Poster AGIT

PANGEO project and the future exploitation of the ESA Radar SAR archive in Austria

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1. Introduction

PANGEO is an EU project aimed at mapping and cataloguing in a web GIS portal, open to everyone, natural and anthropogenic geo-hazard in Europe. The involvement of European geological surveys insures state of the art contribution on hazard and mapping detection in urban and semi-natural environments. Salzburg and Vienna are the two cities investigated for Austria. The Persistent scattering Interferometry enables to detect terrain motion and the correlation with geological information and ancillary data enable analysts to investigate and map specific geo-hazards. As a consequence of PANGEO the Austrian geological survey is now involved in the project called: "Austrian landslide catalogue assessment through the use of radar interferometry application". This is a cost effective way to exploit the ESA Radar SAR archive in Austria producing DINSAR (differential Interferometry SAR) and advanced DINSAR (or PSI) maps obtained by processing a series of radar ERS and ENVISAT images. Few examples for the city of Salzburg will be showcased; furthermore the "Austrian landslide catalogue assessment through the use of radar interferometry application" project will be presented.

2. Data availability

In order to obtain an exhaustive analysis of the ground hazard on PANGEO two time series PSI (1992-1999 and 2003-2009), local geological maps, ground geotechnical observations, GEORIOS landslide catalogue, natural regional risk data, are used in combination with ancillary data like aerial photos, DTM, topographic maps and urban atlas of Salzburg.

Being the Austrian landslide assessment project on a national scale it will bring together geological maps at various scales, GEORIOS landslide catalogue, CORINE land use map, ESRI snow cover map, HYSTALP snow cover and precipitation historical data, "eHYD" data warehouse for cumulated daily rain wheatear stations and ASTER DEM digital elevation model.

3. Methodology

On one hand PANGEO has a unique delivering product: the Ground stability layer. The '*Ground Stability Layer*', conceived to be comparable in all the 52 cities investigated, is a vector layer containing a series of features which spatially locates the geo-hazards. By combining such a layer with a hypertext, containing the explanation of the phenomena mapped based also on direct validation of the motion on the field, it will be possible, by the end of the project, to visualise natural and anthropogenic instabilities on the PANGEO portal.

The method proposed for a cost efficiently use of the archived SAR images aims at verify for the whole scenes the best compromise between statistical probability to detect movements on the ground, temporal and geometric decorrelation and attenuation of the electromagnetic wave by the atmosphere for DINSAR products.

4. Analysis

After having visualised the group of layers together the main attention was draw where there were evidences of maximum rate of subsidence (in mm/year) in both series of descending orbit data. The second step undergone was to subdivide the hot spots of subsidence into punctual and homogeneous areas of interests. The validation work on the field undertaken in Salzburg and surrounding areas represented the final step

The first part of the analysis for the nationwide project it's addressed to verify if the PSI predictability model gives high probability to find very slow mass movements catalogued on the GEORIOS archive. More than 500 features with extent > 10 hectares are susceptible to be detected in motion by using classic two pass DINSAR method. Then through the EOLI-SA software distributed from ESA the first couple of images for the track 86 were ordered via ftp and with the NEST software the first interferogram was obtained.

5. Discussion and preliminary conclusions

On most of the cases the use of both PSI datasets underlined a good match with the evidence on the field. Further exams by using boreholes and levelling data will be made in order to clearly define the nature of the motion occurred in urban areas.

The first result of the interferogram is unwrapped, due to the limitation of NEST and a series of MATLAB scripts it´s going to be tested. The future step in the analysis is to process the first nine couple of images with GMTSAR software in order to test the quality of phase unwrapping and then to perform the A-DINSAR technique only focused on two sample sites.