



## Attribution of changes in precipitation

**Miao Zhang**

Shaanxi Normal University, School of Geography and Tourism, China (zmzpb\_198755@snnu.edu.cn)

In this paper, the causes and mechanism processes of precipitation changes are thoroughly studied by synthesizing Climate hydrological model and water isotope tracking model in north of the Tianshan Mountains. The main conclusions show that: (1) the annual average convective precipitation north of the Tianshan Mountains increases by 0.014 mm/d, the annual average large-scale precipitation decreases by -0.017 mm/d, and the annual average total precipitation is about -0.003 mm/d. The contributions of the regional human activities to the annual average convective precipitation, large-scale precipitation, and total precipitation are 31.21%, 52.63%, and 50.38%, respectively. (2) Based on the water vapor tracking model, near-source water vapor accounts for as much as 52.29% of the precipitation in the mountainous regions north of the Tianshan Mountains, and that the near-source water vapor consists mainly of recirculated water vapor. (3) The study implies that near-source water vapor is very important to local precipitation and both regional human activities and global climate change affect the local precipitation by increasing evapotranspiration (ET), which provides favorable conditions for convective precipitation. In addition, the increase in atmospheric water vapor further contributes to warming due to the greenhouse effect. However, as a result of intense evaporative cooling and increased humidity, regional human activities dominate the reduction of near-surface temperatures and a more stable atmospheric boundary layer, which significantly reduces large-scale precipitation. The contribution of irrigation is very small, with overall regional vegetation greening being the key driver.