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While teleconnections from the tropical Pacific to the North Pacific sea surface temperature are well known, the dynamical response of the North Pacific Ocean to the tropical atmosphere-ocean variability is not well investigated. Based on observed and reanalysis data, we investigate this link through a correlation analysis using the indices of Nino3, Nino3.4, and El Nino Modoki Index (EMI). The simultaneous correlation maps of the wind-stress curl indicate that the signal associated with EMI in the eastern North Pacific is stronger than the counterparts with Nino3 and Nino3.4. Responding to these signals in wind-stress curl, sea surface height (SSH) anomalies develop following EMI, but almost no SSH responses are found to Nino3 and Nino3.4. As El Nino Modoki lasts for a longer period than canonical El Nino, the stronger wind-stress curl signal to EMI drives the ocean more persistently, and induces substantial SSH signals. The induced SSH signals propagate westward to the western boundary region around 35N and affect intensity and/or latitude of the Kuroshio Extension. Predictability of this process will be also discussed.

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