Estimating the prediction errors of dynamical climate model on basis of prophase key factors in north China

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Based on the basic principle of dynamical analogue prediction, we have established the optimal dynamic multi-factor schemes to revise prediction errors. In this paper, we studied the correlations between the interactions in prophase key factors and the precipitation of rainy season in China and found the key atmospheric circulation predictor. According to the predictors which are abnormal in prophase, we compressed the dimensions of the factors to select the similar years through EOF analysis. Furthermore, a new dynamical analogue prediction scheme is constructed, which is on basis of environment based on the anomalous signals of prophase environment field. Analyses show that there is a good corresponding relationship between precipitation in north China and numbers of atmospheric circulation factors which are abnormal in prophase. We developed a comprehensive scheme to revise prediction errors of numerical model combined with abnormal factors scheme and the optimal dynamic multi-factor scheme. Through the diagnostic analysis we found that the comprehensive scheme has a good adaptability. Results of independent sample return of 2003-2009 show that the ACC score has increased from 0.38 to 0.61. The similarity revised method has further improved the prediction capacity of numerical model and has a good application prospect for summer precipitation in North China.