



Application of moving north Pacific index to rainy season rainfall forecast in Yangtze River basin

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A new prediction error correction scheme based on the moving north Pacific index (MNPI) is designed to develop the Operational Numerical Forecast Model (ONFM) of the National Climate Center of China, and the skill level of the precipitation prediction for rainy season (JJA) in the mid-lower reaches (MLR) of the Yangtze River by ONFM is obviously raised, as measured in terms of anomaly pattern correlation coefficient (ACC) and root-mean square error (RMSE). It has been found that the MNPI displayed decadal variation feature in the past 27-yr, and its correlations with the regional rainy season rainfall (RSR) and the precipitation prediction error of ONFM both showed a phase turning from positive to negative in 1998, which objectively describes the impact of north Pacific climate fields on the regional summer rainfall in the MLR. The comparative study results indicate that the effectiveness of the new analogue error correction (AEC) scheme using MNPI (MNPI scheme) is better than the original one using the north Pacific index (NPI scheme), and also better than system error correction (SEC) scheme. On the basis of comprehensive analysis, Euclidean distance-weighted mean, instead of traditional arithmetic mean, was applied to the integration of analogue year's prediction error fields, and the hindcasts of independent samples of RSR in the period 2003 to 2009 by MNPI scheme indicate that the scheme had a higher forecast skill level, with an average ACC over the 7-yr being 0.47, 0.19 higher than that by NPI scheme. And further more, in MNPI scheme, the empirical orthogonal function (EOF) was used in the degree-compression of the prediction error fields of ONFM, and the AEC was applied only to its first several EOF components whose accumulative explained variance accounted for 80% of the total variance, which further improved the regional forecast skill level of RSR in the MLR region, with the ACC of independent sample hindcasts over the 7-yr being 0.55.