

# Using stable isotope to identify impact of evaporation from mountainous reservoirs on local precipitation

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## Abstract

Due to the increase in industry, agricultural production and domestic water consumption, a common practice is to improve water use efficiency by building reservoirs. However, the construction of reservoirs has the effect of an increase in the evaporation area of the water surface. Observations show that due to the evaporation effect of the reservoir, the precipitation and precipitation distribution will change in some area. The Xiyang Reservoir is a typical manmade mountain reservoir in the Qilian Mountains in the upper reaches of the Shiyang River Basin. Based on the data collected by the multi-water body stable isotope observation network in the Shiyang River Basin, the study under discussion here used the isotope mixture model to quantify the impact of reservoir evaporation in this region. It was found that the advected water vapor of the Xiyang reservoir mainly comes from southeast, northeast and northwest. The d-excess value of precipitation around the Xiyang reservoir is significantly higher than that of other regions in the Xiyang River Basin, which is characterized by the mixing of water vapor generated by the evaporation of surface water and advected water vapor, indicating that the evaporation water vapor of the reservoir has a certain impact on local precipitation. It was calculated that 3.86-11.86% of the precipitation around the Xiyang reservoir comes from the evaporation of reservoir water and that about 4.39% ( $8.06 \times 10^6$  m<sup>3</sup>) of the Xiyang river water was consumed by evaporation. The background of atmospheric water vapor content is the main influencing factor responsible for reservoir evaporation. The local atmospheric movement determines the influence range of reservoir evaporation on precipitation.

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