



Detection of human-induced evapotranspiration using GRACE satellite observations in the Haihe River Basin of China

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Regional evapotranspiration (ET) can be enhanced by human activities such as irrigation or reservoir impoundment. Here the potential of using Gravity Recovery and Climate Experiment (GRACE) terrestrial water storage data in water budget calculations to detect human-induced ET change is investigated over the Haihe River basin of China. Comparison between GRACE-based monthly ET estimate (2005-2012) and Global Land Data Assimilation System (GLDAS)-modeled ET indicates that human-induced ET due to intensive groundwater irrigation from March to May can only be detected by GRACE. GRACE-based ET (521.7 ± 21.1 mm/yr), considerably higher than GLDAS ET (461.7 ± 29.8 mm/yr), agrees well with existing estimates found in the literature and indicates that human activities contribute to a 12% increase in ET. The double-peak seasonal pattern of ET (in May and August) as reported in published studies is well reproduced by GRACE-based ET estimate. This study highlights the unique capability of GRACE in detecting anthropogenic signals over regions with large groundwater consumption.