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An Empirical Seasonal Prediction Model of the East Asian Summer Monsoon Using ENSO and NAO

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How to predict the year-to-year variation of the East Asian summer monsoon (EASM) is one of the most challenging and important tasks in climate prediction. It has been recognized that the EASM variations are intimately but not exclusively linked to the development and decay of El Niño or La Niña. Here, we present observed evidence and numerical experiment results to show that anomalous North Atlantic Oscillation (NAO) in spring (April [U+F02D] May) can induce a tripole sea surface temperature (SST) pattern in the North Atlantic that persists into ensuing summer and excite downstream development of sub-polar teleconnections across the northern Eurasia, which raises (or lowers) the pressure over the Ural Mountain and the Okhotsk Sea. The latter strengthens (or weakens) the East Asian subtropical front (Meiyu/Baiu), leading to a strong (or weak) EASM. An empirical model is established to predict the EASM strength by combination of ENSO and spring NAO. Hindcast is performed for the 1979 [U+F02D] 2006 period, which shows a hindcast prediction skill that is comparable to the 14 state-of-the-art multi-model ensemble hindcast. Since all these predictors can be readily monitored in real time, this empirical model provides a real time forecast tool.