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Impacts of the Three Gorges Dam on regional precipitation: based on high resolution simulation

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The Three Gorges Dam (TGD), as the largest hydropower project, resulting in increasing water area from 408km² to 1084km² and extending waterway into 660 km. It is obvious that land use change would influence regional precipitation, but affected region owing to the TGD is on dispute. Moreover, the highest resolution of previous studies is 1.5 km, however the width of artificial lake formed by the TGD is about 1.1 km. To this end, we address the need of a higher resolution of numerical simulation by running weather research and forecast (WRF) model with 3 two-way nested domains. Two simulations under different land use (with or without TGD) are compared. Results showed that regional precipitation is suppressed owing to TGD to some extent. More precisely, increasing precipitation happens in downwind region, whereas decreasing precipitation occurs upwind region. Besides, water surface expansion leads to a reduction in surface temperature within 0~5 km of surrounding area. The TGD construction increase specific humidity and surface within 5 km buffer. That is because water surface expansion results in moisture surplus in nearby region.