The assimilation of multi-type information for seasonal precipitation forecasting using modular neural network

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ABSTRACT

The rainfall occurrences are triggered by different types of climate sources not restricted to past precipitation values but may include climate indices such as El Nino/Southern Oscillation, Indian Ocean Dipole, and Madden Julian Oscillation. In this paper, we investigated the effectiveness of assimilating two sources of inputs for heavy precipitation forecasting using modular neural network. The assimilated input was obtained by merging two input variable sources (climate indices and precipitation records) according to their individual weighting factor determined by correlation test. To simulate the hydrologic response using merged product, a modular neural network model was developed. The modular concept was implemented by separating the precipitation events based on seasonal monsoon and trained the subset of seasonal data using modular neural network. Four subsets of monthly precipitation data were sampled to evaluate modular neural network model at 1-month lead-time with single precipitation neural network model and multiple linear regression as benchmark models. The results show that the merging method can effectively assimilate information from two sources of inputs to improve the accuracy of heavy precipitation forecasting.

KEYWORDS

Artificial neural network; Merging method; Multiple linear regression; Precipitation forecasting

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