

Role of the East-Asian marginal sea SST in the regional predictability and the North Pacific climate variability

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Processes in the East Asian marginal seas add a great complexity in understanding mid-latitude air-sea interaction and prediction of weather and climate in the western North Pacific. Strongly controlled by ocean current and bathymetry, the extent to which these marginal sea SST anomalies are conducive to any modulation of downstream synoptic variability and a mid-latitude storm track has not been clearly understood. Focusing primarily on the East/Japan Sea (EJS), we will discuss 1) key processes leading to dominant modes of SST variability on seasonal and longer timescales, 2) their impact on local air-sea boundary-layer coupling and 3) potential implications for air-sea interactions downstream over the Kuroshio-Oyashio Extensions. Using the synthesis of satellite and in situ ocean measurements with a suite of meteorological reanalysis products, we will identify the characteristic EJS heat content and SST variability, and the associated atmospheric circulation patterns. The identified patterns are then used in a series of process-WRF model simulations to assess the local, downstream and upscaling effect of EJS SST. The model domain covers the Northern Hemisphere poleward of 20N with the multi-scale nesting and two-way feedback to best represent the small semi-enclosed EJS processes in the context of large-scale climate system.

Keywords: Air-sea interaction, Regional climate modeling, East Asian marginal seas, Mid-latitude storm track, Ocean heat content, Kuroshio-Oyashio Extensions