

EGU21-7802, updated on 28 Jul 2021

<https://doi.org/10.5194/egusphere-egu21-7802>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Effect of tropical instability waves on the eastern tropical Pacific basin: damping of TIWs in a high-resolution ocean circulation model

Lisa Maillard¹, Julien Boucharel^{1,2}, and Lionel Renault¹

¹LEGOS, University of Toulouse, CNRS,IRD, CNES, UPS, Toulouse, France

²Department of Atmospheric Sciences, SOEST, University of Hawaii at Manoa, Honolulu, Hawaii, USA

Tropical instability waves (TIWs) are oceanic cusp-like features propagating westward along the northern front of the tropical Pacific cold tongue. Observational and modelling studies suggest that TIWs may have a large impact on the eastern tropical Pacific background state from seasonal to interannual time-scales, through heat advection and mixing. However, observations are coarse or limited to surface data, and modelling studies are often based on the comparison of low- vs. high-resolution simulations. In this study, we perform a set of regional high-resolution ocean simulations (CROCO 1/12°) in which we strongly damp (NUDG-RUN) or not (CTRL-RUN) TIWs propagation, by nudging the mixed layer meridional current velocities in the TIWs active region toward their climatological values. We first show that this approach does not alter the model internal physics, in particular related to the equatorial wave dynamics. The impact of TIWs on the oceanic mean state (zonal current and heat budget) is then assessed by comparing CTRL-RUN to NUDG-RUN. This approach allows quantifying for the first time the rectified effect of TIWs without degrading the model horizontal resolution, and may lead to a better understanding of ENSO asymmetry and the development of accurate TIWs parameterizations in Earth system models.