

Surface displacements after the ground water regulation in Bangkok derived from persistent scatterer SAR interferometry

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Land subsidence due to groundwater extraction has occurred in many cities all over the world, leading to damages of buildings and infrastructures. In recent decades, several cities have regulated groundwater extraction to stop the over-pumping of groundwater. Bangkok, the capital city of Thailand is one of the cities that has regulated groundwater pumping. This regulation successfully led to decrease in ground water pumping rate. In order to understand changes in the groundwater system, it is important to monitor surface displacements after the stop of groundwater extraction. In this study, we estimated the surface displacements in Bangkok from November 2007 to December 2010 by persistent scatterer SAR interferometry (PSInSAR) analysis using ALOS/PALSAR images. Moreover, in order to understand changes in spatial pattern of groundwater flow, we compared the result with past surface displacements estimated by differential SAR interferometry (DInSAR) analysis using JERS-1/SAR images and with changes in groundwater level at the monitoring wells.

Our PSInSAR results revealed that surface has been slightly uplifting at a rate of 1 cm/year around the center of Bangkok. Estimated uplift areas correspond to the past subsidence area inferred from DInSAR analysis by using JERS-1/SAR images, and the uplift rate in each area are correlated with the groundwater recovery rate in the productive aquifer. Since surface uplift has occurred at the past subsidence area, groundwater recovering has especially occurred at preceding extraction area.

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