found that the SINTEX-F2 system is much more skillful in predicting the Indian Ocean Subtropical Dipole. This may contribute to improving prediction skills of the regional rainfall distribution in Southern Africa.

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