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Scale Interaction between Tropical Instability Waves and Oceanic Mean Flows

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Tropical instability waves (TIWs), prevailing in the tropical Pacific and Atlantic Oceans, interact with the low-frequency oceanic flow. It is known that TIWs act as negative feedback to ENSO through a thermal process. In this study, we examine the dynamical eddy feedback of TIWs. We show that in terms of physical processes, the dynamical TIW feedback is very similar to the atmospheric synoptic eddy feedback in the extratropics. For example, the mean seasonal eddy vorticity flux of TIWs can be largely explained by the left-hand rule, which states that eddy vorticity fluxes are predominantly directed toward the left-hand side of the oceanic flow. Therefore, they act as positive feedback to the low-frequency oceanic flow. We also show that the positive eddy feedback is obtained from eddy structure changes induced by the low-frequency flow.