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Mechanisms for the cooling of the central eastern Pacific

Chunlei Liu and Richard Allan
University of Reading, United Kingdom

The sea surface temperature variation over the Central Eastern Pacific (CEP) controls the global mean surface temperature variation (Kosaka and Xie, 2013). The regional cooling over CEP is directly linked to the surface warming slowdown in last twenty years. It is important to understand the mechanisms of the CEP cooling in the warming climate in order to have a robust prediction of the future climate change.
Previous studies showed the CEP cooling is related to the pronounced strengthening in Pacific trade winds over the past two decades, which is sufficient to account for the cooling of the CEP and a substantial slowdown in surface warming through increased subsurface ocean heat uptake in the Pacific shallow overturning cells and equatorial upwelling in the CEP (England et al., 2014). By analysing the cloud data, Zhou et al. (2016) showed the increase of the lower cloud cover (LCC) over the CEP area contributed to the cooling, resulting in positive local feedback and negative global feedback.

Using the data from observations, ERA-Interim reanalysis and atmospheric climate simulations, our study shows that the increasing Latent Heat (LH) also plays an important role in the CEP cooling (Liu et al., 2015). After the sensitivity test using the bulk formula, it showed that both wind and total column water vapour content contribute to the cooling trends of the SST in CEP. The observed trends of the wind and LH in CEP also confirmed this.

England et al. (2014) Recent intensification of wind-driven circulation in the Pacific and the ongoing warming hiatus, Nat. Clim. Change, 4, 222–227, doi:10.1038/nclimate2106.

Kosaka, Y., and S. P. Xie (2013), Recent global-warming hiatus tied to equatorial Pacific surface cooling, Nature, 501, 403–407, doi:10.1038/nature12534.

Liu et al. (2015) Combining satellite observations and reanalysis energy transports to estimate global net surface energy fluxes 1985-2012. J. Geophys. Res. , Atmospheres. ISSN 2169-8996 doi: 10.1002/2015JD023264.

Zhou et al. (2016) Impact of decadal cloud variations on the Earth's energy budget, Nature Geoscience 9, 871–874 (2016) doi:10.1038/ngeo2828.