



## **Ocean forcing to the interdecadal change of summer rainfall in China around the late-1990s**

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Abstract:

Previous studies indicated an interdecadal change in the summer rainfall over China around the late-1990s, and accompanying this interdecadal change, the summer rainfall increased over Southern China and decreased over Northern China, featuring an anomalous “south-flood-north-drought” pattern. The present work, using the observational and numerical studies, investigated the global atmospheric circulation changes and the oceanic role that related to this interdecadal change. Results showed that this interdecadal change had a global climate change background, corresponding to the interdecadal change, the summer atmospheric circulation experienced notable changes with symmetric features in the northern and southern hemisphere. And the global sea surface temperature (SST) revealed remarkable changes as well, having SST warming over Indian Ocean and Atlantic Ocean, and La Niña-like/PDO-like SST anomalies (SSTA) over Pacific Ocean. These features suggested this interdecadal change may be a response to the tropical Ocean SST forcing, especially the tropical Pacific Ocean SST changes. The numerical results using an AGCM forced by the tropical SSTA, especially the tropical Pacific Ocean SSTA, resembled the observational results, confirming the Ocean’s role in the interdecadal change.

The possible mechanism whereby the tropical SSTA triggering the interdecadal change was explored as well. There may be two ways: (1) Anomalous convection over tropical and subtropical areas induced the tropical SSTA excited baroclinic Rossby waves which propagated polarward causing the extratropical circulation changes; (2) Owing to the tropical SSTA forcing, the subtropical westerly jet in the northern hemisphere weakened and shifted polarward. Changes in the subtropical jet influenced the stationary and transient eddy momentum flux which affected the eddy-induced mean meridional circulation, inducing ascending motion over subtropics and descending motion in the middle latitude. Through above two ways the tropical Ocean SSTA may lead to the interdecadal change around the late-1990s.