Tsunami risk mitigation in Stromboli
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- Introduction
- Tsunami risk in Stromboli
- National tsunami risk management overview
- Conclusions
Natural or man-made events that could be managed locally by the competent administration;

**MUNICIPALITY**

Natural or man-made events that given the size and impact could be managed locally in coordination by more than one administration;

**MORE MUNICIPALITIES, PROVINCES, REGIONS**

Natural or man-made calamities that given the size and impact, must be managed rapidly with extraordinary efforts for a limited period of time.

**GOVERNMENT**
Volcano type: stratovolcano
Position: Sicilia – Mar Tirreno
Height: 924 m s.l.m.
Area: 12 km²
Eruptive activity beginning: 200,000 y.a.
Last eruption: 2014, effusive
Activity status: always active
Inhabited areas: Stromboli and Ginostra
Population involved: 800 - 5,000 units
STRUCTURAL FEATURES AND POPULATED AREAS

- ACTIVE CRATERS
- STROMBOLI
- SCIARA DEL FUOCO
- GINOSTRA
TSUNAMIS IN THE LAST CENTURY

<table>
<thead>
<tr>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 luglio 1916</td>
</tr>
<tr>
<td>22 maggio 1919</td>
</tr>
<tr>
<td>11 settembre 1930</td>
</tr>
<tr>
<td>20 agosto 1944</td>
</tr>
<tr>
<td>2 febbraio 1954</td>
</tr>
<tr>
<td>30 dicembre 2002</td>
</tr>
</tbody>
</table>

- *Esplosioni parossistiche*
- *Tsunami*
- *Colate laviche e trabocchi lavici*

Submarine landslides

Volcanic eruptions
THE 2002 TSUNAMI EVENT

2002-2003 ERUPTIVE CRISIS

2002 DECEMBER 28TH
OPENING OF EFFUSION VENTS

2002 DECEMBER 30TH
TSUNAMI

2002 DECEMBER 30TH
LANDSLIDE ALONG SCIARA DEL FUOCO
TSUNAMI RISK MITIGATION: EMERGENCY PLAN

ISOLA DI STROMBOLI
MAPPA DI INGRESSIONE
DELL’ONDA DI MAREMOTO
DEL DICEMBRE 2002

Piano nazionale di emergenza a fronte di eventi vulcanici di rilevanza nazionale
2015

Geografia Geografica

Essa grafica DPC su base dati del lavoro “Torni E., Maresca A., Carriero A., Vizzardi L., Maresca A.,
Pagano G., Zavattaro F. (2006); Observations of
effects from tsunami of December 30, 2002 at Stromboli volcano, southern Italy. Bull.
Volcanol., 68, 459–467”.

Informazioni Cartografiche
Progetto: UTM 32 N Dati: WGS84
Proiezione geografica: Lat/Lon Dati: WGS84
Scala 1:500

Legend
- Limiti regionali
- Limiti provinciali
- Limiti comunali

Note
Safely on Stromboli

Stromboli is a volcano in constant activity, generally interested by explosions of moderate energy with outbursts of lava fragments up to tens of meters high. Such explosions, which are called "stroboliinae", occur with a frequency of 10–20 minutes and define the state of "ordinary" activity. Periodically and without any clear warning, the volcano may increase its explosive energy and alter its manifestation's characteristics, thus increasing its level of danger.

The volcano's state changes require flexible regulations in granting access to the higher parts of the mountain and to the coastal areas. The altitudes which can be reached by the trails, independently or accompanied by authorized guides, are established according to the volcano's current state of activity. Access to coastal areas may be temporarily forbidden for short periods of time, in case of imminent tsunami danger.

Official personnel of the Guardia di Finanza (Alpine Rescue Unit) and of Carabinieri control the territory in order to enforce the prevailing regulations.

On the island, it is advisable to gather all available information regarding the current legislation and regulations provided.

Lava flows

Periodically the volcano's activity has explosive nature, lava flows present the Sciera del Fuoco slope. The high temperature of the lava entering the sea water causes the formation of thick whitish columns.

Rules of conduct

- Be informed on the locations to reach as in the able to observe the phenomenon safely.

Landslides along the Sciera del Fuoco

The phenomenon of movements rolling down the Sciera del Fuoco slope is rather the same, and represents a major risk for visitors in the coastal area's proximity.

Rules of conduct

- Navigation and landing are forbidden within 400 m of the coastline in front of Sciera del Fuoco.

Tsunamis

The creation of Stromboli may rarely be affected by tsunamis. Tsunamis are caused by large landslides down the Sciera del Fuoco slope, and by powerful explosions or by earthquakes.

Rules of conduct

- While visiting the coastal area, the sea retreats from the shore, or an earthquake or a local explosion should occur, immediately at sound of alarms, the visitor must make his way inland following the "red" signs. It is best to take it in the open sea.
Signals show the behaviour rules in case of tsunami.
- Arrows indicate the fastest path to reach safe areas.
TSUNAMI RISK MITIGATION: INSTALLATION OF TWO BUOYS
NATIONAL TSUNAMI RISK OUTREACH CAMPAIGN: IO NON RISCHIO
**What to do**

**DURING a tsunami**

If you are at the beach or in a coastal area and receive an alert message that indicates the possible arrival of a tsunami wave, or recognize at least one of these phenomena:
- A strong earthquake you have felt or that you have heard about
- A sudden and unusual retreat of the sea, a rapid rise in sea level or a big wave extending across the whole horizon
- A deep and increasing noise coming from the sea, like that of a train or a low flying aircraft

1. Move away from the water and quickly reach the nearest elevated area (such as a hill or the upper floors of a building).
2. Warn those around you of imminent danger.
3. Run on foot following the fastest escape route. Do not go by car; it could become a trap.

**What to do**

**AFTER a tsunami**

Stay in the area you have reached and discourage anyone from going back to the coast: the first wave might be followed by more dangerous ones.

1. Check the health conditions of the people around you and, if possible, give first aid assistance.
2. Listen to the authorities to find out when it’s safe to leave and what you need to do.
3. Use the phone only for emergencies.

If your home has been affected by the tsunami, do not return without permission.

- Do not eat foods that have come into contact with the water and materials transported by the tsunami; they may be contaminated.

A tsunami can be generated by an earthquake or volcanic activity: be informed, therefore, about what to do in case of an earthquake or eruption.

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http://iononrischio.protezionecivile.it/en/tsunami/are-you-ready/
NATIONAL SCALE: TSUNAMIS IN THE MEDITERRANEAN

<table>
<thead>
<tr>
<th>Anno</th>
<th>Mese</th>
<th>Giorno</th>
<th>Area</th>
<th>Intensità</th>
<th>Causa</th>
<th>Effetti del maremoto</th>
</tr>
</thead>
<tbody>
<tr>
<td>1169</td>
<td>Febbraio</td>
<td>4</td>
<td>Sicilia Orientale</td>
<td>IV</td>
<td>Terremoto</td>
<td>A Catania e Messina, ritiro del mare seguito da forte inondazione con danneggiamenti.</td>
</tr>
<tr>
<td>1627</td>
<td>Luglio</td>
<td>30</td>
<td>Gargano</td>
<td>V</td>
<td>Terremoto</td>
<td>Ritiro del mare, prosciugamento del Lago di Lesina. Inondazione a Manfredonia.</td>
</tr>
<tr>
<td>1693</td>
<td>Gennaio</td>
<td>11</td>
<td>Sicilia Orientale</td>
<td>V</td>
<td>Terremoto</td>
<td>Inondazione di tutta la costa orientale, maggiori danni a Augusta e Siracusa, vittime a Catania.</td>
</tr>
<tr>
<td>1783</td>
<td>Febbraio</td>
<td>5</td>
<td>Calabria tirrenica</td>
<td>IV</td>
<td>Terremoto</td>
<td>Forte ritiro del mare e inondazione nelle coste dello Stretto di Messina. Danni e qualche vittima.</td>
</tr>
<tr>
<td>1823</td>
<td>Marzo</td>
<td>5</td>
<td>Sicilia Settentrionale</td>
<td>IV</td>
<td>Terremoto</td>
<td>Caduta in mare di parte del Mt.Campalla a Scilla. Onde 6-9m, gravi danni e 1500 vittime a Scilla.</td>
</tr>
<tr>
<td>1836</td>
<td>Aprile</td>
<td>25</td>
<td>Calabria Ionica</td>
<td>IV</td>
<td>Terremoto</td>
<td>A Rossano e Corigliano. Forte ritiro del mare e inondazione con danni a barche e capanne di pesca.</td>
</tr>
<tr>
<td>1905</td>
<td>Settembre</td>
<td>8</td>
<td>Calabria Tirrenica</td>
<td>IV</td>
<td>Terremoto</td>
<td>Inondazioni fino a 30m a Pizzo, Scalea, Bivona, Tropea, con danni a barche e baracche sulla spiaggia.</td>
</tr>
<tr>
<td>1908</td>
<td>Dicembre</td>
<td>28</td>
<td>Stretto Messina</td>
<td>VI</td>
<td>Terremoto</td>
<td>Forte ritiro e inondazione dalla Sicilia orientale alla Calabria ionica. Onde fino a 13m. Distruzione, almeno 10000 vittime.</td>
</tr>
<tr>
<td>1930</td>
<td>Ottobre</td>
<td>30</td>
<td>Adriatico Centrale</td>
<td>IV</td>
<td>Terremoto</td>
<td>Inondazione e lievi danni nel porto di Ancona.</td>
</tr>
<tr>
<td>1944</td>
<td>Agosto</td>
<td>20</td>
<td>Isole Eolie</td>
<td>IV</td>
<td>Eruzione</td>
<td>A Stromboli caduta di materiale eruttivo in mare. Onde, inondazione fino a , 1 casa distrutta.</td>
</tr>
<tr>
<td>2002</td>
<td>Dicembre</td>
<td>30</td>
<td>Isole Eolie</td>
<td>V</td>
<td>Eruzione</td>
<td>A Stromboli caduta di materiale eruttivo in mare. Run-up 10m, gravi danni a case e alberghi.</td>
</tr>
</tbody>
</table>

79 d.C. – today 72 events

✓ 54 triggered by earthquakes
✓ 12 happened during volcanic eruptions
✓ 2 by landslides
✓ 4 undefined
Starting from the 2002 eruption and tsunami in Stromboli the National Civil Protection System and Local authorities made a great effort in increasing prevention and mitigation actions;

Leaflets and other information material were given to hotel owners and other touristic facilities in order to be distributed to tourists and increase awareness among them;

Most of the local people were convinced that giving this information to the visitors would have had a negative effects on the tourism, but this never happened and Stromboli is still nowadays a 12 month destination from all over the world.

An increasing involvement of the local population in civil protection activities led to establish two groups of civil protection volunteers on the island;

These two groups took active part in the tsunami information campaign “Io non Rischio” in 2015 and 2016, which were right in the middle of the summer period.

FURTHER ACTIVITIES:

Updating of the National emergency plan scenario and of the Municipality emergency plan;

Exercise to be arranged as soon as possible (Spring 2018?).
Points of Contacts

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MUCHAS GRACIAS!!