

Surtseyan style eruption in the Ambae (Vanuatu, New Hebrides) caldera lake in 2005 December and its implication to volcanic hazards and emergency management on an ocean island

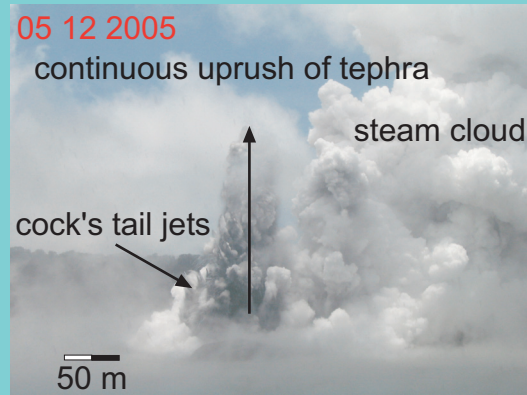
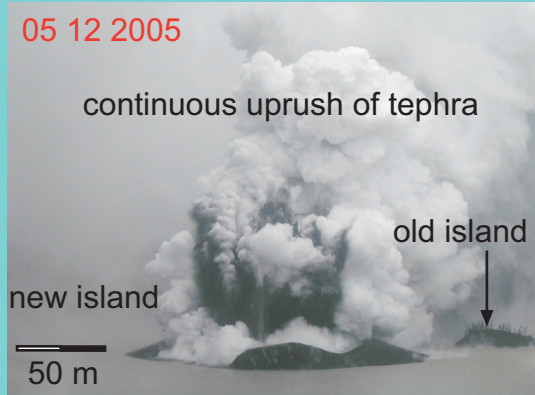
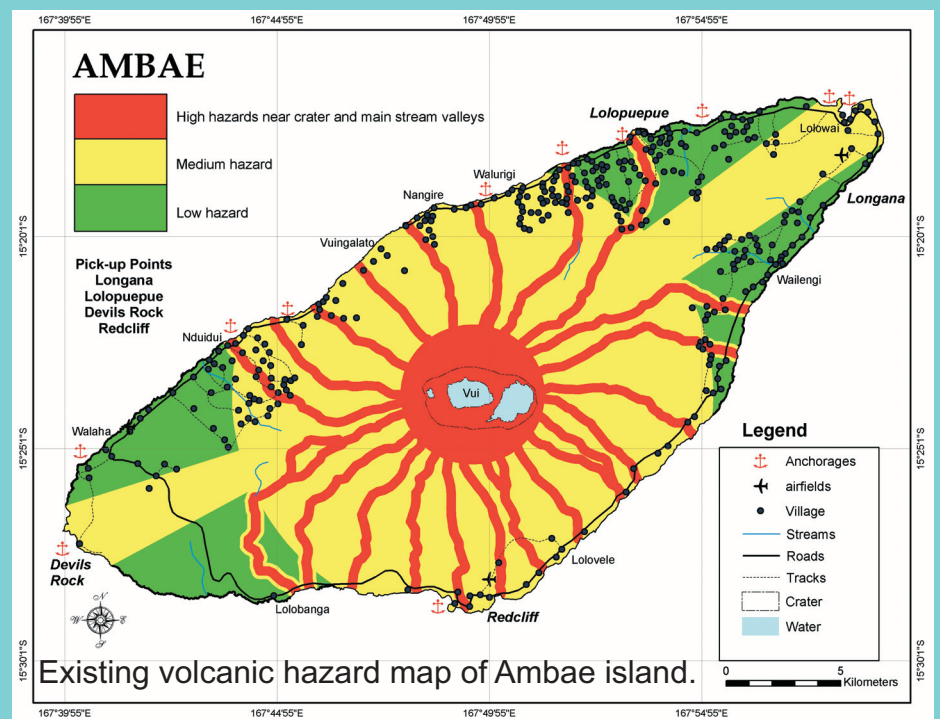
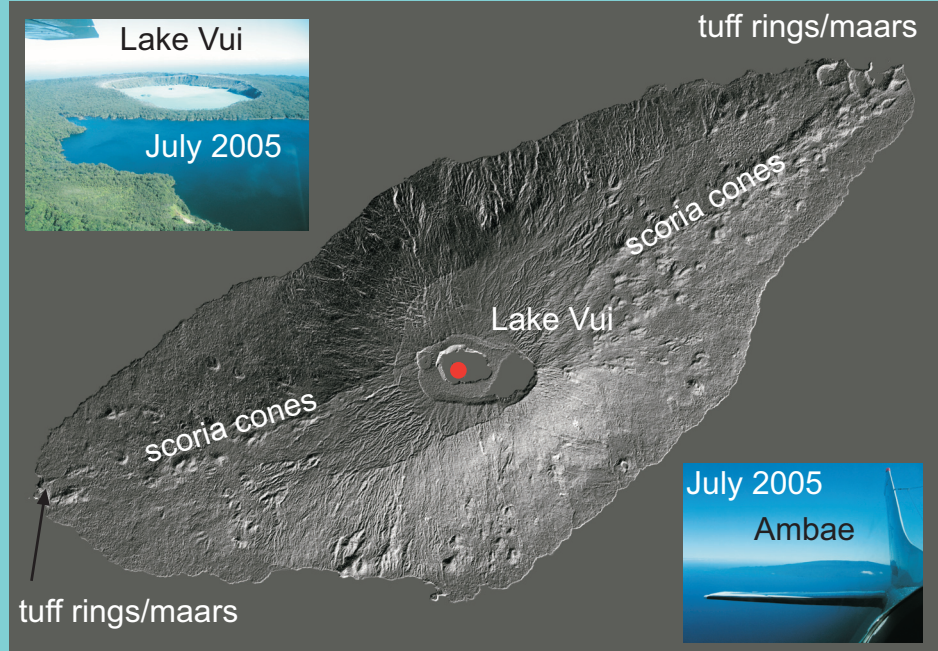
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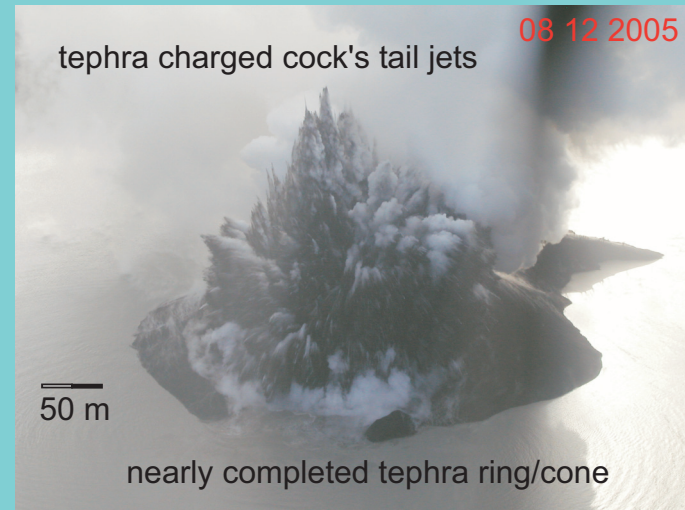
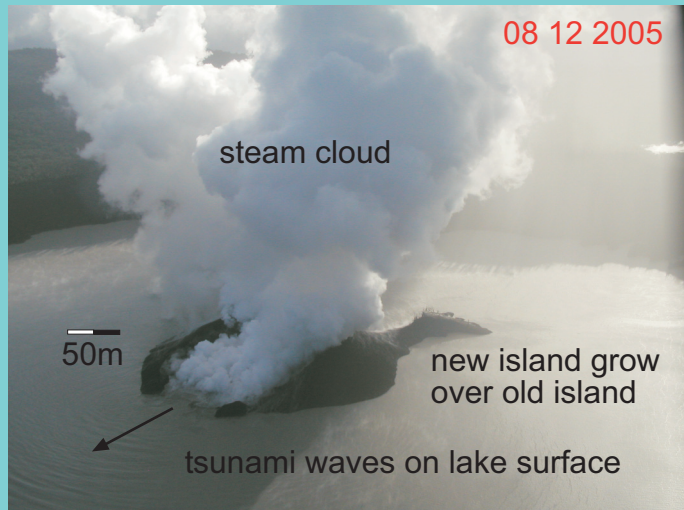
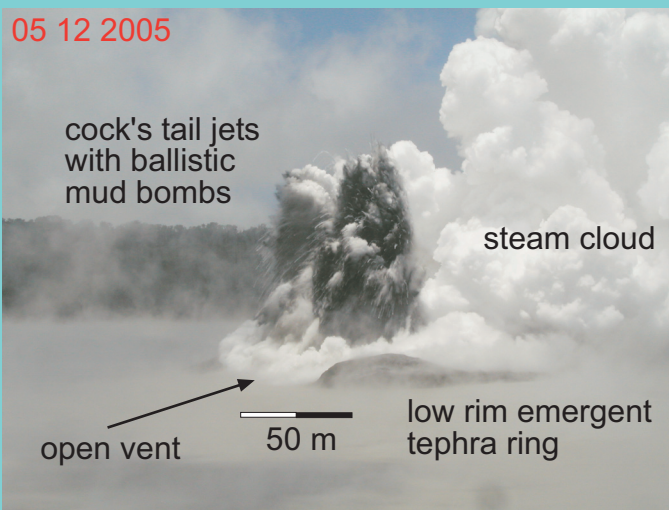


300th Anniversary Volcano International Conference Commemorating the 1706 Arenas Negras Eruption Garachico, Tenerife, Canary Islands, SPAIN

After a long silence, Lake Vui on Ambae Island erupted on the 28th of November 2005, disrupting the lives of 10 000 inhabitants. "Surtseyan-style" explosions burst through the Island's summit lake waters forming a new tuff-cone and threatening to form lahars. The island has an NE-SW elongated shape. Along its axis scoria cones and fissure-fed lava fields occur. The island rises to 1496 m. At the summit, two craters occur, surrounded by crescentic caldera wall. Inside the caldera complex a large phreatomagmatic tephra ring forms a broad outward-sloping volcanic edifice ~ 150 m above the caldera floor. This tephra ring encloses the 2.1 km diameter, acidic Lake Vui. This water mass is the major concern in any volcanic hazard assessment on Ambae, due to its potential as a lahar source. Since the early 1990s, activity has occurred in Lake Vui through a single vent area, with a series of heating-cooling cycles that culminated in a small one-day phreatic eruption in 1995. Historic eruptions on Ambae have been documented in 1575, 1670 and 1870. The latest of these events is believed to have built a small cone inside Lake Vui. A new eruption on Ambae volcano in 2005 late November to early January demonstrates characteristic features of Surtseyan style eruptions. These events were characterised by a rapidly changing explosion styles and magnitude. A new 120-140 m high tephra cone was formed within Lake Vui in less than 8 days. A lateral migration of the vent, a low magma-supply rate, and the predominance of mud-rich waters appear to have kept the coolant ratios high throughout this event, dampening the magnitude of explosions produced. The explosions built to a maximum intensity around 9-10 days after the first breaching of the lake surface by Surtseyan jets. The largest of these explosions may have been intensified by choking induced by the collapsing wet wall of the conduit. Many workers have pointed out that eruptions through crater lakes are too complex, and unpredictable to apply existing theoretical physical models for the potential evolution of such volcanoes. Considering the limited size of an island, creating a useful volcanic hazard map is challenging due to the largely multivariable processes may be involved in the evolution of the intra-caldera lake Surtseyan tephra ring. The 2005 December eruption in Ambae is generated logistic trouble in relocating the island inhabitant. On the basis of the available volcanological data it is now confirmed that the 2005 eruption was similar to those occurred in 1870, and it maybe used as an event scenario for future eruptions in Ambae.



Initial Surtseyan style emergent volcanic eruptions just 7 days after the first eruptions

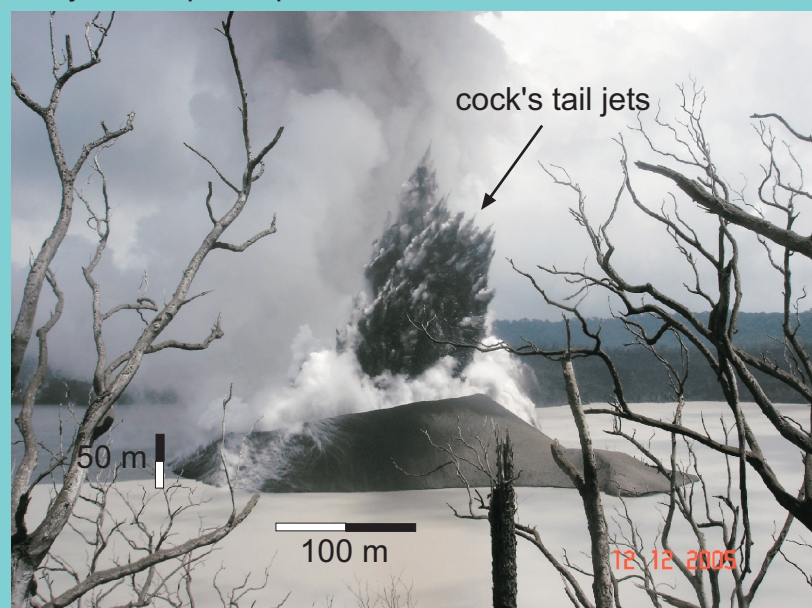


Fast growing tephra cone in Lake Vui

Less frequent but more energetic eruptions in the final stage of the activity

Fully developed tephra cone in Lake Vui

Initial erosional stage of the new tephra cone



The 2005 December eruption can be viewed as a likely eruption scenario in a summit eruption through Lake Vui. This eruption didn't generate lahars through caldera lake displacement. Deposits that assigned to be deposited by lahars need to be reevaluated and the hazard map needs significant revision.

