

New insights from pumice-rich submarine density currents from caldera-forming eruptions in the Izu Bonin arc (ODP 126)

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The Sumisu rift in the Izu Bonin arc was the focus of numerous studies in the late 1980s. During the ODP expedition 126, the upper arc was piston-cored to depths down to 250 mbsf. Most research was focussed on the forearc, with few investigations addressing the enormous volume of volcanoclastic deposits at sites 790 and 791 in the rift basin, and site 788 on the rift shoulder. At site 790C, the piston cores reached 275 ka at 180 mbsf, and sampled numerous units of silicic pumice lapilli developed in beds up to several 10s of m thick, and interbedded with units of silicic and basaltic ash and hemipelagic mud. Careful analysis of the stratigraphy from core to core allows reconstruction of the major eruption sequences, although many of the very thick pumiceous beds were partially disturbed during core recovery, artificially increasing their thickness, and creating false bed boundaries. From our new logging data from legacy samples stored at the Kochi Core Center, we present a first attempt at stratigraphic correlation of beds throughout the rift basin, and discuss the origin of the pumice lapilli beds. Textural analyses, including of grain size, grain shape, componentry and pumice vesicularity were carried out to characterise the most recent pumice lapilli beds, in addition to clast, glass and mineral geochemistry. This new dataset allows correlation of strata across the rift basin with high confidence, underpinning our analysis of the style and environment of eruption, as well as of transport processes, involved in producing the pumice lapilli beds. We expect the pumice lapilli beds to have been derived from caldera-forming eruptions and by post-eruptive resedimentation, and discuss the probable water depth at the vent during eruption. This work applies modern textural and geochemical studies to legacy cores, showing the long-term value (already 20 yrs after collection) of samples from coring the shallow crust.