

## Changes in Land Subsidence after Groundwater Exploitation Ban over Suzhou, East China, from Long-term Radar Interferometry

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### Abstract:

Groundwater was uncontrolled exploited to meet the huge demands in the early stage of industrialization and urbanization of Suzhou City, China. The overexploitation had caused approximately 1-2m/year decrease in groundwater level since the 1980s, which stimulated the progress of land subsidence in the downtown. It was not until then that the government had realized both the urgency and importance to carry out exploitation bans over the affected territory. After decades, for the benefit of studying local hydrogeological conditions as well as guidance making in water resource mining, the actual effect of the bans is somehow needed to be evaluated in a city-level scale. The interferometric synthetic aperture radar (InSAR) can provide spatially large-scale and temporally long-term surface deformation at millimeter-level accuracy. In this work, we use multi-sensor SAR images, i.e. ERS-1/2, Envisat-ASAR, Sentinel-1, ranging from 1993 to 2017 to study the long-term surface deformation in time series. To overcome phase decorrelation over low SNR regions, we propose a combined processing strategy of persistent and distributed scatterers to retrieve the missing signals. Our preliminary result shows the land subsidence was well controlled in the urban area and small rebound was seen over some specific zones after the exploitation ban. However, still there is continuous subsidence around the city even the groundwater level is rising. The result has provided an essential indicator in evaluating the effectiveness of the policy, and at the same time offers us new subsidence patterns which are important for the next section of groundwater resource management.

Keywords: Land Subsidence, InSAR, Groundwater, Exploitation ban