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Past and future climate change, evapotranspiration and effective moisture on the Tibetan Plateau

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The spatiotemporal changes in evapotranspiration and effective moisture, defined as the ratio of actual evapotranspiration to reference crop evapotranspiration, have been studied by applying a modified Lund–Potsdam–Jena Dynamic Global Vegetation Model (LPJ). Climate data from 80 meteorological stations on the Tibetan Plateau were compiled for the period 1981–2010 and future climate projections were generated by a regional climate model through the twenty first century. Statistically significant increases in actual evapotranspiration and effective moisture were detected during the period 1981–2010. A transition from significant negative to positive reference crop evapotranspiration occurred in 1997. Additionally, a pronounced increase in effective moisture occurred during the period 1981–1997 because of significant decreased reference crop evapotranspiration before 1997. Future effective moisture show notable increases in the northwestern plateau and decreases in the southeastern plateau. Moreover, the reduced magnitude of effective moisture is likely to intensify in the long term, due mainly to increased evaporative demand.