ALLEGATO 3 – Posto aggiuntivo riservato a borsisti di specifici programmi di mobilità internazionale in collaborazione con Joint Research Centre (Ispra)

ANNEX 3 - Additional position reserved to candidates holding a scholarship from a specific international mobility program in cooperation with Joint Research Centre (Ispra)

This PhD position is the result of the cooperation between University of Pavia (UNIPV) and European Commission's Joint Research Centre (JRC) in the frame of the Collaborative Doctoral Partnership Agreement in the field of AI for Earth Observations.

The PhD position will be covered for 18 months with a PhD scholarship funded by the Department of Electrical, Computer and Biomedical engineering, and for 18 months with an employment Grantholder-20 contract provided by JRC (https://joint-research-centre.ec.europa.eu/system/files/2014-08/jrc_grantholder_rules.pdf), for a yearly gross amount of approximately € 41.000. For this PhD position, a compulsory mobility period of 18 months at JRC (Ispra, Italy) is required.

In order to be eligible to get the Grandholder 20 contract, candidates should, prior to the start of the employment contract with the JRC:

- have the nationality of a Member State of the EU or a country associated to the Research Framework Programmes or being resident in a EU Member State since at least five years.
- be enrolled in a PhD programme with UNIPV.

PhD topic

PhD Topic: Detection of bi- and three-dimensional changes in human settlements

Since 2011, the Global Human Settlement Layer (GHSL) project of the European Commission's Joint Research Centre has been transforming Earth observation (EO) data into statistics on global human settlements and population supporting the decisional processes of international policy frameworks. Automatically processed EO data are combined with population census and other economic data. The open and free GHSL data range from global datasets to pan-European built-up layers and analytical data like the Urban Centre Database[1].

The building height and volume estimation is crucial for disaster risk management and, in particular, for population disaggregation, the second pillar of the GHSL data production. With the start of the operational production of GHSL data as exposure component of the Copernicus Emergency Management Service[2], it is essential to develop methods for the

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[1] https://ghsl.jrc.ec.europa.eu/datasets.php

[2] https://emergency.copernicus.eu

regular update of the building height and volume information. In particular, the prediction of building heights in new built-up surfaces (built-up expansion) or in surfaces already built (built-up densification) provide crucial information that should be updated with an annual or bi-annual update frequency to demonstrate the use of the volumetric information in the framework of the GHSL Copernicus Emergency Management Service.

The PhD research will support this endeavour with the development of bi- and three-dimensional change detection in human settlements using Sentinel-1 SAR data. The approach aims at designing a procedure able to cope with both types of changes by combining interferometric coherence and backscatter amplitude and provide a semantically meaningful analysis of the changes detected in both city inner cores and suburban areas.

Specifically, the method will focus on detecting multidimensional changes in urban areas using a stack of repeat-pass SAR data sets from Sentinel-1A/B satellites. The proposed procedure will jointly exploit amplitude and coherence time series to perform this task. Indeed, SAR amplitude can be used to extract changes about the urban extents, i.e., in 2D, while interferometric coherence is sensitive to the presence of buildings and to their size, i.e., to 3D changes.

Selection procedure

The candidate will be selected according to the following procedure:

1. Pre-selection by UNIPV.

2. Final selection by the JRC in agreement with UNIPV

The pre-selection will be carried out by the examining committee at UNIPV on the basis of an assessment of the qualifications listed in Annex 1 of the call. The shortlisted candidates will be sent to the JRC, with the candidate application, for the final selection.

The JRC Commission, which will include one or more UNIPV representatives, might contact pre-selected candidates for a further interview.

At the end of the selection procedure, the JRC will contact each pre-selected candidate to inform about the outcome of their interview.

The final ranking list will be published by UNIPV according to the provisions of the call for applications. The winner will enroll in the PhD program according to the rules of the call.

Candidates interested in the details of the agreement subscribed by UNIPV and JRC for the co-funding of this position can contact uoc.formazionericerca@unipv.it.