



Island Arc Magmatism: Santorini

Volcanic Successions in Santorini

Narrator:

All over Santorini many different volcanic successions are exposed because what we are seeing is the ruin of the complete volcanic pile after the centre dropped out.... presenting us with a caldera. In the north of the island just see how varied the lithologies are, and try to work out what sort of eruptions might have formed them. We'll go ashore at Oia, a 19th century fishing village, now a favourite port of call for tourist boats. The prominent red scoria bed would have formed in a pyroclastic eruption and it's overlain by a much thicker layer of lava. Capping the sequence is a stratified pumice bed which is very easily eroded to form white scree running down the cliffs. So, three different types of eruption for us to study in more detail.

Dr Richard Thorpe:

Near the base of the Santorini volcanic succession at Oia there's a lava flow. It's about five or six metres in thickness and it has the usual rubblely base and top. Although it's presently exposed near to sea level, we think from its form that it probably erupted subaerially before the caldera was formed. In hand specimen we can see small phenocrysts of plagioclase, pyroxene, and since the plagioclase is fairly calcium-rich, we could say that this is probably a typical calc-alkaline andesite. In the centre of the succession there is a very distinctive pyroclastic unit. It's composed mainly of blocks of reddish andesite scoria, but it also contains quite large lithic blocks. The lithic blocks are fragments of older volcanic rocks below Santorini. And the scoria blocks have a slightly ragged, distinctive form which suggests that they were perhaps molten when they landed. So I think the way we can interpret this unit is as a result of a very violent andesitic eruption from a localised volcanic vent fairly close to where we are.

Narrator:

Getting to the top of the succession isn't always easy, but I'm sure you've all experienced the rigours of geological field trips. Oia, with its neoclassical buildings, stands on the youngest layer, but don't be taken in by its old world appearance. Poorly consolidated pumice doesn't provide the best foundations for cliff top dwellings. In 1956 several people were killed and most of Oia destroyed by an earthquake. Such tragedies remind us that we're in an active tectonic region, and that living on an island arc volcano carries an inevitable risk. Remember we are near the edge of the Eurasian Plate, and 200 kilometres south is the Hellenic Trench where the northwards-moving African plate subducts beneath Eurasia. The foot of earthquakes deepens northward, defining a Benioff Zone, which lies about 150 kilometres below Santorini and the other volcanoes in the Aegean Arc.