

Flood potential index over China based on GRACE

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As an important element relating to wet status over a region, the terrestrial water storage (TWS) has a tight connection with the potential of flood occurrence. However, few of the flood indicators have taken TWS into consideration because it is difficult to measure in large regional scale. After 2002, Gravity Recovery And Climate Experiment (GRACE) mission became a helpful tool to fill the gap in regional water storage estimation. Over the GRACE record period, the repeated maxima in water storage anomaly suggest an active storage capacity for a given grid. When the additional precipitation exceeds the water deficit in the vertical space, it is marked as potential saturation runoff. Hence, in this paper, a normalized gridded index indicating the flood potential was developed over China based on the monthly storage deficit simulated by the terrestrial water storage anomaly (TWSA) from GRACE, precipitation from GPCC as well as the simulated potential water release. The results indicate that the average release water rates show large variation over China mainland, with larger rate in south and the lower around the north-west deserts. The monthly rate of release water in most of grids are well correlated with the precipitation feed especially in summer. This provides us the chance in estimating the monthly natural release water with the average precipitation in corresponding month. To highlight the flood potential application, the monthly map during the 2013 floods and 2009-2010 droughts are presented. The flood potential index can effectively indicate the floods in specific regions with higher values. Moreover, we can detect the spatial extend and temporal development of the droughts if the index in the region keeps in a lower level. As the advantages, this flood potential index captures the spatial structures while the common hydrological drought index is more regionally. Meanwhile, compared to the widely used meteorological drought index, the index here is more related to the local status which has more close connection to the agriculture and the available water resources for regional use.