

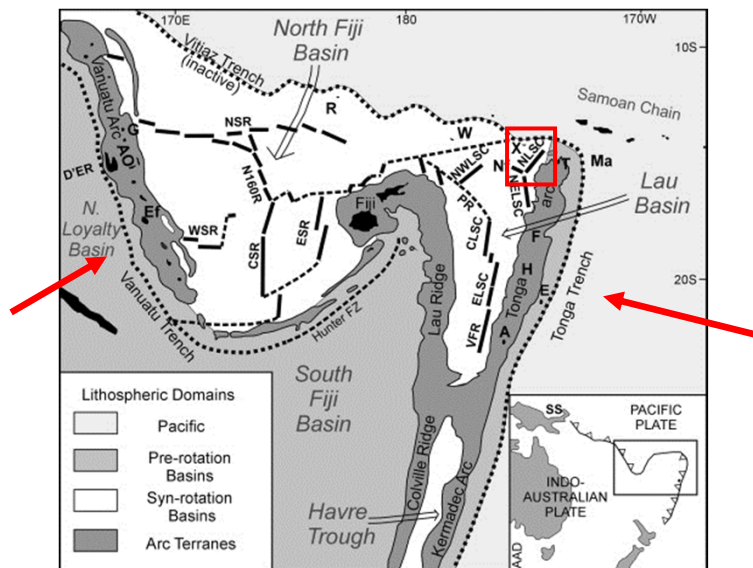
Week 5 – The ongoing eruption at W. Mata Volcano

Multi-disciplinary studies – Resing et al., 2011 (in press)

Submarine explosive and effusive volcanism

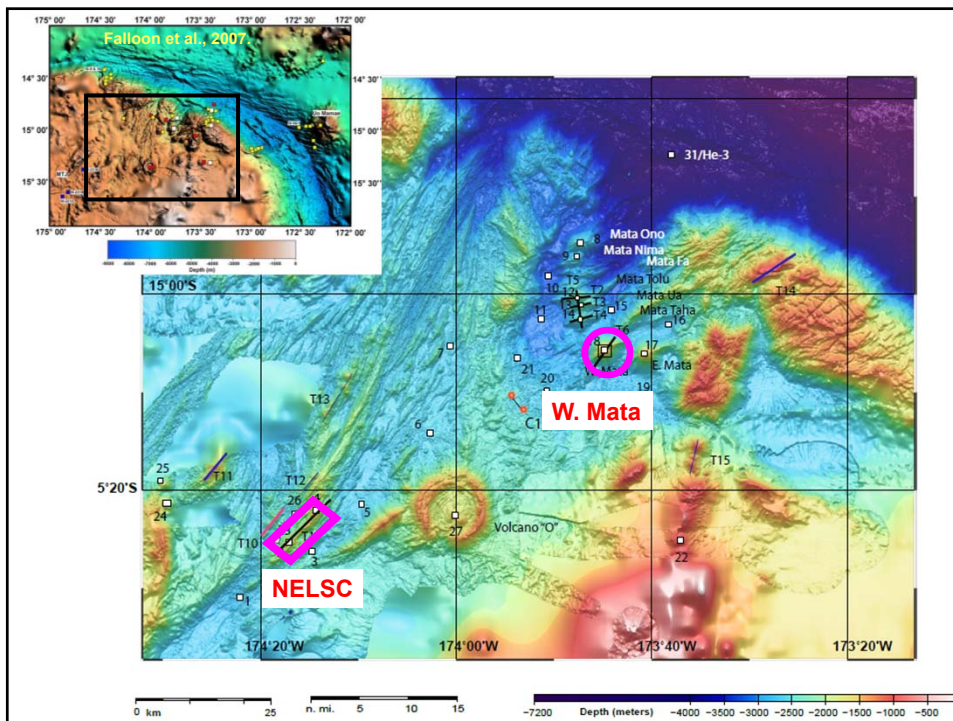
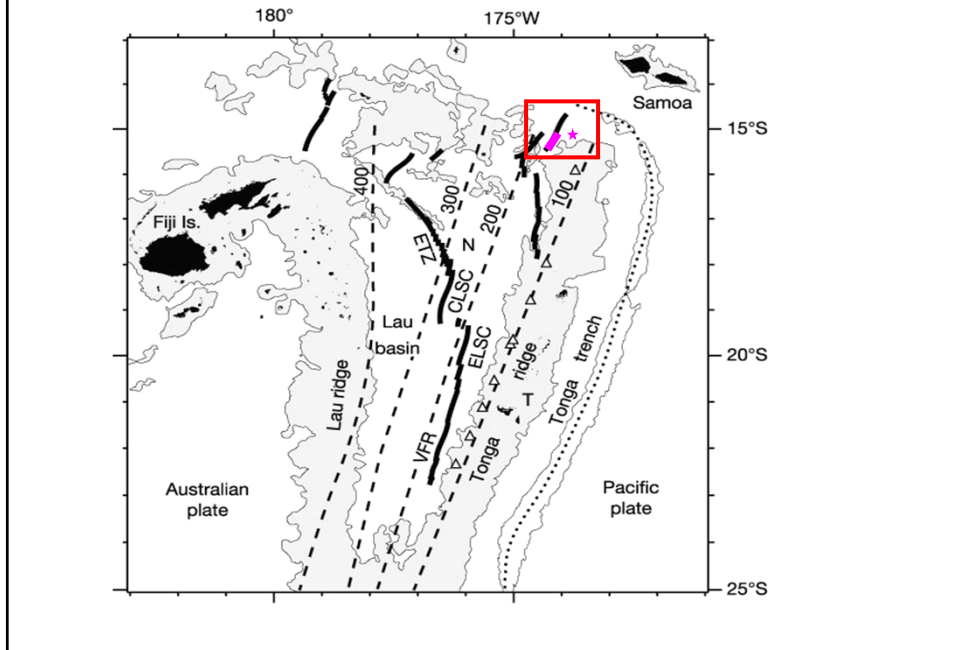
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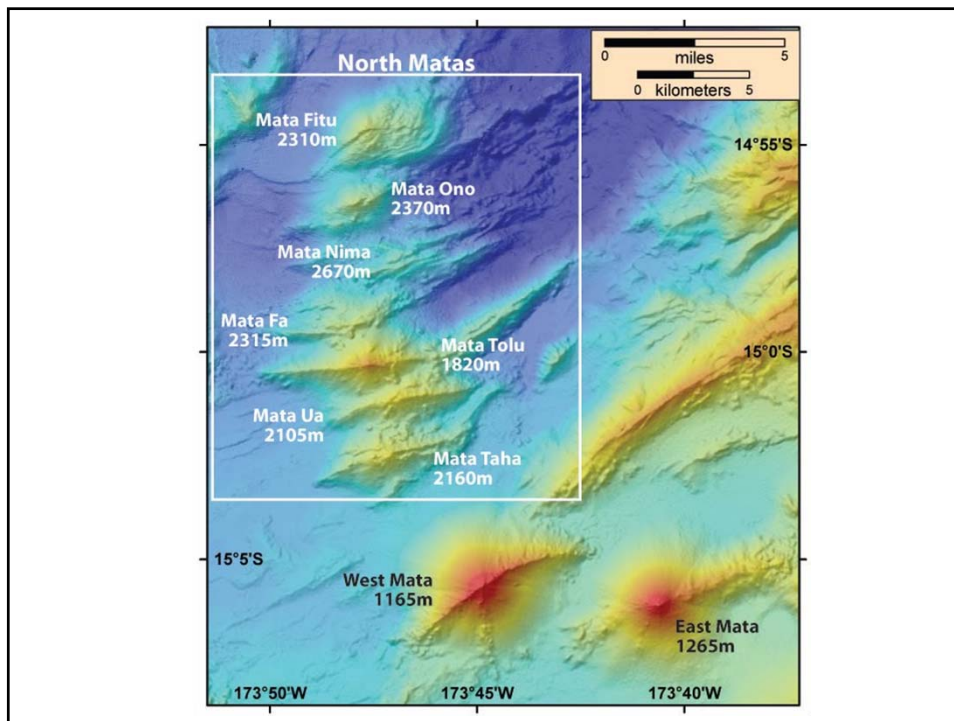
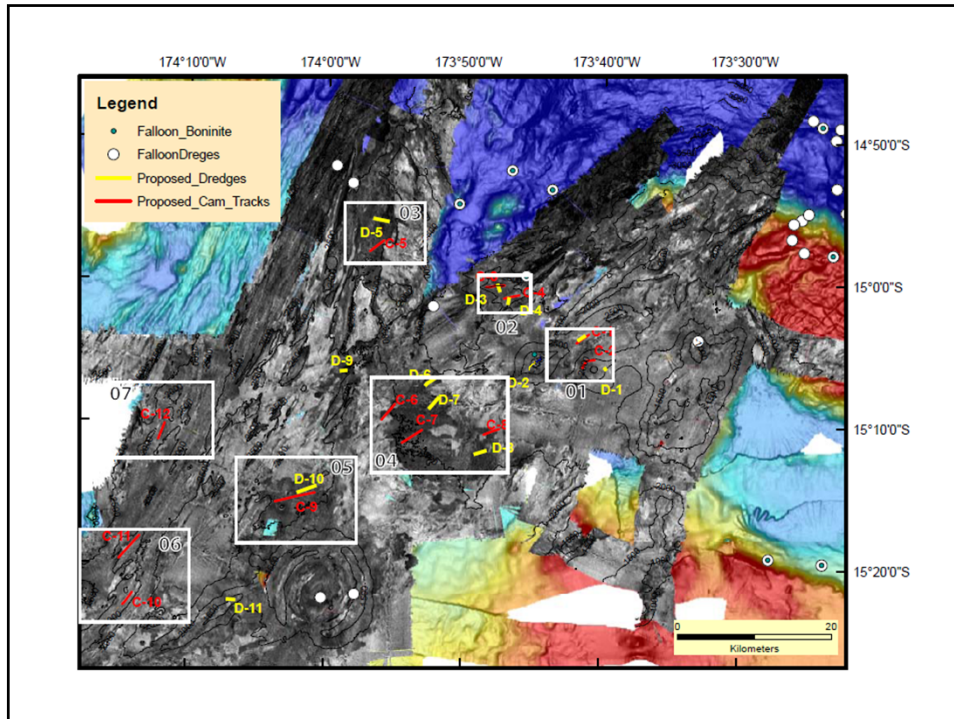
Regional setting and tectonics

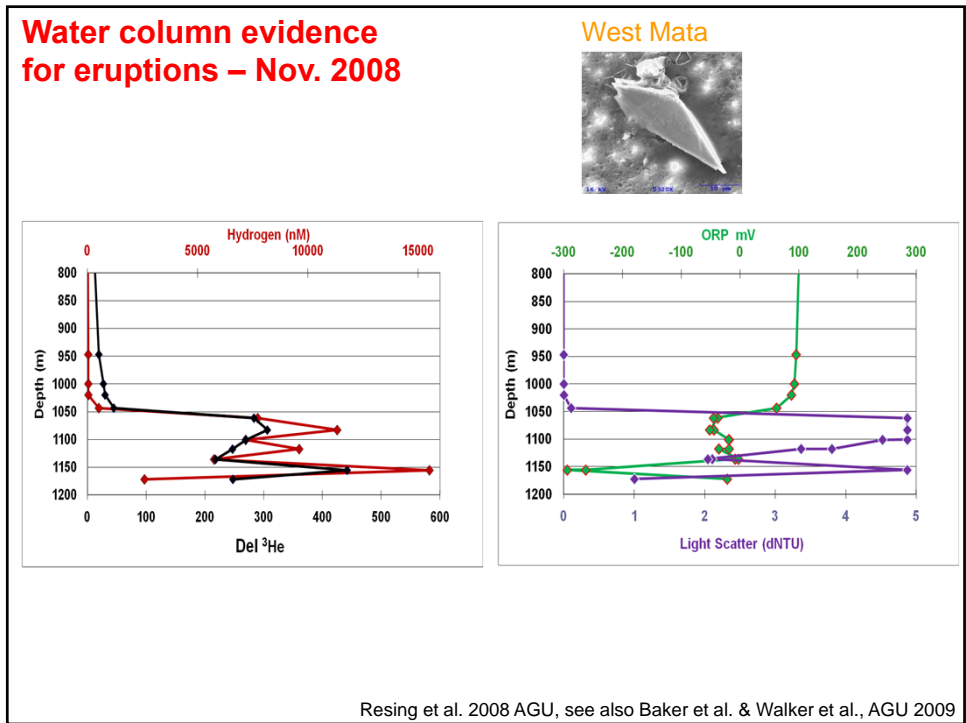
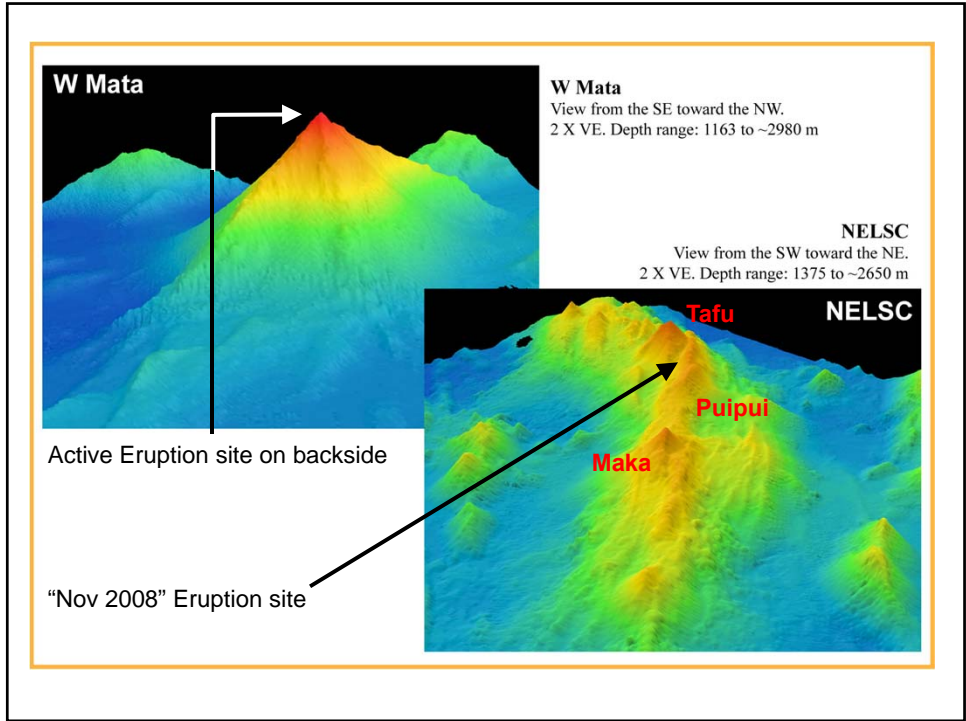


SW Pacific island groups and tectonic interpretation (Pearce et al., 2007. EPSL). The Tonga–Lau system consists of the active Tonga arc and the remnant Lau Ridge arc, separated by the Lau Basin, which consists of a series of spreading centers and transforms (some 'leaky'). Subduction is of opposite polarity in the west, beneath the active Vanuatu arc. Behind it, in the North Fiji Basin contains a complex of spreading centers and fracture zones.

Study Sites are in the NE Lau Basin





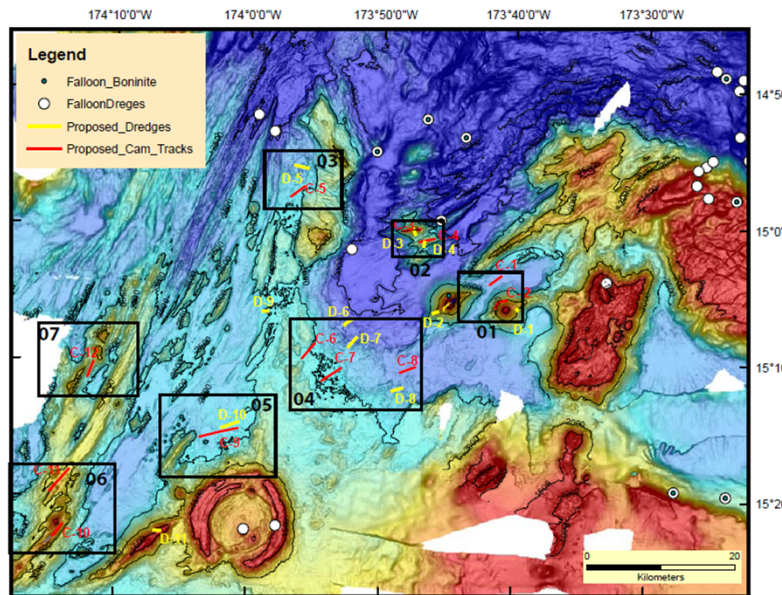


Boninite Lava

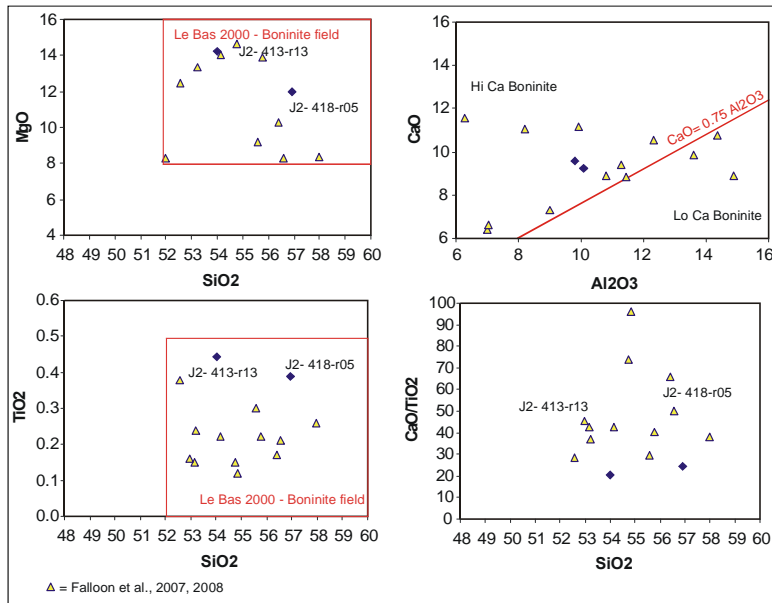
Boninite is an "end-member" supra-subduction zone magma type known from only a few regions of the world.

Boninite:

- high H₂O
- refractory mantle source
- Other unique chemical & mineralogical characteristics
- shallow, high T (>1400 C), flux-melting of refractory mantle

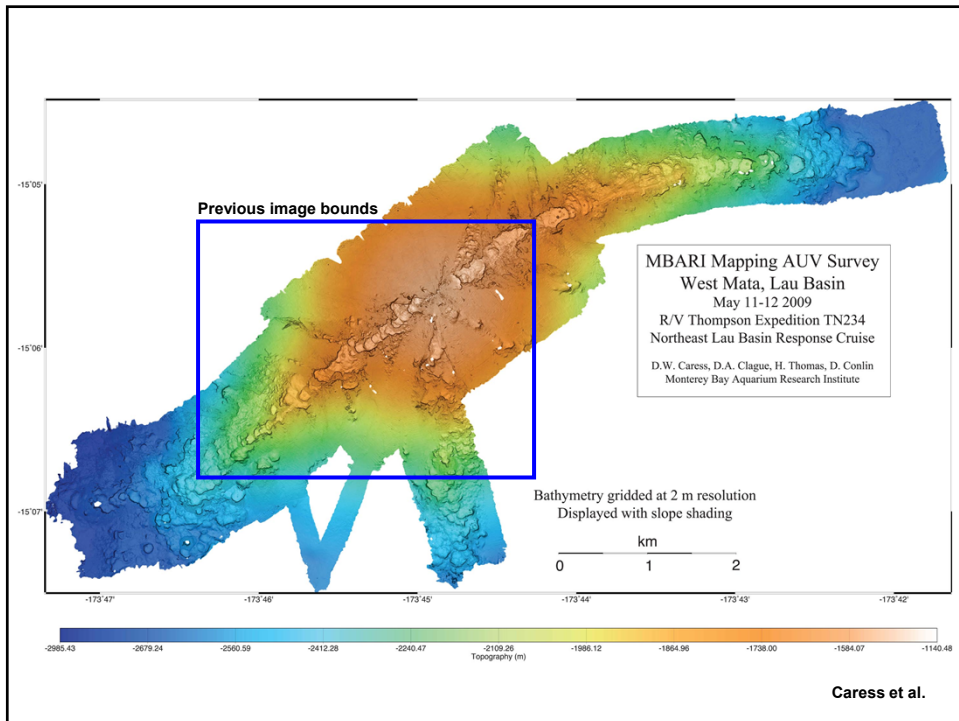
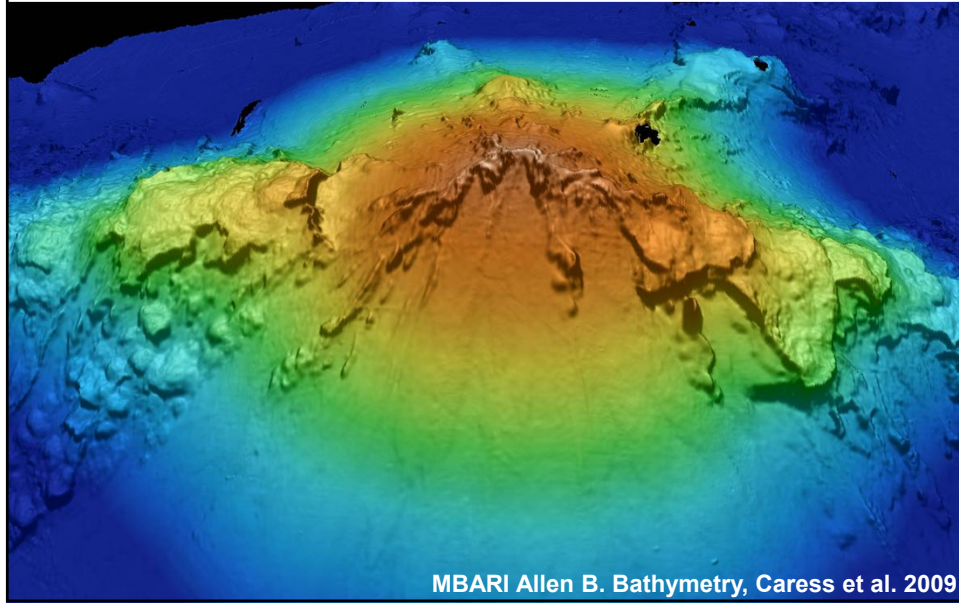


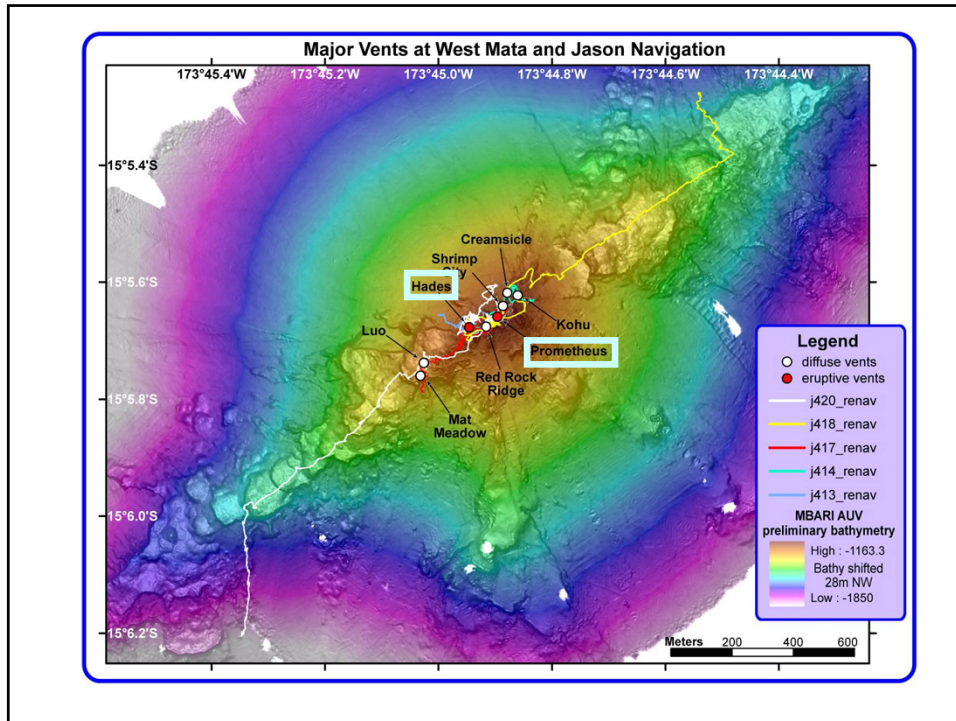
W. Mata 2009 lavas



Whole Rock XRF analyses from the University of Hawaii (total Fe as FeO)

W. Mata Volcano





W. Mata

Prometheus Hades

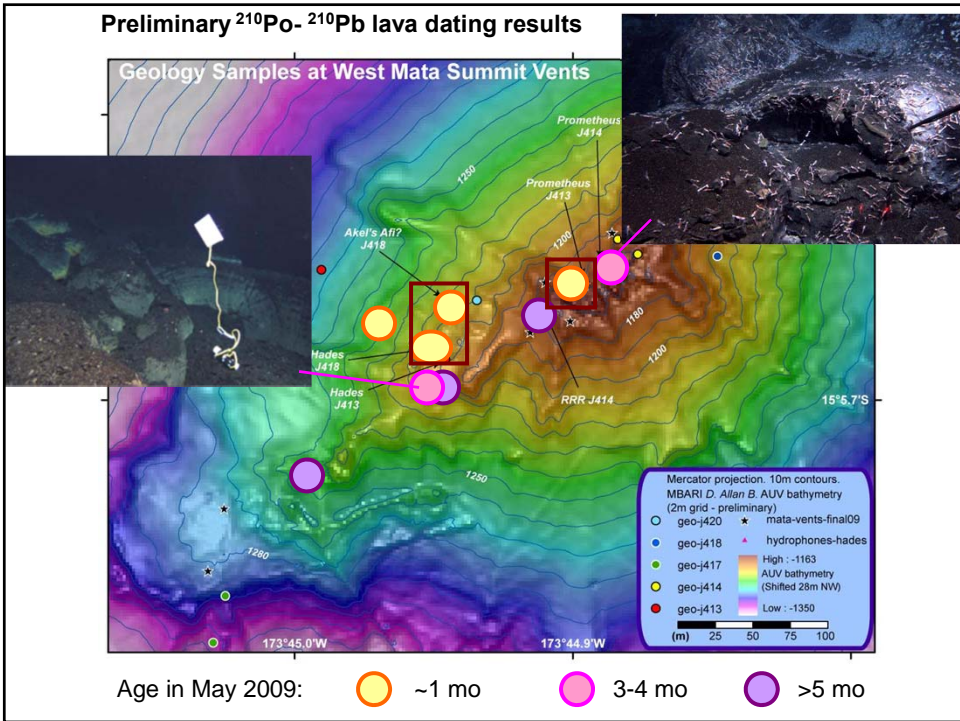
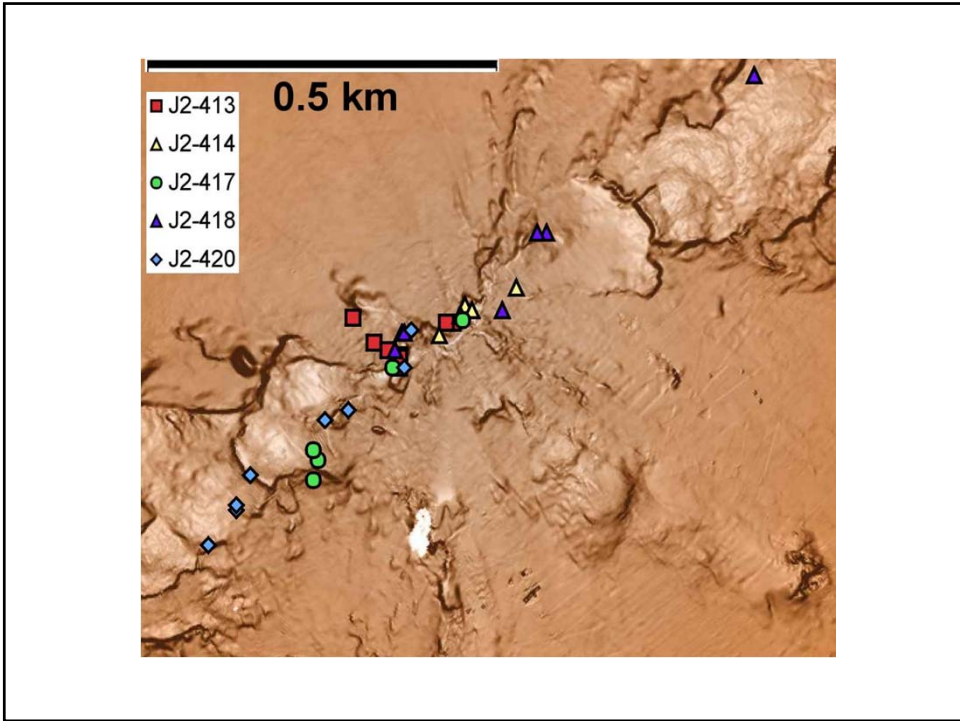
0.25 km

100m

Puu Oo

W. Mata vent spacing and eruptive style in May 2009 was similar to these 1997 images of the ongoing Puu Oo eruption of Kilauea, Hawaii ..

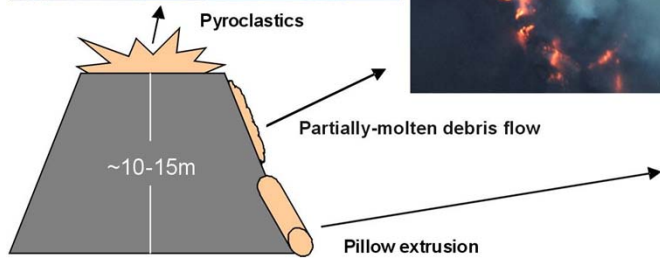
But fountain height and flow length is probably not.



Extrusion conditions summarized



**West Mata Volcano
Hades vent
1200m bsl**



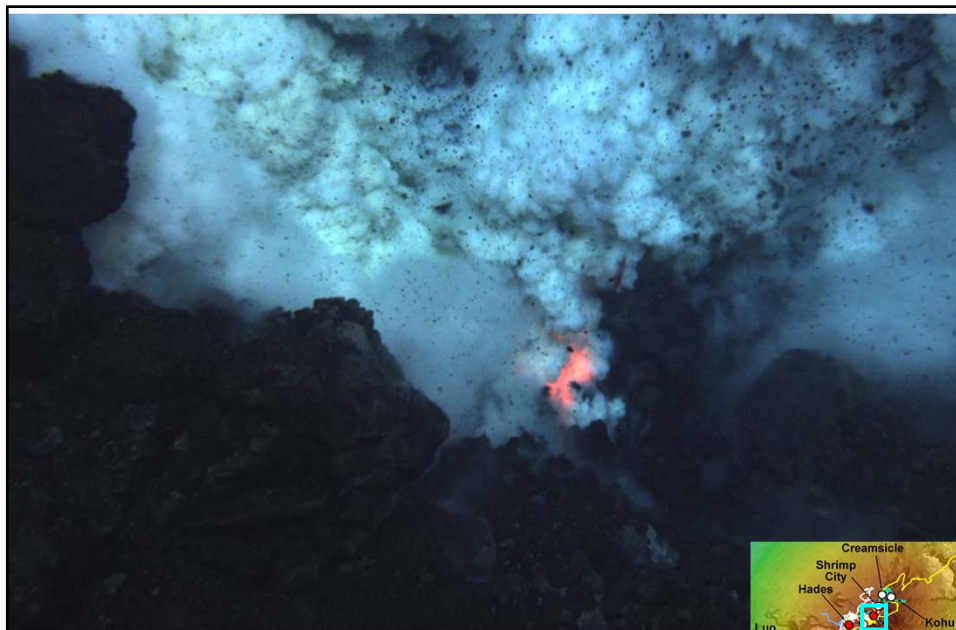
Hades Vent. Multiple sulfur and ash plumes issuing from part of the Hades vent complex (image ~ 10 m across)



Hades Vent – a range of extrusion conditions govern emplacement of vent proximal lava flows



vent proximal lava flows, ~12m field of view



Prometheus Vent, dive J2-417 (W Mata). Eruptive venting of magma, tephra and a sulfur-laden plume. Image ~ 3m across



Shrimp City, near Prometheus,
Dive J2-418. Note pyroclastic apron
over the lavas



Hades Vent – distal locales – active Pillow lava flows downslope

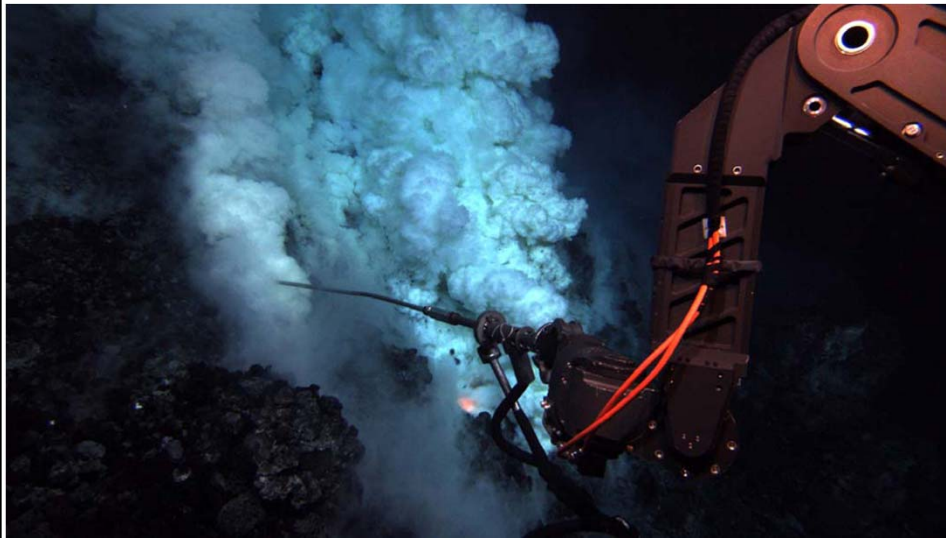






Hades J2-414 (W Mata).

Magma is visible to the left of the sulfur-laden plume. Image ~ 2m across.

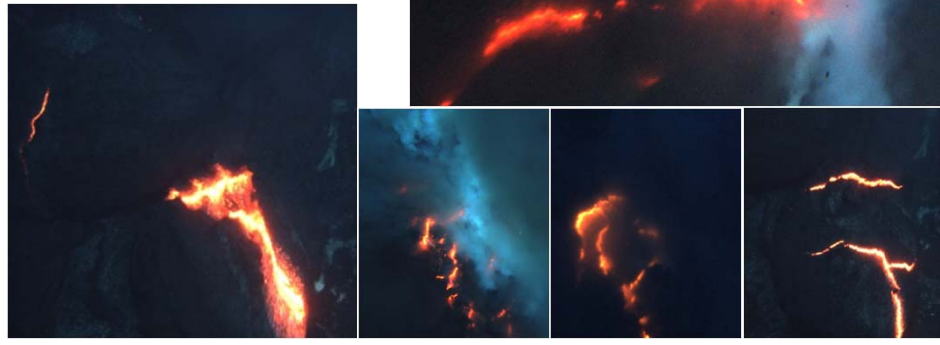


Hades Area (Akel's Afi) J2-418 (W Mata).

Fluid sampling at an eruptive vent in the Hades Area. Fluid sampling "wand" ~1m long.

Summary

- Two 2008-09 eruptions resulted in young lava flows in the NE Lau Basin – (*we only talked about W. Mata today*)
- They had very different styles, sizes, durations, effusion rates, sea floor character, compositions, and relationships to older lava units.
- Many other potentially active sites exist in this region, suggesting unusually high density of volcanic activity, with implications for deep sea chemical cycles and ecology



Questions for this and other papers:

What were the main points of the paper (sometimes it's difficult to separate primary from secondary points)?

Which aspects would you like more info about? Where would you look if you wanted to delve deeper into the topic?

What aspects of the conclusions did you feel were well justified in the paper? Why?

Which aspects were not well justified? Why?