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multi-Risk sciEnce for resilienT commUnities undeR a changiNgclimate

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1. Technical references

Project Acronym	RETURN
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Dissemination level*	PU
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Task	T2.2.1 - Identification of areas at different scales affected or predisposed to ground instabilities, either in the subaerial (a) and submerged (b) environment by existing inventories and archives – implemented and updated by EO services – and permanent and temporary geophysical observatories (dynamic mapping)
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* PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services)

Document history

Version	Date	Lead contributor	Description
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0.2	20.07.23	RF; CTS; FR; MDS	Completion, review and editing
0.3	28.07.23	CTS; FR	Completion, review and editing
0.4	30.07.23	Salvatore Martino, Francesca Bozzano (UniRoma1), Domenico Calcaterra, Diego Di Martire (UniNA), Riccardo Fanti (UniFI)	Completion, review and editing
0.5	31.07.23	RF; WP coordinators and TK leaders	Final version and editing

2. ABSTRACT

This report summarized the scientific research activities carried out in the period January – July 2023 by the Task 2.2.1 "Identification of areas at different scales affected or predisposed to ground instabilities, either in the subaerial (a) and submerged (b) environment by existing inventories and archives –implemented and updated by EO services – and permanent and temporary geophysical observatories (dynamic mapping)" (hereinafter referred to as TK1) of the Work Package 2.2 "State of the art and knowledge base to define impact-oriented hazard indicators" (hereinafter referred to as WP2) inside the vertical spoke VS2 "Ground Instabilities" of the Extended Partnership RETURN.

It should be noted that VS2 structured WP2, WP3 and WP4 by identifying the following areas of interest for each of them:

- WP2 focuses on the detection and analysis of PREDISPOSING factors to ground instabilities.
- WP3 targets PREPARATORY factors to ground instabilities.
- WP4 is centered on TRIGGERING and multiple geohazards cascading scenarios (MULTIHAZARD).

In accordance with the definitions given within the VS2, the distinction between predisposing, preparatory and triggering factors/processes is made on a temporal basis: in fact, it means that the predisposing factors are considered invariable on the observation scale, while the preparatory factors show changes or cyclical trends during the same period. As consequence, a trigger is considered as a process that acts in a very short and well-defined time.

The activities of WP2 were directed in the reference period to the examination of the factors predisposing the ground instabilities, starting from a series of case studies (defined Learning Examples, LEs) which represent experiences that each partner has carried out in recent times, and which include cutting-edge analyzes in the theme of characterization of predisposing factors and in the spatial and temporal quantification of susceptibility.

The partner involved in the WP2 are ENEA, OGS, POLITO, UNIBA, UNIBO, UNIFI, UNIGE, UNINA, UNIPA, UNIPD and UNIROMA1. WP2 leaders are Riccardo Fanti (UNIFI) e Mario Parise (UNIBA), TK1 leader is Francesco Maria Chiocci (UNIROMA1), TK2 leader is Mario Parise (UNIBA), TK3 leader is Matteo Berti (UNIBO). 72 researchers participate in the activities of WP2/TK1 (i.e. TK 2.2.1): 5 from ENEA, 3 from OGS, 6 from POLITO, 5 from UNIBA, 6 from UNIBO, 7 from UNIFI, 7 from UNIGE, 8 from UNINA, 13 from UNIPA, 8 from UNIPD and 4 from UNIROMA1.

The goal of TK1 (Identification of areas at different scales affected or predisposed to ground instabilities, either in the subaerial (a) and submerged (b) environment by existing inventories and archives –implemented and updated by EO services – and permanent and temporary geophysical observatories (dynamic mapping)) and the issue of DV 2.2.2 (Detection and classification of potentially threatening ground instabilities) have been interpreted in the framework of the LEs collection.

According with the main idea of the Project and of VS2, the learning phase had the objective of building a Rationale for preparatory processes to be used as input to the Proof of Concept (PoC). This phase has been articulated in three stages:

i) Inventory of Learning Examples (LE).
ii) Individuation of the preparatory processes analyzed in each LE.
iii) Definition of a Rationale for each process based on the available LEs.

Within this framework, DV 2.2.2 is regarded as the conversion of a representative dataset extracted from all Learning Examples (LEs) into a comprehensive collection of information focused on identifying various contributing factors. This process, referred to as the "inversion of the information matrix" in the project's context, aims to establish a valuable framework for implementing the envisioned Proof of Concept (PoC). Indeed, the successful execution of the PoC necessitates a firm foundation anchored in the framework of predisposing factors and processes. The overarching applicability of this framework strengthens its value as it enables a detached discussion beyond the confines of any specific context.