



A Copernicus downstream service for surface displacement monitoring in Germany

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SAR Interferometry is a powerful technique able to detect and monitor various surface displacements caused by e.g. gravitative mass movement, subsosion, groundwater extraction, fluid injection, natural gas extraction. These processes can e.g. cause damage to buildings, infrastructure, affect ecosystems, agriculture and the economic use of the geological underground by influencing the hydro(geo)logical setting. Advanced techniques of interferometric processing (Persistent Scatterer Interferometry, PSI) allow highly precise displacement measurements (mm precision) by analyzing stacks of SAR imagery. The PSI mapping coverage can be increased to entire nations by using several adjacent satellite tracks. In order to assist the operational use of this technique a German-wide, officially approved, PSI dataset is under development. The intention of this presentation is to show i) the concept of the Copernicus downstream service for surface displacement monitoring in Germany and ii) a pilot study to exemplarily demonstrate the workflow and potential products from the Copernicus downstream service.

The pilot study is focusing on the built up of an officially approved wide-area PSI dataset. The study area covers an area of more than 30.000 km² and is located in the Northwest German Basin. Several natural processes (e.g. compaction of marine sediments, peat loss) and anthropogenic activities (e.g. natural gas extraction, rock salt mining) are causing surface displacements in the study area. The PSI analysis is based on six ERS-1/-2 data stacks covering the timespan from 1992 until 2001. Each data stack consists of 49 to 73 ERS-1/-2 SAR images. A comparison of the PSI results with thematic data (e.g. volume and location of extracted natural gas) strongly indicates that a part of the detected land subsidence is caused by natural gas extraction. Furthermore, land subsidence caused by e.g. fluid injection and rock salt mining were successfully detected by the PSI analysis.