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Nonlinear response of summertime synoptic-scale disturbance intensity over the tropical western North Pacific to ENSO amplitude

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Synoptic-scale disturbances prevail over the tropical western North Pacific during boreal summer. Those disturbances are generated over the equatorial western-central Pacific and propagate northwestward to the tropical western North Pacific. They may cause extremely heavy rainfall events and serve as initial disturbances for tropical cyclone genesis. The intensity of the synoptic-scale disturbance over the tropical western North Pacific is closely related to the El Niño–Southern Oscillation (ENSO) that modulates the seasonal atmospheric fields over the source regions, along the propagation paths, and over the impact regions of the synoptic-scale disturbances. ENSO displays a diverse range of amplitude, spatial pattern and temporal evolution. In view of the increasing frequency of extreme ENSO events under global warming and their substantial consequences, it is essential to investigate the relationship between the intensity of the synoptic-scale disturbances over the tropical western North Pacific and ENSO of varying amplitudes. In this talk, we will present evidences for the nonlinear response of the synoptic-scale disturbance intensity over the tropical western North Pacific during boreal summer to the amplitude of ENSO. A distinct difference is revealed between the nonlinear response of the synoptic-scale disturbance intensity over the tropical western North Pacific to the amplitude of El Niño and La Niña events. Physical explanation will be provided for the above feature based on observational analysis and numerical model experiments.