

CGD Seminar Series

Analyzing the Impact of Intraseasonal Oscillations on Indian Monsoon Variability

Heather Roman-Stork

NOAA

Date: Tuesday 30 March 2021

Time: 11am – 12pm

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For live stream information, visit the

CGD Seminar Webpage

ABSTRACT

The Indian Ocean and the monsoon system are dynamically complex. In the Bay of Bengal (BoB) and southeastern Arabian Sea (SEAS), surface circulation is strongly influenced by the monsoons and notable local eddying that modulates the East India Coastal Current (EICC). In this study, the role of freshwater transported from the BoB into the SEAS in determining both the timing of monsoon onset and the strength of the ensuing monsoon is examined. It is found that the long-term decrease in moisture flux from the sea surface and freshwater transport into the SEAS, along with a rise in upper ocean heat content (OHC) over a 15-year duration after 1994, contributed to the lack of strong monsoons in recent years; the prevailing interannual and interdecadal variability in these parameters associated with the Indian Ocean Dipole (IOD) and El Niño Southern Oscillation (ENSO) events favored weaker and normal monsoons after 1994 until the strong monsoon of 2019. Both ENSO and the IOD are also found to modulate coastal Kelvin wave and Rossby wave propagation in the BoB, which impacts the mesoscale eddy field in the EICC region and further influences the precipitation associated with these eddies. Intraseasonal oscillations (ISOs) further contribute to and modulate monsoon rainfall. Satellite observations are used to monitor the 30-90-day Madden-Julian Oscillation (MJO) and 10-20-day ISO, and how they influence local atmosphere and ocean dynamics in the BoB. In May 2020, Cyclone Amphan achieved a minimum central pressure of 907 mb in the BoB. The oceanic and surface atmospheric conditions leading up to cyclogenesis, the impact of this storm on the BoB, and how the processes that led to cyclogenesis, such as the Madden-Julian Oscillation (MJO) and Amphan itself, in turn impacted southwest monsoon preconditioning and onset are analyzed. This work emphasizes the importance of using satellite altimetric and salinity observations for monsoon prediction and monitoring.

Disclaimer: The scientific results and conclusions, as well as any views or opinions expressed herein, are those of the author and do not necessarily reflect those of NOAA or the Department of Commerce.

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