UNIVERSITY of HAWAI'I MĀNOA

Department of Atmospheric Sciences Seminar Announcement

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SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY

Recent progress in the ENSO forecasts using deep learning

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You are invited to our weekly online Atmospheric Sciences Fall 2021 seminars via Zoom meeting.
When: September 8, 2021 at 3:30PM HST
Meeting admission: 3:15PM HST

Register in advance for this meeting:
https://hawaii.zoom.us/meeting/register/tJwlcOmtpz8iGtFAfj1LmB2t-J89CV76hI1s

After registering, you will receive a confirmation email containing information about joining the meeting.
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Abstract:

In line with the recent efforts that adopt advanced deep learning algorithms for the ENSO forecasts, we applied the ConvLSTM to setup a statistical model particularly for the ENSO forecasts shorter than 6-month lead. Among the four model groups (i.e., ConvLSTM, Convolutional Neural Network (CNN), SINTEX-F dynamical model, and dynamical models included in the IRI forecasts), the ConvLSTM was the only model that successfully predicted the initiation of the La Niña during 2020/21. The abrupt decrease in the heat content anomalies over the equatorial Pacific during the boreal spring of 2020 was successfully recognized as the distinct developing signal of the La Niña by the time sequencing algorithm in the ConvLSTM.

In addition, a CNN-based ENSO model was upgraded to account for the seasonality associated with the ENSO. The correlation skill of the Nino3.4 index in the upgraded model (i.e., All-season CNN model) was particularly improved for forecasts of the boreal spring, which is the most challenging season to predict. Moreover, activation map values indicated a clear time evolution with increasing forecast lead time. This reveals that the comprehensive role of various climate precursors of ENSO events that act differently over time, thus indicating the potential of the All-season CNN model as a diagnostic tool.