Geophysical Research Abstracts
Vol. 19, EGU2017-3438, 2017
EGU General Assembly 2017

Influence of the Summer NAO on the Spring-NAO-Based Predictability of the East Asian Summer Monsoon

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The dominant mode of atmospheric circulation over the North Atlantic region is the North Atlantic Oscillation (NAO). The boreal spring NAO may imprint its signal on contemporaneous sea surface temperature (SST), leading to a North Atlantic SST tripolar pattern (NAST). This pattern persists into the following summer and modulates the East Asian summer monsoon (EASM). Previous studies have shown that the summer NAST is caused mainly by the preceding spring NAO, whereas the contemporaneous summer NAO plays a secondary role. The results of this study illustrate that, even if the summer NAO plays a secondary role, it may also perturb summer SST anomalies caused by the spring NAO. There are two types of perturbation caused by the summer NAO. If the spring and summer NAO patterns have the same (opposite) polarities, the summer NAST tends to be enhanced (reduced) by the summer NAO, and the correlation between the spring NAO and EASM is usually stronger (weaker). In the former (latter) case, the spring-NAO-based prediction of the EASM tends to have better (limited) skill. These results indicate that it is important to consider the evolution of the NAO when forecasting the EASM, particular when there is a clear reversal in the polarity of the NAO, because it may impair the spring-NAO-based EASM prediction.