

Influence of Latent Heating over Southern Asia on Sahel Summer Rainfall

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The summer rainfall in the Sahel region shows an apparent decreasing trend since the 1950s. This decreasing rainfall trend is related to variations of global summer sea surface temperature (SST) including an increase of SST in the Asian monsoon region (AMR). Analysis also indicates that the anomalous rising motion over AMR and anomalous sinking motion over the Sahel region are associated with the decrease in the African rainfall since the 1970s.

The U.S. NCAR Community Atmospheric Model version 4 is applied to investigate the influence of latent heating anomaly associated with the Asian summer monsoon on the Sahel summer rainfall. When the condensation latent heating rate of deep convection over AMR in summer is increased to 1.1 folds, the response of the model to the heating anomaly matches the general features of circulation anomalies that have been observed. The model features of anomalous rainfall in the Sahel region are also similar to those observed. Hence, it is concluded that the teleconnection between the increase in summer SST over AMR and the decrease in summer rainfall in the Sahel region is resulted from the positive condensation latent heating anomaly of deep convection over AMR under the global warming background.

Key words: teleconnection, summer, latent heating, rainfall, CAM4