



Island Arc Magmatism: Santorini

Patterns in volcanic eruptions

Dr Steve Blake:

All the lava flows on the Kamenis are formed from a viscous rhyodacite magma and form these thick flows that are covered in a jumble of blocks. This one was erupted in 1940 and only travelled a couple of hundred metres from its vent before it came to a stop. That means we don't have to go very far to go to look at the craters. But even on a hot day like this it can mean a bit of effort.

Narrator:

For the tourists on the obligatory boat trip to the Kamenis it's a race to the top where the youngest craters lie. The interval between eruptions has ranged from two to 844 years so that no pattern exists for making long-term predictions of when the next eruption is likely. As at other volcanoes, the longer periods of quiescence seem to precede the more energetic outbursts, although none have been particularly violent yet.

Dr Richard Thorpe:

When the last eruption in Santorini took place in 1950, and each of the different eruptions on Nea Kameni has been erupted through a small vent which lies below little craters such as this one. If we look at the distribution of those craters we can see that they define a north-east/south-west alignment that's very similar to the trend we've seen in the dykes exposed in the caldera wall. Well this is the blocky front of the youngest lava flow erupted from Nea Kameni, and although I'm standing on what appears to be older volcanic rocks, we can deduce that all of the rocks around here are underlain at fairly shallow depth by hot volcanic material, and the thing that provides a clue about this is the existence of these small cavities through which we're getting hot, sulphurous steam depositing beautiful crystals of prismatic sulphur, and these are what we term fumaroles.

Narrator:

Nearby is another kind of fumarole which required a little ingenuity to get to.

Dr Steve Blake:

Swimming along here the water's quite warm. It's very pleasant but I've just put my feet down into some gelatinous gunk. It feels horrible.

Narrator:

The proximity of hot lava causes water to circulate, just as a hot element stimulates water circulation in a kettle. This circulating water leaches iron from the lava, and brings it to the surface where it is precipitated as an iron-rich mud, a process aided by bacteria which thrive in these warm waters. Just as water degasses when it boils, so this hydrothermal system degasses as well. The nearby drilling operation has already p.....ed cores 200 metres below sea level lava pile. The final target is 5.....es. The purpose of this project is to find out the detailed chemistry by which the metals are concentrated and extracted by the hydrothermal system. But to discover the magmatic processes occurring at greater depth within the volcano, we rely on the composition of the erupted rocks. The white Minoan pumice is a rhyodacite and this magma must have been stored in a sizeable chamber prior to collapse of the caldera. Darker andesite scoria can also be found in the Minoan layers if you search hard enough, and implies that this eruption came from a compositionally zoned chamber which contained both acidic and intermediate magmas. Other eruptions have produced basalt lava.