



Kavachi

birth of an island

Text by Corey Howell



Thirteen nautical miles to the seaward of Gatokae and Vangunu Islands in the Solomons Western Province lies the submarine volcano Rejo te Kavachi [or 'Kavazi' in Vangunu language], usually referred to simply as Kavachi. The volcano spends most of the time just below the seasurface, erupting on a totally unpredictable but frequent basis, ranging from once a day to every 2-3 minutes, with occasional longer periods of inactivity. There is nothing quite so unpredictable as a submarine volcano.

With the Australian tectonic plate being rapidly subducted under the Pacific plate just a few miles to the southwest, Kavachi represents a classic example of fore-arc volcanism. The earlier products of this process - the high rugged caldera of Vangunu and the symmetrical peak of Gatokae - tower to the north and east of Kavachi, totally cloaked in luxuriant tropical rainforest.

Since early 2000, when we began regular visits and occasional charters to monitor activity, snorkel, and fish we've witnessed a range of different activity types, ranging from a long period of quietude in 2003/4, through strange artillery-like seasurface percussion episodes, countless spectacular explosive eruptions producing columns of ash and steam often including lava bombs vividly incandescent in the midday sun, to the island-building event of 2002. Every few years edifice inflation and lava flow forms an ephemeral island that lasts for a few days or weeks before being eroded by sea and swell. The edifice can change in spectacular fashion, going from 15 metres underwater to a 10 metre high island and back to 22 metres deep in the space of 3 weeks. Currently the vent is ~10metres depth and erupting sporadically several times a day [reports from observers in Biche Village]. Most eruptions can be seen from the remote weather coasts of Gatokae and Vangunu - a spectacular night-time show during larger eruptions - and larger eruption columns can easily be seen from sealevel 25 n.m. away. The last Wilderness Lodge charter to Kavachi was in April of this year, a few days after the nearby 8.1 mag earthquake that produced the devastating tsunami, to check if the big shake had affected the volcano.

Navigational charts indicates a number of different locations of volcanic activity in the vicinity of the present vent location, however given the known bathymetry of the surrounding seabed these are likely to be a combination of pre-GPS fix errors and observers mistaking the extensive

Kavachi underwater volcano erupting. (Photo's by Corey Howell and Simon Albert)





Kavachi surfacing. (Photo: Corey Howell)

downcurrent mud and sulfur plumes as reefs [an easy mistake to make], with the exception of a north trending ridge that extends for some distance from the edifice that could possibly have hosted historical eruptive activity though we have not witnessed any signs of this to date.

Kavachi's deep bass thuds and cracks are a feature when freediving Kicha and Bulo Islands, some 23 n.m. distant from the volcano. These are clearly audible on the surface and increase in intensity the deeper you go, with some days below 15 metres the subsonic assault is such that we have to leave the water due to the pressure on chest, ears and internal organs, opting for the other side of the island where it is quieter. The fish also respond to the frequent bursts of sound, particularly the schools of fusiliers and surgeonfish, 'whump'ing in a similar manner to when a predator strikes. Kavachi is also clearly audible underwater at Borokua, an island 40 n.m. to the east of the volcano.

Being a remote seamount with kilometre-deep ocean all around, Kavachi hosts a unique pelagic ecosystem lacking completely in benthic growth due to the frequent eruptions. To what extent the attendant schools of fish are attracted simply by the structure – a major attractor in this great expanse of deep ocean – or whether there exists a

specific food chain related directly to what is coming out of the volcano, we do not yet know. Huge schools of rainbow runner, bigeye trevally, and barracuda are interspersed with a spectacular array of apex predators including dogtooth tuna, wahoo, spanish mackerel, and several species of shark including silvertip, silky, grey reef, and occasional visits from oceanic whitetips and hammerheads. Chasing baitfish through this fixed aggregation are roving schools of yellowfin tuna, skipjack and bonito, with blue and black marlin and sailfish picking off the unwary.

In August of this year the BBC Natural History Unit succeeded in aerial filming some moderate eruptive activity utilising the revolutionary stabilized HD technology used in the ground-breaking Planet Earth documentaries, and we hope to capture, if very lucky, an island event in the near future.

Stay tuned to Melanesian Geo magazine and thewildernesslodge.org for news on Kavachi's epic island-building process!

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Undersea mining

Minings last frontier?

By Corey Howell

For decades venture capitalists have been tempted by the riches of seafloor mining for manganese, gold and other minerals essential to the burgeoning global economy. Untested mining technologies and the inherent cost of ship-borne extraction techniques, however, have kept the seabed mostly intact to date. The sustained bullishness of world gold and copper markets, however, coupled with advances in remote ore extraction technology, have again raised the prospect of viable undersea mining, this time the initial focus is PNG's Bismarck Sea, and the neighbouring Solomon Sea adjacent to Kavachi and it's sister submarine volcanoes Kana Keoki and Coleman.

David Heydon's Nautilus Minerals Inc secured seabed exploration rights to PNG waters in 1997 and proved up very high grade ores containing copper, gold, silver, and nickel at depths of ~1500 meters by deploying underwater robotics. Nautilus's Solwara project licenses have since been extended to cover an enormous area of the Bismarck and Solomon Seas. Nautilus's investment success [Mining giants Anglo-American and Teck Cominco are amongst the financiers] and considerable media profile has been supported by the research conducted by Dr Brent McInnes and team from CSIRO into seafloor massive sulfide [SMS] and hydrothermal sulfide throughout Melanesia in the past decade aboard the RV Franklin, which included visits to Kavachi in 2000 and 2002. Nautilus press claims they have exploration rights to much of the seafloor of PNG, Solomon Islands, Vanuatu...actual commercial mineral extraction is slated to commence in 2009

As you will note from the tone of the articles in the links below, Nautilus's focus is very much on the technology - there is little to indicate the recent 30-day EIS study will provide an operational model that is sympathetic to an environment that humans have no experience of, and very little knowledge of, whatsoever. Rather the EIS represents a rubber stamp to allow the mining companies to run away from the thicket of landowner and environmental hassles that

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typifies terrestrial mining in Melanesia to date. Certainly the onus is on getting the 'Jules Verne' - the specially built mining platform – into commercial production as soon as possible, and if ever there was a case of out-of-sight-out-of-mind, this is it - this is too remote for even the most concerned of stakeholders to visit. The impact of this mining on the deep sea environment is as unknown as the deep sea fauna itself, suffice to say that all those wonderful images you see in National Geographic Magazine and on the Discovery



channel of recently discovered black smoker vents and their colonies of new-to-science extremophiles, are one and the same phenomenon that Nautilus is planning to mine. The 'small footprint' claims of the media releases do not take into account how much these undersea vents concentrate life into one area in what is otherwise a relatively barren abyssal plain. All of the ore extracted will be processed on-shore in PNG as well, which in itself presents enormous environmental considerations given the track record of Panguna, Ok Tedi, Misima et al.

We hope that consistent ongoing scrutiny from the scientific community, and regional environmental management bodies, will introduce some sustainability into this 'frontier' mining enterprise so the same disastrous mistakes made on land – Ok Tedi, Panguna, Misima – are not made in our Melanesian seas, for which not only the people of Melanesia, but increasingly the world, rely on for their fish.

links:

- www.nautilusminerals.com/s/Media-FactSheet.asp
- www.nautilusminerals.com/i/pdf/Nautilus_Reprint_Vancouver_Sun.pdf
- www.nautilusminerals.com/i/photos/Location-Map.jpg
- www.findarticles.com/p/articles/mi_m1590/is_3_56/ai_56249898