

EGU21-14593, updated on 16 May 2022
<https://doi.org/10.5194/egusphere-egu21-14593>
EGU General Assembly 2021
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.



The different mechanisms of extreme snowfall in the eastern and southern Tibetan Plateau.

Nan Yao^{1,3}, Lian Liu¹, and Yaoming Ma^{1,2,3}

¹Key Laboratory of Tibetan Environment Changes and Land Surface Processes, Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing, China(nyao@itpcas.ac.cn)

²CAS Center for Excellence in Tibetan Plateau Earth Sciences, Beijing, China (nyao@itpcas.ac.cn)

³University of Chinese Academy of Sciences, Beijing, China(nyao@itpcas.ac.cn)

Snowfall is a key component of the hydrological system of the Tibetan Plateau (TP), and it is also a very sensitive factor to climate change. To understand the mechanism of extreme snowfall in different regions of the TP, we used the 50-year snow depth data from the China Meteorological Administration (CMA) ground observations and the ERA5 reanalysis datasets of European Centre for Medium-Range Weather Forecasts (ECMWF). Results show the threshold of extreme snow in the southern TP is four times greater than that in the eastern region. Sixteen numerical experiments using the weather research and forecasting (WRF) model were conducted to quantify the contribution of water vapor and dynamic conditions to snowfall events. Here are the preliminary results: (1) For the snowfall event caused by local circulation in the eastern TP, the contribution of dynamic conditions is greater than that of moisture conditions. An increase of 10% in the wind field (water vapor) will enhance the snow water equivalent (SWE) by more than 25% (10%). (2) For large-scale circulation, q has a greater effect. But the overall increase in snowfall is smaller than the local circulation. (3) The severe snowfall frequently takes place in the southern TP, where water vapor channel and topographic uplift are significant factors to snowfall. We think the southern simulation will produce interesting results. Our results will provide scientific reference in improving the snowstorm forecasting and disaster prevention and mitigation.