Poster Topic and Abstract

Intraseasonal Teleconnection between the Summer Eurasian Wavetrain and the Indian Monsoon

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ABSTRACT

This study investigated the most recurrent coupled pattern of intraseasonal variability between mid-latitude circulation and the Indian summer monsoon (ISM). The leading singular vector decomposition (SVD) pattern reveals a significant, coupled intraseasonal variation between a Rossby wavetrain across the Eurasian continent and the summer monsoon convection in northwestern India and Pakistan (referred to as NISM hereafter). The wavetrain associated with an active phase of NISM rainfall displays two high-pressure anomalies, one located over central Asia and the other over northeastern Asia. They are accompanied by increased rainfall over the western Siberia Plain and northern China and decreased rainfall over the eastern Mediterranean Sea and southern Japan. The circulation of the wavetrain shows a barotropic structure everywhere except the anomalous central Asian high, located to the northwest of India, where a heat-induced baroclinic circulation structure dominates. The time-lagged SVD analysis shows that the mid-latitude wavetrain originates from the northeastern Atlantic and traverses Europe to central Asia. The wavetrain enhances the upper-level high pressure and reinforces the convection over the NISM region; meanwhile, it propagates further toward East Asia along the wave guide provided by the westerly jet. After an outbreak of NISM convection, the anomalous central Asian high retreats westward. Composite analysis suggests a coupling between the central Asian high and the convective fluctuation in the NISM. The

significance of the mid-latitude-ISM interaction is also revealed by the close resemblance between the individual empirical orthogonal functions and the coupled (SVD) modes of the mid-latitude circulation and the ISM.

We hypothesize that the eastward and southward propagation of the wavetrain originating from the northeastern Atlantic contributes to the intraseasonal variability in the NISM by changing the intensity of the monsoonal easterly vertical shear and its associated moist dynamic instability. On the other hand, the rainfall variations over the NISM reinforce the variations of the central Asian high through the "monsoon-desert" mechanism, thus reenergizing the downstream propagation of the wavetrain. The coupling between the Eurasian wavetrain and NISM may be instrumental for understanding their interaction and can provide a way to predict the intraseasonal variations of the Indian summer monsoon and East Asian summer monsoon.