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Magma-sediment interaction at Anak Krakatau, Indonesia: contamination of solid, liquid and gaseous phases.

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Anak Krakatau, the active cone within the 1883 Krakatau caldera, is growing by approximately 13 cm/yr and is currently marked by mainly ballistic eruptive styles. The basaltic-andesite lava bombs from the 2002 eruptive cycle contain numerous inclusions of foamy sandstone lithologies, marked by rounded quartz crystals, high SiO_2 content ($\sim$ 65-70 wt%) and elevated $^{86}Sr/^{87}Sr$ isotope ratios. Recent work by Gardner *et. al.* (2007) has revealed that in addition to xenolithic fragments, several feldspar crystal populations exist in the lavas that are best explained by contamination processes, such as the presence of xenocrystic material and cores to crystals that appear foreign to the system. In addition, unpublished analyses of fumarole gas from the volcano reveal helium isotope values that are consistently reduced towards crustal values (ca. 2 R/R_A). This is in contrast with published helium data from pyroxene crystals by Gasparon *et. al.* (1994) of around 7 R/R_A, implying that contamination of the volcanic gases with crustal components does occur after the crystallisation of the pyroxene, putting this event in the uppermost crust. The contamination thus affects not only the crystal and liquid parts of the system, but also the gas budget of the volcano. This raises the prospect of understanding better the process of crustal gas recycling by volcanic activity. Preliminary 3D tomographic results from these foamy xenoliths indicate that they, at least locally, comprise a connected framework of bubbles that

would allow crustal volatiles to escape into the magma and thus contribute to the volcano's volatile output.

Our combined results are therefore a first step in constraining contamination effects on all involved magmatic phases, with impact on the liquid magma, the crystallising solids as well as the gaseous phases in the Krakatau magmatic system.

References

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