Simulation and prediction of equilibrium line altitude of glaciers in the eastern Tibetan plateau

Keqin Duan

Tourism and Environmental Sciences of Shaanxi Normal University, Xian,China(kqduan@snnu.edu.cn)

As the third polar on the Earth, the Tibetan plateau holds more than 40,000 glaciers which have experienced a rapid retreat in recent decades. Glacier loss has increased concern for water resources around the Tibetan plateau. The variability of equilibrium line altitude (ELA) indicates expansion and wastage of glacier directly. Here we simulated the ELA variability in the eastern Tibetan Plateau based on a full surface energy and mass balance model. The simulation results are agreement with the observations. The ELAs have risen at a rate of 2-8m/a since 1970 throughout the eastern Plateau, especially in the Qilian Mountain and the southeastern Plateau where the ELAs have risen to or over the top altitude of glacier, indicating the glaciers are accelerating to melting over there. Two typical glacier, Xiaodongkemadi glacier in the center of the Plateau and Qiyi glacier in the Qilian Mountain, are chosen to simulate its future ELA variability in the scenarios of RCP2.6, RCP4.5 and RCP 8.5 given by IPCC. The results show the ELAs will arrive to its maximum in around 2040 in the scenario of RCP2.6, while the ELAs will be over the top altitude of glaciers in 2035-2045 in the scenarios of RCP4.5 and RCP8.5, suggesting the glaciers in the eastern plateau will be melting until the disappear of the glaciers.