Geophysical Research Abstracts
Vol. 17, EGU2015-11601, 2015
EGU General Assembly 2015

How operational Advanced-DInSAR Analysis can improve knowledge on natural and anthropogenic deformations for Nuclear Power Plant areas

Andreas Vollrath (1), Francesco Zucca (1), Salvatore Stramondo (2), Christian Bignami (2), and Johannes Roeder (3)

(1) Università Studi Pavia, Earth & Env. Sciences, Pavia, Italy , (2) Istituto Nazionale di Geofisica e Vulcanologia, National Earthquake Center, Via di Vigna Murata 605 00143 Rome Italy, (3) European Space Agency (ESA)

The application of Advanced Differential Interferometric Synthetic Aperture Radar (A-DINSAR) techniques has strongly emerged in the last two decades and became an important part in georelated fields. State-of-the-art A-DInSAR methods, such as Persistent Scatterer Interferometry (PSI) or the Small BASeline (SBAS) approach have demonstrated their usefulness in monitoring urban areas and single buildings, up to critical infrastructures. Combined with additional data from GPS networks or levelling, it could prove its large potential for an operational, cost-effective mapping of surface deformations. Given a reasonable amount of images, changes in surface deformation can be detected down to 1 mm/y. Compared to point-wise field measurements it offers a spatially consistent mapping approach from local to regional scales.
In this review we want to provide a synopsis how A-DInSAR can be utilized in the framework of Nuclear Power Plant safety. Indeed, A-DInSAR is able to provide a detailed spatial analysis of slow movements occurring at NPP structures directly, as well as within the surrounding areas of the NPPs. Different phenomena of surface motion can be subject of such a monitoring. Natural causes, like active tectonics and terrain instability of slope which lead to landslides, as well as human-induced subsidence phenomena due to heavy construction or water pumping can be detected. We start by presenting techniques to determine the feasibility of the analysis for a given area and show its limitations. Then we propose a short insight into state-of-the-art studies where landslides, interseismic and human-induced deformation of the surface were mapped by A-DInSAR, to point out the relevance of a consequent analysis over an area of a NPP.
Furthermore we present results of case studies from international projects (TERRAFIRMA) as well as preliminary results from the Krsko NPP in Slovenia. Finally, we provide a outlook into present and future trends concerning the use of freely available Sentinel-1 data from the European Space Agency for the proposed aim.