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ENSO, Indian monsoon and the annual cycle of the climatic system over tropical Indian and Pacific oceans

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It is well known, that during warm years of ENSO the Indian monsoon tends to be below normal, and during cold events ones tends to be more extensive. However, the Indian monsoon is not directly related to the ENSO. Lau and Yang (1996) and Meehl (1997) have proposed, that the tropical biennial oscillation (TBO) and the annual cycle of maximum convection are main active participants in the link between the Indian monsoon, Indian ocean and tropical Pacific. Maximum convection (tropical precipitation) anomalies can be viewed as a suppression or enhancement of the annual cycle in the movement of the intertropical convergence zones, the regions of convergence of the large-scale moisture fluxes.

The purpose of this paper is to show the role of large-scale moisture circulation in the development of coupled ocean-atmosphere system anomalies over tropical Indian and Pacific oceans during dry and wet years. Dry - years with weak summer Indian rainfall and warm events of ENSO during following seasons. Wet - years with strong summer rainfall and cold events of ENSO.

The sea surface temperature, velocity potential and streamfunction at 200 gPa, OLR, precipitable water, moisture transport and moisture convergence in low atmosphere were analysed. NCAR/NCEP reanalysis mean monthly datasets for period 1950-1999 were used for study.

Schematic patterns, were created for every season of dry and wet composite year, show how anomalies of the interaction between large-scale monsoon and passat circulation in the tropical troposphere provide and monsoon precipitation anomalies over India in summer, and development of ENSO during following seasons in Pacific.

The main special feature of the seasonal evolution from one winter season to another, as in dry, as in wet years, is the changing of the anomalies pattern to opposite.

The analysis had shown the important role of the large-scale moisture circulation and made it possible to underline the moisture convergence, as the important regulate factor, in the annual cycle of maximum convection anomalies and development of TBO.