## Role of the Wind Stress Forcing on the Changes in ENSO Amplitude Before and After the Late 1970s

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Using a Simple Ocean Assimilation Data (SODA) version 2.0.2 for the period of 1958-97, we examine the variability in wind stress forcing in relation with El Niño and Southern Oscillation (ENSO) decadal change before and after the late 1970s through the inspection of its theoretical contribution to the gravest (1 to 3) baroclinic modes. The wind projection coefficients named in our study quantify the amount of momentum flux that projects on each oceanic baroclinic mode. It is found that the wind stress projection coefficients according to the oceanic baroclinic modes are different in terms of their magnitude, seasonal cycle and even a long-term period of variability in the tropical Pacific, reflecting a specific forcing associated with each mode. A lead-lagged analysis between the wind projection coefficients and the NINO3 SST index reveals that the wind stress-SST feedback associated with ENSO changed before and after the late 1970s. The feedback processes, that the first baroclinic mode forcing impacts SST through equatorial wave dynamics and the second baroclinc mode forcing is associated with the atmospheric response to the SST anomalies in the eastern Pacific, are more effective after the late 1970s. Our analysis further indicates that the wind stress forcing associated with the first three baroclinic modes (that are relevant to the equatorial wave dynamics) increases after the late 1970s, which is consistent with an increase in ENSO amplitude. In the meantime, there is a decrease in the wind stress forcing projecting onto the Ekman layer. This result suggests that the changes in the ENSO properties before and after the late 1970s are largely associated with the changes in the way that the wind stress forcing is projected onto a multi-mode linear system in the tropical Pacific Ocean.

Keywords: ENSO amplitude; baroclinic mode; wind stress forcing, projection coefficient

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