

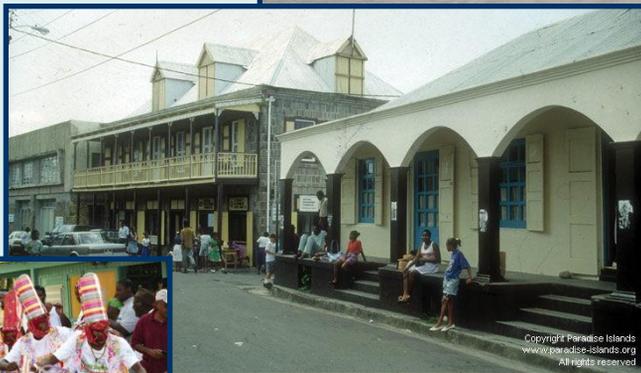
Volcanic Crisis: The Soufrière Hills Volcano, Montserrat

“Montserrat - the way the Caribbean used to be!”

In the early 1990s, the small island of Montserrat was home to ~10500 people. The island was traditional, and simple; the main sources of income were farming, fishing, and tourism. Montserrat also had a rich musical legacy, from traditional and modern Caribbean music, to the legendary AIR Studios. There were no large resorts, no modern clubs, no chain stores; just tropical beaches, jungle-covered mountains, and the famous Soufrière hot springs.

However, Montserrat was not a perfect paradise. The island was too small to be self-sustaining, and relied on economic assistance from the UK.

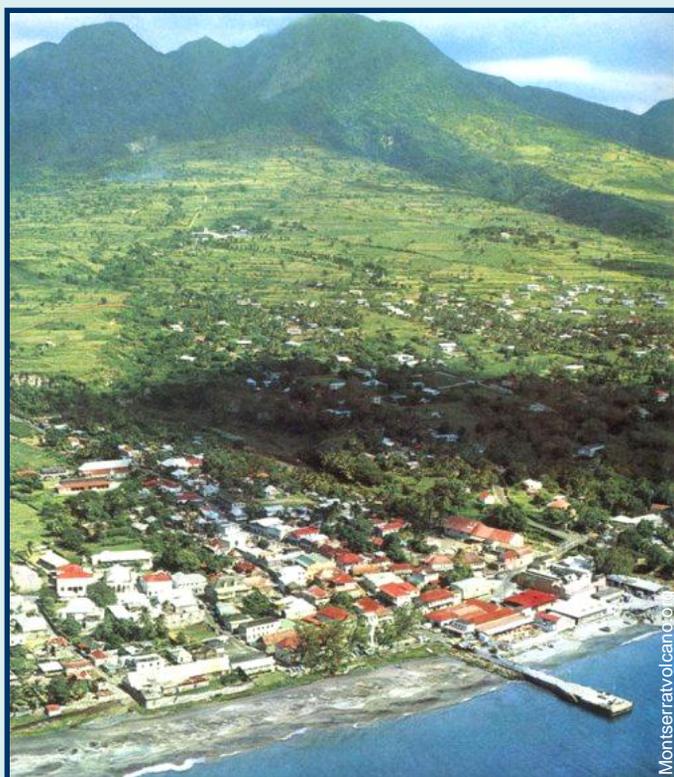
Montserrat was a British overseas territory, with a local, elected government, but a Governor appointed by Westminster. Despite a dark history involving slavery and imperialism, Montserradians were very proud of their British heritage.



Below: The Soufrière Hills in the 1970s. There had been no volcanic activity in recorded history



Repeatingislands.com



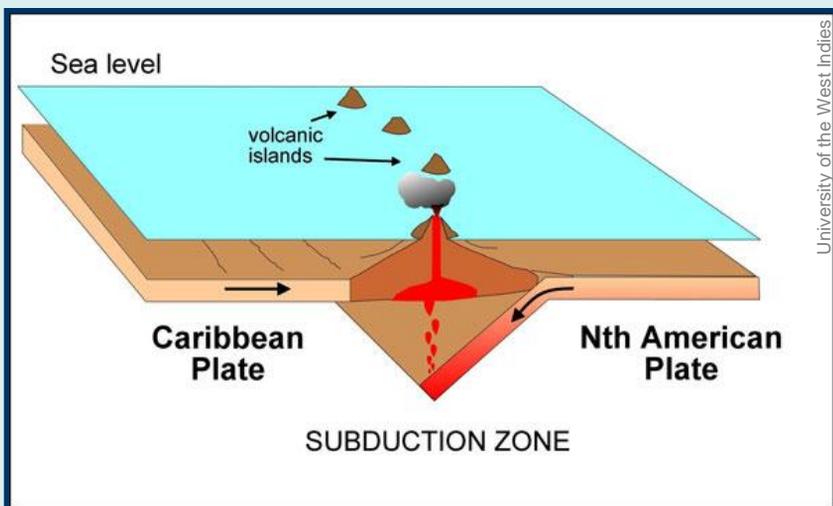
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Montserrat – the science

Montserrat lies on the Caribbean tectonic plate, which is slowly colliding with the North American plate. Because the crust of the North American Plate is thinner and more dense, it is sliding (or subducting) beneath the Caribbean. The down-going crust is full of water – trapped in the sediment, in cracks in the rock, and even incorporated into minerals which make up the rock. As the plate descends into the

hot mantle, this water is forced out, and upward. It invades the wedge of mantle rock between the two plates, causing the rock to melt. The resulting mix of molten rock and pressurized H₂O forces its way upward, through the overriding Caribbean Plate, and erupts onto the surface. This process creates a chain of volcanoes, called an arc. Montserrat is part of the Lesser Antilles arc.



pyroclastic flow
(Philippines)



lahar (Montserrat)



Volcanic hazards – a quick guide

Pyroclastic flow A dense cloud of extremely hot gas, ash, and rock that flows like a liquid. Pyroclastic flows move very fast – you cannot outrun them.

Lava Montserrat lava is very thick – it doesn't flow, but piles up around the vent to form a hot, rubble dome. If domes grow too big, they collapse – the hot rubble can form a pyroclastic flow as it moves downhill.

Ash Small particles of rock. Ash makes roads very slippery, breathing very difficult, and destroys plant life. It gets absolutely everywhere, even becoming ingrained in your skin.

lava dome (Guatemala)



Lahars Ash mixes with rainwater to form a cement-like liquid which flows downhill and can bury entire towns in minutes.

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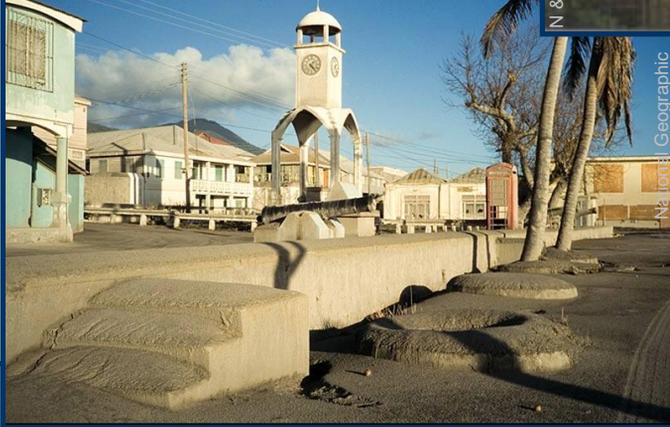
The crisis begins....

During the early 1990s, many small earthquakes were detected beneath Montserrat. Most were too small to be felt, but seismologists realized that they were caused by magma forcing its way up through the crust. Scientists arrived on Montserrat with seismometers to carefully monitor activity.

eruptions begin 18 July 1995



ash deposits in Plymouth



The Soufrière Hills volcano began erupting on 18 July, 1995. The eruptions were explosive, but relatively small and restricted to the summit and upper flanks of the volcano. They did not damage the towns several kilometres away. However, these eruptions continued for months, producing vast quantities of ash which covered the south of the island.

ash cloud on Montserrat



Planes cannot fly through ash, so flights were often grounded. Ash was collected from the roads and paths and shipped to dumping sites in the north; roofs had to be swept regularly, or the weight of ash would make them collapse. Ash blanketed farmland, killing crops; and with the airport often closed, food had to be brought to the island through the port – when the sea was calm enough. People wore masks to keep ash from their lungs. Life in the south of Montserrat became very difficult, but people adjusted – they were determined to get through the crisis.

Scientists, politicians, and the public

The people involved in volcanic crises do not always understand each other; this can lead to tension, distrust, and mismanagement of the crisis. **Scientists** are there to interpret data, but interpretations can vary; the sight of scientists disagreeing with each other can be very unnerving for everyone else. In a crisis, scientists should debate in private, but speak with one voice in public. Scientists must educate and inform the local population; but they must be very careful not to cause unnecessary panic. **Politicians** are advised by scientists, but they must also consider what is best for their electorate. Any decision to evacuate will be economically damaging, and politicians will need to find shelter, food, and clothing for evacuees. **The public** hear what scientists and politicians tell them, but ultimately they make their own decisions. The best scientists and politicians can do is to make sure the public understands the potential danger, and that everyone can be taken care of in the event of evacuation.

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Evacuation

In August 1995 scientists saw that activity was intensifying, and they recommended that the south be evacuated. The politicians ordered an evacuation – everyone was to leave immediately for the safe area in the north. Although the danger passed, and people were allowed to move back home, more evacuations followed. Sometimes the danger was focused on particular valleys and towns, sometimes the entire south was considered at risk. Evacuation became permanent in mid-1996 as pyroclastic flows became larger and more frequent, often destroying buildings. An exclusion zone was established across the south, and refugee camps set up in the north.

Life in the north

Some evacuees were able to stay with friends or relatives in the north. Others stayed in churches (below) or schools, usually with only one toilet between more than one hundred people. Everyone else lived in tents (above, right), battered by the strong Atlantic wind; there were no proper toilets, and little running water. There was no privacy, no room for dignity, and very little security. Children could not go to school; many adults could no longer work. And there was no end in sight.



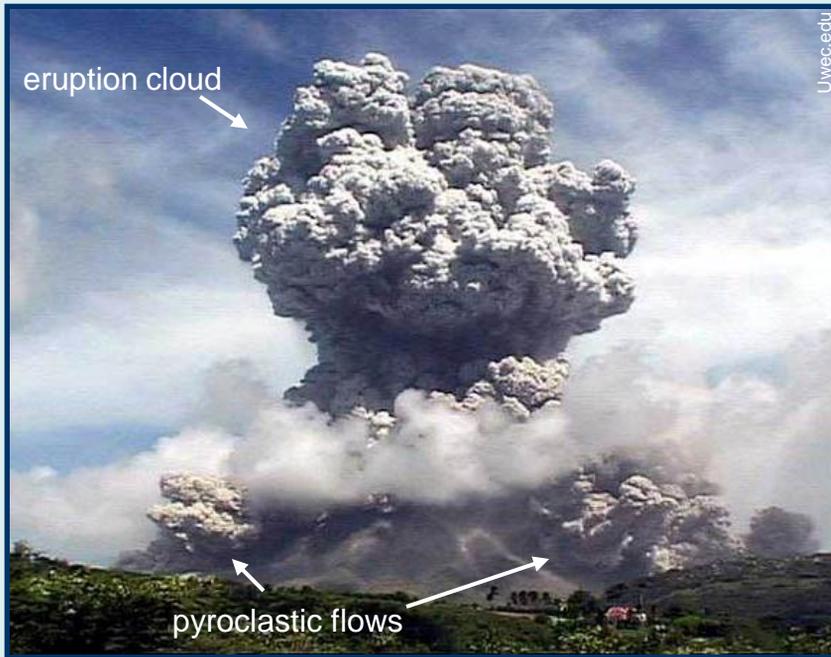
The airport

With the main harbour in Plymouth closed, the airport was the only way to bring supplies onto

the island. Because of this, and because the airport was on the very edge of the exclusion zone (see map, page 1), the government kept the airport open during the day. The scientists agreed on one condition – that one of them should be at the airport, watching the volcano's summit at all times. Other observers on the opposite side of the island also watched the summit; at the first sign of a pyroclastic flow, they would sound the alarm, and the people at the airport would evacuate north, into the safe zone.



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What next?

After the final evacuation, months passed without any major increase or decrease in volcanic activity. Scientists could not tell if it would ever be safe to return to the south. Some people decided to leave Montserrat and begin new lives on neighbouring islands or in the UK. A few people returned to their homes in the south, despite the risks – life in the camps was too difficult. Many more entered the exclusion zone during the day – to work, to collect belongings, or sometimes just to have time alone.

Disaster strikes

On 25 June, 1997, volcanic activity intensified. Huge pyroclastic flows rushed down the mountain at over 100 km per hour, across farmland, through villages – and towards the airport. These flows were so fast, they even travelled uphill. Houses directly in the path of these flows were buried; those



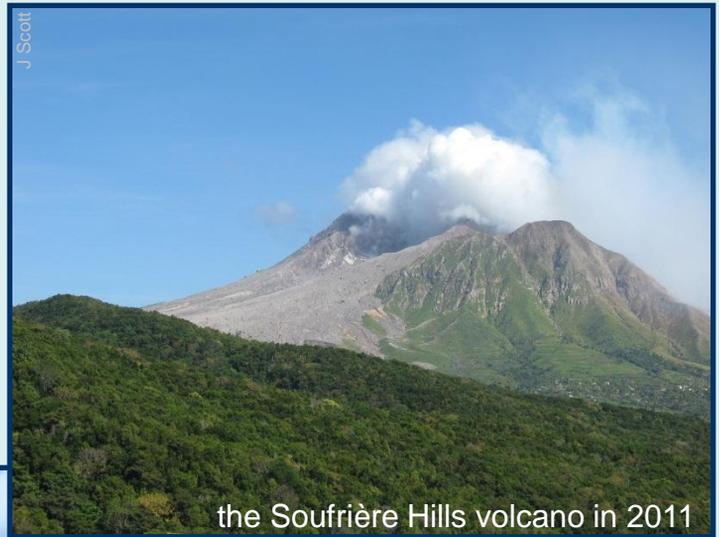
on the margins incinerated. Nineteen people were killed that day, and many more injured.

This was the first of many large eruptions. In the months which followed, pyroclastic flows destroyed the airport, and reached the centre of Plymouth. After two years of uncertainty and exile, Montserratians realized the south of their island was lost.

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Present day

The Soufrière Hills volcano is still active today. Pyroclastic flows and lahars are common. The exclusion zone is still in place, but Montserratians are re-building their island in the north. They have a new airport, new houses; work has just begun on a new capital. Some of those who left during the crisis are now returning, but despite this, only around 5500 people now live on Montserrat.



the Soufrière Hills volcano in 2011



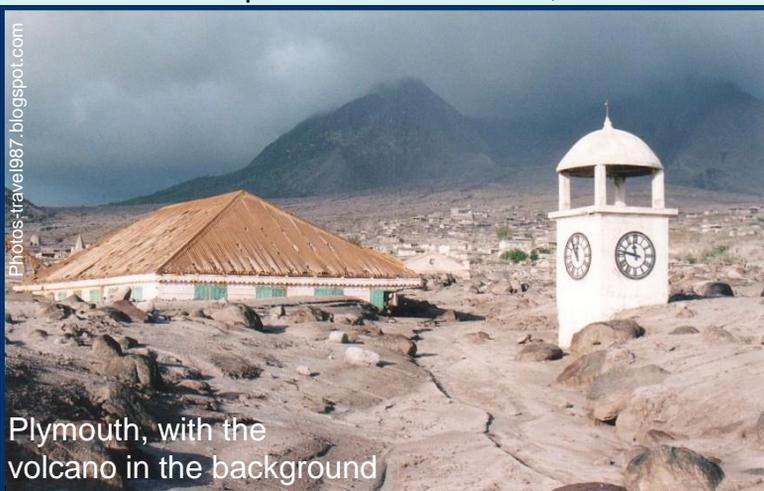
2011 – there is no trace of the old airport

Did everyone respond well to this crisis?

The volcanic crisis on Montserrat was handled well by the vast majority of those involved. The scientists generally behaved well; although there was friction between some individuals, as a group, their message was calm and consistent. They worked hard to inform and educate politicians and the public, and their predictions were very accurate. The government of Montserrat also

handled the crisis well – they listened to scientific advice about when and where to evacuate, and they worked hard to get foreign aid for the evacuees. With very few exceptions, the people of Montserrat coped with the crisis extremely well. They were keen to learn the science behind their volcano; they worked with scientists; they left their homes when instructed, and are now working hard to rebuild in the north.

Unfortunately, the UK government did not respond well to the crisis. Although Montserrat is a UK territory, with a governor appointed by Westminster, Montserratians were not treated as British citizens. The aid provided was minimal, and often completely impractical (for instance, sending tents to an island exposed to very strong winds). Aid to establish new infrastructure in the north was seriously delayed, leaving people to live as refugees for years. Montserratians who chose to emigrate were given such a small resettlement fund, they could not stay out of poverty; and because those who moved to the UK were not British citizens, they could not work. Montserratians felt betrayed, and deeply insulted by the UK government.



Plymouth, with the volcano in the background

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Things to consider

- All fatalities occurred within the exclusion zone. Scientists got it right – so why did people put themselves in danger?
- Should people have been kept out of the exclusion zone by the police?
- Most evacuees were completely reliant on aid for years. It would have been more cost-effective to build new infrastructure so they could restart their businesses. Why didn't this happen?
- The UK government wanted all Montserratians to emigrate, even though scientists were sure the north was safe. Would this have been a better option, and if so, why?
- Tourists are returning – slowly – to Montserrat; many attracted by the active volcano. Would you go there?
- Montserratians inhaled a lot of ash; but scientists now realize that inhaling ash can be dangerous. How many people may develop lung conditions as they age?



Useful references

Montserrat Volcano Observatory
www.mvo.ms

Bulletin of the Global Volcanism Network for Montserrat – full reprint of the activity reports submitted by scientists:

www.volcano.si.edu/world/volcano.cfm?vnum=1600-05=&volpage=var

DVDs of the Montserrat eruptions can be purchased at:

www.priceofparadise.com

Fire from the Mountain by Polly Pattullo, published 2000; this concentrates on the social and political issues raised by the volcanic crisis.