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HYDERABAD

# INCOIS-French scientists discover new sea level oscillation



SPECIAL CORRESPONDENT

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## The process is driven by intense winds hovering over a very small area in the eastern Indian Ocean

Indian National Centre for Ocean Information Services (INCOIS) researchers, in collaboration with scientists from France, have discovered the existence of a ‘synchronous oscillation’ of sea level across the entire Tropical Indian Ocean with a time period of 30 to 80 days during winter months of December to April.

In these months, Indian Ocean routinely gains/loses 3 trillion tonnes of water from the Pacific Ocean every 30-80 days accompanied by a sea level rise/fall of 4 cm which is 30 % of total sea-level change. This process is driven by intense winds hovering over a very small area in the eastern Indian Ocean. This wind is associated with a little-known tropical weather phenomenon known as ‘Madden-Julian Oscillation (MJO)’.

MJO – an eastward moving disturbance of clouds, rainfall, winds, and pressure, circles the planet along the tropical belt in 30-80 days. It intensifies over three distinct regions – eastern Indian Ocean, south of maritime continent and the western Pacific Ocean – and transfers a part of its energy to the underlying ocean. When MJO winds reach the eastern Indian Ocean, particularly over

the North West Australian Basin (NWAB), its energy is transferred deep down to the ocean bottom leading to an oscillation of the entire water column. This oscillation is subsequently radiated out through fast-moving ocean waves to eventually invade the entire Tropical Indian Ocean within hours, according to the joint study published in the latest issue of 'Nature Communications'.

These waves carry a lot of energy and momentum 20 peta Joules within the North Indian Ocean “similar to exploding 100s of atomic bombs like the one over Hiroshima in 1945”. While how this energy is eventually dissipated and various manifestations are yet to be explored, MJOs being a low pressure system, is known to facilitate cyclone formation over the Indian Ocean.

The rise and fall of sea level in the Indian Ocean leads to mass exchanges with the Pacific Ocean. Such large mass exchanges are known to influence the polar motion of the Earth and the length of the day of the Earth, whose variability is of utmost importance to the accuracy of Global Positioning System (GPS). MJOs, being a low pressure system, is known to facilitate cyclone formation over the Indian Ocean. These cyclones could intensify and inundate coasts of Indian subcontinent. These waves can add to the menace caused by these cyclones and therefore a larger area would be vulnerable. These waves gain more relevance since MJOs are gradually getting more intense in the warming climate, it said.

Scientists - B. Rohit, Arya Paul, Fabien Durand, Laurent Testut, S. Prerna, M. Afroosa, S.S.V.S. Ramakrishna and INCOIS director S.S.C. Shenoi, are part of the group which undertook the research project.

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