

Compositional changes in the eruptives of the Barren Island volcano: The lone active volcano in the Indian subcontinent.

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The Barren Island volcano in the Andaman Sea, lying on the SE Asian Neogene volcanic arc, shows resurgent volcanism of three distinct cycles. The first cycle probably dates back to late Pleistocene, whose initial configuration was blown out by a massive explosion. The second cycle has intermittent eruption between 1789 and 1832 A.D., while the third cycle commencing from March 1991 has still been continuing. The first eruptive phase of the third cycle ended in October '91 followed by its second phase between Dec'94 and May'95. The oldest lava is olivine basalt and that of 1789 – 1832 A.D a high alumina olivine basalt. The 1991 lava is olivine bearing basaltic andesite while that of 1994-95 an olivine basalt. In all the three cycles the lava is an aggregate of melt with varying concentrations of plagioclase ($An_{92.5-86}$), olivine ($Fo_{84-66.5}$) and diopside xenocrysts. The first cycle contains larger proportions of clinopyroxene and olivine xenocrysts and the volume of tephra to lava was 1:2, which remained identical during the second cycle with plagioclase xenocrysts more abundant. In the third cycle tephra is dominant. No distinct mineralogical evolution is encountered with progress of time; lava texture, however points to prolonged partial crystallisation in subterranean shallow magma chamber with intermittent perturbations. Lava chemistry is closely matching with that of island arc tholeiite having been enriched in LREE and LILE and depleted in HREE and HFSE compared to N-type MORB. Sr isotope abundances reflect crustal contamination. Barren magma was possibly derived through partial melting of an E-type mantle source.