**Advancing Permafrost Monitoring: the EO-PERSIST Project**

**Authors:** Katerina Dermosinoglou1; Spyridon E. Detsikas1; Loukia-Maria Fratsea1; Apostolos G. Papadopoulos1; Giuseppe DiCaprio2; George P. Petropoulos1

1 Department of Geography, Harokopio University of Athens, El. Venizelou 70, Kallithea, 17671, Athens, Greece,

2 PLANETGIS SKY S.R.L.

Permafrost, a pivotal component of the Arctic ecosystem, remains particularly vulnerable to the effects of global warming, exerting profound impacts on both environmental and socioeconomic facets. In the light of increasing challenges posed by climate change, understanding and monitoring the dynamics of permafrost regions in the Arctic have gained paramount importance. In response to this critical need, the EO-PERSIST project [<https://eo-persist.eu/>], a 4 years MSCA staff exchanges project funded by EU, aims to leverage existing services, datasets, and innovative technologies to establish a consistently updated ecosystem with Earth Observation (EO)-based datasets suitable for permafrost applications.

By harnessing advanced EO technologies, including innovative tools and datasets such as cloud platforms, and tapping into an extensive array of remote sensing datasets, EO-PERSIST aspires to revolutionize the monitoring and assessment of permafrost dynamics. The project aims to advance methodological approaches in the field of permafrost by leveraging the huge volume of remote sensing (RS) datasets and providing indicators directly linked to socioeconomic effects from permafrost dynamics.

The aim of this study is twofold: (i) to provide an overview of the EO-PERSIST project and its objectives, and (ii) to present the results of a case study in which EO was utilized to map urban sprawl through monitoring Impervious Surface Areas (ISA), in an Arctic setting characterized by high structural density over the past decade. A pixel-based machine learning classifier in conjunction with Landsat imagery in Google Earth Engine (GEE) cloud platform has been employed to map with high accuracy ISA changes in Tromso area, Norway, from 1993 to 2023. The results of this study not only precisely map the urban changes in the study area but also hold promise of enhancing our comprehension of the dynamics behind urban expansion, the primary factors associated with urban sprawl and their interaction with the challenges posed by climate change in Arctic environments. All in all, results of this case study showcase the overall potential of EO datasets to be used for socioeconomic studies along with the recent advancements in cloud-based platforms paving the way for new opportunities and challenges.

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