

INTERANNUAL VARIABILITY OF MONSOONS SIMULATED BY AN ATMOSPHERIC GCM

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ABSTRACT

Interannual variability of the simulated monsoon is investigated by a series of the 24-year integration of an atmospheric GCM with various configurations of SST variations. The observed SST for the period 1970-1993 is utilized as the boundary condition in the global ocean(GLOB SST), in the tropical (20° S-20° N) Pacific(TPAC SST) or in the tropical Indian Ocean(INDSST), respectively in each experiment. An experiment with no interannual SST variations(CLIM SST) is also made.

First, relationship between the South Asian summer monsoon circulation and the SST is examined. Simulated interannual monsoon activities in South Asia are influenced by the SST anomalies in the western Pacific, but not by that in the Indian Ocean. The positive SST anomalies in the western Pacific are favorable to the intensified South Asian summer monsoon circulation with strong surface westerlies over the north Indian ocean.

Second, the effect of excessive snow mass over the Eurasian continent on spring and summer climate is explored. It is found that heavy spring Tibetan snow mass is followed by a weak Indian summer monsoon in the CLIM SST run. This is explained by weak land-sea temperature contrast due to lower tropospheric temperature over the Eurasian continent. The heavy Tibetan snow is produced in winter by a wavetrain from Europe to South Asia with a trough in western Tibet, which coexists with the positive phase NAO pattern. A similar relationship is found in the GLOB SST run. That is, weak monsoon is preceded by heavy Tibetan snow in spring. This implies a possibility that circulation changes leading to Tibetan snow variability are regulated by evolving global SST anomalies.