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# Contrasting the Eastern Pacific El Niño and the Central Pacific El Niño: Process-based Feedback Attribution

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This paper examines the roles of radiative and non-radiative air-sea coupled thermodynamic processes in modifying sea surface temperature(SST) anomalies driven by (air-sea coupled) oceanic dynamic processes, focusing on their contributions to the key differences between the eastern Pacific (EP) El Niño and the central Pacific (CP) El Niño. The attribution is achieved by decomposing sea surface temperature SST anomalies into partial SST anomalies due to individual processes using a coupled atmosphere-surface climate feedback-response analysis method.

Oceanic processes induce warming from the central to the eastern equatorial Pacific and cooling over the western basin with a maximum warming center in the central Pacific for both types of El Niño. The processes that act to oppose the oceanic process-induced SST anomalies are surface latent heat flux, sensible heat flux, cloud, and atmospheric dynamic feedbacks, referred to as negative-feedback processes. The cooling due to each of the four negative-feedback processes is the strongest in the region where the initial warming due to oceanic processes is the largest. Water-vapor feedback is the sole process that acts to enhance the initial warming induced by oceanic processes. The increase in atmospheric water vapor over the eastern Pacific is much stronger for the EP El Niño than for the CP El Niño. It is the strong water-vapor feedback over the eastern Pacific and the strong negative feedbacks over the central equatorial Pacific that help to relocate the maximum warming center from the central Pacific to the eastern basin for the EP El Niño.