

How is Mount Vesuvius being monitored?

Living in the shadow of Italy's volcanoes

Mount Vesuvius is an active volcano and as such it represents a significant hazard to people living in the Bay of Naples. Located at the foot of the volcano, the city of Naples, with a population approaching one million people, is particularly at risk. A future eruption of Mount Vesuvius is likely to involve ash falls, pyroclastic flows and lahars. Naples could be affected in just a matter of minutes and, if the eruption is significant, the city could potentially be transformed into a volcanic wasteland.

Monitoring Vesuvius

In common with active volcanoes all over the world, Mount Vesuvius is being carefully monitored by scientists and there is a detailed evacuation plan in place should the volcano show signs of an eruption. Monitoring techniques include:

- Seismographs used to record and measure earthquakes. As magma rises it fractures rocks causing earthquakes.
- Tiltmeters are used to measure the tilt or physical deformation of the volcano caused by swelling as magma rises to the surface.
- Satellites monitor infrared heat and can also be used to detect minute physical changes in the volcano's shape using sensors positioned on the volcano's flanks.
- Gases are monitored as increased concentrations of gases such as sulphur and carbon dioxide can indicate that magma is rising.

Evacuation plans

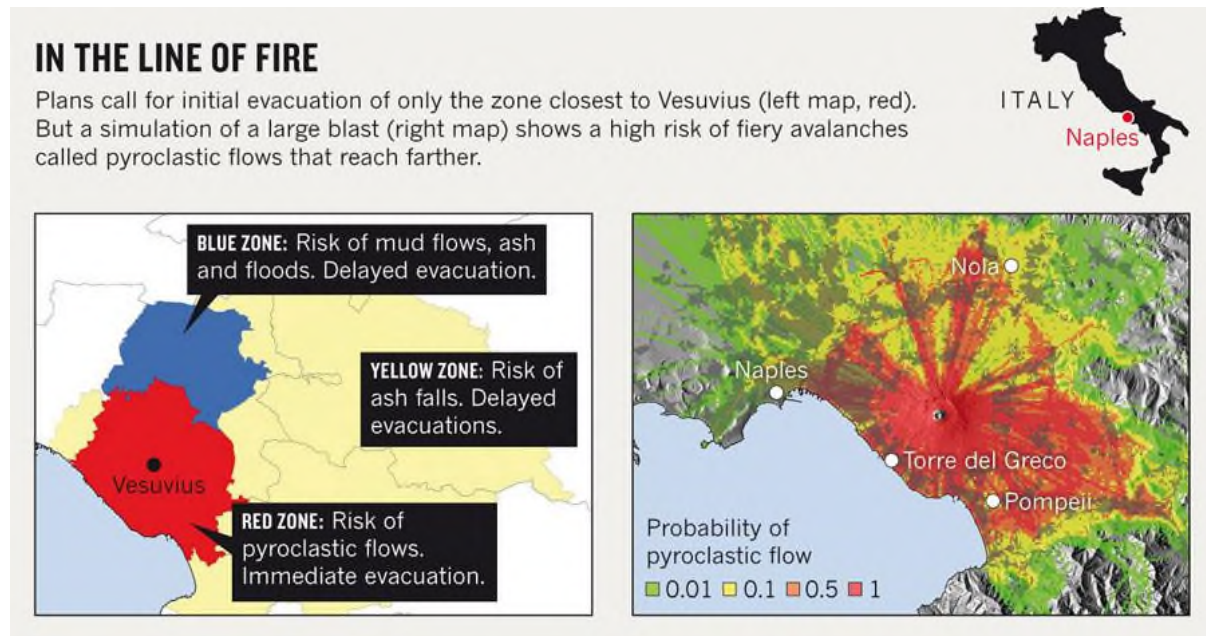
Italy's Department of Civil Protection maintains a National Emergency Plan for Vesuvius (1995) based on an intermediate-sized eruption. The plan divides the area around the volcano into three zones according to the type of hazard expected (Figure 1).

- Red zone - closest to Vesuvius, this is deemed most at risk from pyroclastic flows. The plan calls for the evacuation of all 600,000 residents in this area before an eruption starts. No new buildings are allowed to be constructed in the red zone. Updated in 2003, this zone now extends into parts of outer Naples.
- Yellow zone - the main danger here is from falling ash and small rocks. Areas downwind are most at risk and these are the areas that will be evacuated.
- Blue zone – this zone is at risk from floods and mud flows (lahars) triggered by the eruption, and would be evacuated if an eruption starts.

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Figure 1

National Emergency Plan for Vesuvius



<http://www.nature.com/news/2011/110511/full/473140a/box/1.html>

Critics state that the plan underplays the likely effects and extent of pyroclastic flows, which would threaten areas outside the red zone. Additionally, Naples could be under threat from ash falls if the wind blows towards the west.

In 2003, the Department of Civil Protection announced that it would constantly update the emergency plan to take account of new scientific information. The red zone has been expanded to include the eastern districts of Naples and officials have reduced the anticipated evacuation time from two weeks to 72 hours.

Seismic imaging has recently identified a seismic anomaly some 8-10km below the surface which could be a magma reservoir. Previous eruptions have provided evidence of a rapid onset of an eruption, with magma rising quickly to the surface in just a few hours. Such a scenario would give little chance for a full scale evacuation of Naples. Scientists plan for an evacuation of an area 20km around the volcano if there is an increase in earthquake activity.

Scientists have expressed concerns about how people will respond to warnings of an impending eruption given their general lack of recognition of the threat posed by the eruption. Most people are more concerned about the day-to-day issues such as traffic and crime than the possibility of a volcanic eruption. Will people evacuate the area and where will they go? Will they be prepared to leave their property unattended and at risk from looting?



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Questions

1. Look at Figure 1.
 - What level of probability of a pyroclastic flow has been used to determine the extent of the Red Zone?
 - What level of probability of a pyroclastic flow applies to Naples?
 - To what extent does the Yellow Zone reflect the prevailing wind direction?
 - Describe the pattern of probabilities of pyroclastic flows
 - How might physical factors explain the location of the Blue Zone?
2. Do you think Naples should be included in evacuation plans?
3. Why do you think some local people show little concern about the impacts of a future volcanic eruption?
4. What are the potential problems associated with the evacuation of a city the size of Naples?
5. Use the following websites together with your own independent research to discover more about the monitoring of Vesuvius and the evacuation plans for the area.

Vesuvius monitoring

<http://www.gvess.org/HPreSt.html>

<http://www.nature.com/news/2011/110511/full/473140a.html>

<http://phys.org/news159599107.html>

http://www.esa.int/Our_Activities/Observing_the_Earth/Satellites_join_watch_on_Naples_volcanic_hinterland

<http://www.ov.ingv.it/ov/en/activities.html>

Emergency plans/maps of danger areas

http://www.protezionecivile.gov.it/jcms/en/view_pde.wp;jsessionid=3DDAF6E6B2D6096A41CF68577C44324F?contentId=PDE12771