ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

Geological report at the seismic station IT.RMMM – Roma Monte Mario (RM)

Report geologico per il sito della stazione sismica IT.RMMM – Roma Monte Mario (RM)

Working Group: **Daniela FAMIANI** **Deborah DI NACCIO**	Date: December 2019
Subject: **Final report illustrating the geological setting for station IT.RMMM**	

Convenzione DPC-INGV 2019-21, All.B2- WP1, Task 2: "Caratterizzazione siti accelerometrici" (Coord.: G.Cultrera, F. Pacor)
Cite as: Working group INGV "Agreement DPC-INGV 2019-21, All.B2- WP1, Task 2", (2019). Geological report at the seismic station *IT.RMMM – Roma Monte Mario http://hdl.handle.net/2122/12982*

INDEX

1. INTRODUCTION

The geological description is related to the site of studied seismic station. The coordinates are reported in Table 1.

Table 1.

CODE	NAME	LAT [°]	LON [°]	ELEVATION [m]
IT.RMMM	Roma Monte Mario (RM)	41.92320*	12.45260*	137**
ADDRESS	Viale del Parco Mellini, 6, 00136 Roma RM, Italy			

* Coordinates from ITACA (Nov. 2019) **Elevation from CTR 5k Regione Lazio

2. TOPOGRAPHIC AND GEOLOGICAL INFORMATION

Topographic information related to the site are reported in Table 2. Table 3 summarizes all available geological maps from literature for geological analyses.

Table 2.

Topography	Description	Topography Class	Morphology Class	EC8 Class
	Flat surfaces, isolated slope and reliefs with slope i<=15°	T1	P*	B

*Reference table from ITACA (Nov. 2019)

Table 3.

Geological map	Source	Scale
IT.RMMM	Geological map of Italy sheets 149 (Cerveteri)-*150* (Roma)	1:100.000
IT.RMMM	La Carta Geologica di Roma alla scala 1:10:000 – Funiciello and Giordano 2005 (Foglio 374060).	1:10.000

In Table 4 Geological and Lithotechnical Units (according to Seismic Microzonation classification; Technical Commission SM, 2015) are described and are concerned to maps of following chapters. The term "original" means the result comes from a preexisting cartography (Table 3); the term "deduced" means the result comes from an interpretation of a preexisting cartography according to the nomenclature of corresponding cartography.

Table 4

GEOLOGICAL UNITS		**LITHOTECHNICAL UNITS**	
"La Carta Geologica di Roma alla scala 1:10:000 – Funiciello and Giordano 2005" (Foglio 374060) *original*		(MZS) *deduced*	
code	**description**	**code**	**description**
MTM	Monte Mario Formation	SW	Well sorted sand, gravelly sand
MTM1	Farneto Member	SC	Clayey sand, mixture of sand and clay
MVA	Monte Vaticano Formation	AL	Geologic substratum lithotypes alternances
STFba	Alluvial deposits	OL	Organic silt, low plasticity organic silty clay

3. GEOLOGICAL MAP

In Figure 1 Geological Map is reported in a 1kmx1Km square around the station.

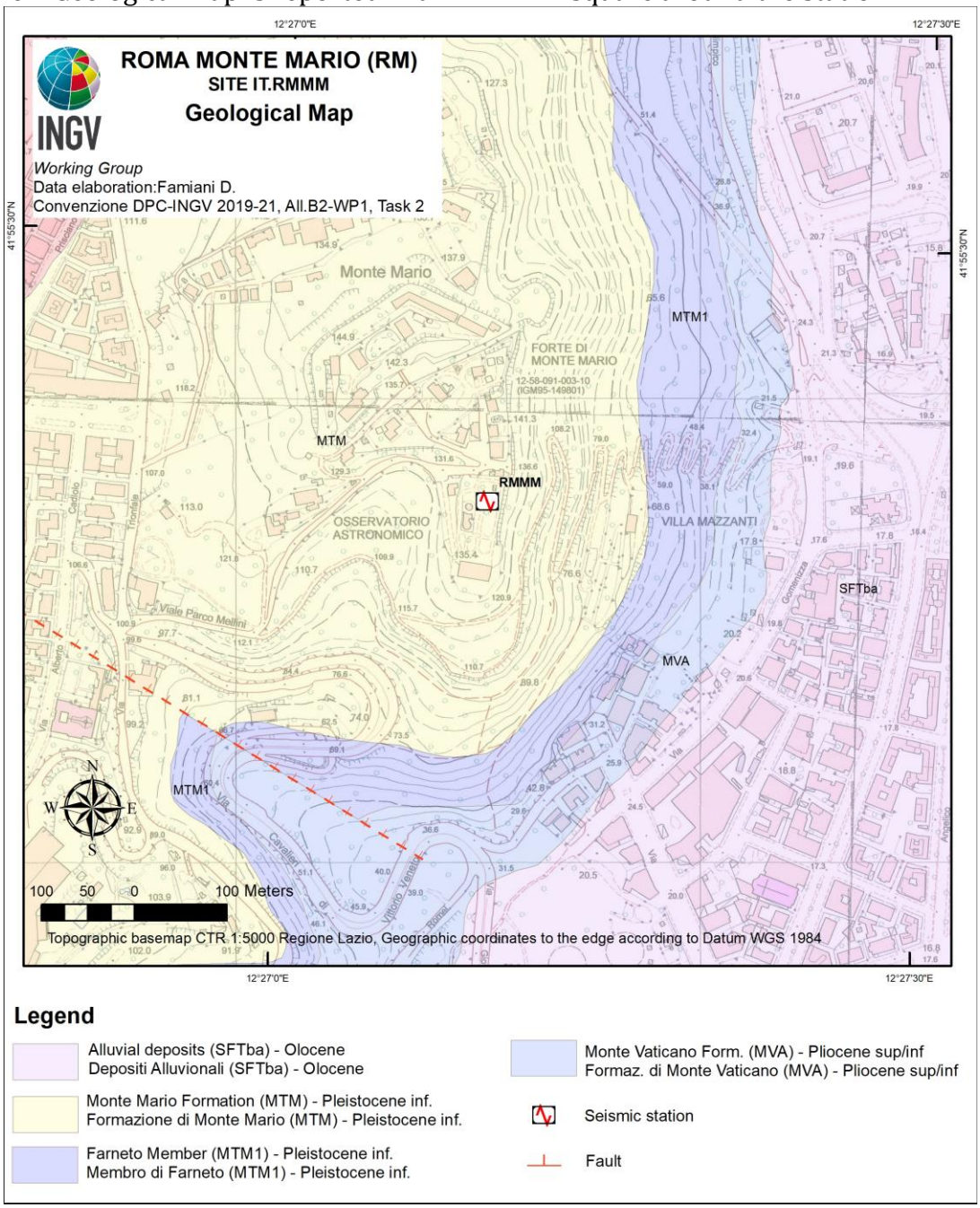


Figure 1. Geological map of seismic station IT.RMMM. Scale 1:10.000. Geological units come from "La Carta Geologica di Roma alla scala 1:10:000 – Funiciello and Giordano 2005 (Foglio 374060)".

4. LITHOTECHNICAL MAP

In Figure 2 Lithotechnical Map is reported in a 1kmx1Km square around the station.

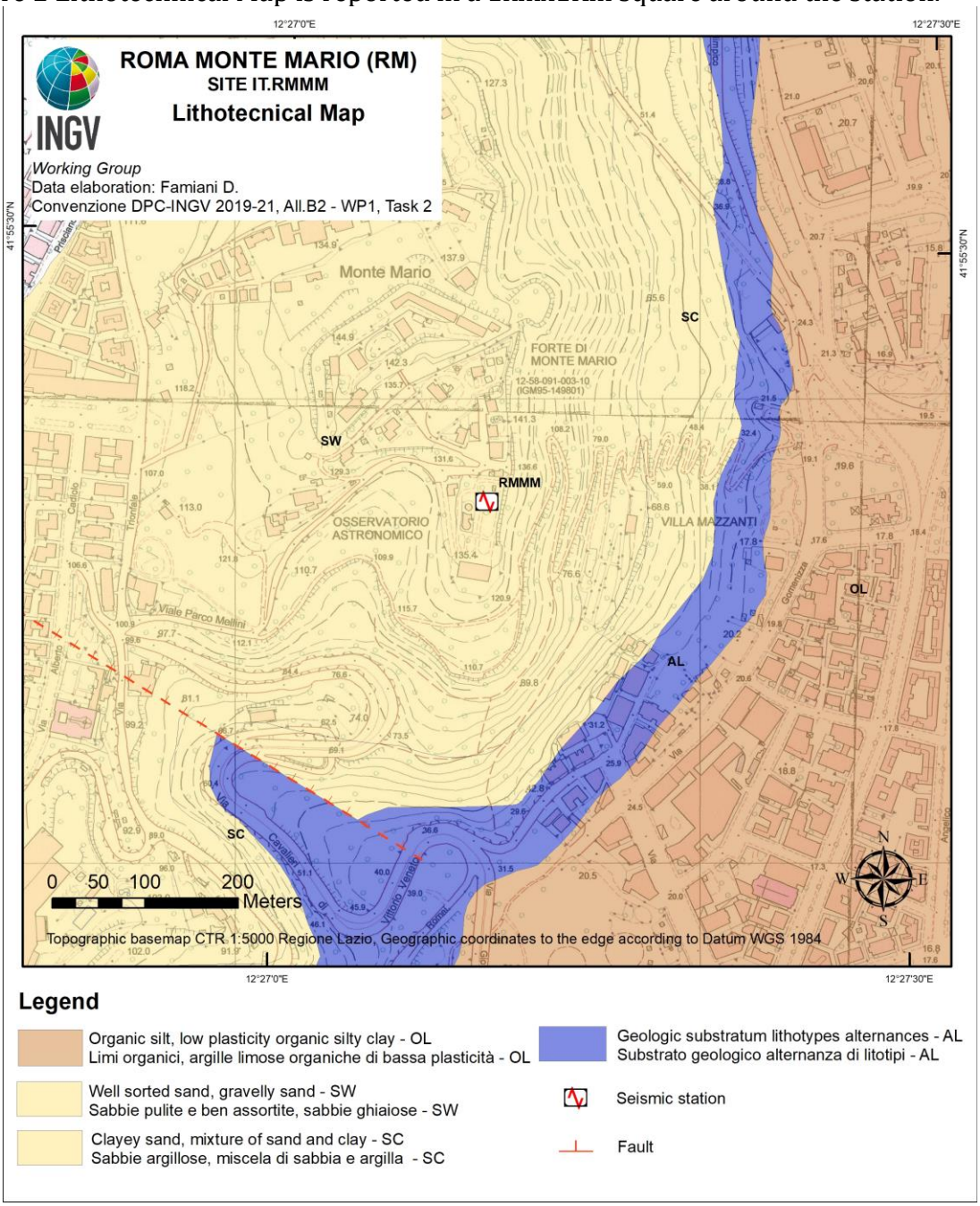


Figure 2: Lithotechnical map of the seismic station IT.RMMM. Scale 1:10.000. The lithotechnical units are deduced from the "La Carta Geologica di Roma alla scala 1:10:000 – Funiciello and Giordano 2005 (Foglio 374060)" and assigned according to the nomenclature of Seismic Microzonation (Technical Commission SM, 2015).

5. SURVEY MAP

Figure 3 shows the Survey Map reporting both previous investigations and geophysical surveys conducted by INGV Working Group.

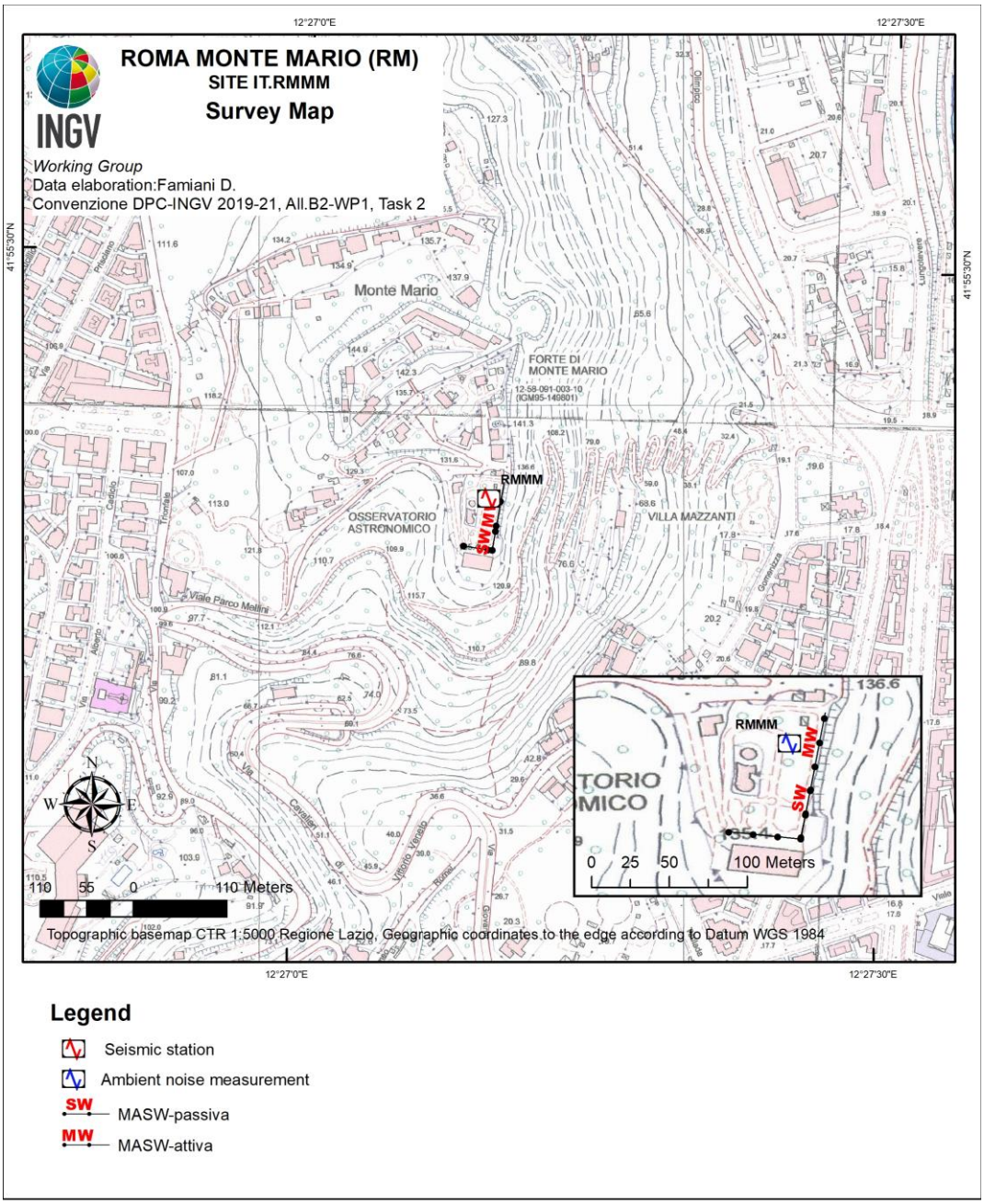
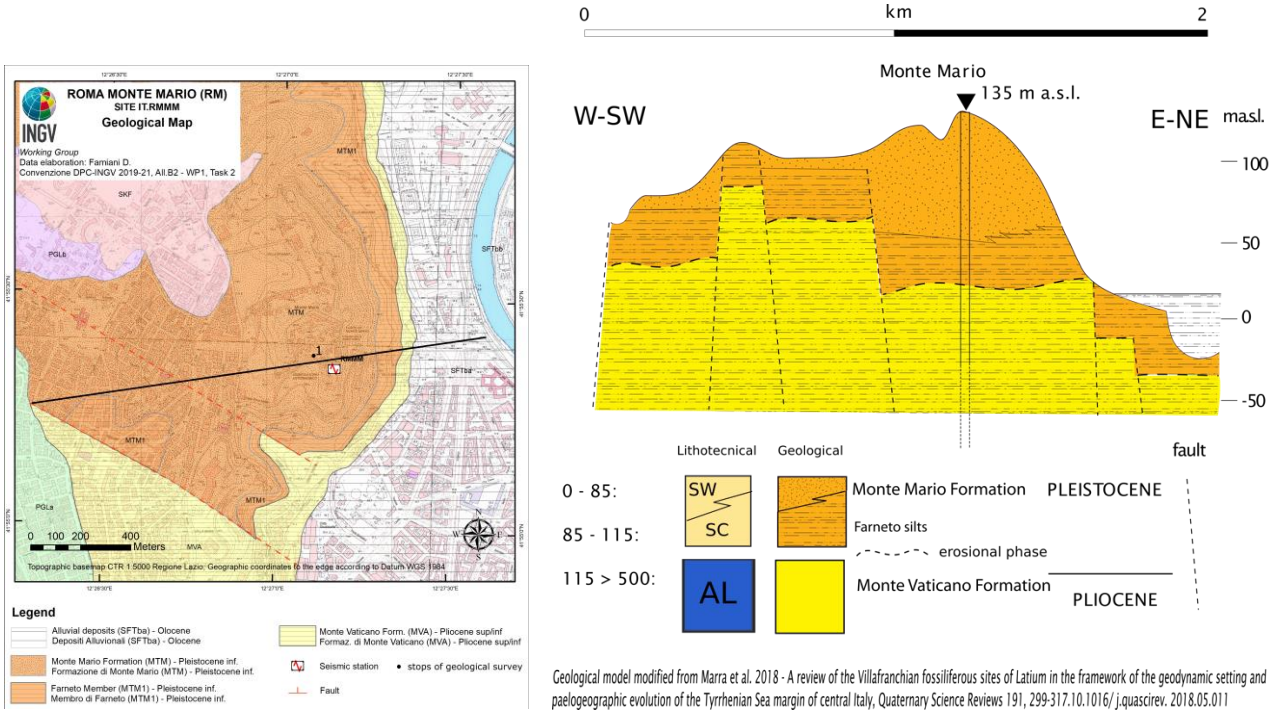


Figure 3: Map of the surveys in the surroundings of the station IT.RMMM. Scale 1:10.000. The box at the bottom right contains a zoom of the area with the detail of the geophysical survey conducted by INGV Working Group for the seismic characterization of the site (Agreement DPC-INGV 2019-21, All. B2, WP1 - TASK 2, Velocity profile report IT.RMMM)

6. GEOLOGICAL MODEL

6.1 General description

The seismic station is installed on Monte Mario hill which is located in the north-western part of the historical center of Rome.



Geological model modified from Marra et al. 2018 - A review of the Villafranchian fossiliferous sites of Latium in the framework of the geodynamic setting and paelogeographic evolution of the Tyrrhenian Sea margin of central Italy, Quaternary Science Reviews 191, 299-317.10.1016/ j.quascirev. 2018.05.011

Figure 4. Left: Geological map of the study area where is installed IT.RMMM seismic station; Right: (top) geological section and (bottom) subsoil model for the site.

Picture 1: outcrop of the upper member of Monte Mario formation (MTM) located at point 1 in the geological map (Fig. 4)

6.2 Geological Section

The WSW-ENE oriented geological section (Marra personal communication in Fig.4) is reported in Marra et al. 2018 and highlights the geological and structural setting of Monte Mario area. The trace with the location of the section is reported as a black line in the geological map (Fig. 4 left).

6.3 Subsoil model

The geological description reported from the surface to the bottom is described in the following part. There are not boreholes in the surroundings of the seismic station but a very detailed collection of studies of the stratigraphic units which characterize Monte Mario area is available (Marra et al. 2018, Funiciello and Giordano 2005, Marra et al. 1995) and some extracts are reported in the following part of the report.

The stratigraphic succession starts with the Pleistocene classic M. Mario formation which is mainly outcropping on the right side of Tiber river, along the Monte Mario – Gianicolo structure. The maximum thickness of this deposit is about 140 m, but the top is always erosional and therefore the estimated thickness is a minimum thickness. This formation is characterized by two members: the upper member (Monte Mario formation MTM) and the lower member

(Farneto Member MTM1). MTM is made by coarse sand with cementified levels and clayey intercalations (an outcrop is reported in Picture 1 after a site inspection) with thickness of around 85 m. MTM1, with thickness of about 30 m below the station, is in lateral heteropic contact with the aforementioned upper one and is characterized by decametric alternances of quite consolidated clay and sand levels. Monte Mario formation is over-imposed (by an erosional contact) to the Monte Vaticano Formation (MVA) characterized by blue and stratified blue-grey marly clay deposits, from consolidated to highly consolidated, which have estimated values of between depths of 115 m up to at least 500 m. MVA is lowered from NO-SE faults located between Monte Mario hill and Farnesina area.

As evinced from results of geophysical investigations carried out by INGV Working Group, we can attribute to the shallower member of Monte Mario Formation Vs values of around 400 m/s, compatible with EC8 class assigned at the site according to geological evidences.

7. REFERENCES

EC8: European Committee for Standardization (2004). Eurocode 8: design of structures for earthquake resistance. P1: General rules, seismic actions and rules for buildings. Draft 6, Doc CEN/TC250/SC8/N335.

Funiciello and Giordano 2005. The Geological Map of Rome: lithostratigraphy and stratigraphic organization

Marra F., Carboni M.G., Di Bella L., Faccenna C., Funiciello R. & Rosa C. (1995) - Il substrato plio-pleistocenico nell'area romana. Bollettino della Società Geologica Italiana, 114: 195-214.

Marra, F., Petronio, C., Salari, L., Florindo, F., Giaccio, B., Sottili, G., A review of the Villafranchian fossiliferous sites of Latium in the framework of the geodynamic setting and paleogeographic evolution of the Tyrrhenian Sea margin of central Italy, Quaternary Science Reviews 191, 299-317. 10. 1016/ j. quascirev. 2018. 05. 011

NTC 2018: Ministero delle Infrastrutture e dei Trasporti (2018). Aggiornamento delle Norme Tecniche per le Costruzioni. Part 3.2.2: Categorie di sottosuolo e condizioni topografiche, Gazzetta Ufficiale n. 42 del 20 febbraio 2018 (in Italian).

Technical Commission SM, 2015 – Microzonazione sismica. Standard di rappresentazione e archiviazione informatica, Versione 4.0b (Commissione tecnica inter-istituzionale per la MS nominata con DPCM 21 aprile 2011).

Working group INGV "Agreement DPC-INGV 2019-21, All.B2- WP1, Task 2", (2019). Velocity profile report at the seismic station IT.RMMM – Roma Monte Mario. http://hdl.handle.net/2122/12963

ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

Disclaimer and limits of use of information

The INGV, in accordance with the Article 2 of Decree Law 381/1999, carries out seismic and volcanic monitoring of the Italian national territory, providing for the organization of integrated national seismic network and the coordination of local and regional seismic networks as described in the agreement with the Department of Civil Protection.

INGV contributes, within the limits of its skills, to the evaluation of seismic and volcanic hazard in the Country, according to the mode agreed in the ten-year program between INGV and DPC February 2, 2012 (Prot. INGV 2052 of 27/2/2012), and to the activities planned as part of the National Civil Protection System.

In particular, this document1 has informative purposes concerning the observations and the data collected from the monitoring and observational networks managed by INGV.

INGV provides scientific information using the best scientific knowledge available at the time of the drafting of the documents produced; however, due to the complexity of natural phenomena in question, nothing can be blamed to INGV about the possible incompleteness and uncertainty of the reported data.

INGV is not responsible for any use, even partial, of the contents of this document by third parties and any damage caused to third parties resulting from its use.

The data contained in this document is the property of the INGV.

1This document is level 3 as defined in the "Principi della politica dei dati dell'INGV (D.P. n. 200 del 26.04.2016)"

Esclusione di responsabilità e limiti di uso delle informazioni

L'INGV, in ottemperanza a quanto disposto dall'Art. 2 del D.L. 381/1999, svolge funzioni di sorveglianza sismica e vulcanica del territorio nazionale, provvedendo all'organizzazione della rete sismica nazionale integrata e al coordinamento delle reti sismiche regionali e locali in regime di convenzione con il Dipartimento della Protezione Civile.

L'INGV concorre, nei limiti delle proprie competenze inerenti la valutazione della Pericolosità sismica e vulcanica nel territorio nazionale e secondo le modalità concordate dall'Accordo di programma decennale stipulato tra lo stesso INGV e il DPC in data 2 febbraio 2012 (Prot. INGV 2052 del 27/2/2012), alle attività previste nell'ambito del Sistema Nazionale di Protezione Civile.

In particolare, questo documento[1] ha finalità informative circa le osservazioni e i dati acquisiti dalle Reti di monitoraggio e osservative gestite dall'INGV.

L'INGV fornisce informazioni scientifiche utilizzando le migliori conoscenze scientifiche disponibili al momento della stesura dei documenti prodotti; tuttavia, in conseguenza della complessità dei fenomeni naturali in oggetto, nulla può essere imputato all'INGV circa l'eventuale incompletezza ed incertezza dei dati riportati.

L'INGV non è responsabile dell'utilizzo, anche parziale, dei contenuti di questo documento da parte di terzi e di eventuali danni arrecati a terzi derivanti dal suo utilizzo.

La proprietà dei dati contenuti in questo documento è dell'INGV.

---

[1]Questo documento rientra nella categoria di livello 3 come definita nei "Principi della politica dei dati dell'INGV (D.P. n. 200 del 26.04.2016)".