



## **Spring Arctic Oscillation- Summer Western Pacific connection in CMIP5 Models**

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Spring Arctic Oscillation (AO) has been an important predictor for East Asian summer monsoon, and the positive air-sea feedback through cyclonic anomaly over western Pacific (WP) is one of the key processes to memorize the spring AO-associated signal through the following summer. Whether the current models can capture this memory of spring AO over WP is crucial for seasonal prediction of East Asian climate. Based on the 24 state-of-the-art climate models from CMIP5, this study separates their performances into three categories according to the simulation of simultaneous WP circulation associated with spring positive AO. (1) Eight models can well reproduce the simultaneous spring AO-associated WP cyclonic anomaly (WPCA) and this WPCA does persist through summer; (2) Four models can capture the spring WPCA but the simulated WPCA is much weaker which fails to be maintained through summer; (3) Twelve models fail to capture the spring AO-associated WPCA. The evaluation further confirms the important role of WPCA on keeping spring AO signals through summer over East Asia. This study also suggests that the realistic simulations of the atmospheric dipole over western North Pacific, the tropical Pacific trade wind and transient eddies along westerly jet are necessary to form the WPCA in models.