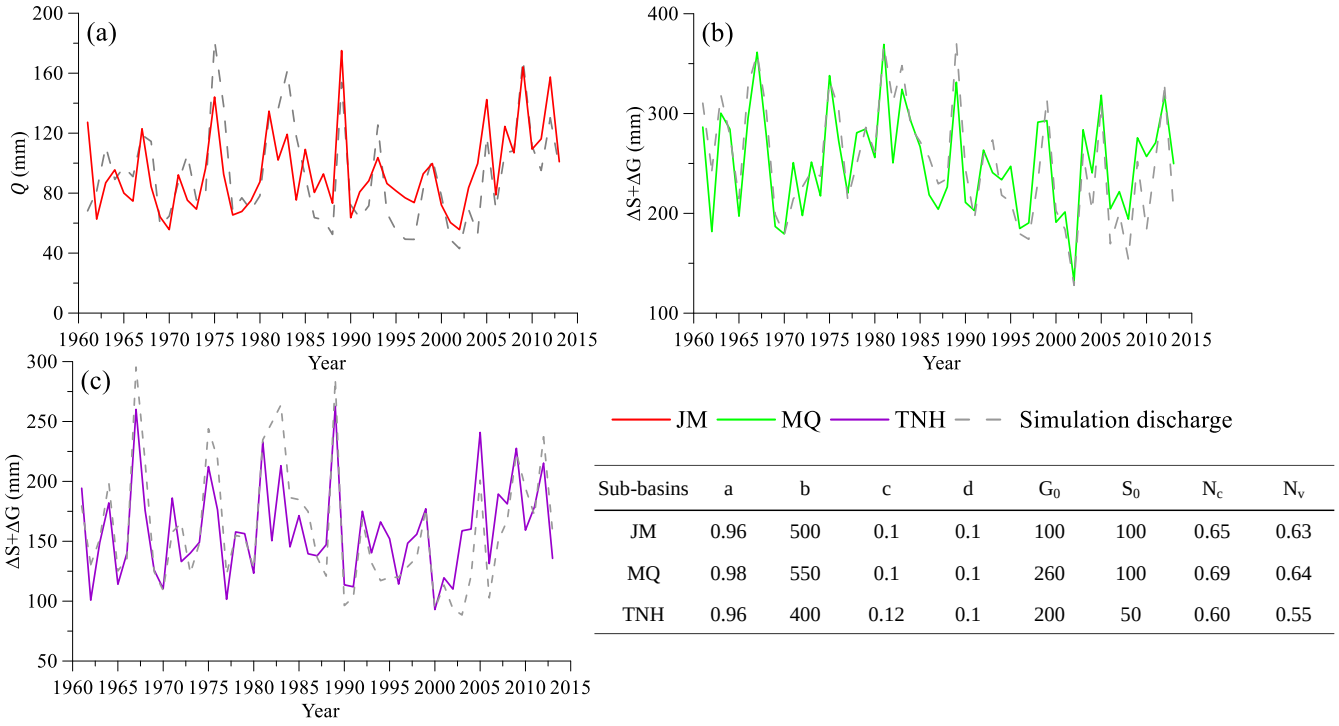
To further exam the efficiency of 11-year moving average method in removing water storage change in study area, we use ABCD (Thomas, 1981) model to simulate the three sub-basins discharge change. Results are shown as following:

## 1. Model calibration and validation




| Sub-basins | a | b | c | d | $G_0$ | $S_0$ | $N_c$ | $N_v$ |
|---|---|---|---|---|---|---|---|---|
| JM | 0.96 | 500 | 0.1 | 0.1 | 100 | 100 | 0.65 | 0.63 |
| MQ | 0.98 | 550 | 0.1 | 0.1 | 260 | 100 | 0.69 | 0.64 |
| TNH | 0.96 | 400 | 0.12 | 0.1 | 200 | 50 | 0.60 | 0.55 |

Figure 1 Discharge simulated by ABCD

The performance of ABCD model is evaluated by Nash–Sutcliffe efficiency. Generally model performance is very good if $R^2 > 0.75$, satisfactory if $0.36 < R^2 < 0.75$, and unsatisfactory if $R^2 < 0.36$ (Nashand Sutcliffe, 1970; Krause et al., 2005; Moriasi et al., 2007).

## 2. Water storage variation

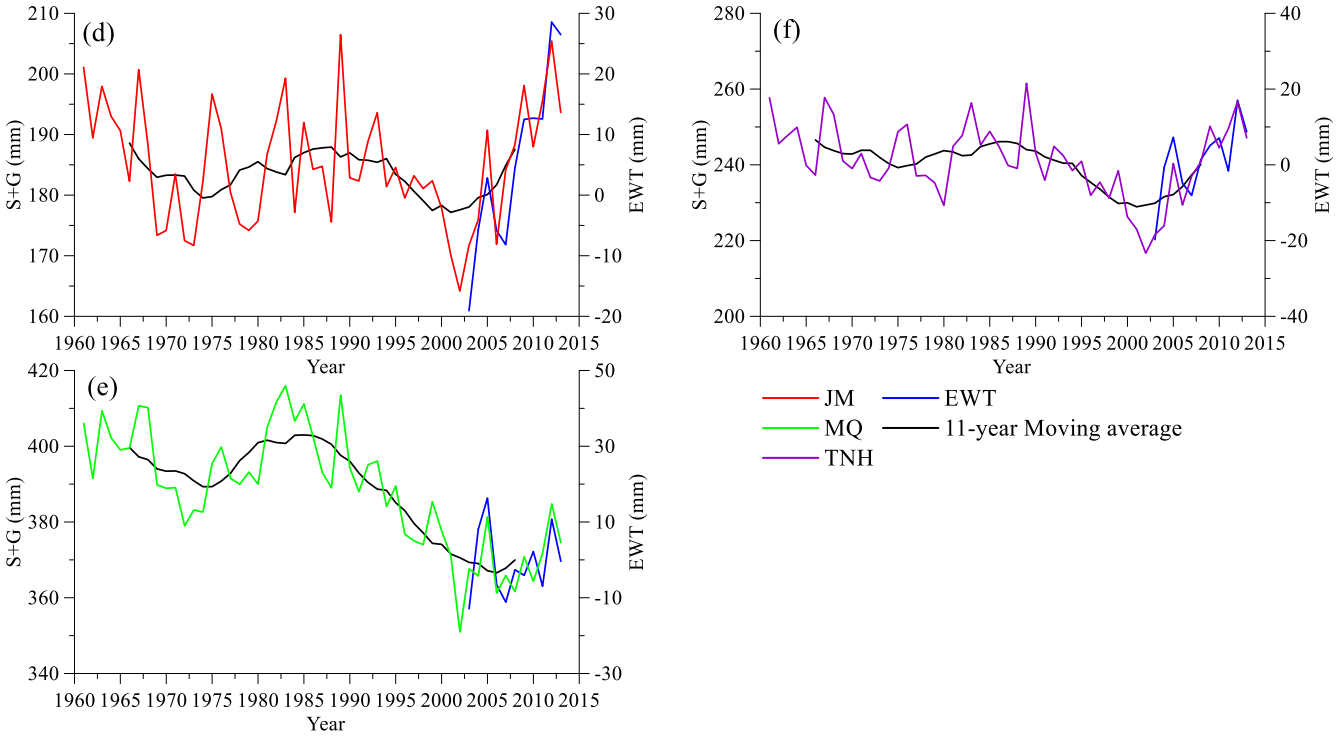



Figure 2 Water storage change obtained by ABCD model

Here S+G indicates annual soil water and ground water storage. Blue lines indicate EWT obtained for ensemble mean of the three Grace datasets. Simulated S+G agrees well with EWT. It proves efficiency of ABCD model in simulation discharge of the three sub-basins.

### 3. Δ(S+G) obtained by 11-year moving average method

$$\Delta(S+G) = (S+G)_i - (S+G)_{i-1}$$

$(S+G)_i$ indicates each value of 11-year moving average (S+G) series shown in Fig. 2.

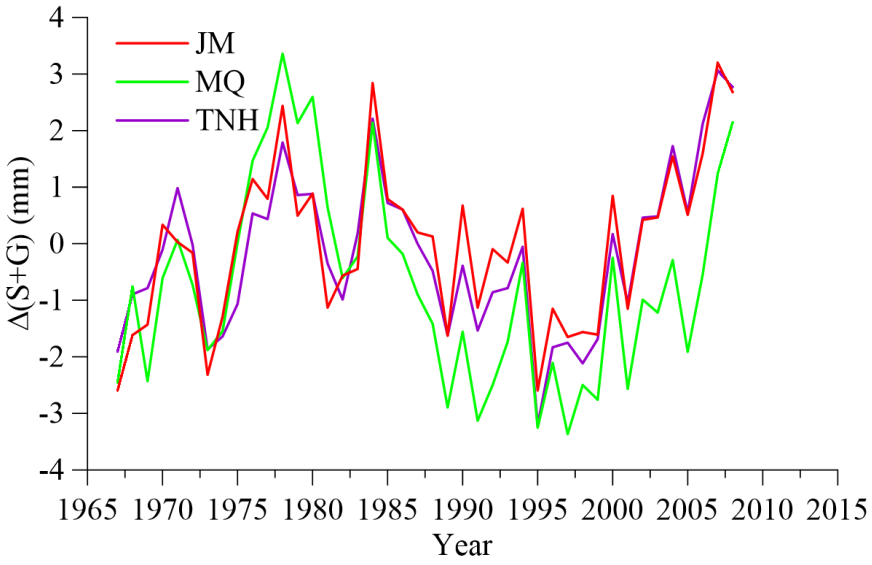



Figure 3 Water storage change

As indicated by Fig. 3, Δ(S+G) amplitudes of the three sub-basins are less than 3 mm. So by using 11-year moving average mothed, water storage change is negligible in this study area.

## Reference

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