

**Tropical Climate Shifts:  
the Indo-Pacific Warm Pool, the MJO, and Monsoon in a  
Warming World**

Dr. Roxy Mathew Koll

Tropical climate variability and change are crucial drivers of global weather patterns and extreme climate events, such as cyclones, floods, and droughts. The IPCC Sixth Assessment Report (AR6) highlights the increasing role of ocean and atmospheric changes in intensifying these extremes, particularly in the Indo-Pacific region. This presentation will explore the Indo-Pacific warm pool as a key element influencing both subseasonal and seasonal climate variability. The Madden-Julian Oscillation (MJO) and the Asian Monsoon, two of the most dominant subseasonal and seasonal systems in the tropics, are both highly sensitive to changes in sea surface temperatures and atmospheric circulation. Ocean warming is reshaping these systems, leading to more intense monsoon patterns and altered rainfall distribution. Understanding these shifts is critical for improving climate predictions and addressing impacts on agriculture, water resources, and vulnerable populations. By integrating trans-basin observations and Earth system models, we aim to refine predictions of tropical climate variability and change, ultimately enhancing resilience and informing adaptation strategies in climate-sensitive regions.