



## **The variations in land-air temperature difference in the Tibetan Plateau from 1981 to 2015**

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The thermal effects of the Tibetan Plateau (TP) play an important role in the atmospheric circulation, which may further have complex implications on regional climate system and water resources. In the study, we investigated variations in land-air temperature difference (T-diff) using observed air and ground surface temperatures at 86 weather sites in the TP, and related possible atmospheric impacts were examined in terms of two subtropical high systems. Our results showed that the T-diff had an overall increase trend in cold/warm seasons respectively at the average rates of  $0.033 \pm 0.019$  and  $0.028 \pm 0.013$  °C a<sup>-1</sup>, implying that surface sensible heat would become stronger annually. Then, the seasonal pattern that the T-diff was larger in May than July and the T-diff spatial heterogeneity were closely related to the topographic and hydro-meteorological characteristics of the plateau, such as precipitation and sunshine duration. The results also indicated that area indexes of two subtropical high systems over India ( $-0.779$  a<sup>-1</sup>,  $p < 0.05$ ) and South China Sea ( $-0.585$  a<sup>-1</sup>,  $p < 0.05$ ) tended to weaken in response to the increasingly rising T-diff, and thus further caused climate warming and drying on the TP region. Our study suggested that the surface thermal variations of the TP likely affect the atmospheric circulation over the subtropical zone and local climate system.