TMSI
Tropical Marine Science Institute
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RESEARCH SEMINAR

Seasonal and Interannual Controls on the Malacca Strait Sea Level Gradient

By Dr. Sumit Dandapat
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Date: **Tuesday, 24 November 2026**
Time: **3:00 PM – 4:00 PM (SGT)**
Format: Hybrid.
In Person at TMSI Conference Room, S2S Building Level 1, 18 Kent Ridge Road, Singapore 119227
Host: Dr. Pavel Tkalich
Please register: Zoom Link

ABSTRACT:
The Malacca Strait is a shallow channel, about 900 km long, linking the Andaman Sea to the South China Sea. The sea level difference between its two ends shapes circulation through one of the world's busiest waterways. Using 27 years of satellite altimetry (1994–2020), ERA5 winds, tide gauge records and climate indices, this talk examines what controls this along-strait gradient. The gradient reverses with the monsoon over a seasonal range of about 32 cm, and the contrast in local wind stress curl between the two ends reproduces about 80% of it. Equatorial Kelvin waves reach the strait at about 1.7 m s^{-1} but matter mainly at 20 to 90 day periods. On interannual timescales, the Indian Ocean Dipole shifts the level of the gradient rather than its sensitivity to either forcing, through a low-frequency sea level anomaly arriving along the Sumatran coast, most strongly in October–December. Sea level upstream along Sumatra, rather than the climate index itself, is therefore the better guide to year-to-year changes in the Malacca Strait.

About the Speaker:
Dr Sumit Dandapat is a Senior Research Fellow at the Tropical Marine Science Institute (TMSI), National University of Singapore, working with Dr Pavel Tkalich on storm surge modelling. He received his PhD in Physical Oceanography from the Indian Institute of Technology Kharagpur, India. His research interests include sea level variability, storm surges, ocean dynamics and monsoon-driven circulation in the Indian Ocean and Maritime Continent, using observations and numerical models.