

In this section you will learn about impacts and human responses to a recent volcanic event

Out of an estimated 1500 active volcanoes globally, 50 or so erupt every year. In 2015, global eruptions were widespread and included Mount Etna in Sicily, Italy, Cotopaxi in Ecuador, Villarrica in Chile, Piton de la Fournaise on Réunion Island and Kilauea on Hawaii.

Mount Etna, Sicily, Italy

Rising to an altitude of 3350 m and covering an area of 1250 km², Mount Etna is Europe's most active volcano (Figure 1). It is a strato-volcano with a classic, elegant conical shape that can only be best appreciated from a distance. Close up, Etna is a cartographer's nightmare – a complex, dynamic geology of summit craters, and numerous secondary (parasitic) cones and fissures. In short, Etna has the longest documented record of eruptions of any volcano in the world. Its fertile slopes are a potentially hazardous home to over 900 000 people, and rarely a decade passes without some spectacular activity involving a wide variety of eruptive styles (Figure 3).

Etna's geological and eruptive complexity results from challenging tectonics. The volcano is a result of the collision between the African and Eurasian tectonic plates, but there is no agreement on the exact cause of each eruption. Most theories suggest they are linked to *rifting*, normally associated with constructive plate margins. As seen in the Great African Rift Valley, this pulling apart of the Earth's crust is thought to be separating eastern Sicily from the rest of Italy.

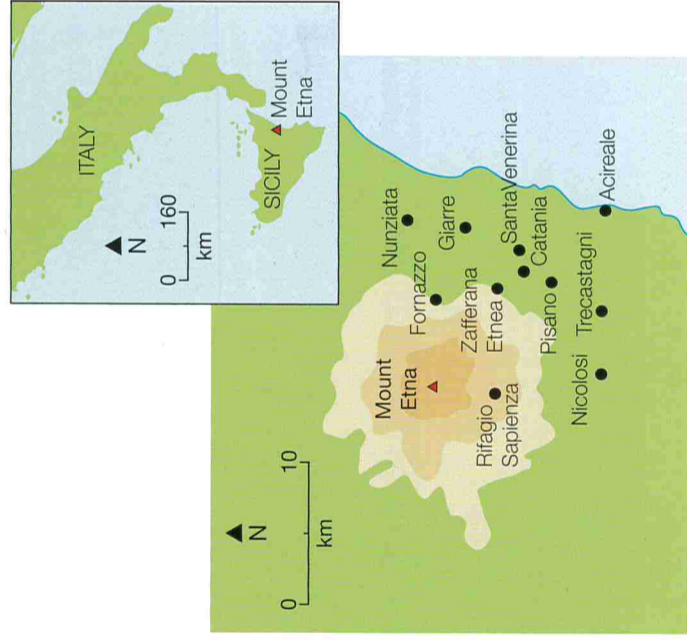


Figure 1 Location of Mount Etna, Sicily, Italy

Volcanologists classify the eruptions of Etna as mostly effusive (low-viscosity lava flows) and occasionally mild *strombolian*. The *strombolian*-type eruptions, with short lava flows, tend to occur on the summit (Figure 2). Less frequent, but more effusive, are the eruptions from fissures on the sides of Etna. At the summit, volcanic cones mark the locations of the active Northeast and Southeast Craters. The remaining summit craters, the Voragine and the Bocca Nuova, actually lie within the pre-existing 250 metre-wide Central Crater.

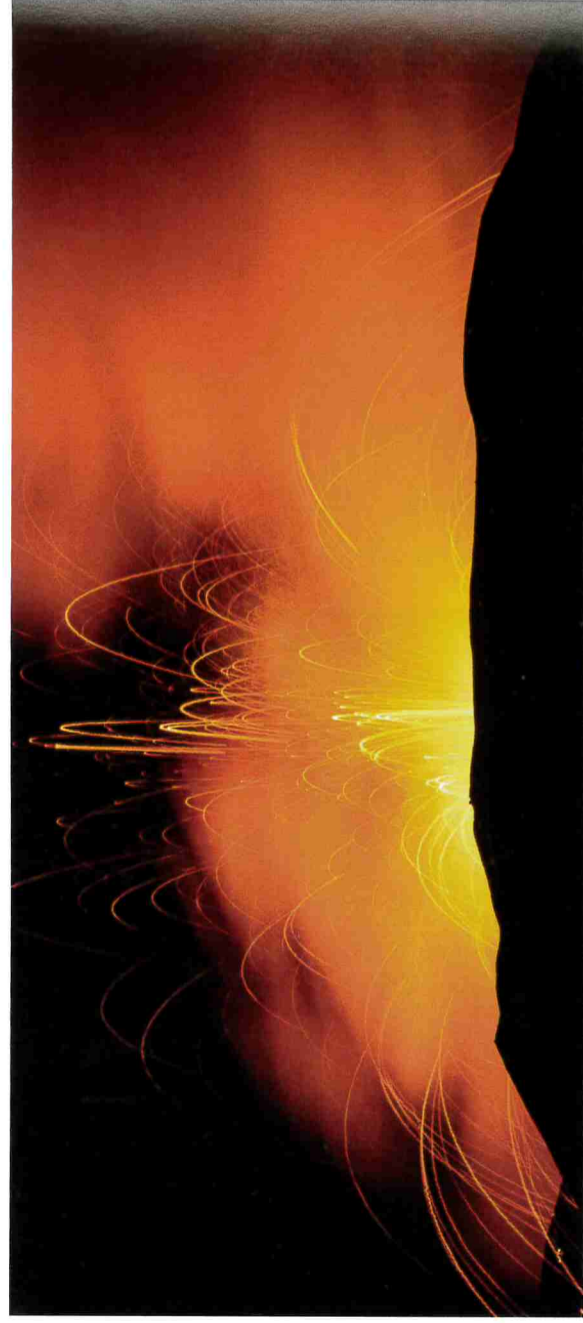


Figure 2 Voragine Crater eruption, Mount Etna, December 2015

Secondary volcanic cones and jagged fissures combine to create a rich and varied landscape on the slopes of Etna. A catastrophic collapse of Etna's eastern slopes resulted in the impressive 7 km-long horseshoe-shaped Valle del Bove (Valley of the Oxen). This natural funnel is layered with ancient and recent lava flows. By drilling through these layers, scientists have been able to uncover a detailed geological record of past eruptions. In contrast, ridges such as the active Northeast Rift, stand upright and may be identified by eruptive cones separated by deep fissures.

Figure 3 Mount Etna eruptions 1983–2015

Date	Nature of eruption	Impacts and responses
Mar 1983	Lava effusion from a 750 m fissure, lasting for 131 days.	Slow-moving lava flows threatened to destroy property, including the Grand Hotel of Etna and the Astrophysics Observatory. Huge (750 000 m ³) earthworks were used to redirect lava flows away from inhabited areas.
Dec 1991–Mar 1993	Effusive lava flows and Hawaiian fountaining from a fissure on the eastern side of Southeast Crater. The eruption lasts for 473 days.	Town of Zafferana Etna was threatened by the largest volume of lava in hundreds of years. So: <ul style="list-style-type: none"> • an earth dam was built to temporarily hold the lava flow • rock and concrete blocks were dropped to 'plug' the lava channel • explosives used to divert the lava flow into a new human-made channel.
July–Aug 2001	Seven fissures erupt effusively on the south and north-east flanks.	Significant damage to tourist facilities. The town of Nicolosi is threatened. Catania airport is intermittently forced to close as a result of the ash fall.
Oct 2002	Strombolian, Hawaiian fountaining and phreatomagmatic (magma is mixed with water) flank eruptions.	The most explosive flank eruption in the last 150 years. Lava flows threaten the mountain village of Rifugio Sapienza. Catania airport is closed again.
Nov 2009	Strombolian eruptions in the Southeast Crater.	4.4 magnitude earthquake beneath the southwest flank.
Apr 2010	Summit ash eruption from the lower east flank of the Southeast Crater.	The eruption increases the crater width from 10 m to 50 m.
Jan–Oct 2011	Hawaiian fountaining and lava flows from the Southeast Crater. The ash column reaches several kilometres high.	A lava flow descends the western slope of the Valle del Bove. It is successfully diverted from the ski resort at Sapienza Refuge (the main tourist hub on the volcano).
Oct 2013	Renewed eruptions at New Southeast Crater and Northeast Crater.	
Jan–Jun 2014	Strombolian activity at New Southeast Crater.	Lava flows travel towards the Valle del Bove and also north-east in the direction of Monte Simone.
Dec 2015	Strombolian eruptions from the Voragine Crater. Lava fountaining 1 km in height and the ash column rose to 7 km above the summit.	Catania Airport is temporarily closed. Sulphur dioxide plumes drift to Tunisia, Libya, Egypt, Iran and Turkmenistan. Catania Airport is closed for a few hours.

ACTIVITIES

1 Access the Osservatorio Etneo Istituto Nazionale di Geofisica e Vulcanologia website at www.ct.ingv.it/en/real-time-seismic-signal.html. Here you can see a live seismic feed and also access an Etna webcam. Explore the website to see what other information is available about monitoring Mount Etna. Comment on the management issues that arise from your observations.

2 You will find a map of recent earthquakes in the Mount Etna area and the Aeolian Islands at www.ct.ingv.it/ufs/analisti/maps.php. Comment on the current seismic activity and locate the epicentres of recent earthquakes.