Identifying surface water evaporation loss of inland river basin based on evaporation enrichment model

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Abstract

Accurately quantifying the evaporation loss of surface water is essential for regional water resources management, especially in arid and semi-arid areas where water resources are already scarce. The long-term monitoring of stable isotopes (δ18O and δ2H) in water can provide a sensitive indicator of water loss by evaporation. In this study, we obtained surface water samples of Shiyang River Basin from April to October between 2017 and 2019. The spatial and temporal characteristics of stable isotopes in surface water show the trend of enrichment in summer, depletion in spring, enrichment in deserts and depletion in mountains. The Surface Water Line (SWL) has been defined by the lines: δ2H=7.61δ18O+14.58 for mountainous area, δ2H=4.19δ18O-17.85 for oasis area, δ2H=4.08δ18O-18.92 for desert area. The slope of SWL shows a gradual decrease from mountain to desert, indicating that the evaporation of surface water is gradually increasing. The evaporation loss of stable isotopes in surface water is 24.82% for mountainous area, 32.19% for oasis area, and 70.98% for desert area, respectively. Temperature and air humidity are the main meteorological factors affecting the evaporation loss, and the construction of reservoirs and farmland irrigation are the main man-made factors affecting the evaporation loss.

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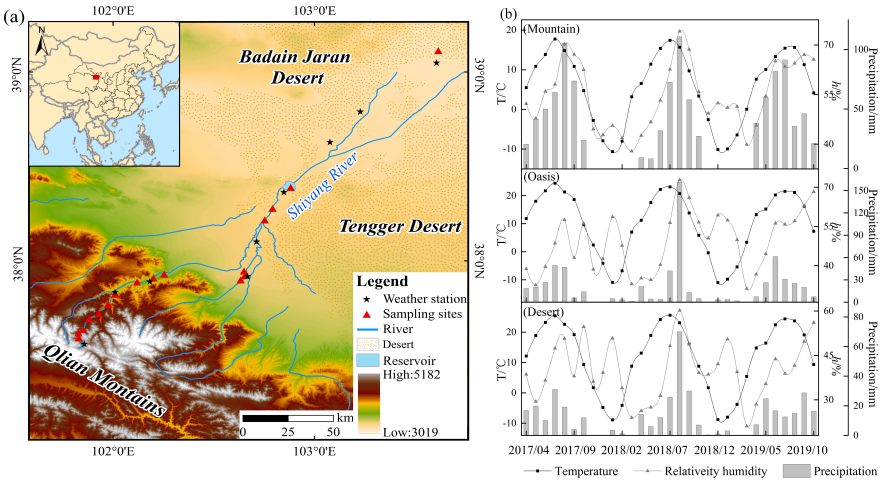

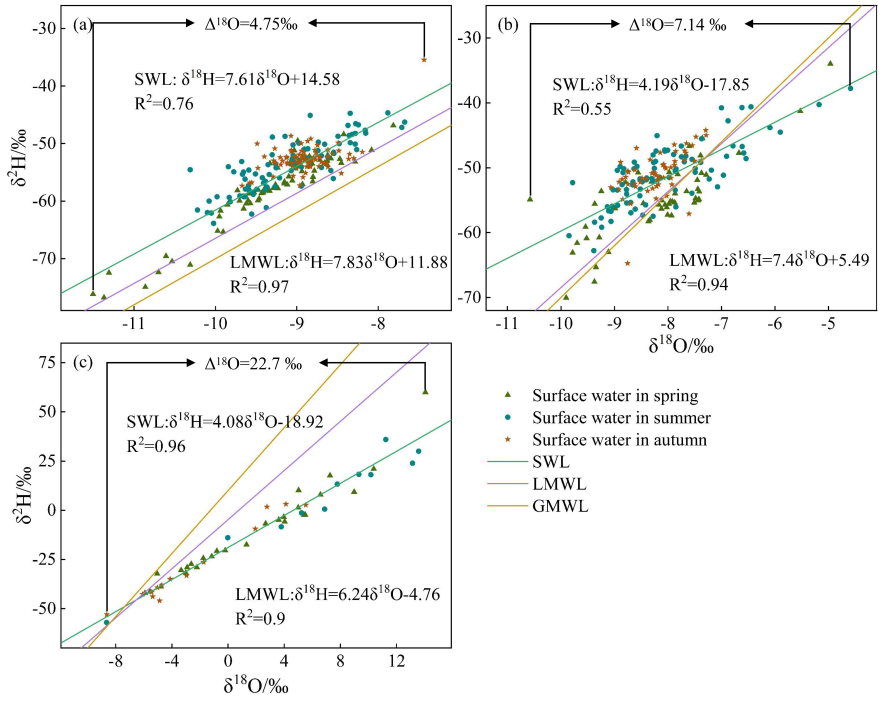

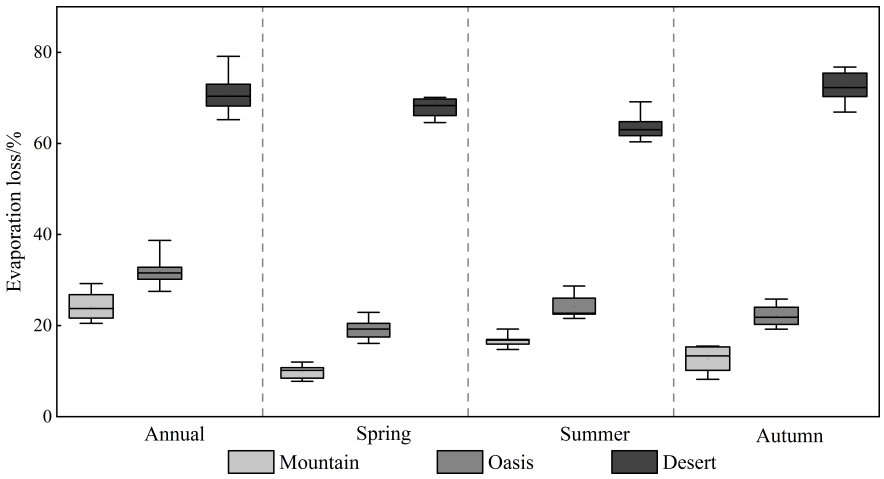

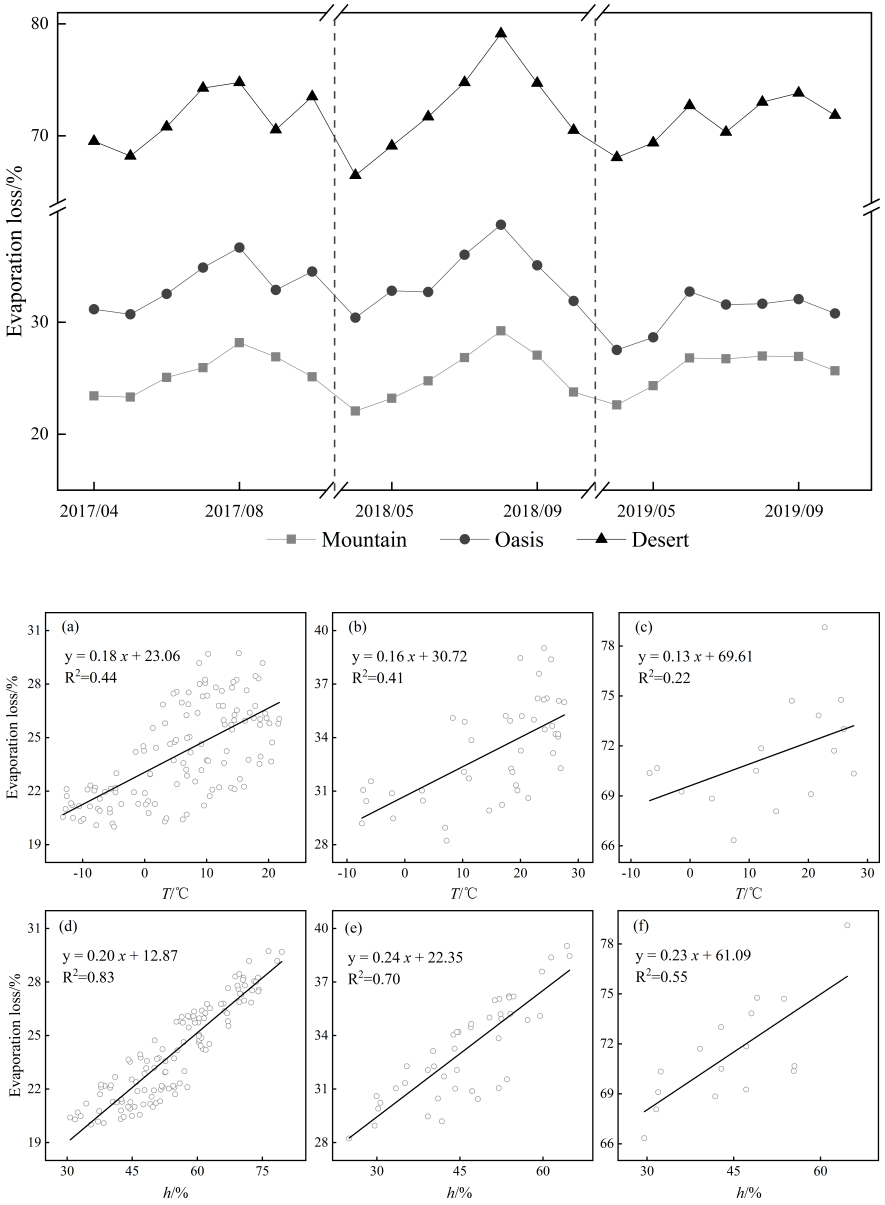

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