



The Rungwe Pumice (Rungwe, Tanzania): a wind-still Plinian eruption

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The Late Holocene eruptive history of Rungwe Volcano in South-West Tanzania indicates a dominance of sustained explosive eruptions ranging from violent Strombolian to Plinian scale, generating extensive pumice fall deposits. The most significant deposit is that of the Rungwe Pumice, a ca. 4 ka old Plinian pumice fall deposit of trachytic composition. The comprehensive documentation in the field of the preserved part of the deposit enables us to estimate a set of crucial eruptive parameters. A maximum eruption column height H_T of 30.5 – 35 km, associated with a peak mass discharge rate of $2.8\text{--}4.8 \times 10^8$ kg/s, is suggested by empirical models. These values are consistent with estimations from TEPHRA2 inversion on grain size data, which suggest a maximum H_T of 33 ± 4 km, corresponding to mass discharge rates of $2.3\text{--}6.0 \times 10^8$ kg/s. The total grain size distribution of the preserved part of the deposit shows Md_f of -1.5f to -2.4f. The deposit thinning trend can be extrapolated far beyond on-land exposures using lake core data from Lake Malawi. Volume estimates from thickness data range between 3.2 and 5.8 km³, corresponding to an erupted mass of $1.1\text{--}2.0 \times 10^{12}$ kg, which is consistent with TEPHRA2 inversion (1.1×10^{12} kg). The deposit dispersal is consistent with an eruption happening during nearly no-wind conditions. The plume corner is estimated at 11 – 12 km from the vent. The Rungwe Pumice eruption clearly classifies as Plinian (VEI 5, Magnitude 5 – 5.3). The eruption intensity gradually increased during the opening phase, after which a high discharge rate was maintained throughout the eruption. A lack of pyroclastic density current deposits, including in proximal-to-medial locations, suggests that there was no fountain collapse, which may be caused by the extremely low pumice density of order of 400 – 450 kg/m³.