

Characteristics of the Double ITCZ observed over the Tropical Indian Ocean

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The Inter Tropical Convergence Zone (ITCZ) plays a dominant role in the hydrological cycle, radiation and energy budget of the earth-atmosphere system. Satellite observations of cloudiness, convection, Outgoing Longwave Radiation (OLR) and precipitation have revealed the doubling of ITCZ over Eastern Pacific, each branch being located on either side of the equator. Over the Pacific, this feature was prominently seen during the March-April period. Even though there exists some evidence to show that double-ITCZ (D-ITCZ) feature exists over the Equatorial Indian Ocean (EIO) also, its detailed characteristics in terms of the amplitude, preferred latitudes of occurrence, the longitudinal extent and the temporal variations are not well understood. We report here the characteristics of D-ITCZ over the Indian Ocean based on a detailed analysis of cloud cover derived from 7-years of NOAA14/16-AVHRR data (1996-2003), the cloud characteristics obtained from ISCCP-D2 data during 1984-2004, the OLR data during 1974-2004 and the Optimum Interpolated Sea Surface Temperature (OI-SST) data during 1981-2004. Though a well discernible signature of D-ITCZ could be observed over the EIO in terms of total as well as high cloud amount and OLR, only a weak signature of this could be observed in SST. The D-ITCZ pattern observed over the EIO is more prominent during November (percentage of occurrence $\sim 26\%$) and December ($\sim 47\%$) in the longitude region 50°E - 80°E . The doubling of ITCZ occurs mainly in the western EIO between 50°E and 70°E and blends with the strong convection in the eastern EIO. Most preferred latitude of its occurrence (identified as the locations of maximum cloudiness and minimum OLR) is around 7.5°S and 5°N in November and around 10°S and 5°N in December. In general, while the southern band extends up to 12.5°S the northern band extends only up to 7.5°N with the region of minimum cloudiness near the equator swinging between 5°N and 2.5°S . Generally the southern hemispheric branch of the D-ITCZ is stronger than its northern hemispheric branch. The amplitude of the double-ITCZ, defined as the difference between the total cloud fraction in the equatorial region of minimum cloudiness and that in the respective wings of the D-ITCZ, is 10 to 25% for the southern branch and 10 to 15% for the northern branch. The corresponding amplitude in terms of OLR is $10\text{W}/\text{m}^2$ to $15\text{W}/\text{m}^2$ in the Southern Hemisphere and $5\text{W}/\text{m}^2$ to $10\text{W}/\text{m}^2$ in the Northern Hemisphere.