Department of Atmospheric Sciences & IPRC
Joint Seminar Announcement

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SEMINAR TITLE:

Can we predict northern hemisphere land monsoon rainfall a decade in advance?

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Date:	**Wednesday, August 28, 2019**
Refreshments:	**3:00pm at MSB courtyard**
	Cookies, Coffee & Tea Provided
Seminar Time:	**3:30pm**
Location:	**Marine Sciences Building, MSB 100**

Abstract:

Predictions of changes of the land monsoon rainfall (LMR) in the coming decades are of vital importance for successful sustainable economic development. Current dynamic models, though, have shown little skill in the decadal prediction of the Northern Hemisphere (NH) LMR (NHLMR). The physical basis and predictability for such predictions remain largely unexplored.

The NHLMR is an important measure of the total NH continental precipitation and the strength of the tropical general circulation, and its decadal variation reflects, to a large extent, those of regional land monsoon rainfall over northern Africa, India, East Asia, and North America.

Observations from 1901 to 2014 and numerical experiments show that the decadal variability of the NHLMR is rooted primarily in (i) the north–south hemispheric thermal contrast in the Atlantic–Indian Ocean sector measured by the North Atlantic–south Indian Ocean dipole (NAID) sea surface temperature (SST) index and (ii) an east–west thermal contrast in the Pacific measured by an extended El Niño–Southern Oscillation (XEN) index.

We demonstrate, from a 500-yr preindustrial control experiment, that the leading mode of decadal NHLMR and the associated NAID and XEN SST anomalies may be largely an internal mode of Earth's climate system, although possibly modified by natural and anthropogenic external forcing. The best CMIP 5 model's multi-model ensemble can predict NAID index 7-10 years ahead but not the XEN index.

A 51-yr, independent forward-rolling decadal hindcast was made with a two-tier hybrid dynamic conceptual model and using the NAID index predicted by a multi-climate model ensemble. The results demonstrate that the decadal changes in the NHLMR can be predicted approximately a decade in advance with significant skills, opening a promising way forward for decadal predictions of regional land monsoon rainfall worldwide.