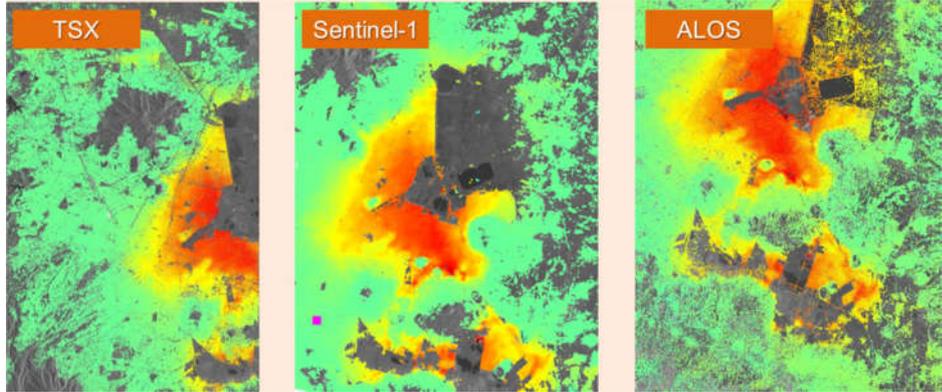


Topic	Multi-sensor Persistent Scatter Interferometry	February 11, 2019
Description	<div>  </div> <p>Mean deformation velocity estimated by using Persistent Scatterer Interferometry (PSI) techniques with different sensors. The acquisitions are over Mexico City, where a large part is subject to subsidence of up to 2 cm/month due to ground water extraction (reddish area). Area size: around 2000 km²</p> <p>Persistent Scatter Interferometry (PSI) is a powerful remote sensing technique which allows for the accurate measurement of small terrain deformation. This is achieved by collecting repeated acquisitions of the area of interest, building a so-called time series. PSI is an important tool for Earth monitoring and risk management, and, as such, is of great interest for both industry and scientific community. Many SAR sensors are currently acquiring high-quality interferometric stacks, e.g., TanDEM-X (X-band), ALOS-2 (L-band), Sentinel 1A/B (C-band). Moreover, future SAR missions will further increase the availability of data acquired from different viewing geometries and in different frequency bands (e.g., Tandem-L, NISAR, Sentinel-1C & D, BIOMASS, among others).</p> <p>In principle, this data diversity can be exploited in order to improve the quality of the estimated deformation using PSI. However, at the present time, there is a lack of research aiming for an optimum solution to combine all the information gathered by different sensors exploiting the intrinsic characteristics of the corresponding datasets. For example, the stacks from different sensors can be processed independently and the estimated East-West and vertical deformation components combined in a a posteriori step. In this case, no assumptions are required regarding the nature of the deformation, but the estimation can be sub-optimal if only a small number of images are available in each stack or if the time span is short. Alternatively, the PSI chain can be adapted to handle simultaneously the data from different sensors. This can be achieved by making a few assumptions on the deformation characteristics and retrieving the mean velocity in the line-of-sight of a certain sensor, or performing the PSI processing in a geocoded grid directly estimating East-West and Vertical velocities.</p> <p>The main questions to be answered by this research are:</p> <ol style="list-style-type: none"> 1) Under which conditions is there an expected performance gain when retrieving the deformation using simultaneously the data from different sensors in comparison to retrieving it independently from each sensor and combining it a posteriori? 2) If the simultaneous processing is preferred, what is the impact of the different sensor characteristics in the retrieved deformation velocities? 3) Are there additional benefits from the processing of multi-sensor stacks (for example, the retrieval of a denser PSI map)? <p>In order to answer those questions, the main tasks to be performed encompass:</p> <ol style="list-style-type: none"> 1) 1D performance simulations of different scenarios (different number of sensors, images, time sampling, etc.), 2) The extension of the HR Institute's stack characterization tool in order to perform 2D simulations considering different viewing geometries and deformations, 3) The assessment and implementation of different multi-sensor PSI processing strategies and its validation with simulated (and eventually real) stacks. 4) The writing of the thesis. 	
Starting	Immediate	
Duration	6 months	
Remuneration	E5 TVöD, Stufe 1, 19h	

Required Skills	<ul style="list-style-type: none">• Experience with IDL, Python or Matlab• Experience with signal processing is a plus• Proactive and ability to work independently• English Proficiency is a an asset
Benefits	Look forward to a fulfilling job with an employer who appreciates your commitment and supports your personal and professional development. Our unique infrastructure offers you a working environment in which you have unparalleled scope to develop your creative ideas and accomplish your professional objectives. We are striving to increase the proportion of female employees and therefore particularly welcome applications from women. Disabled applicants with equivalent qualifications will be given preferential treatment.
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