Geophysical Research Abstracts
Vol. 13, EGU2011-10938, 2011
EGU General Assembly 2011

Synergy of SAR acquisitions for ground deformation monitoring by means of PSI, SBAS and DInSAR. Case study of western rift of Corinth, Greece

Panagiotis Elias (1), Pierre Briole (2), and Olga Sykioti (1)

(1) Institute for Space Applciations and Remote Sensing, National Observatory of Athens, I. Metaxa & Vas. Pavlou, GR-15236 Penteli, Athens, Greece, (2) Laboratoire de Géologie, UMR CNRS 8538 - Ecole Normale Supérieure, 24 Rue Lhomond, Paris, France

The rift of Corinth has been long identified as a site of major importance in Europe due to its intense tectonic activity. It is one of the world's most rapidly extending continental regions and it has one of the highest seismicity rates in the Euro-Mediterranean region. It produces in average, an earthquake of magnitude 6 per century. The GPS studies conducted since 1990 indicate a north-south extension rate across the rift of ∼1.5 cm year-1 around its western termination. Geological evidences show that the south coast of the rift is uplifting whereas the north part is subsiding.

The western termination of the rift in the Patras broader area presents a major scientific and socio-economic importance, with the Psathopyrgos and the Rion-Patras faults being located very close to the city of Patras.

The first DInSAR studies were carried out using SAR/ERS data after the Ms= 6.2 June 15, 1995 Aigion earthquake and contributed to its characterization. The Ms=5.9 November 18, 1992 Galaxidi earthquake could also be examined with the same data set. More recently se seismic and aseismic the ground deformations of the area have been measured using series of ASAR/ENVISAT, PALSAR/ALOS and RASARSAT-2 acquisitions. All datasets were processed by means of PSI, SBAS and DInSAR techniques. In addition to widely used tools (DIAPASON, ROI-PAC, STAMPS e.t.c.) in-house procedures and tools have been developed in order to exploit of the synergy of multiple characteristics/properties (frequency, viewing angles, sides etc) of the SAR acquisitions aiming to the minimisation of the noise components.

On June 8th, 2008 an Mw=6.4 earthquake occurred in NW Peloponnesus, western Greece, at a distance of 17km SW of the city of Patras. This seismic event is the largest strike-slip earthquake that taken place in western Greece during the past 25 years. Although the magnitude was large enough to produce a land deformation detectable by DInSAR, no deformation was revealed, leading to the assumption that the focal depth exceeded the 20-25km.

On 18th of January 2010, an Mw=5.1 (NOA) earthquake occurred near Efpalion and 25 km NE of Patras. Another strong event occurred on 22nd of January 2010, with Mw= 5.1 (NOA) approximately 3 km NE of the first event. Intense post-seismic activity followed. Despite their low magnitudes those events show a small signature in C-band DInSAR. Modelling of the deformation source has been used provides constraints on the location, size and azimuth of the faults.

The Psathopyrgos (striking E-W) and the Rion-Patras (striking NE-SE, an oblique-slip transfer zone between the Corinth and Patras rifts) fault zone present aseismic linear slip rate of ∼2 - ∼5 mm year-1 in the LOS direction of both ascending and descending SAR acquisitions.

Another structure is seen in the South area of Patras (Ag. Triada fault) striking E-W, with a linear slip rate in the LOS direction of ∼3 - ∼6mm year-1.