Investigation of Land Subsidence Phenomena in the wider Tirana (Albania) Region by applying Persistent Scatterer Interferometry Techniques

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The occurrence of land subsidence phenomenon has been investigated for the wider area of the city of Tirana, Albania. A set of Ninety-four SAR images acquired between January 2015 and 23 of November 2019 by the European Space Agency (ESA) Sentinel1, have been processed by applying the Persistent Scatterer Interferometry (PSI).

Interpretation of PSI analysis output results, revealed subsidence deformations at the northwest and near the center of Tirana, mainly due to natural land compaction. The deformation rates reach up to 9.6 mm/yr.

The most intensive phenomena have been identified at the Laknas and Breg Shkoze- Rinas regions. In particular at the “Mother Tereza” National Airport of Tirana, located at the Rinas area, land subsidence ranges between 2.3mm/yr and 4.5mm/yr. Whereas in Tirana e Re, close to the city center, less intensive subsiding movements have been identified, ranging from 1.5 to a maximum of 5.2 mm/yr.

By evaluating geological, geotechnical, and hydrological data it was determined that except for Laknas, in all other areas, land subsidence is caused by natural compression of alluvial deposits of the Ishmi River. At the Laknas zone, besides natural compression, water withdrawal due to over pumping of ground water can be identified as well. This was proved by the piezometric surface monitoring data referring to the period 2015-2019.

Besides the interesting findings about the deformation pattern at the wider area of Tirana, the current study highlights the potential of PSI as a suitable, accurate, and cost-efficient technique for the study of land subsidence phenomena.