Reduction in the east-west contrast in water budget over the Tibetan Plateau under a future climate

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As the Tibetan Plateau (TP) is an important Asian water resource, future changes in precipitation over the TP are an essential part of climate change assessments for the TP and surrounding regions. Here we investigate the water budget over the TP with the global 20-km grid atmospheric general circulation model MRI-AGCM3.2. The present climate simulation reproduces different characteristics in precipitation seasonal cycle: double peaks in spring and summer over the western TP and a single peak in summer over the eastern TP. In the present climate, an east–west contrast in the water budget is noted: over the eastern TP, both moisture flux convergence and local evaporation contribute to summertime precipitation with comparable magnitude; on the other hand, over the western TP, contribution from local evaporation dominates. In the future climate at the end of the 21st century under the RCP8.5 scenario, precipitation increases over the entire TP. Contribution from increasing evaporation dominates that from increasing moisture flux convergence into the TP. A prominent east–west contrast is also found in future surface water budget changes. Over the western TP, surface temperature increases are higher, an increasing rate of precipitation is greater, soil moisture becomes wetter, and runoff increases more than over the eastern TP. This suggests that the east–west contrast in surface climate over the TP could become smaller in the future.