



ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

Geological report at the seismic station IT.PGN – Pignataro Interamna (Fr)

Report geologico per il sito della stazione sismica IT.PGN– Pignataro Interamna (Fr)

Working Group: Luigi ZARRILLI Raffaele MOSCHILLO	Date: Dicembre 2020
Subject: Final report illustrating the geological setting for station IT.PGN	



INDEX

1. Introduction
2. Topographic and geological information
3. Geological map
4. Lithotechnical map
5. Survey map
6. Geological model
 - 6.1 General description
 - 6.2 Geology and structural geology of the area.
 - 6.3 Geological section
 - 6.4 Subsoil model
7. References



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 (°) [ITRF]	LOG (°)	ELEVATION [m]
IT.PGN	Pignataro Interamna (Fr)	41.45243	13.79163	74
ADDRESS	Via Ponte S. Lorenzo, Pignataro Interamna FR, Italy			

* coordinates from Itaca INGV

* address from Itaca INGV

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 $i \leq 15^\circ$	T1	P	C

**Table 3.**

Geological map	Source	Scale
IT.PGN	Geological map of Italy 1:100.000- sheet 160- Cassino	1:100.000

In Table 4 Geological, Lithotechnical Units are described and are concerned to maps of following chapters. The term “deduced” means the result comes from an interpretation of a preexisting data according to the nomenclature of Seismic Microzonation classification; Technical Commission MS, 2015.

Table 4

GEOLOGICAL UNITS		LITHOTECHNICAL UNIT	
deduced. According to the nomenclature of geological map of Italy 1:100.000- sheet 160 - Cassino.		(MZS) <i>original</i>	
code	description	code	description
Is	predominantly silts and silty sands sometimes with crossed stratification and black and brune tufaceous intercalations	SM-lc	silty sands, mixture of sands and silt



3. GEOLOGICAL MAP

In Figure 1 Geological Map is reported in a 1kmx1km square around the station.

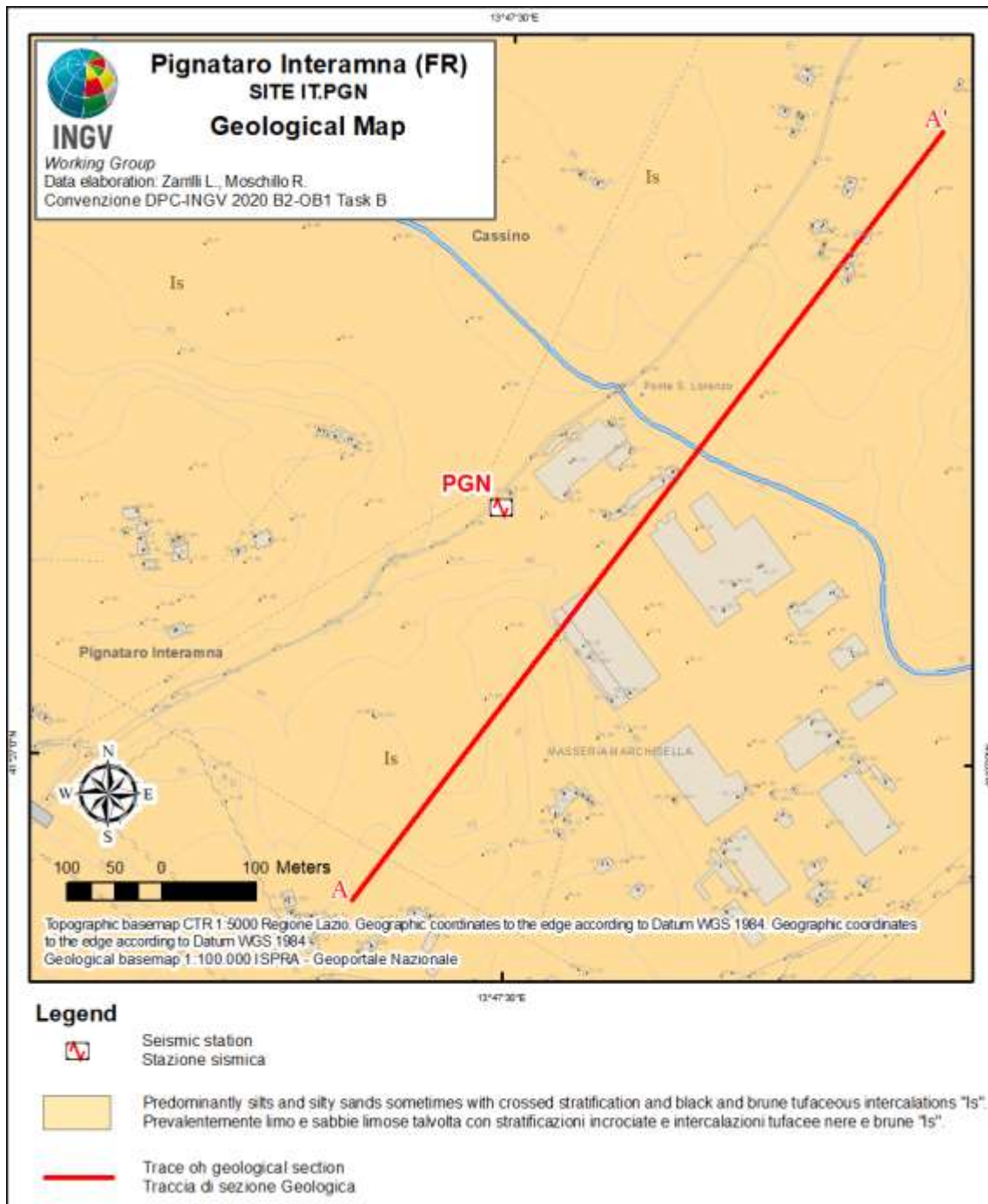


Figure 1. Geological map of seismic station IT.PGN. Scale 1:5.000. Geological units are established according to the nomenclature of geological map of Italy 1:100.000 (Sheet 160-Cassino).

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.PGN - Pignataro Interamna (Fr). <http://hdl.handle.net/2122/14056>.



5. SURVEY MAP

Figure 3 shows the survey Map reported previous geotechnical and seismological investigations used for the characterization of the area, finalized to the realization of the report for the seismic microzonation of Pignataro municipal area.

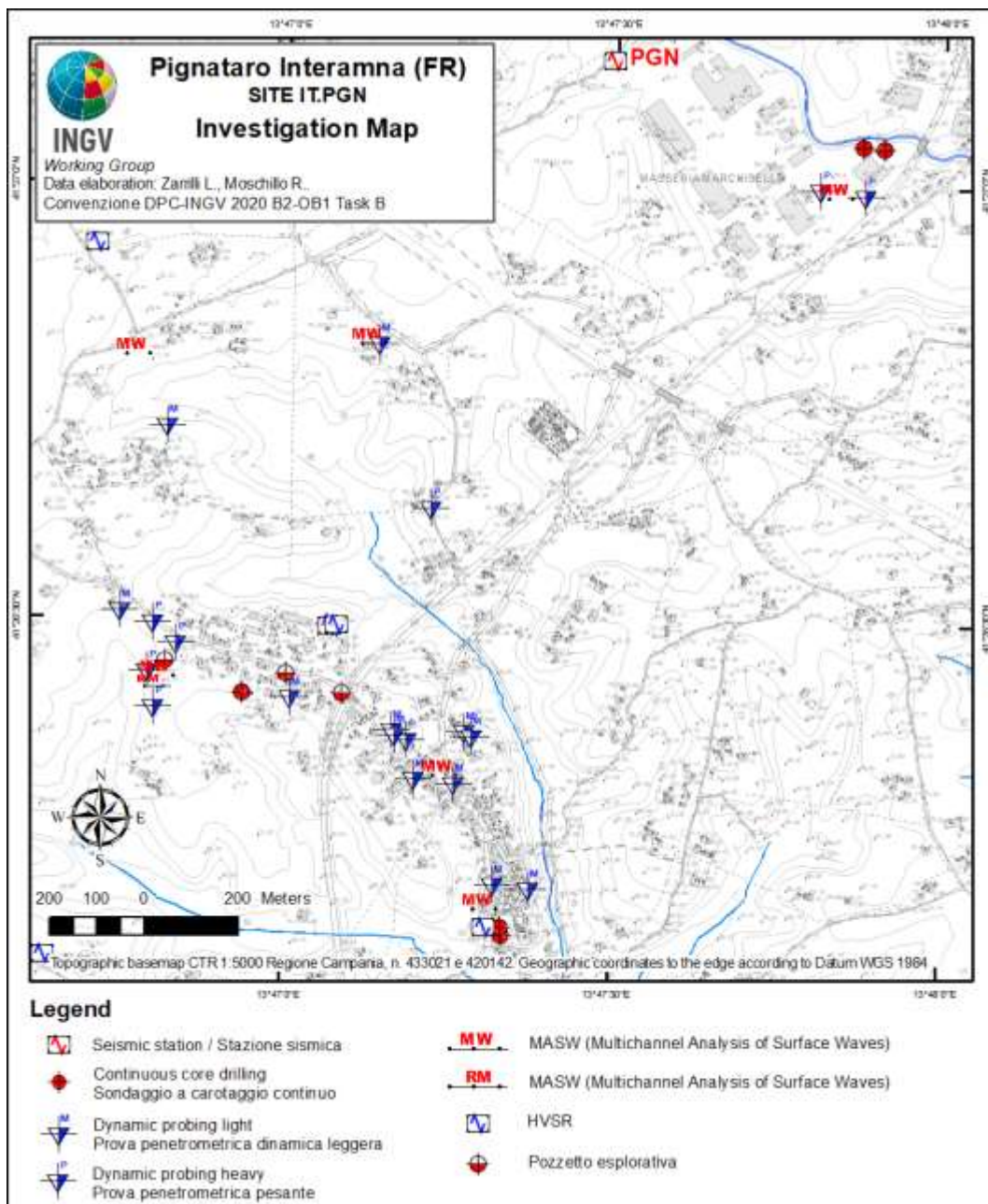


Figure 3: Map of the surveys near the station IT.PGN. Scala 1: 10.000. The box at the bottom right contains a zoom of the area with the detail of the inside investigations conducted in the area.



6. GEOLOGICAL MODEL

6.1 General description

The area affected by the present work is characterized by the presence of marine Pliocene-Pleistocene deposits resting on Miocene flysch sediments.

During the geological survey of the area the following stratigraphic terms were identified:

- Continental Quaternary deposits Pleistocene-Inf. fluvial-lake depositis

The area under examination is characterized by outcrops of predominantly silts and silty-sands lithotypes with a low to medium degree of firmness.

6.2 Geology and structural geology of the area.

The reliefs of the area are characterized, for the most part, by limestones and dolomites in carbonatic platform facies, ranging from the Upper Triassic to the Paleocene, with a thickness of about 4000 meters.

The succession continues, after a stratigraphic gap, with Miocene formations (Calcari bryozoans and lithotamni, marls in Orbulina, Frosinone Formation) consisting of turbidite deposits of sin-rift (flysch), which fill the intramontane basins. At the top of the latter and above the Cretaceous limestones there are strips of disrupted materials, different from the soils that today they surround them and generically called chaotic clays, referable to the "Sicilidi Units (or external Liguridi) coming from more internal areas (Tyrrhenian Sea) (Naso & Tallini 1993). In discordance with Mesozoic carbonates and Miocene units, clays are found with chinks of the Messinian (5 Ma) and conglomerates from the Lower Pliocene (5-3 Ma).

During the Pleistocene the investigated area emerges and a relaxing tectonic phase generates internal basins fluvio-lacustrine with related volcanic manifestations (Roccamonfina), controlled by Apennine and anti-Apennine faults.



The silts and sandy silts that are recognizable in the study areas, are the result of fluvial and lake deposits happened in the indicated internal basins. In these deposits there are brown and blackish tuff intercalations as a result of Roccamonfina volcanic manifestations (fig. 4). According to what reported in the official geological cartography (Geological Map of Italy scale 1: 100.000 – Cassino 160) the area under examination is not affected by large tectonic discontinuities and, during the surface geological survey, no faults were identified or other tectonic elements, that could compromise the stability of the area near the seismic station.

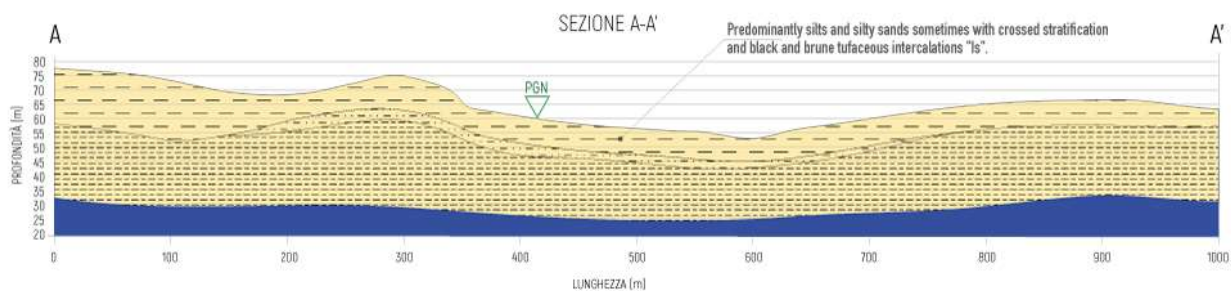


Figure 4: Geological cross section: A-A'.

6.3 Geological Section

A knowledge of the station site subsurface is available, thanks to geotechnical and seismological investigations finalized to the realization of the report for the seismic microzonation of Pignataro municipal area.

Looking at results we can see that the shallower portion (10 m) consists in silts and sandy silt slightly or moderately compacted with crossed stratification and including black and brune tuffaceous intercalations.

Between the 10 and the 15 m, there is a layer made of the same materials with a larger clayey portion (probably a local and punctual deepening of the pull-apart basin). Under these



products, there is a layer of about 30 meters thick characterized by an alternation of silts, sands and clays. All these lithotypes are the product of a lake-fluvial depositional environment.

6.4 Subsoil model

A subsoil model is built up a depth of 50 m for the area around the IT.PGN station (Figure 5) based on geological information, and data extracted from a geological and geotechnical report finalized to the production of seismic microzonation of Pignataro municipal area.

According to seismic and geotechnical data extracted from the report described, the substrate consists of not stone, stratified materials.

All the data in this report and the consequent interpretations will be integrated with supply informations resulting from the data analysis of geophysics surveys (array) that will be conducted by INGV Working Group for the PGN site.



STRATIGRAPHIC PROFILE

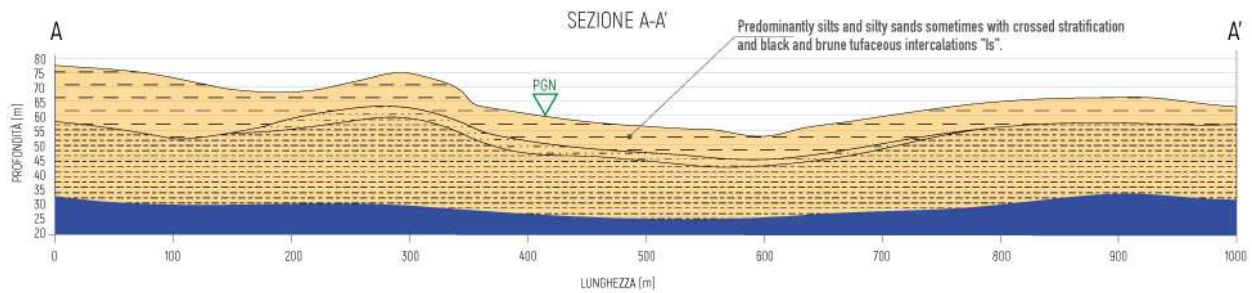
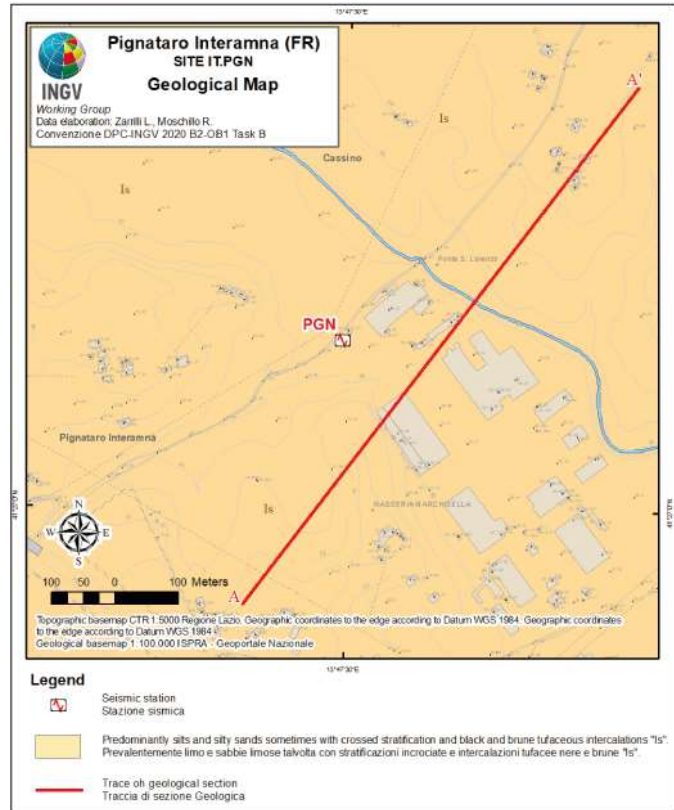
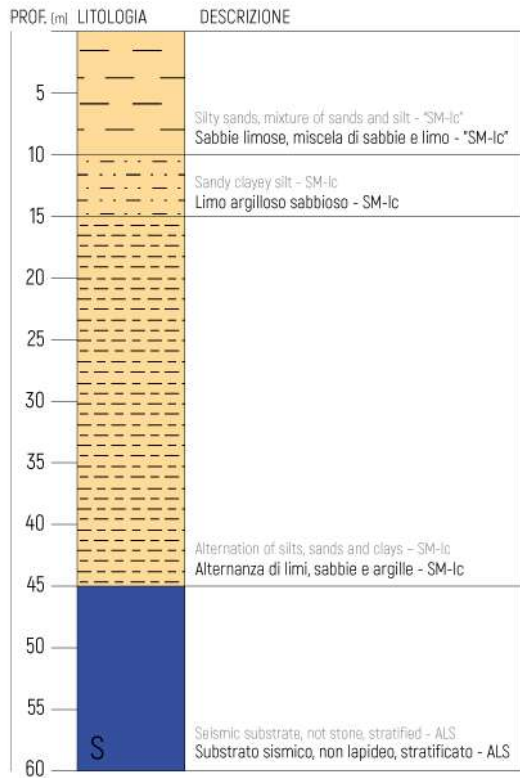


Fig. 5: Geological Map (a). Subsoil model under the IT.PGN seismic station according to seismic and geotechnical investigations (b). Geological cross section (c).

Fig. 5b



7. REFERENCES

Geological MAP of Italy - 1:100.000 – Sheet 160 -Cassino. ISPRA

http://193.206.192.231/carta_geologica_italia/tavoletta.php?foglio=174

Topographic basemap CTR 1:5000 Regione Lazio. Geographic coordinates to the edge according to Datum WGS 1984.

Geographic coordinates to the edge according to Datum WGS 1984

<http://dati.lazio.it/catalog/it/dataset/carta-tecnica-regionale-2002-2003-5k-frosinone>

Notes attached Geological map of Italy sheet 160 (Cassino) and geological survey

Commissione Tecnica per la Microzonazione Sismica (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)

Geotechnical and seismological investigations finalized to the realization of the report for the seismic microzonation of Pignataro municipal area. – Dott. Andrea Evangelista, Dott. Gaspare Ruggiero.

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.



This document is licensed under License

Attribution – No derivatives 4.0 International (CC BY-ND 4.0)

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 documento¹ 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.



Quest'opera è distribuita con Licenza

Creative Commons Attribuzione - Non opere derivate 4.0 Internazionale.

1Questo 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)”.