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EDUCATION

2009/09 – 2012/12 Ph.D. Helmholtz Centre for Ocean Research Kiel (GEOMAR), Germany(2012)
2006/09 – 2008/08 M.S. Depart. of Atmospheric Science, National Taiwan Uni., Taiwan
2002/09 – 2006/06 B.A. Depart. of Atmospheric Science, National Taiwan Uni., Taiwan

EMPLOYMENT

2013/03 - present Postdoc Research Fellow RCEC, Academia Sinica, Taiwan

HONORS & AWARDS

2020 2020 TAO Young Scientist Award
2019 黃廈千博士學術論文獎
2019 Researcher Publication Award of Dr. Chia Chou, Meteorological Society of the Republic of China - Taiwan
2015 Postdoctoral Researcher Publication Award from Ministry of Science and Technology of Taiwan

RESEARCH INTEREST

- Tropical climate and large scale circulation
- Ocean-atmosphere interaction
- Madden-Julian Oscillation
- Global circulation model and data diagnostics

RESEARCH HIGHLIGHTS

Better resolving the upper ocean layer leads to the improvement of MJO simulation

The Madden-Julian Oscillation (MJO) is the dominant pattern of atmospheric subseasonal variability in the tropics and has major global impacts, affecting monsoons, tropical storms, extra-tropical weather, and the El Niño Southern Oscillation. The MJO, however, is poorly simulated and predicted

by state-of-the-art models. While vigorous atmosphere-ocean interaction is observed during the MJO's eastward propagation from the Indian Ocean to the Western Pacific, attempts to incorporate this process into models has not led to substantial improvement, but rather to its role being debated. A breakthrough is achieved in this study. Here we show that the proper inclusion of a simple ocean mixed layer model dramatically improves simulation of the MJO to have realistic strength, period, and propagation speed. Better resolving the fine structure of upper ocean temperature strengthens intraseasonal SST variations, which drive low-level atmospheric circulation and thus, more vigorous atmosphere-ocean interaction and preconditioning eastward propagation of organised atmospheric convection. These results are consistent with observations and demonstrate a simple but effective means to significantly improve MJO simulation and forecasts, and hence help close the gap between weather and seasonal prediction.

Effects of Surface Orography and Land–Sea Contrast on the MJO in the Maritime Continent
This study three experiments are conducted with realistic topography, without orography, and with oceans only in the MC region to evaluate the relative effects of orography and land–sea contrast. Orography and land–sea contrast have the following effects on the MJO in the MC: 1) a larger amplitude, 2) a smaller zonal scale, 3) more realistic periodicity and stronger eastward-propagating signals, 4) a stronger southward detour during the eastward propagation, 5) a distorted coupled Kelvin–Rossby wave structure, and 6) larger low-level moisture convergence. The existence of mountainous islands also enhances the mean westerly in the eastern Indian Ocean and the western MC, as well as the moisture content over the MC. This enhancement of mean states contributes to the stronger eastward-propagating MJO. Our findings suggest that theoretical and empirical studies, which are largely derived from an aqua planet framework, have likely provided an oversimplified view of the MJO. The effects of mountainous islands should be considered for better understanding and more accurate forecast of the MJO.

REPRESENTATIVE PUBLICATIONS (*: corresponding author)

Png IPL*, Chen Y, Chu J, Feng Y, Lin EK-H, & **W-L, T.** (2020). Temperature, Precipitation, and Sunshine Across China, 1912-51: A New Daily Instrumental Dataset. Geoscience Data Journal. doi:10.1002/gdj3.91

DeMott, C.*, Klingaman, N., **Tseng, W.-L.**, Burt, M., Gao, Y., & Randall, D. (2019) The convection connection: How ocean feedbacks affect tropical mean moisture and MJO propagation, *JGR.*

Son, R.*, Wang, S.-Y. S., **Tseng, W.-L.**, Schuler, C. W. B., Becker, E., & Yoon, J.-H. (2019) Climate diagnostics of the extreme floods in Peru during early 2017. *Climate Dynamics.*

Chang, C.-W. J.*, Hsu, H.-H., Cheah, W., **Tseng, W.-L.**, & Jiang, L.-C. (2019). Madden–Julian oscillation enhances phytoplankton Biomass in the Maritime Continent. *Scientific Reports*, 9(1), 5421.

Tseng, W.-L.*, Wang, S.-Y. S., Hsu, H.-H., & Meyer, J. (2019) Observed intensification of Equatorial Rossby Waves during the recent decades corresponding to changes in the tropical circulation, *Terrestrial, Atmospheric and Oceanic Sciences*, 30, 563-574.

Hong, C.-C., Lee, M.-Y., Hsu, H.-H.*, **Tseng, W.-L.** (2018). Distinct influences of the ENSO-like and PMM-like SST anomaly on the mean TC genesis location in the western North Pacific: The 2015 summer as an extreme example, *Journal of Climate*, 31(8), 3049-3059.

Tseng, W.-L., Hsu*, H.-H., Keenlyside, N., Chang, C.-W. J., Tsuang, B.-J., Tu, C.-Y., & Jiang, L.-C. (2017). Effects of Surface Orography and Land–Sea Contrast on the Madden–Julian Oscillation in the Maritime Continent: A Numerical Study Using ECHAM5-SIT. Journal of Climate, 30(23), 9725-9741. doi:10.1175/jcli-d-17-0051.1

Hong, C.-C., Hsu, H.-H.*, **Tseng, W.-L.**, Lee, M.-Y., Chow, C.-H., & Jiang, L.-C. (2017). Extratropical Forcing Triggered the 2015 Madden–Julian Oscillation–El Niño Event. *Scientific Reports*, 7, 46692. doi:10.1038/srep46692

Chang, C.-W. J.*, **Tseng, W.-L.**, Hsu, H.-H., Keenlyside, N., & Tsuang, B.-J. (2015). The Madden-Julian Oscillation in a warmer world. *Geophysical Research Letters*, 42(14), 6034-6042. doi:10.1002/2015GL065095

Jiang, X.*, Waliser, D. E., Xavier, P. K., Petch, J., Klingaman, N. P., Woolnough, S. J., . . .**Tseng, W.-L**, . . .Zhu, H. (2015). Vertical structure and physical processes of the Madden-Julian oscillation: Exploring key model physics in climate simulations. *Journal of Geophysical Research: Atmospheres*, 4718-4748. doi:10.1002/2014JD022375

Tseng, W.-L.*, Tsuang, B.-J., Keenlyside, N. S., Hsu, H.-H., & Tu, C.-Y. (2014). Resolving the upper-ocean warm layer improves the simulation of the Madden–Julian oscillation. *Climate Dynamics*, 44(5-6), 1487-1503.

Gleixner, S.*, Keenlyside, N., Hodges, K. I., **Tseng, W.-L.**, & Bengtsson, L. (2014). An inter-hemispheric comparison of the tropical storm response to global warming. *Climate Dynamics*, 42(7-8), 2147-2157.