



## **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  $33 \pm 4$  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 km<sup>3</sup>, corresponding to an erupted mass of  $1.1\text{--}2.0 \times 10^{12}$  kg, which is consistent with TEPHRA2 inversion ( $1.1 \times 10^{12}$  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/m<sup>3</sup>.