國立中央大學大氣物理研究所書報討論

時間:2023/11/24

地點:S1-713

講員:Yhen-Jhen You

指導教授:Prof. Fang-Yi Cheng

Climate variability of heat waves and their associated diurnal temperature range variations in Taiwan

Abstract

Severe hot temperatures and their persistent days have increased on a global scale. Since the persistent hot days have been prolonged, the heat waves issue is discussed by its increasing frequency and intensity. These heat wave events are usually associated with the western North Pacific subtropical high (WNPSH) in Taiwan. To better understand the heat waves and their maintenance mechanism, both recent past (1979-2003) and future (2075-2099) simulations are conducted by using the WRF model with a 5 km grid spacing. Also, the flexible hot-day is assumed by defined as a 95th threshold of daily $\mathrm{T_{MAX}}$. Meanwhile, if the hot-day lasts for at least 3 consecutive days, these days will be counted as heat wave days.

Taking the NCEP/CFSR, IPCC AR4 ECHAM5/MPIOM dataset for simulations, and with the comparison to TCCIP observation data, heat waves are forecast to become more severe in the future. This future change is primarily a result of the shift in the mean daily maximum temperature and not the frequency. Also, the diurnal temperature range (DTR) during heat wave events is quite large. The daily maximum and minimum are all predicted to be higher in the future. This indicated that not only the solar heating increase in the future but also the nighttime temperature will rise.

Heat waves in Taiwan are associated with abnormal warming and drying atmospheric conditions under the influence of Western North Pacific Subtropical High (WNPSH). Given the humid environmental conditions and the high moisture content in Taiwan, the WNPSH suppresses water vapor to the surface layer. These conditions are leading to positive feedback to the hot surface condition, which may cause the accumulated risk of human heat stress.

Keyword

Heat waves, ECHAM5-MPIOM

Reference

Kueh, M. T., Lin, C. Y., Chuang, Y. J., Sheng, Y. F., & Chien, Y. Y. (2017). Climate variability of heat waves and their associated diurnal temperature range variations in Taiwan. *Environmental Research Letters*, ***12*****(7)**, 074017.