**Monsoon Intraseasonal Oscillations in Equatorial Atmosphere and Oceans**

H.J.S. Fernando

Departments of Civil & Environmental Engineering and Earth Sciences and

Aerospace and Mechanical Engineering

University of Notre Dame

9 August 2019 (Friday)

2:00 - 3:00pm

IAS2042, 2/F, Lo Ka Chung Building, HKUST

**Abstract**

The hydrology of Indian Summer Monsoons is sensitively determined by the active and break phases of rainfall. Such variability is related to a bevy of intraseasonal oscillations (ISO) present in the tropical atmosphere and oceans with time scales ranging from about 30 to 60 days. Some examples of ISO are the ubiquitous equatorial planetary waves and the Madden Julian Oscillation that travel along an equatorial wave guide. Another important but meagerly understood ISO is the Monsoon Intraseasonal Oscillations (MISO) that propagate from the equatorial Indian Ocean toward the Bay of Bengal and then split into westward and northward branches. MISO events are directly related to the rainfall variability as well as a source of ISO with global reach that trigger larger scale phenomena, for example, El Niño. A comprehensive research program sponsored by the US Office of Naval Research (2012-2022) is afoot to peer into both oceanic and atmospheric ISO in the northern Indian Ocean. Under the umbrella of this initiative are the ASIRI, ASIRI-RAWI, NasCAR and MISO-BOB initiatives. Hypotheses are advanced on the dynamics of MISO propagation as well as convective-coupling of atmospheric and oceanic ISO across the air-sea interface. Two-month long ocean cruises were conducted in 2013, 2014, and 2015 concentrating on oceanic ISOs, complemented by deep ocean moorings and land based observations covering four southeast Asian countries. A Pilot experiment in the summer 2018 was exclusively focused on MISO events, and included observations aboard a research vessel and an instrumented aircraft. These in situ observations were complemented by satellite and reanalysis products to obtain a holistic picture of MISO dynamics. In unison, the research programs sheds light on the dynamics of MISO as well as processes that undergird convective coupling of MISO with the ocean below. The ocean was found to exert great control on MISO via complex multiscale air-sea interaction processes. Observations and modeling conducted during these programs will be outlined in this presentation, paying attention to intriguing phenomena and interactions across the scales that provide building blocks of weather variability in equatorial oceans and atmosphere.

**Speaker**

Prof. Fernando received his BSc in Mechanical Engineering (1979) from the University of Sri Lanka and MS (1982) and PhD (1983) in Geophysical Fluid Dynamics from the Johns Hopkins University. He received post-doctoral training in environmental engineering sciences at California Institute of Technology (1983-84). During 1984-2009, he was affiliated with the Department of Mechanical & Aerospace Engineering at Arizona State University, ASU (Assistant Professor 1984-87; Associate Professor 88-92; Professor 1992-2009. In 1994, Fernando was appointed as the founding Director of the Center for Environmental Fluid Dynamics, a position he held until 2009, while holding a co-appointment with the School of Sustainability (200-09). In 2010 January he joined University of Notre Dame as Wayne and Diana Murdy Endowed Professor of Engineering and Geosciences, with the primary affiliation in the Department of Civil Engineering & Geological Sciences and a joint appointment with the Department of Aerospace & Mechanical Engineering. He is a concurrent Professor in the Department of Applied and Computational Mathematics and Statistics.

Among awards and honors he received are the UNESCO Gold Medal for the Best Engineering Student of the Year (1979), Presidential Young Investigator Award (NSF, 1986), ASU Alumni Distinguished Research Award (1997), Rieger Foundation Distinguish Scholar Award in Environmental Sciences (2001), William Mong Lectureship from the University of Hong Kong (2004) and Life Time Achievement Award from the Sri Lanka Foundation of the USA (2007). He is a fellow of the American Society of Mechanical Engineers (ASME), American Physical Society (APS), American Meteorological Society (AMS) and American Association for Advancement in Science (AAAS). He was elected to the European Academy in 2009 and was awarded Doctor Honoris Causa by the Universite Joseph Fourier (University of Grenoble, France) in 2014 and Doctor of Laws, Honoris Causa by the University of Dundee in 2016.