Geophysical Research Abstracts
Vol. 15, EGU2013-13582, 2013
EGU General Assembly 2013

Atmospheric Water Vapor Transport Associated with Two Decadal Rainfall Shifts over East China

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The atmospheric water vapor transport and moisture budget associated with two decadal summer rainfall shifts in 1978/79 and 1992/93 over East China were investigated by using observational precipitation and the European Centre for Medium-Range Weather Forecasts (ECMWF) 40 Years Re-Analysis (ERA-40) dataset. After 1978/79, summer precipitation increased abruptly in the Yangtze-Huaihe River valley (YH) but decreased in South China (SC) and North China (NC). Associated with this rainfall shift, southerly water vapor transport over East China was weakened; an anticyclonic moisture circulation anomaly along with decreasing moisture convergence existed in SC; abnormal water vapor from western SC converged in YH with that from western NC, then turned eastward, instead of northward to NC. After 1992/93, rainfall over SC increased dramatically. It is closely related to two abnormal anticyclonic moisture circulations to the south and the north with their northwesterly and southwesterly outflows converged over SC. During these two regime shifts, it was the variation of meridional water vapor flux, located mainly in the lower troposphere, which played an important role in the rainfall anomalies over YH, SC, and NC. The water vapor transport anomalies were mainly controlled by the disturbance wind field instead of the disturbance moisture field.