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Hydropower change of the water tower of Asia in 21st century: A case of the Lancang River hydropower base, upper Mekong

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Abstract: This study evaluates the future change in hydropower potential and sustainability of the Tibetan Plateau (TP) in 21st century under climate change, using the Lancang River hydropower base (LRHB) in the upper Mekong basin (UMB) as a case study. Future climate projections simulated by five different global climate models (GCMs) individually and the variable infiltration capacity (VIC) distributed hydrological model coupled with a reservoir model are used to project the future hydropower outputs. Results present a generally ideal prospect for hydropower development in the UMB, as most GCMs illustrate overall increasing hydropower outputs of the plants along with the increasing reservoir inflow. The sustainability of the hydropower is also improved in most GCMs, with generally higher reliability and lower vulnerability; however, due to the large impact of increased climate variability, some GCMs show poorer sustainability for the hydropower plants in the future scenarios, even though its overall hydropower outputs are increased. Therefore, the negative influence of the increased variability of

some passive GCM projections still indicates the risks for hydropower development in the TP and thus requires consideration. This study is expected to provide reference for further hydropower planning and development over the TP under climate change.
Keywords: Hydropower potential; Hydropower sustainability; Climate change; Global climate model (GCM); Tibetan plateau; Upper Mekong basin