Tropical Cyclone-Ocean Interaction and Global Warming

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Tropical cyclones (TCs, i.e., hurricanes and typhoons) are among the most damaging natural disasters on earth. Its possible change under future global warming condition in the coming century is undoubtedly of critical importance to the humankind. There is much concern that global warming can lead to increase in TC intensity and thus its destructiveness, and this topic is one of the most active current research topics in the international community. In 2015, Huang, Lin et al. (Nature Commu.) discovered that if consider the contribution from subsurface ocean, there is a suppression effect to slow down the rapid TC intensity increase. Under global warming, though both ocean surface temperature (SST) and subsurface ocean warms, subsurface ocean warms slower than SST and increases upper ocean thermal gradient. As a result, the TC-ocean coupling effect is stronger under global warming and can contribute to suppression of TC intensity. This idea was soon confirmed by Emanuel (J. Climate 2015) and he reported that this sharpening can contribute to ~ 15% drop in category 4 and 5 TC occurrences and 13% drop in TC destructive potential (the power dissipation index, PDI), as compared to the projection without considering the ocean subsurface effect. This presentation will present latest development in this new field, including differences in this subsurface suppressive effect to future TC intensification over different regions.

References

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