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Research on climate prediction method based on memory kernel function using multiple initial values

Shiquan Wan (1,2) and Wenping He (3)

(1) Yangzhou Meteorological Beareau,Yangzhou,China, (2) Yangzhou University, Insitude of Physics, Yangzhou, China , (3) School of Atmospheric Sciences, Sun Yat-sen University, Zhuhai, China

As known, the numerical model mainly focuses on a trend climate prediction of larger spatial scale, whose deviation brought by large scale may be a non-negligible error on the regional climate, even leading to the prediction being contrary to the reality. Therefore, for the regional microclimate problem, the prediction method should have the characteristics of low complexity, small scale and strong pertinence, which is more practical significance to improve the prediction ability. In view of this problem, this paper proposes to make full use of its historical evolution information in regional microclimate prediction, make up for the lack of spatial information, and construct a more targeted regional climate prediction method. Obviously, this is the opposite of the large-scale numerical model, which takes full account of spatial information, but weak of temporal information. Because of the complexity of regional microclimate dynamic process, this paper combines data-driven and physical process, and makes use of the intelligent advantage of machine learning to automatically determine a special math structure in differential modeling, which is called Memory Kernel Function(MKF). The MKF can extend the integral problem of a single initial value into a differential equation with multiple initial values. It plays a role in the physical structure of the differential equation and reflects the original properties of the dynamic system. It can improve the ability of describing complex nonlinear system. In this paper, the ENSO system is taken as an example, and numerical experiments are carried out on the scheme. The results show that the efficiency of predictive modeling is improved obviously based on this scheme. The prediction model has a better performance in understanding the evolution trend of ENSO, and the prediction time scale can be up to 24 months.