

Figure F1. Regional map of central section of south Aegean volcanic arc, Expedition 398. Red dots = Expedition 398 drill sites from which samples were collected, green = areas above sea level. Inset: position of study area relative to Eastern Mediterranean. Figure made with GeoMapApp (<https://www.geoma-papp.org>) CC BY Ryan et al. (2009).

Figure F2. Histograms of total porosity (ϕ) and isolated porosity (ϕ_i) of clasts (expressed as fractions) from each eruption, Expedition 398. N = number of clasts, μ = mean values, σ = standard deviations.

Figure F3. 3D renderings of XRT images of subvolumes of two clasts from the Kameni 726 CE eruption, Expedition 398. A. Segmented subvolume. Gray = solids (glass and any crystals), dark blue = water-filled (i.e., interconnected) vesicles, cyan = gas-filled (i.e., isolated) vesicles. B. Isolated vesicles (light blue) and a continuous curvilinear water-filled pore (dark blue) with solids removed from visualization. Low porosity sample in bottom row is not representative of bulk of pumice clasts, but it is shown to highlight textural diversity of clasts and geometry of connected and isolated pores in highly deformed samples that lost much of their porosity during deformation. Scale bars are approximate due to perspective. Images were collected on XRT beamline 8.3.2 of the Advanced Light Source using 28 keV monochromatic X-rays. Voxel linear dimension of tomography data is 0.635 μm .

Figure F4. Total porosity of pumice samples versus their connectivity, Expedition 398. A. Sorted by eruption. To identify combinations of porosity and connectivity that make clasts unsinkable, we use two different densities of the solid fraction of the clasts (DRE, 2.4 and 2.6 g/cm^3) to encompass values reported for Archaeos and Kameni samples. Below these curves, pumice is prevented from

sinking when connected porosity is filled with water because of sufficient isolated porosity. B. From PePPER database (<https://www.pepper-database.com>). Triangles = samples collected from floating pumice rafts or washed onto shore, circles = samples collected on seafloor. Samples that plot above a connectivity of 1 are impossible and arise from (not always reported) uncertainty in measurements. FOB = Fukutoku-Oka-no-Ba.

Figure F5. Porosity, connectivity, and cold and hot sinking time versus clast envelope volume for clasts from each eruption, Expedition 398. There is large scatter in sinking times across all eruptions. Cold sinking times are on log scale. One clast remained floating at time of submission (>675 days) and is not plotted. Clasts >8 cm^3 (clast envelope volume) were too large for pycnometry and were excluded. Data points with no visible error bars have error bars smaller than symbol size.

Figure F6. Clast envelope volume versus (A) hot sinking time and (B) cold sinking time, Expedition 398. Global R^2 values show stronger relationship for hot pumice than cold pumice. Linear regression line is shown for hot pumice (light gray dashed line) but not for cold pumice because R^2 is so small.

Figure F7. Relationship between clast connectivity and (A) hot sinking times and (B) cold sinking times, Expedition 398. Connectivity values >1 are impossible and due to measurement uncertainty.

Figure F8. Relationship between hot sinking time and cold sinking time, Expedition 398. Cold sinking times are shown on log scale. Hot pumice clasts that fractured when entering water are not plotted.