



## **Observational study on complementary relationship between pan evaporation and actual evapotranspiration and its variation with pan type**

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The pan evaporation process is essential to understanding the climate change of pan evaporation. To study the physical process of pan evaporation and its interactions with the surrounding environment, an elaborate pan evaporation experiment was carried out by means of micrometeorological method in the arid region of northwest China, in which hourly pan evaporation was measured by E601B, Class A and D20 pans, the local actual evapotranspiration was measured using eddy correlation system. Our results show that the pan water surface and the surrounding land surface constitute a significant non-uniformity of heat and moisture, and the non-uniformity energy exchange between them has an important influence on pan evaporation rate. As the environmental humidity changes, daily actual evapotranspiration and pan evaporation rates have a contradictory tendency, with the relationship between these two evaporations presenting a clear asymmetrical complementary behavior. In addition, a simple pan non-uniformity intensity index (IE) is defined as the ratio of pan evaporation to the Penman potential evaporation (LEppman) ( $IE = LE_{pan}/LE_{ppman}$ ). This index reflects the non-uniformity intensity between pan water and the surrounding land. Meanwhile, the comparison of complementary relationship corresponding to three types of pans shows that the degree of complementary relationship asymmetry linearly rises as the intensity of non-uniformity between pan and surrounding environment increases.