JOINT GEOLOGICAL SOCIETY OF NEW ZEALAND & NEW ZEALAND GEOPHYSICAL SOCIETY CONFERENCE LAUNCHING INTERNATIONAL YEAR OF PLANET EARTH

PROGRAMME & ABSTRACTS

New Zealand Geophysical Society (Inc)

TAURANGA
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GEOLOGICAL SOCIETY OF NEW ZEALAND & NEW ZEALAND GEOPHYSICAL SOCIETY JOINT ANNUAL CONFERENCE

Launching International Year of Planet Earth
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Baycourt Community and Arts Centre, Tauranga

New Zealand
Geophysical Society Inc.

Programme and Abstracts

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A LARGE-SCALE, NEAR-SEA LEVEL, SILICIC CALDERA-FORMING ERUPTION IN EFATE? AN ALTERNATIVE MODEL FOR THE 1 MA EFATE PUMICE FORMATION, VANUATU, SW-PACIFIC

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The Efate Pumice Formation (EPF) is a rhyodacitic volcaniclastic succession widespread in the central part of Efate Island, and on small islands to the north. The volcanic succession was inferred to result from a major, entirely subaqueous explosive event north of Efate Island. The accumulated pumice-rich units were previously interpreted to be subaqueous pyroclastic density current deposits on the basis of their bedding, componentry and stratigraphy characteristics. Here we suggest an alternative eruptive scenario of this widespread succession based on recent field work at key locations. The major part of the EPF is distributed in central Efate, where pumiceous pyroclastic rock units several hundred meters thick are found within fault scarp cliffs elevated about 800 m above present day sea level. The basal 200 m of the pumiceous succession is composed of massive to weakly bedded pumiceous lapilli tuff units, each 2-3 m thick. This succession is interbedded with wavy, undulatory and dune bedded pumiceous tuff units, characteristic of co-ignimbrite surges and ground surges. Hence, the surge beds imply that the intervening units comprise a subaerial ignimbrite succession. There are no sedimentary indicators in the basal units that are consistent with water-supported transportation and/or deposition. Upwards the basal facies grade toward 200 m of massive to finely bedded, fossil-rich pumiceous volcaniclastic sand and silt interbedded with pumice gravels. Cross-lamination and convolute-bedding in this upper unit, accompanied by dish-structures and dewatering pipes, suggest traction and suspension deposition from water-supported density currents followed by loading deformation. This unit is interpreted to be deposited from reworking of the earlier volcaniclastic pumiceous units in a wet environment, such as a lagoon. The pumiceous succession is topped by reef limestone, which presumably preserved the entire EPF against erosion.

During formation of the EPF, we now propose a combination of initial subaerial ignimbrite-forming eruptions, followed by caldera subsidence. The basal part of the EPF, commonly referred to as Efate Pumice Breccia, is considered to be a normal subaerial rhyodacitic ignimbrite sequence, rather than a succession of subaqueously formed pyroclastic density currents. The upper volcaniclastic successions in our model represent intra-caldera pumiceous volcaniclastic deposits accumulated in a shallow marine environment in the resultant caldera. The present day elevated position of the succession is a result of a combination of potential caldera resurgence and ongoing arc-related uplift in the region.

TALK – Tue pm