Supplementary Materials:

Section 2.3.2. Remote sensing-based meteorological products

Reliability verification of the TRMM precipitation data

In this study, we used the Tropical Rainfall Measuring Mission (TRMM) data to monitor the drought and flood dynamics of the study area. It is well known that the TRMM satellite was originally designed to improve the understanding of the distribution and variability of precipitation within the tropics. Our study area, the Xiashan Reservoir is located within Shandong province, a region with high latitude and beyond the subtropical zone. Although the reliable gauged observation from the meteorological stations should be optimal selection, the nearest meteorological station Weifang Station (ID 54843) is 40 km away from the study area. So, the remote sensing-based Spatially continuous rainfall product TRMM was selected. To validate the reliability of the TRMM data in the study area, we performed two evaluations of TRMM products with the meteorological station data of the Weifang Station and the other remote sensing-based precipitation product, the Global Precipitation Measurement (GPM) data of the study area, which is designed for worldwide rainfall observation.

Correlation analyses on the monthly precipitation of the two pairs of data (TRMM vs. Station, TRMM vs. GPM) from 2010 to 2019 were conducted. The first experiment was carried out using the point (Weifang station with geographical coordinates of 119.18°E, 36.75°N) value extracted from the time series TRMM data and the observed value of Weifang Station. The second experiment was carried out by using the mean value of the study area of TRMM and GPM. The results showed that TRMM had a high correlation with the station data and the GPM data with R^2 of 0.9473 and 0.9829, respectively (Figure S1), indicating the reliability of TRMM data in the study area.

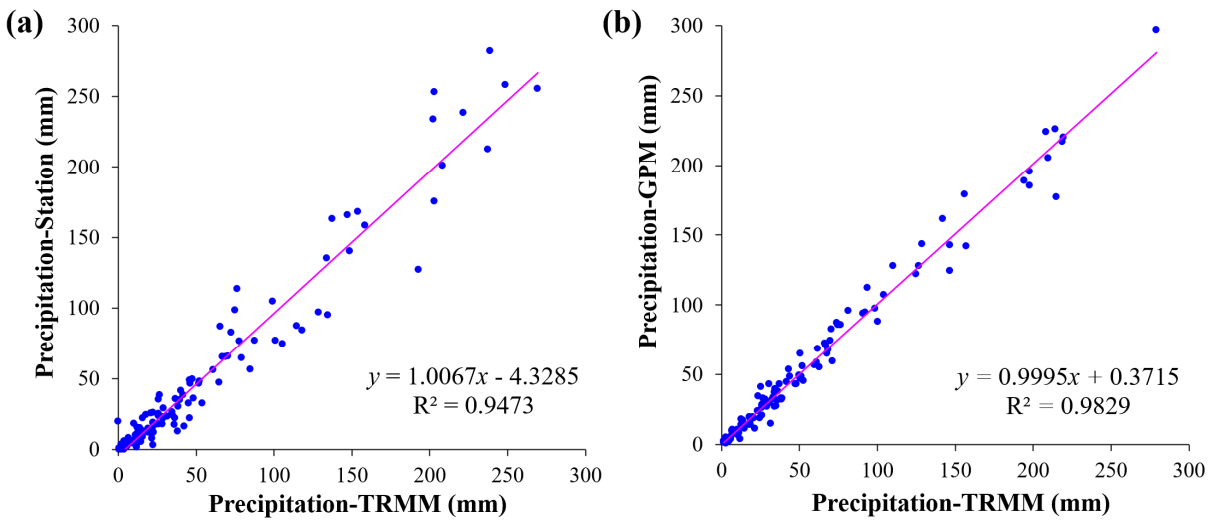

Figure S1. Reliability verification of the TRMM precipitation data in the study area. (a) TRMM vs. Station data; (b) TRMM vs. GPM