Synergy of ASAR and RADARSAT-2 ultra-fine acquisitions for ground deformation monitoring by means of DInSAR and PS. Case study gulf of Corinth - town of Patras, Greece

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The Gulf of Corinth presents a major scientific and/or socio-economic interest such as the Patras broader area, the Psathopyrgos fault zone which is considered to be a presently active structure, the Rion-Patras fault zone, the town of Patras and the Rion-Antirrion bridge. Patras is the third most populated town of Greece with more that 200,000 inhabitants. The bridge of Rion-Antirrion is 2,880m along (its width is 28 m) and connects the eastern and western Greece. The bridge has been designed and constructed taking into account the increased seismicity of the area. Psathopyrgos fault zone which is acting as a transfer zone between the Corinth and Patras rift as well as the Rion-Patras transfer fault zone are investigated for any detectable ground deformations that could be indicators/precursors of inter-seismic accumulation processes before a main seismic event. The town of Patras is investigated for any detectable ground/buildings deformation due to human impact or geophysical processes. The potential of Rion-Antirrion bridge and surrounding area deformation monitoring is also investigated and assessed.

The studied area presents major difficulties for DInSAR/PSI applications, due to its intense vegetation coverage and abrupt topography presenting, high slopes and shadowing effects. Moreover the nature of the topography and the location of the study area, between Aegean and Ionian seas, result to high precipitation rates and extended cloud coverage. All these characteristics contribute to high decorrelation of the interferometric products. For the estimation of the occurred deformations a series of ASAR/ENVISAT (image swath 2) data are processed by means of PSI and DInSAR techniques, but RADARSAT-2 (ultra-fine beam mode) data are processed only by means of DInSAR technique due to its lack of historical data. The processing is carried out exploiting commercial and in-house software. The medium and high ground resolution added- value products are combined in thematic level and discussed.

Arsenic distribution in laterite deposits of the Balkan Peninsula

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The laterite deposits (Fe–Ni-laterite and bauxites) in the Balkan Peninsula are mainly located in the Mirdita–Sub-Pelagonian and Pelagonian geotectonic zones and are of great economic significance. These deposits have been affected by intense tectonism, which has created overthrusting, foliation, folding, and faulting. The investigation of arsenic in laterites is thought to be important for the ferronickel smelting process and the serious affect of the health. Minerals such as iron oxides and pyrite are of particular significance in controlling arsenic mobility, and hence aquifer contamination. Laterite samples from Ni-laterite deposits of Greece (Lokris, Vermio, Edessa, Olympos, Kastoria), Albania (Bitinca and Gouri-Perjuegjiun), Serbia (Rzanovo and Topola), bauxitic laterites and the Parnassos-Ghiona bauxite deposit were analyzed for major and trace elements, including arsenic (As). Arsenic concentrations for all laterite samples from the Balkan Peninsula range from < 2 ppm to a few decades ppm. However, arsenic concentrations for the individual laterite occurrences and deposits from Aghios Ioannis vary significantly from <2 ppm to 2600 ppm. Arsenic in the

Parnassos-Ghiona deposit ranges from <10 ppm in typical red colored ore to 900 ppm in yellow-grey colored ore. The latter type occurs along and near faults and constitutes a significant (approximately 30 vol. %) portion of the bauxite ores. They are characterized by the presence of abundant pyrite and micro-organisms. Elevated arsenic contents are mostly associated with Fe-oxides/hydroxides in Ni-laterites, showing enrichment in REE, Co, Ni, Th and U contents, and with Al-oxides in bauxites. The sulphur isotope compositions of Fe sulphides from the bauxite deposit show a range from +10.2 to –30.2 per mil. Most negative values were obtained from grey-coloured ore samples. The organic matter may be related to the source of arsenic and play a major role in controlling the redox conditions, since they can drive the formation of pyrite or Fe-oxides.

On groundwater resources available in Oltenia Plain, Romania

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The Oltenia Plain occupies ca 8,400 km^2 in the SW Romania. With decreasing altitudes from north to south, it includes three W-E elongated subunits: a High Plain (210-110 m elevation), followed to the south by the Danube Terraces (140-35 m) and by the large Danube Floodplain (40–25 m). The fresh groundwater resources are located in the Pliocene-Quaternary formations. The oldest Berbesti Formation consists of lacustrine sands (50-150 m thick) and is overlapped by the Jiu-Motru Formation composed of swampy clays and coal beds with sands insertions (150-300 m). The next lithostratigraphic unit, the Lower Member of the Danube Formation (15-20 m) was built during the Early Pleistocene. Finally, the Danube River moulded Valley own profile. As a result, the higher relief of the Oltenia Plain formed repeated down-cuttings of five-stepped terrace sequence and the Floodplain (Upper Member of the Danube Formation).

The Berbesti Formation is a continuous multilayered aquifer, the hydraulic conductivity of 0.2-15 m/day and specific capacity values of 0.05-4.0 l/s/m.The Jiu-Motru Formation is the discontinuous multilayered aquifer (sands) on the mainly aquiclude clayey-coaly background. The specific capacity values of the lens-shaped tested sands are in the range of 0.01-0.25 l/s/m. The fine sands inserted on the aquiclude background are characterized by low Na+, K+, I+ contents and by higher contents of organic substances, CO_2, Fe_3+, $SO_2$4-, NO_2- and Br-. The hydraulic conductivity determined through tests in situ has values between 0.1 and 5.0 m/day. The specific capacity has a large variation interval from 0.2 to 5.0 l/s/m.

The Lower Member of the Danube Formation, represented by the alluvial fan, is discordantly disposed over the previous two formations and bears a continuous extended phreatic aquifer. Its potentiometric contour lines decrease from 200 m to the north to 95 m to the south. Despite the high hydraulic conductivity values (10-55 m/day), being situated at 40-60 m over the local base level of the floodplains, this aquifer discharges on the slopes of the main valleys and has limited resources.

The six mono-layer aquifers bear in the Upper Member of the Danube Formation with 5 terraces and the floodplain of the big watercourses (Danube, Jiu and Olt). Within the Upper Member, there is a N-S increase of productivity (from 1-3 l/s/m in the N strip, to 3-6 l/s/m in the middle one and > 6 l/s/m within the whole Danube Floodplain.

In the eastern subunit of the studied area – the so-called Leu-Rotunda Plain – the Danube Formation is covered by a continuous pile of the Aeolian Formation (30-35 m thick of loose wind-blown silts, clayey sands, fine to coarse sands, having like insertions fossil soils at different levels). Field investigations carried out during April 2010 in accordance to “Climate Change and Impact on Water Supply” Project (see logo) showed that the phreatic aquifer of the Aeolian Formation constitutes the historical source to feeding the people of 15 localities. In large areas, the depth of the water table ranges from 0.5 to 3 m, being vulnerable to estimated climate change. Its resource is contaminated by domestic seepage and fertilizers only within the perimeter of localities. There, the public fountains have around 1,200-2,100 μS/cm Electric