UNIVERSITY of HAWAI'I MĀNOA

Department of Atmospheric Sciences
Seminar Announcement

Department of Atmospheric Sciences, S.O.E.S.T., University of Hawai'i at Mānoa
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SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY

Dynamical Understanding of Ensemble Seasonal Prediction for Extratropical Atmospheric Circulation

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Date: Wednesday, April 27, 2016
Refreshments: 3:00pm at MSB courtyard
Free Cookies, Coffee & Tea Provided
(Please Bring Your Own Cup)
Seminar Time: 3:30pm
Location: Marine Sciences Building, MSB 100

Abstract:

Dynamical seasonal prediction suffers from initial condition uncertainty and model uncertainty. Perturbed initial value ensemble and multi-model ensemble (MME) techniques are widely utilized to address these uncertainties and to predict the range of possible evolutions. The ensemble technique not only provides probabilistic forecast but improves deterministic forecast skill through ensemble mean as well. Though seeing much success, dynamical rationale behind ensemble seasonal prediction for extratropical atmospheric circulation remains unclear, i.e., which processes provide uncertainties and should be responsible for ensemble mean prediction being better?

As a first step to address above questions, we build a stationary wave model based on linearized vorticity equation, which allows us to calculate response forced by individual tendency terms. In-phase and in-quadrature high-frequency eddy feedback is empirically parameterized and included in the linear operator. The North Atlantic Oscillation (NAO) and the Pacific/North American teleconnection pattern (PNA) are chosen as representatives of extratropical atmospheric circulation. Within a novel probability space, we notice that for single model ensemble with perturbed initial conditions, ensemble mean prediction is generally superior than individual realiazations with above 90% confidence. Reduction of noise, especially from divergence and low-frequency transient eddy forcing, contributes to success of ensemble mean prediction. For MME, better performance of ensemble mean prediction benefits from more accurate forcing whereas better basic state plays a minor role. It is also noted that signal error compensation resulted from multi-model composite does not guarantee higher prediction skill without noise reduction.