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WIDE AREA SURFACE MOVEMENT DETECTION AND MONITORING IN MILLIMETRE  
PRECISION FROM SPACE.

**Abstract**

Nowadays we may notice day by day any information about happenings on the surface of our planet. It could be wide area changes or on small scale; maybe caused by natural happenings or manmade.

Extraction of groundwater, e.g. due to heavy constructions such as digging a tunnel for the underground, land reclamation or port extension as well as the phenomena of sinkholes are some of those examples.

Traditional means of surveillance focus on pre-calculated areas, where various measurement devices are installed in a computed distribution. Traditionally this type of distribution is along estimated problem zones. The results are more local.

Extraction of groundwater around an underground corridor e.g. could cause problems even some hundred meters away due to complex structures in the sub-surface. Constructions on either side may develop cracks, in this case the evidence / non-evidence of any connection to the groundwater extraction could jeopardize the success of the project. Similar complex happenings on the surface may cause e.g. sinkholes.

In order to understand and prevent possible interactions in the surroundings of any surface movements phenomena, a complementary wide-area approach would be suitable.

From space, e.g. by data collected by the TerraSAR-X Synthetic Aperture Radar (SAR) satellite, proven technologies can provide those wide-area overviews in sub-centimetre range of accuracy. Independent of any weather conditions or accessibility to the terrains, without installing any complex or valuable items on the ground and without involving the consent of people living or working in the surroundings.

Due to the unique characteristics of SAR, another area of human activity may be monitored – namely oil contamination in the marine environment. SAR very clearly can detect and identify oil slicks on water.

Examples of ground subsidence along the routes of tunnels in different cities, of subsidence along railroads and in mining areas are shown .