

Chapter 12

Supplement OS12B

Video of Submarine Eruptions

Pele Meets the Sea

Video of lava flow activity at Kilauea volcano, Hawaii in the early 1990s. Footage includes subaerial flows and lava lakes, as well as underwater footage of pillow lava formation, channelized lavas, H₂ explosions resulting from lava-seawater interactions, and floating lava rocks.

Part 1: <http://www.youtube.com/watch?v=yjL7jogUaI>

Part 2: http://www.youtube.com/watch?v=4U_gHaYBELE

Written and narrated by Frank Sansone. Photographed by Richard Pyle and Jane Culp. Edited and produced by Jane Culp and Frank Sansone.

Reference: Sansone, F. J., Pyle, R. L. and Culp, J. B. (1990). *Pele Meets the Sea*. 27-minute video. LavaVideo Productions, Honolulu, Hawaii, USA.

Explosive eruptions at W Mata volcano, Lau Basin

<http://www.pmel.noaa.gov/vents/laubasin/laubasin-multimedia.html>

Expedition co-funded by NOAA and NSF. Video acquired using the Jason ROV, operated by Woods Hole Oceanographic Institution, as part of the National Deep Submergence Facility, jointly funded by NSF, the Office of Naval Research, and NOAA.

Explosive eruptions at NW Rota-1, Mariana Arc

Movie 1

A large plume covered the summit during the first ROV dive in 2006 (J2-186). ROV is ~80 m above Brimstone Pit. Bubbles of CO₂ are visible rising past the ROV.

Movie 2

The first visit to Brimstone Pit showed that most of the cinder cone was gone (dive J2-187; number on overlay is incorrect). The yellow sulfur coated wall behind the vent is a remnant of the preexisting cone. At first, the eruptive vent was only discharging a weak plume. Later the gas flux increased and CO₂ bubbles streamed from the vent.

Movie 3

During the second visit to Brimstone Pit, lava was passively extruding from the vent accompanied by strong degassing of both CO₂ bubbles and sulfur-dominated particle plumes

(dive J2-187; number on overlay is incorrect). Red lasers are 10 cm apart.

[Movie 4](#)

Later during the second visit to Brimstone Pit, lava extrusion occurred in pulses preceded by streams of CO₂ bubbles (dive J2-187; number on overlay is incorrect).

[Movie 5](#)

A sulfur-dominated particle plume is discharged directly from a lobe of actively extruding lava during the second visit to Brimstone Pit (dive J2-187; number on overlay is incorrect). Red lasers are 10 cm apart.

[Movie 6](#)

Mild explosions observed during the fourth visit to Brimstone Pit (dive J2-189). A tephra cone has now formed over the vent.

[Movie 7](#)

Later during the fourth visit to Brimstone Pit (dive J2-189), mild explosions continue at Vent A (upper left) while a more vigorous burst suddenly erupts from Vent B (upper right), generating a dilute density flow. The ROV is positioned ~10 m downslope from the vents and lifts off the bottom as the cloud approaches.

[Movie 8](#)

During the fifth visit to Brimstone Pit, CO₂ bubbles and sulfur-dominated plumes create a lobate pattern of degassing on the flanks of the Vent C tephra cone (dive J2-189). Red lasers are 10 cm apart.

[Movie 9](#)

Later during the fifth visit to Brimstone Pit (dive J2-189), intense degassing accompanies mild explosions at Vent C, including CO₂ bubbles and a very yellow sulfur-dominated plume. Fragmental lava can be seen falling from the plume. Red lasers are 10 cm apart.

[Movie 10](#)

Brief, strong explosions occurred at the vent late in the fifth visit to Brimstone Pit (dive J2-189).

[Movie 11](#)

During the sixth visit to Brimstone Pit (dive J2-191), the active vents were shallower and located up against the sulfur wall. At first, globules of sulfur are visible raining out of the plume. Later, visibility becomes poor when explosion clouds and ashfall engulf the vehicle.

[Movie 12](#)

Sequence of three clips during the seventh visit to Brimstone Pit (dive J2-192) showing: (a) the beginning of an explosive burst (2144:08 to 2144:29 UT), (b) a plug of lava being forced upward in the vent and blown apart (2144:44 to 2145:19 UT), and (c) the end of the same burst (2150:28 to 2150:49 UT). Audio is the sound recorded by the hydrophone during the same time intervals.

[Movie 13](#)

Another view of a lava plug being destroyed at the beginning of an explosive burst during the seventh visit to Brimstone Pit (dive J2-192; 2054:05 to 2055:08 UT). Flat, disc-shaped bombs ejected from the vent are probably remnants of the lava cap. Audio is the sound recorded by the hydrophone during the same time interval.

[Movie 14](#)

Flashes of red glow are visible in the vent during this explosive burst. Audio is the sound recorded by the hydrophone during the same time interval. This burst was the largest observed and had the highest recorded acoustic amplitude during the seventh visit to Brimstone Pit (dive J2-192). The rapid oscillations in the eruption plume are interpreted to be due to steam formation and condensation as hot lava and seawater interact.

[Movie 15](#)

Slow motion segment of Movie 14 showing red flashes and plume oscillations (J2-192; 2058:48-2059:00 UT).

From: Chadwick, W. W., Jr., Cashman, K. V., Embley, R. W., Matsumoto, H., Dziak, R. P., de Ronde, C. E. J., Lau, T. K., Deardorff, N. D. and Merle, S. G. (2008). Direct video and hydrophone observations of submarine explosive eruptions at NW Rota-1 volcano, Mariana arc. *Journal of Geophysical Research*, **113**, B08S10, doi:10.1029/2007JB005215. Copyright 2008 American Geophysical Union. Reproduced by permission of the American Geophysical Union.

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