Geophysical Research Abstracts
Vol. 20, EGU2018-4424, 2018
EGU General Assembly 2018

Comparison of Temperature Extremes between East Antarctica and Antarctica Peninsula in the Last Three Decades

Aihong Xie, Shimeng Wang, and Yicheng Wang

Northwest Institute of Eco-Environment and Resources, Chinese Academy of Sciences, State Key Laboratory of Cryosphere Science, China (xieaih@lzb.ac.cn)

There is growing evidence of warming over portions of Antarctica that may contribute to the regional retreat of glaciers, disintegration of floating ice shelves and rising of sea level. However, there are many disagreements about warming magnitude, intensity, and seasonality, especially there is scarcity of study on temperature extremes in Antarctica. On the base of daily minimum, maximum, and mean surface air temperatures (Tmin, Tmax, Tmean) at Great Wall Station (1985-2015) and Zhongshan Station (1989-2015) in Antarctica, changes in temperature extremes are compared between Antarctica Peninsula and East Antarctica in the last three decades. Annual mean temperature at both the two stations reveals the strongly warming trend in Tmin, slightly warming in Tmean, while cooling in Tmax, and shows different seasonal variabilities with the least variability in summer. Annual mean of daily temperature range (DTR) has decreased by -0.39 and -0.29 °/decade, at Great Wall Station and Zhongshan Station, respectively. The characteristic of typical coreless winter temperature pattern obviously appears at the two stations. Higher continentality index, higher seasonal mean DTR, at Zhongshan Station than at Great Wall Station, presents that continental climate has more effect on Zhongshan than on Great Wall. More importantly, we have found that the seasaw exists East Antarctica and Antarctica Peninsula in the interannual time scale. Nine indices of extreme temperature are also examined. The occurrence of extreme warm days has decreased by -0.53 and -0.048 d/decade at Great Wall Station and Zhongshan Station, respectively, while the occurrence of extreme warm nights has shown nonsignificant trend with much interannual variability. The number of melting days has increased by 4.3 d/decade at Great Wall Station, and demonstrates nonsignificant trend at Zhongshan Station.

Although our analysis can explain part of the variability by changes in winds or to the coastal icescape, an additional but unknown factor is how atmosphere has responded to changes in ocean heat. Unraveling cause and effect, critical for predicting changes to this rapidly evolving ocean-atmosphere-sea ice-ice sheet system, will require more in situ observations, along with improved atmosphere modeling and remote sensing capabilities.