



Deepest volcano caught on Pacific Ocean video

By Jonathan Amos
Science correspondent, BBC News, San Francisco

VIDEO ADVERTISEMENT

West Mata is the deepest eruption ever filmed

Extraordinary video has been obtained in the Pacific Ocean of the deepest undersea eruption ever recorded.



The pictures show lavas bursting into the water at the West Mata submarine volcano, which is sited about 200km (125 miles) south-west of the Samoas.

The US Jason robotic submersible had to descend over 1,100m to acquire the high definition video.

The vehicle found microbes and a specialized volcano-dwelling shrimp thriving in hot, acidic waters.

"It's an extraordinary environment," said Joseph Resing, a chemical oceanographer at the University of Washington and the Joint Institute for the Study of the Atmosphere and Ocean in Seattle, US.

"You have molten lavas at 1,400C producing acidic fluids - the sulphur dioxide makes these fluids as acidic as pH1.4 - and yet microbes are thriving," he told BBC News.

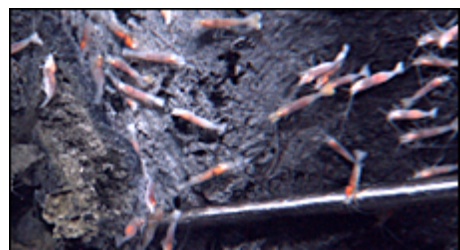
"The magmatic gases sustain and provide energy for microbial life, and then the microbes provide energy for the shrimp.

"We see them very close to the volcano - within metres."

Dr Resing has been describing the volcano's behaviour here at the American Geophysical Union's (AGU) Fall Meeting, the world's largest annual gathering of Earth scientists.

Rock recycling

The West Mata submarine volcano is about 9km long and 6km wide. The base is some 3km down.



Its setting is very close to the 10,000m-deep Tonga-Kermadec Trench. This is where the Pacific Tectonic Plate, which comprises much of the central ocean floor, dives under (subducted) the Australian Plate.

It is a key location for the recycling of rock back into the interior of the Earth and it is where molten material can also then force its way back up to the surface.

The possible existence of the eruption was first identified in November 2008 through water samples recovered from the ocean that contained anomalously high levels of hydrogen and volcanic debris.

But it was not until a full scale expedition took place in May this year and Jason was able to go down and investigate West Mata that scientists realised the magnificence of the discovery.

Lava flows

Jason, which is operated by the Woods Hole Oceanographic Institution (WHOI), moved to within 3m of the erupting volcano.

The vehicle's high-definition camera captured large molten lava bubbles about a metre across bursting into cold seawater, and it saw glowing red vents explosively ejecting lava into the sea.

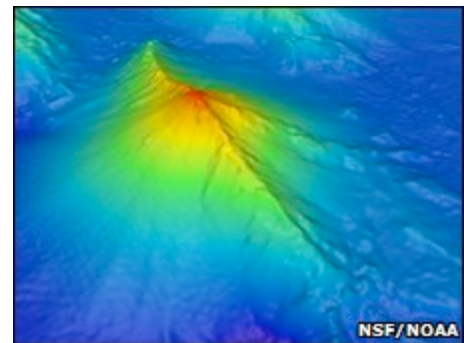
It is said to be the first-observed advance of lava flows across the deep-ocean seafloor.

Jason's two robotic arms collected samples of rocks, hot spring waters, the microbes, and the shrimp.

To find and study animal life in such a location was fascinating, said Tim Shank, a WHOI macro-biologist on the expedition.

"The animal life you see down there has evolved over millions of years to take advantage of the situation. Virtually every species down on the sea floor at vents has some sort of novel adaptation," he told reporters at the AGU meeting.

"Shrimp have modified eye forms, and modified claws to enable them to scrape certain types of bacteria. This is where fundamental planetary processes like eruptions meet life, so it has profound implications for me as a biologist looking at the evolution of life on this planet." Researchers say the volcano is spewing boninite lavas, believed to be among the hottest erupting on Earth in modern times, and a type only seen before on extinct volcanoes older than a million years.



The summit of West Mata is more than a kilometre down



Researchers say the volcano is spewing boninite lavas

"Having a very fresh occurrence - it hasn't been altered by the ravages of time - and having a known date of eruption gives us the ability to study many different aspects of the rock, including radioactive tracers which will give us the rates of these processes - i.e. how long it takes for this recycling [at subduction zones] to occur."

The West Mata expedition was funded by the US National Science Foundation and the US National Oceanic and Atmospheric Administration.