



## **The Low-frequency processes in the Indo-Pacific Region and their impact on tropical Indian Ocean**

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The Indo-Pacific Region is a noteworthy area with the sophisticated ocean and atmosphere system. Here, we focus on the low-frequency signals related to the ocean and atmosphere variation and its impact on dynamic and thermodynamic processes in this region. Dynamically, the sea level rise signals in the tropical west Pacific (WTP) and the southeast Indian Ocean (IO) are closely linked to each other through the pathways of oceanic waveguide within the Indonesian Seas. The low-frequency westward-propagating wave originated in the tropical Pacific is the major cause for the southeast IO sea level change. At this linkage, the interannual wave signal is dominated by the wind variability along the equatorial Pacific and the interdecadal signal is driven mainly by the wind curl off the equatorial Pacific, respectively associated with the El Nino and the Pacific Decadal Oscillation. The sea level variability in the southwest IO is mainly related to the local wind. Thermodynamically, we find a contrasting trend pattern of sea surface salinity between the WTP and the southeastern tropical IO since mid-1990s, with significant salinity increase in the WTP and freshening in the southeastern tropical IO. These trends were associated a strengthening trend of the Walker Circulation over the tropical Indo-Pacific. Precipitation, surface level pressure and wind also underwent a decadal shift in mid-1990s. Understanding low-frequency processes in the tropical Indo-Pacific will better inform on how the tropical hydrological cycle will be affected by the natural variability and a warming climate.