Geophysical Research Abstracts
Vol. 14, EGU2012-3894, 2012
EGU General Assembly 2012

The role of air-sea interaction for prediction of Australian summer monsoon rainfall

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We assess forecast skill for seasonal mean rainfall across northern Australia in the pre-monsoon and the summer monsoon seasons based on 25 years of hindcasts using the Australian Bureau of Meteorology's coupled dynamical seasonal climate forecast system, POAMA. Forecast skill for the summer monsoon rainfall is found to be much lower than that for the pre-monsoon rainfall. We argue that this difference in the forecast skill is associated with seasonally-varying air-sea interaction in the seas around northern Australia. Background easterlies during the pre-monsoon season support a positive feedback between surface wind, SST, and rainfall, which results in stronger and more persistent SST anomalies that compliment the remote forcing of rainfall from El Niño in the Pacific. Once the Australian summer monsoon starts, this feedback is not supported in the monsoonal westerly regime, resulting in weaker SST anomalies to the north of Australia and with lower persistence. The seasonality of this air-sea interaction is successfully captured in the POAMA forecast model.