• Eastward- and northward-propagating Tropical Intraseasonal Oscillations (TISO) are tracked (Fig. 1) in observations of outgoing longwave radiation (OLR) anomalies (1979-2017) and in model simulations using a new feature tracking algorithm.

• Eastward events propagate faster than northward events (Fig. 2).

• A marked seasonality (Fig. 3) of both eastward- and northward-propagating TISO events is found with a boreal summer minimum in eastward events and maximum northward events; however, both types of events occur year around.

• As the mean state of sea surface temperature (SST), low level wind (U850) and low level humidity goes through its annual cycle (Fig. 4) and boreal winter maxima move northward, the dominance of eastward propagation diminishes and the northward propagation becomes more prevalent.

• Numerical simulations with constrained SST and U850 show that the geographical migration of maxima in the mean state control TISO propagation direction and speed.
PREDICTABILITY AND PREDICTION OF CLIMATE FROM DAYS TO DECADES

Augmentation to NNX14AM19G

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- Gridded analyses of daily soil moisture and surface fluxes estimated from satellite data have been used to construct global observationally-based estimates of land-atmosphere coupling, like those that have been produced by global weather and climate models for many years.

- Using multiple products, a picture of uncertainly in observationally-based estimates of land-atmosphere coupling is made for the first time.

- Forecast models from SubX have been confronted with these estimates – resulting in clear categorization of model fidelity (top figure).

- This confirmation of the model-based picture of coupling “hot spots” implies forecasts can be improved by improving soil moisture initialization and forecasts.

- The impacts of soil moisture forecast errors on short time scales (5–15 days) has implications for longer-term forecasts of variables like maximum daily air temperature (bottom figure). In certain regions, there are clear sensitivities for anomalously dry (left) and hot (right) situations.

- Short-term forecasts of soil moisture can be improved by (1) improved initialization (involving both quality of input data and data assimilation techniques) and (2) improved models (involving both land surface and atmospheric components, especially boundary layer processes, clouds and precipitation).
