ISSN 2039-6651
anno 2019 numero 50



MISCELLANEA INGV

A photographic collection of the coseismic geological effects induced by the 21 August 2017, M=4, Casamicciola earthquake (Ischia island, Italy)

ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

50

Direttore Responsabile
Valeria DE PAOLA

Editorial Board
Luigi CUCCI - Editor in Chief (luigi.cucci@ingv.it)
Raffaele AZZARO (raffaele.azzaro@ingv.it)
Christian BIGNAMI (christian.bignami@ingv.it)
Mario CASTELLANO (mario.castellano@ingv.it)
Viviana CASTELLI (viviana.castelli@ingv.it)
Rosa Anna CORSARO (rosanna.corsaro@ingv.it)
Domenico DI MAURO (domenico.dimauro@ingv.it)
Mauro DI VITO (mauro.divito@ingv.it)
Marcello LIOTTA (marcello.liotta@ingv.it)
Mario MATTIA (mario.mattia@ingv.it)
Milena MORETTI (milena.moretti@ingv.it)
Nicola PAGLIUCA (nicola.pagliuca@ingv.it)
Umberto SCIACCA (umberto.sciacca@ingv.it)
Alessandro SETTIMI (alessandro.settimi1@istruzione.it)
Andrea TERTULLIANI (andrea.tertulliani@ingv.it)

Segreteria di Redazione
Francesca DI STEFANO - Coordinatore
Rossella CELI
Barbara ANGIONI

redazionecen@ingv.it

REGISTRAZIONE AL TRIBUNALE DI ROMA N.174 | 2014, 23 LUGLIO

© 2014 INGV Istituto Nazionale di Geofisica e Vulcanologia
Rappresentante legale: Carlo DOGLIONI
Sede: Via di Vigna Murata, 605 | Roma

ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

ISSN 2039-6651
anno 2019 numero 50

MISCELLANEA INGV

A photographic collection of the coseismic geological effects induced by the 21 August 2017, M=4, Casamicciola earthquake (Ischia island, Italy)

Emergeo Working Group*

*Rosa Nappi[1], Giuliana Alessio[1], Germana Gaudiosi[1], Rosella Nave[1], Enrica Marotta[1], Valeria Siniscalchi[1], Riccardo Civico[1], Luca Pizzimenti[1], Rosario Peluso[1], Pasquale Belviso[1], Sabina Porfido[2,1]

[1]INGV | Istituto Nazionale di Geofisica e Vulcanologia
[2]CNR-ISA | Avellino

EMERGEO
ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

Accepted 19th July 2019 | *Accettato il 19 luglio 2019*
How to cite | *Come citare* Emergeo Working Group, (2019). A photographic collection of the coseismic geological effects induced by the 21 August 2017, M=4, Casamicciola earthquake (Ischia island, Italy). Misc. INGV, 50: 1-94.

Cover | *In copertina* Coseismic rupture in the ground with evidence of about 1 cm of opening

50

INDEX

Indroduction	**7**
**Via Crateca	Fango	Lacco Ameno**	**9**
**Via dei Carri	Via Montecito	Via D'Aloisio**	**25**
**Piazza Maio	Via Campomanno**	**61**
Acknowledgements	**89**
References	**89**

Introduction

On 21 August 2017, a shallow earthquake of Md 4.0 struck the Casamicciola Terme village in the north of Ischia volcanic island (Italy). The earthquake has the typical characteristics of volcano-tectonic events recorded at active volcanoes and occurred along the E-W normal system fault bounding the northern slope of Mt. Epomeo. The epicentral area has been repeatedly damaged in the last three centuries (1796, 1828, 1881, 1883) [Alessio et al., 1996; Carlino et al., 2011; Cubellis and Luongo, 1998].

In this work, we present a collection of pictures showing the geological effects produced on either the natural or the built environment by the Casamicciola earthquake. Most of the coseismic geologic effects were observed along the E-W piedmont belt of Mt. Epomeo, which extends for about 2 km between the village of Fango (Lacco Ameno) to the west and Bagni Square to the East (Fig. 1).

Mapped effects define a belt which closely follows the trace of the Casamicciola E-W trending normal fault system, bounding the northern slope of Mt. Epomeo, previously known as a Latest Pleistocene to Holocene normal fault [Nappi et al., 2018].

The Emergeo Working Group conducted a field work, collecting data that were managed following the procedures codified after the earthquake sequences of Emilia 2012 and Amatrice-Visso-Norcia 2016-2017 [Emergeo Working Group, 2012, 2016; Pucci et al., 2017; Civico et al., 2018; Villani et al., 2018]. Photographic collections of the coseismic geological effects induced by these earthquake were also published [Emergeo Working Group, 2012; Emergeo Working Group, 2017 a, b]. Field measurements were greatly aided by the use of mobile devices equipped with a specific software employing GPS, compass and orientation sensors (Rocklogger© mobile app, www.rockgecko.com), which allowed for quick and accurate structural data collection and real-time sharing. The whole data set was stored and managed in a georeferenced database on an Environmental Systems Research Institute ArcGIS platform. Further data were acquired using remotely piloted aircraft systems (RPAS) equipped with a Sony Alpha 6000 camera and a Flir SC655 thermal camera. We collected more than 100 observations of several different coseismic effects across the epicentral area and its sourroundings. These include fractures, ruptures, and a few minor gravitational phenomena like collapses and small landslides in volcanoclastic deposits.

Moreover we observed widespread effects related to shaking, such as the collapse of drywalls made of green tuff and lava and known locally as “parracine”.

The photographic dataset consist of 72 pictures of coseismic geological effects along a E-W direction. The pictures are grouped in three areas of observation. Each picture reports a series of information such as type of effect, site of observation, and geographical coordinates (decimal degrees). The reference system/datum used is WGS84. In Figure 1 we show the map of the pictures sites along with the location of the mainshock of the seismic event.

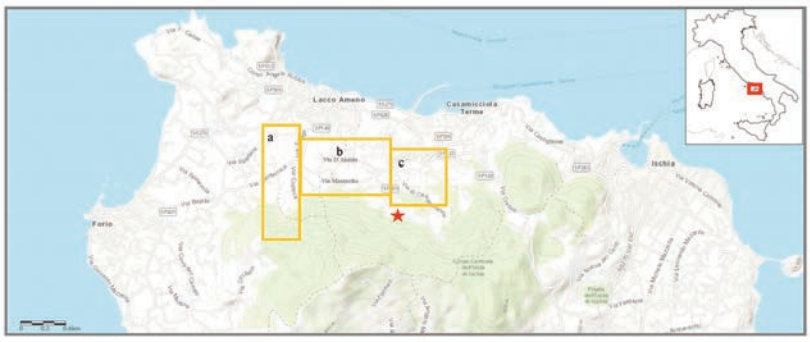
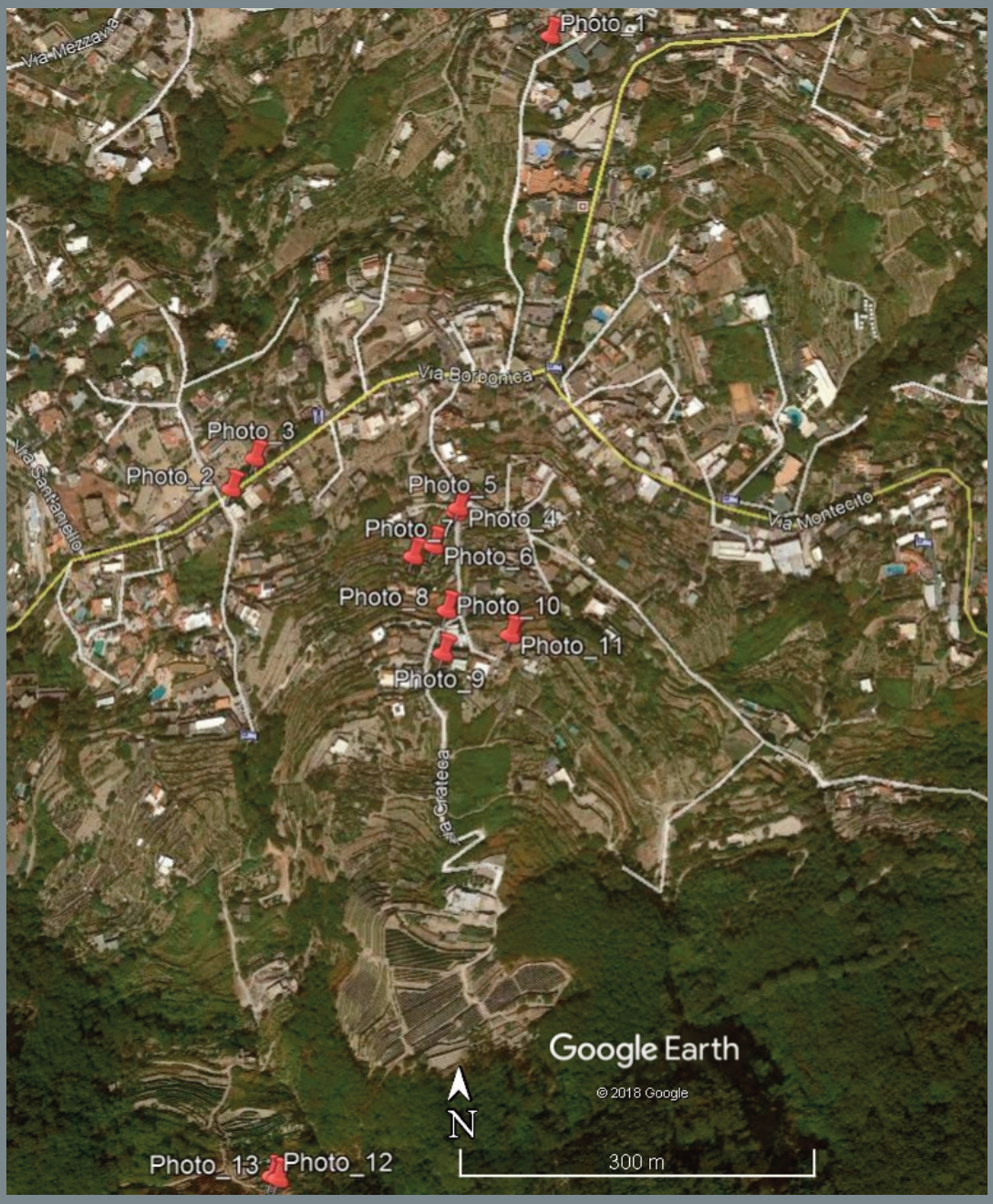


Figure 1 Map showing the location of the areas (the yellow rectangles) where the 72 pictures presented in this work were taken: **a**) Via Crateca - Fango - Lacco Ameno area; **b**) Via dei Carri - Via Montecito - Via D’Aloisio area; **c**) Piazza Maio - Via Campomanno area. The red star indicates the epicenter of the Md=4.0 mainshock.

VIA CRATECA | FANGO | LACCO AMENO



Detailed location map of the photographs of the area Via Crateca-Fango-Lacco Ameno shown in the a) yellow rectangle of figure 1. Red numbered pins locate the photos.



Photo 1
(40.746131° 13.888086°)
Collapsed sidewall in Via Fango.



Photo 2
(40.742235° 13.884543°)
Severely damaged and collapsed houses along Via Borbonica.



Photo 3
(40.742495° 13.884802°)
Fractured pillars along the sidewalk of the Via Borbonica.



Photo 4
(40.742066° 13.887092°)
Coseismic rupture in the ground in the driveway of private property (Via Crateca, Fango) with total length of about 30 m.



Photo 5
(40.742028° 13.887070°)
Detail of photo 4: open rupture in the soil with evidence of about 1 cm of opening.



Photo 6
(40.741751° 13.886823°)
Coseismic rupture in the soil in the driveway of the same private property of photo 4 (Via Crateca, Fango).



Photo 7
(40.741663° 13.886602°)
Rupture in the ground adjoining to the private property of photo 4 with about 2 cm wide, extending along a concrete pavement.



Photo 8

(40.741216° 13.886989°)

Open fractures affect two pillars bordering the entrance of n. 28 Via Crateca. This property showed fractures in the paving slab at the entrance with paving stones lifting of a few cm.



Photo 9
(40.740865° 13.886959°)
Property at n. 26 Via Crateca: coseismic rupture with direction N70E and total length of about 10 meters, open and vertical downthrow of about 2/3 cm towards North.



Photo 10
(40.741025° 13.887702°)
N70E rupture of about 18 meters long with horizontal opening of about 2 cm and vertical downthrow of about 2 cm towards North. This rupture shows a vertical deepening into the ground of about 35 cm.



Photo 11
(40.741016° 13.887679°)
Details of photo n.10 with evidence of block lowering.

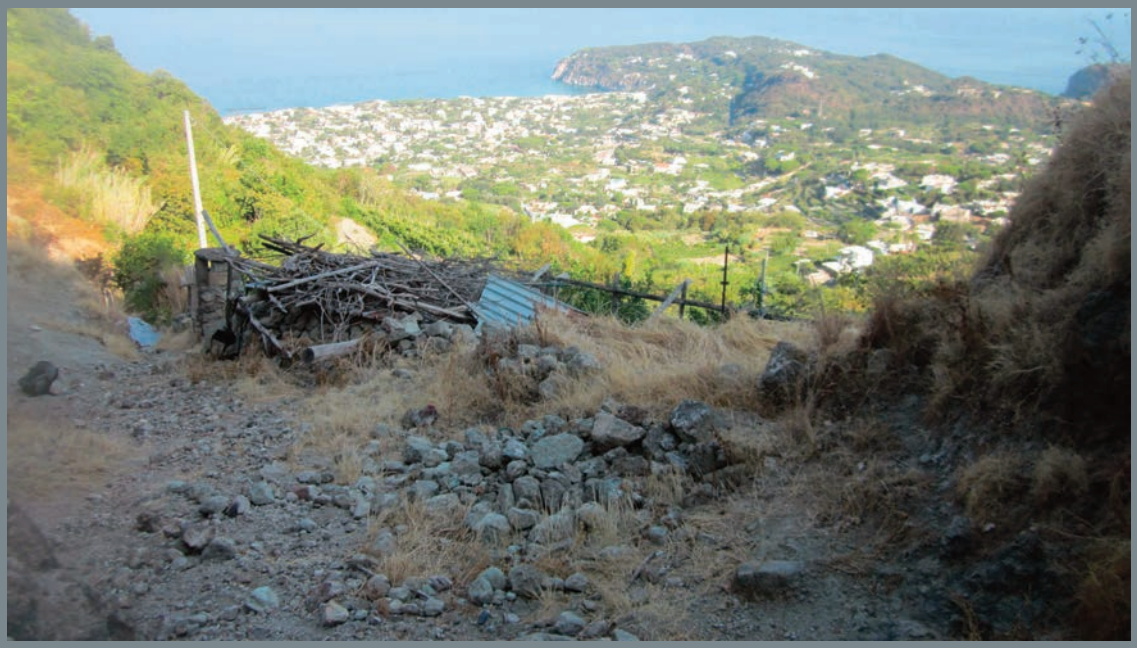


Photo 12
(40.736831° 13.885297°)
Pizzone fumarolic area with evidence of diffuse rockfalls.



Photo 13
(40.736814° 13.885357°)
Fracture into the ground in Pantane fumarolic area (M.te Cito).

VIA DEI CARRI | VIA MONTECITO | VIA D'ALOISIO



Detailed location map of the photographs of the area Via dei Carri-Via Montecito-Via D'Aloisio shown in the b) yellow rectangle of figure 1. Red numbered pins locate the photos.



Photos 14
(40.742222° 13.887901°)
Coseismic rupture with horizontal opening on a paved road along Via dei Carri, also affecting the courtyard wall.



Photo 15
(40.742225° 13.887884°)
Detail measurement of the rupture strike, as in photo 14.



Photo 16
(40.741903° 13.888114°)
Secondary coseimic effects, along Via dei Carri: collapse of drywalls, known locally as “parracine”.



Photo 17
(40.741460° 13.888710°)
Severe damages on a detached house, in Via dei Carri.



Photo 18
(40.741478° 13.888903°)
Collapse of the external wall of the damaged house shown in Photo 17.



Photo 19
(40.740609° 13.889906°)
Collapse of drywalls as secondary seismic effects along Via dei Carri.



Photo 20
(40.739369° 13.893487°)
Collapse of drywalls as secondary seismic effects along Via dei Carri.



Photo 21
(40.739136° 13.894196°)
Collapse of drywalls bordering both sides of the road, along Via dei Carri.



Photo 22
(40.739102° 13.894529°)
Coseismic fracture with few centimeters vertical displacement along Via dei Carri.



Photo 23
(40.739117° 13.895028°)
Coseismic fracture in volcanic ash soil, showing an open horizontal displacement along Via dei Carri.



Photo 24
(40.739118° 13.895109°)
Detail measurement of the fracture in photo 23.



Photo 25
(40.742180° 13.890433°)
Fracture on concrete pavement causing its detaching from the handrail pillar, along Via Montecito.



Photo 26
(40.741051° 13.893538°)
Rollover of small pillars of the handrail.

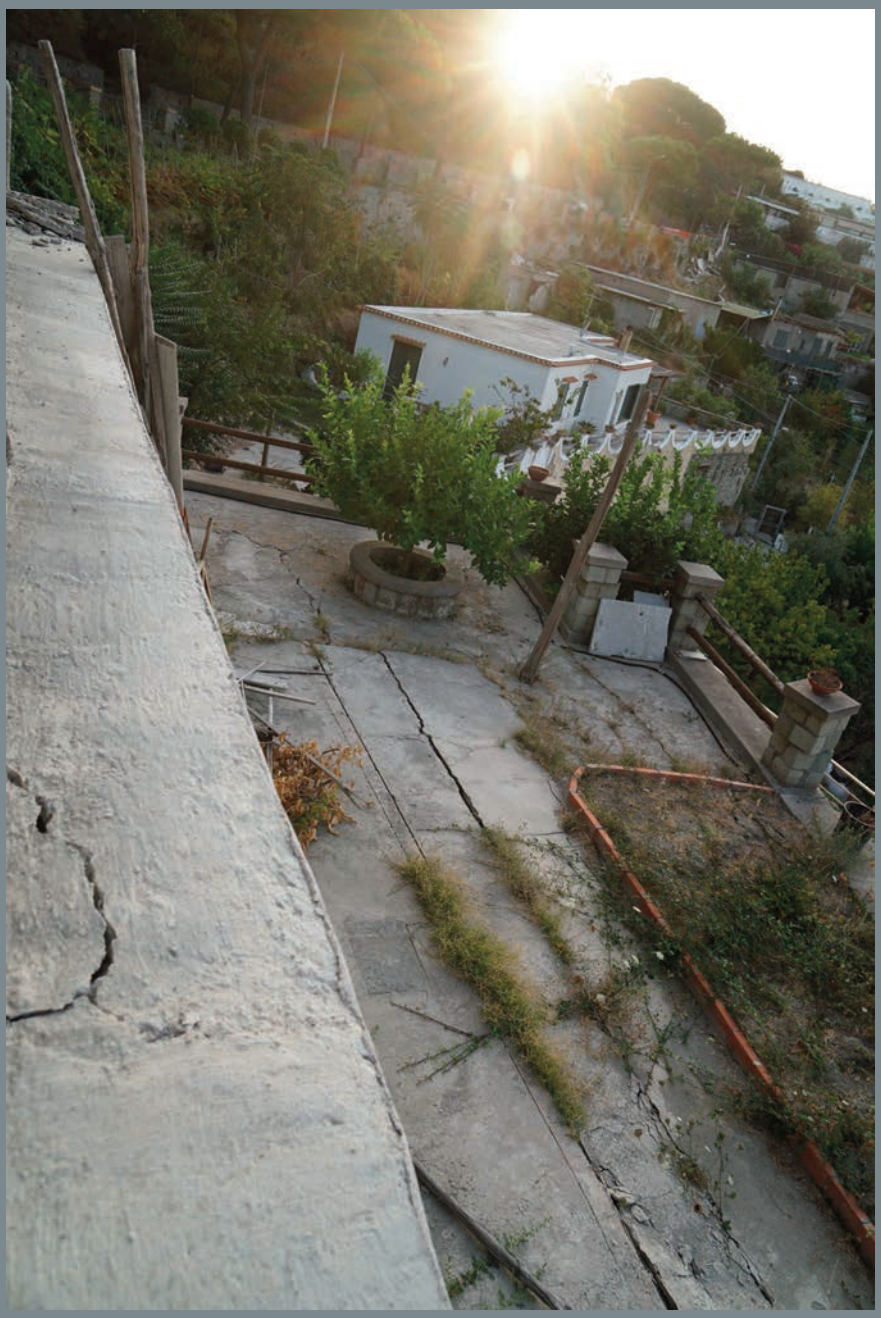


Photo 27
(40.740769° 13.894643°)
Coseismic ruptures affecting both concrete basement and ground soil, in a villa along Via Montecito.



Photo 28
(40.740884° 13.894815°)
Detail on the fracture affecting the garden soil.



Photo 29
(40.740833° 13.894542°)
Coseismic effects involving the concrete basement and the adjacent handrail wall.



Photo 30
(40.740876° 13.894627°)
Detachment and rotation of the top of a handrail pillar.



Photo 31
(40.740934° 13.894751°)
Collapse of the external wall of a damaged villa, downstream of Via Montecito.



Photo 32
(40.743664° 13.895713°)
Coseismic ruptures on paved road with horizontal opening, in Via D'Aloisio parking area.



Photo 33
(40.743697° 13.895643°)
Detail of the coseismic rupture on paved road shown in photo 32.
It is appreciable a vertical offset of almost 2 cm.



Photo 34
(40.743854° 13.897108°)
Coseismic rupture in soil in a garden at Via D'Aloisio with direction N80E and horizontal opening of a few cm, along the E-W striking dip-slip system fault of the Mt. Epomeo northern flank.



Photo 35

(40.743700° 13.897243°)

Coseismic rupture in soil in a garden at Via D'Aloisio with direction N80E and horizontal opening of a few cm, along the E-W striking dip-slip system fault of the Mt. Epomeo northern flank.



Photo 36
(40.743476° 13.897395°)
Collapse of drywall in Via D'Aloisio known locally as "parracine", from south to north along the E-W striking dip-slip system fault of the Mt. Epomeo northern flank. Lamppost and chimney of the house lowered towards North.



Photo 37

(40.742807° 13.897883°)

Collapse and severely damaged houses in a side street of Via D'Aloisio, along the E-W striking dip-slip system fault of the Mt. Epomeo northern flank.



Photo 38
(40.743093° 13.898186°)
Collapse of drywall in a side street of Via D'Aloisio with E-W trending. In the background of the picture it is visible the collapse of the house shown in the previous photo 37.



Photo 39
(40.743094° 13.898618°)
Severe damages and collapse of the Suffragio church bell tower which caused the death of a woman, along Via D'Aloisio.



Photo 40
(40.743097° 13.898661°)
Coseismic fracture affecting both paved road and man-made structures, near the Suffragio church along Via D'Aloisio.



Photo 41
(40.742505° 13.899797°)
Fracture in paved road along Via D'Aloisio, which extends on the wall of a house.
The house is severely damaged.



Photo 42
(40.742574° 13.900215°)
Column of doorway of an house along Via D'aloisio, showing a fracture with right movement.



Photo 43
(40.742580° 13.900307°)
Coseismic fracture affecting both paved road and man-made structures, along Via D'Aloisio.



Photo 44
(40.742057° 13.899640°)
Fracture affecting the tarred Via Montecito along the E-W striking dip-slip system fault of the Mt. Epomeo northern flank. Houses along the road are collapsed or heavily damaged.

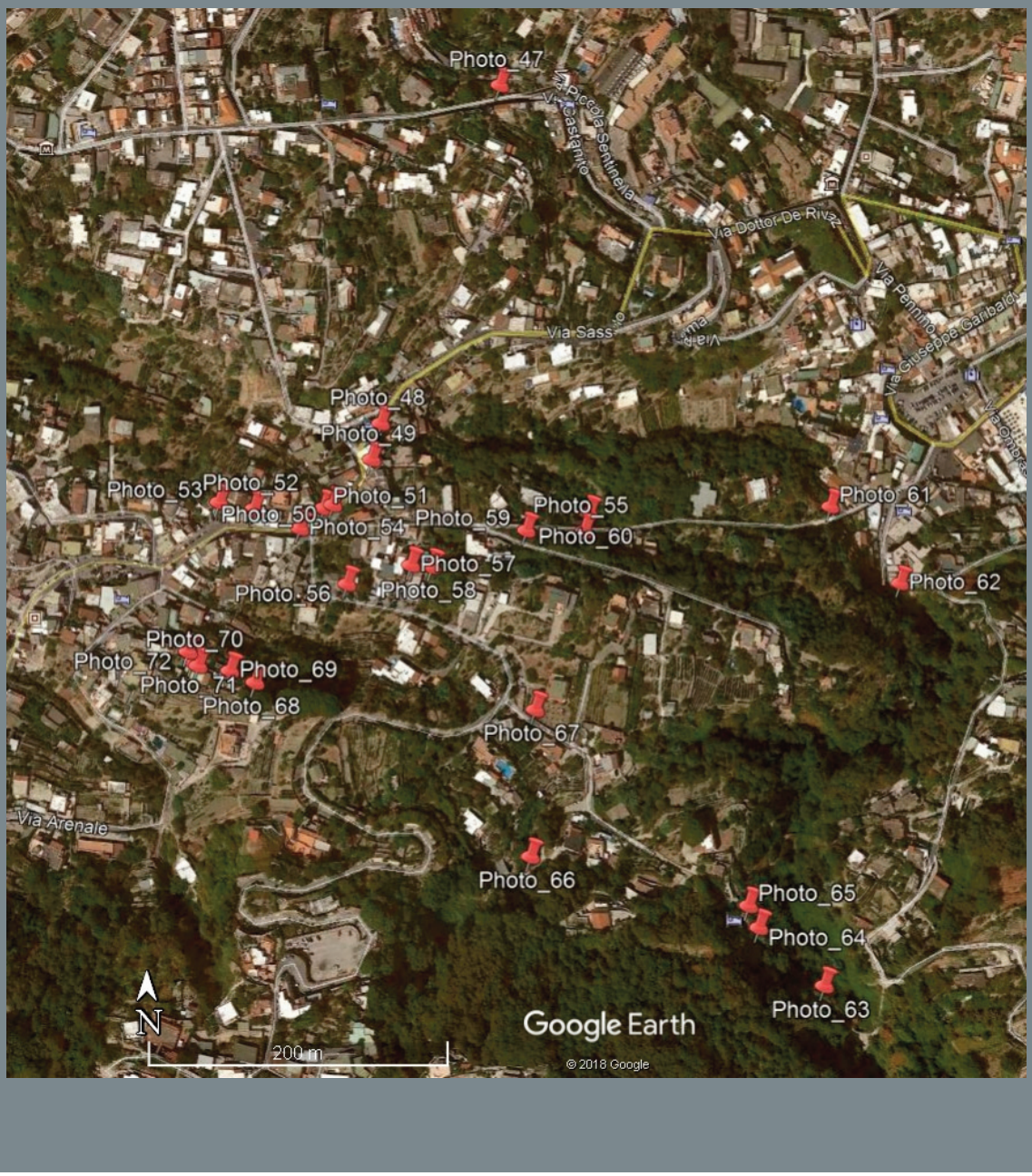


Photo 45
(40.742054° 13.899618°)
The fracture in tarred Via Montecito.



Photo 46
(40.742052° 13.899620°)
Detail of fracture showed in photo 45.

PIAZZA MAIO | VIA NIZZOLA VIA CAMPOMANNO



Detailed location map of the photographs of the area Piazza Maio-Via Nizzola-Via Campomanno shown in the c) yellow rectangle of figure 1. Red numbered pins locate the photos.



Photo 47
(40.745316° 13.903518°)
Coseismic fracture on paved road in Via Castanito, Casamicciola Terme.



Photo 48
(40.743056° 13.902477°)
Fracture in the courtyard of a house in Via Sassolo, Casamicciola Terme.



Photo 49
(40.742814° 13.902402°)
Houses heavily damaged along Via Ottringolo in the hilly historical centre of Casamicciola Terme.



Photo 50
(40.742514° 13.902068°)
Coseismic fracture on tarred Via Ottringolo, Casamicciola Terme.



Photo 51
(40.742491° 13.901988°)
Collapses of the wall of a house damaged along Via Ottringolo.



Photo 52
(40.742486° 13.901391°)
House heavily damaged along Via Speziera.



Photo 53
(40.742529° 13.901086°)
Collapses of walls at Piazza Maio.



Photo 54

(40.742357° 13.901784°)

Fracture in tarred road, collapse of house walls, displacement of the votive statue along the fracture affecting the wall of the house at the intersection of Via Speziera, Via Ottringolo and Via Santa Barbara.



Photo 55
(40.741962° 13.902163°)
Fracture in the asphalt at the beginning of Via Santa Barbara, which extends to the sidewalk.
The fracture has direction N10/20E, crosses the entire road surface and has a length of about 5m.



Photo 56

(40.741991° 13.902195°)

The same fracture of photo n.55 in Via Santa Barbara, but seen from the opposite side of the road; it is evident that it extends to the wall of a house.



Photo 57
(40.742115° 13.902752°)
Fracture with lowering into the tile flooring of the terrace outside the house at n.16 Via Santa Barbara.



Photo 58

(40.742104° 13.902934°)

Rupture in the house garden at n. 16 Via Santa Barbara; it begins along the edge of this street, and extends for about 20 m towards Northeast. There is also evidence of ground sinking with direction N110E - N120E and horizontal opening of some cm.



Photo 59
(40.742345° 13.903753°)
Collapse phenomena of drywalls in Via Nizzola, Casamicciola Terme.



Photo 60
(40.742459° 13.904303°)
Fracture on paved road in Via Nizzola, Casamicciola Terme.



Photo 61
(40.742511° 13.906498°)
Collapse phenomena of tuff blocks in Via Nizzola, Casamicciola Terme.



Photo 62
(40.741983° 13.907134°)
Small landslides in volcanoclastic deposits in Via Nizzola, Casamicciola Terme.



Photo 63
(40.739411° 13.906299°)
Rupture in tarred road along Via Campomanno. The total length of the fracture system is of the order of hundred of meters.



Photo 64
(40.739782° 13.905744°)
The rupture extends along Via Campomanno. An opening of 1 cm is appreciable.



Photo 65
(40.739919° 13.905659°)
Small debris flow in volcanoclastic deposits along Via Campomanno.



Photo 66
(40.740213° 13.903796°)
Coseismic rockfall in volcanoclastic deposits as secondary coseimic effect, along Via Campomanno.



Photo 67
(40.741168° 13.903835°)
Collapse of drywalls as secondary coseimic effect, along Via Campomanno.



Photo 68

(40.741360° 13.901447°)

Long ruptures observed in the concrete floor of the entrance avenue of a villa in n. 29 Via Santa Barbara. The average direction of the ruptures is about N110E (in detail the segments vary from N80E to N120E) and the maximum observed opening is about 4 cm.



Photo 69
(40.741435° 13.901233°)
The ruptures shown in photo 68 extend along a cemented embankment, and on a lateral containment wall, in the same villa.



Photo 70
(40.741468° 13.900964°)
The ruptures of the previous photos extends to the terrace outside.



Photo 71
(40.741497° 13.900916°)
The rupture of the previous photos also extends to the back of the house and affects the skirting board and ground. The overall length of the fracture system in Photo 68, 69, 70, 71 is of the order of hundred of meters.



Photo 72
(40.741559°13.900874°)
Rupture in ground a few meters long, open at some points, in the garden at the back of the same villa (previous photos) with mean direction of N100/110E and a lowering towards Northeast.

Acknowledgements

We want to thank the people that gave us helpful information and took us in their properties. We also thank the referee Roberto Vallone for his useful suggestions. Photographs taken by: R. Nappi, G. Alessio, G. Gaudiosi, R. Nave, E. Marotta, V. Siniscalchi, S. Porfido.

Further information on the Casamicciola earthquake (Ischia island):
INGV Uffico Stampa News

http://www.ingv.it/it/stampa-e-urp/stampa/news/2153-il-terremoto-di-casamicciola-isola-d-ischia-del-21-agosto-2017-evidenze-di-fagliazione-superficiale?highlight=WyJjYXNhbWljY2lvbGEiXQ==

References

Alessio G., Esposito E., Ferranti L., Mastrolorenzo G., Porfido S., (1996). *Correlazione tra sismicità ed elementi strutturali nell'isola d'Ischia*. Il Quaternario, 9, no. 1, 303-308.

Carlino, S., Cubellis E. and Marturano A., (2011). *The catastrophic 1883 earthquake at the island of Ischia (southern Italy): macroseismic data and the role of geological conditions*. Nat. Hazards, 52, 1, 231-247, 10.1007/s11069-009-9367-2.

Civico R., Pucci S., Villani F., Pizzimenti L., De Martini P.M., Nappi R. and the Open EMERGEO Working Group: Agosta F., Alessio G., Alfonsi L., Amanti M., Amoroso S., Aringoli D., Auciello E., Azzaro R., Baize S., Bello S., Benedetti L., Bertagnini A., Binda G., Bisson M., Blumetti A.M., Bonadeo L., Boncio P., Bornemann P., Branca S. , Braun T., Brozzetti F., Brunori C.A. , Burrato P., Caciagli M., Campobasso C., Carafa M., Cinti F.R., Cirillo D., Comerci V., Cucci L., De Ritis R., Deiana G., Del Carlo P., Del Rio L., Delorme A., Di Manna P., Di Naccio D., Falconi L., Falcucci E., Farabollini P., Faure Walker J.P., Ferrarini F., Ferrario M.F., Ferry M., Feuillet N., Fleury J., Fracassi U., Frigerio C., Galluzzo F., Gambillara R., Gaudiosi G., Goodall H., Gori S., Gregory L.C., Guerrieri L., Hailemikael S., Iezzi F., Invernizzi C., Jablonská D., Jacques E., Jomard H., Kastelic V., Klinger Y., Lavecchia G., Leclerc F., Liberi F., Lisi A., Livio F., Lo Sardo L., Malet J.P., Marco O., Mariucci M.T., Materazzi M., Mazzarini F., McCaffrey K.J.W., Michetti A., Mildon Z.K., Montone P., Moro M., Nave R., Pace B., Paggi S., Pagliuca N., Pambianchi G., Pantosti D., Patera A., Pérouse E., Pezzo G., Piccardi L., Pierantoni P.P., Pignone M., Pinzi S., Pistolesi E., Point J., Pozzi A., Proposito M., Puglisi C., Puliti I., Ricci T., Ripamonti L., Rizza M., Roberts G.P., Roncoroni M., Sapia V., Saroli M., Sciarra A., Scotti O., Skupinski G., Smedile A., Tarabusi G., Tarquini S., Terrana S., Tesson J., Tondi E., Valentini A., Vallone R., Van der Woerd J., Vannoli P., Venuti A., Vittori E., Volatili T , Wedmore L.N.J., Wilkinson M., Zambrano M., (2018). *Surface ruptures following the 30 October 2016 Mw 6.5 Norcia earthquake, central Italy*. Journal of Maps, vol. 14, 151-160, doi: 10.1080/17445647.2018.1441756.

Cubellis E. and Luongo G., (1998). Il terremoto del 28 luglio 1883 a *Casamicciola nell'Isola di Ischia - Il contesto fisico. In: Monografia n 1, Presidenza del Consiglio dei Ministri*, Servizio Sismico Nazionale, Istituto Poligrafico e Zecca dello Stato, Rome, Italy, 49-123.

EMERGEO Working Group: Alessio G., Alfonsi L., Brunori C.A., Burrato P., Casula G., Cinti F.R., Civico R., Colini L., Cucci L., De Martini P.M., Falcucci E., Galadini F., Gaudiosi G., Gori S., Mariucci M. T., Montone P., Moro M., Nappi R., Nardi A., Nave R., Pantosti D., Patera A., Pesci A., Pignone M., Pinzi S., Pucci S., Vannoli P., Venuti A., Villani F., (2012). *Technologies and new approaches used by the INGV EMERGEO Working Group for real-time data sourcing and processing during the Emilia Romagna (Northern Italy) 2012 earthquake sequence*. Annals of Geophysics, 55, 4, 2012; doi: 10.4401/ag-6117.

EMERGEO Working Group: Cucci L., Pinzi S., Alessio G., Alfonsi L., Azzaro R., Brunori C.A., Burrato P., Caciagli M., Carafa M., Carluccio R., Chiappini M., Cinti F.R., Civico R., d'Ajello Caracciolo F., Del Carlo P., De Martini P.M., De Ritis R., Di Naccio D., Falcucci E., Fracassi U., Gaudiosi G., Gori S., Kastelic V., Lancia M., Lo Sardo L., Mariucci M.T., Mazzarini F., Montone P., Moro M., Nappi R., Nave R., Nicolosi I., Pagliuca N., Pantosti D., Patera A., Pezzo G., Pignone M., Pizzimenti L., Pucci S., Ricci T., Sapia V., Saroli M., Sciarra A., Smedile A., Tarquini S., Vallone R., Vannoli P. and Villani F., (2017a). *Photographic collection of the coseismic geological effects originated by the 24th August, Amatrice (Central Italy) seismic sequence*. Miscellanea INGV n.34, 1-114, ISSN 2039-4651

EMERGEO Working Group, Cucci L., Alfonsi L., Caciagli M., Pinzi S., Vallone R., Alessio G., Amoroso S., Azzaro R., Bertagnini A., Braun T., Brunori C.A., Burrato P., Carafa M., Cinti F.R., Civico R., Del Carlo P., De Martini P.M., De Ritis R., Di Naccio D., Falcucci E., Fracassi U., Gaudiosi G., Gori S., Kastelic V., Lancia M., Lo Sardo L., Mariucci M.T., Mazzarini F., Monaco P., Montone P., Moro M., Nappi R., Nave R., Pagliuca N.M., Pantosti D., Patera A., Pezzo G., Pignone M., Pizzimenti L., Pucci S., Ricci T., Sapia V., Saroli M., Sciarra A., Smedile A., Tarabusi G., Vannoli P., Villani F., (2017 b). *A new photographic dataset of the coseismic geological effects originated by the Mw 5.9 Visso and Mw 6.5 Norcia earthquakes (26th and 30th October 2016, Central Italy)*. Miscellanea INGV, 38: 1-114, ISSN 2039-6651.

Nappi R., Alessio G., Gaudiosi G., Nave R., Marotta E., Siniscalchi V., Civico R., Pizzimenti L., Peluso R., Belviso P., Porfido S., (2018). *The 21 August 2017 Md 4.0 Casamicciola Earthquake: First Evidence of Coseismic Normal Surface Faulting at the Ischia Volcanic Island.* Seismological Research Letters, vol.89 n.4, 1323-1334. doi.org/10.1785/0220180063.

Pucci S., De Martini P.M., Civico R., Villani F., Nappi R., Ricci T., Azzaro R., Brunori C.A., Caciagli M., Cinti F.R., et al., (2017). *Coseismic ruptures of the 24 August 2016, Mw 6.0 Amatrice earthquake (central Italy)*, Geophys. Res. Lett. doi: 10.1002/ 2016GL071859.

Villani F., Civico R., Pucci S., Pizzimenti L., Nappi R., De Martini P.M., Agosta F., Alessio G., Alfonsi L., Amanti M., Amoroso S., Aringoli D., Auciello E., Azzaro R., Baize S., Bello S., Benedetti L., Bertagnini A., Binda G., Bisson M., Blumetti A., Bonadeo L., Boncio P., Bornemann P., Branca S., Braun T., Brozzetti F., Brunori C.A., Burrato P., Caciagli M., Campobasso C., Carafa M., Cinti F., Cirillo D., Comerci V., Cucci L., De Ritis R., Deiana G., Del Carlo P., Del Rio L., Delorme A., Di Manna P., Di Naccio D., Falconi L., Falcucci E., Farabollini P., Walker J.F., Ferrarini F., Ferrario F., Ferry M., Feuillet N., Fleury J., Fracassi U., Frigerio C., Galluzzo F., Gambillara R., Gaudiosi G., Goodhall H., Gori S., Gregory L., Guerrieri L., Hailemikael S., Hollingsworth J., Iezzi F., Invernizzi M., Jablonska D., Jacques E., Jomard H., Kastelic V., Klinger Y., Lavecchia G., Leclerc F., Liberi F., Lisi A., Livio F., Lo Sardo L., Malet J.P., Mariucci M.T., Materazzi M., Maubant L., Mazzarini F., McCaffrey K., Michetti A., Mildon Z., Montone P., Moro M., Nave R., Marc O., Pace B., Paggi S., Pagliuca N., Pambianchi G., Pantosti D., Patera A., Pérouse E., Pezzo G., Piccardi L., Pierantoni P., Pignone M., Pinzi S., Pistolesi E., Point J., Pousse L., Pozzi A., Proposito M., Puglisi C., Puliti I., Ricci T., Ripamonti L., Rizza M., Roberts G., Roncoroni M., Sapia V., Saroli M., Sciarra A., Scotti O., Skupinski G., Smedile A., Socquet A., Tarabusi G., Tarquini S., Terrana S., Tesson J., Tondi E., Valentini A., Vallone R., Van der Woerd J., Vannoli P., Venuti A., Vittori E., Volatili T., Weldmore L., Wilkinson M. and Zambrano M., (2018). *A database of the coseismic effects following the 30 October 2016 Norcia earthquake in Central Italy*. Scientific Data, 5, n.180049, https://doi.org/10.1038/sdata.2018.49.

QUADERNI di GEOFISICA

ISSN 1590-2595 http://istituto.ingv.it/it/le-collane-editoriali-ingv/quaderni-di-geofisica.html/

I QUADERNI DI GEOFISICA (QUAD. GEOFIS.) accolgono lavori, sia in italiano che in inglese, che diano particolare risalto alla pubblicazione di dati, misure, osservazioni e loro elaborazioni anche preliminari che necessitano di rapida diffusione nella comunità scientifica nazionale ed internazionale. Per questo scopo la pubblicazione on-line è particolarmente utile e fornisce accesso immediato a tutti i possibili utenti. Un Editorial Board multidisciplinare ed un accurato processo di peer-review garantiscono i requisiti di qualità per la pubblicazione dei contributi. I QUADERNI DI GEOFISICA sono presenti in "Emerging Sources Citation Index" di Clarivate Analytics, e in "Open Access Journals" di Scopus.

QUADERNI DI GEOFISICA (QUAD. GEOFIS.) welcome contributions, in Italian and/or in English, with special emphasis on preliminary elaborations of data, measures, and observations that need rapid and widespread diffusion in the scientific community. The on-line publication is particularly useful for this purpose, and a multidisciplinary Editorial Board with an accurate peer-review process provides the quality standard for the publication of the manuscripts. QUADERNI DI GEOFISICA are present in "Emerging Sources Citation Index" of Clarivate Analytics, and in "Open Access Journals" of Scopus.

RAPPORTI TECNICI INGV

ISSN 2039-7941 http://istituto.ingv.it/it/le-collane-editoriali-ingv/rapporti-tecnici-ingv.html/

I RAPPORTI TECNICI INGV (RAPP. TEC. INGV) pubblicano contributi, sia in italiano che in inglese, di tipo tecnologico come manuali, software, applicazioni ed innovazioni di strumentazioni, tecniche di raccolta dati di rilevante interesse tecnico-scientifico. I RAPPORTI TECNICI INGV sono pubblicati esclusivamente on-line per garantire agli autori rapidità di diffusione e agli utenti accesso immediato ai dati pubblicati. Un Editorial Board multidisciplinare ed un accurato processo di peer-review garantiscono i requisiti di qualità per la pubblicazione dei contributi.

RAPPORTI TECNICI INGV (RAPP. TEC. INGV) publish technological contributions (in Italian and/or in English) such as manuals, software, applications and implementations of instruments, and techniques of data collection. RAPPORTI TECNICI INGV are published online to guarantee celerity of diffusion and a prompt access to published data. A multidisciplinary Editorial Board and an accurate peer-review process provide the quality standard for the publication of the contributions.

MISCELLANEA INGV

ISSN 2039-6651 http://istituto.ingv.it/it/le-collane-editoriali-ingv/miscellanea-ingv.html

MISCELLANEA INGV (MISC. INGV) favorisce la pubblicazione di contributi scientifici riguardanti le attività svolte dall'INGV. In particolare, MISCELLANEA INGV raccoglie reports di progetti scientifici, proceedings di convegni, manuali, monografie di rilevante interesse, raccolte di articoli, ecc. La pubblicazione è esclusivamente on-line, completamente gratuita e garantisce tempi rapidi e grande diffusione sul web. L'Editorial Board INGV, grazie al suo carattere multidisciplinare, assicura i requisiti di qualità per la pubblicazione dei contributi sottomessi.

MISCELLANEA INGV (MISC. INGV) favours the publication of scientific contributions regarding the main activities carried out at INGV. In particular, MISCELLANEA INGV gathers reports of scientific projects, proceedings of meetings, manuals, relevant monographs, collections of articles etc. The journal is published online to guarantee celerity of diffusion on the internet. A multidisciplinary Editorial Board and an accurate peer-review process provide the quality standard for the publication of the contributions.

Coordinamento editoriale e impaginazione
Francesca DI STEFANO, Rossella CELI
Istituto Nazionale di Geofisica e Vulcanologia

Progetto grafico e impaginazione
Barbara ANGIONI
Istituto Nazionale di Geofisica e Vulcanologia

©2018
Istituto Nazionale di Geofisica e Vulcanologia
Via di Vigna Murata, 605
00143 Roma
t. +39 06518601

www.ingv.it

