

## Submarine monogenetic volcanism

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Monogenetic volcanism is a widespread phenomenon recognized to occur in a range of terrestrial settings. By comparison, very few observations of submarine volcanism have been interpreted as monogenetic, particularly in the vast expanse of the deep sea, which forms Earth's volumetrically dominant volcanic province. The purpose of this presentation is to consider the types of landforms, eruption products and vent geometries one might anticipate for deep sea monogenetic fields in the context of what is known from direct and remote observations of deep sea volcanism. We discuss several settings in which submarine monogenetic volcanism is likely to be common and explore examples using a generic definition (small magma batches, small volume eruptions, isolated/dispersed magmatic systems, and no link of eruption deposits to pre-existing polygenetic volcanic structures but structural control on the locus of volcanism is permissible). These settings include extensional basins (particularly in back arcs), near-spreading-center seamount fields, and mid-plate settings. Examples will be compared to subaerial settings (e.g., Michoacan-Guanajuato and Auckland volcanic fields). For example, apparently short-lived volcanism at discrete, closely spaced elongate volcanic cones and low lying lava flows in the NE Lau backarc basin shares many characteristics with subaerial monogenetic fields, including the size and spacing of volcanic vents and edifices. Geological, morphological, petrological, and geochemical observations made over six research expeditions since 2008 have been used to characterize this volcanic field and to test for a monogenetic or polygenetic classification. Volcanoes in the group are as close as 1.5 km apart (summit to summit) and 450-1400m tall. They are formed predominantly of low effusion rate pillow lavas with variable amounts of pyroclastic deposits, suggesting relatively long-lived volcanism (ca 100-200 yrs) at each edifice, similar to large lava shields in Iceland (e.g., skjaldbreidur). ROV and near-bottom photographic surveys do not indicate the types of structures expected for a protracted, many-eruption volcanic history at a single volcano, although there is some evidence for syn or post eruptive tectonism. At least three of the (the now inactive) volcanoes support black smoker hydrothermal chimneys, suggesting relatively recent volcanism and a crustal magma body remains to generate these high temp systems. Terrestrial monogenetic fields can also support robust geothermal systems. All but one of the cones are built of broadly boninitic volcanic products yet major and trace element compositions are distinct enough to imply that each is fed by separate, poorly mixed, small magma batches. Rapid extension combined with thin lithosphere and episodic and dispersed magma supply from the nearby subduction system appears to promote conditions favoring dispersed monogenetic volcanism over longer lived volcanic edifices or ridges at this site.