Crustal assimilation or magma mixing as an eruption trigger at Gede Volcano, West Java, Indonesia

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An understanding of the relative importance of composition-modifying processes such as fractional crystallisation, crustal contamination and magma mixing in arc lavas is needed before the nature of the magmatic source can be established. The negative correlations observed between whole-rock Pb-Sr isotopic ratios and indices of differentiation (SiO_2) in Gede Volcanic Complex volcanic rocks (West Java, Indonesia) suggest a role for the assimilation of crustal material during magmatic differentiation. The negative trends may be attributed to: (1) increasing incorporation of less radiogenic material, such as more isotopically primitive arc rocks or ophiolitic oceanic crust (in the arc crust), during magmatic evolution or, (2) the lowest silica rocks have assimilated the most (by volume) radiogenic crustal material. The latter may represent assimilation of carbonate material, which has been implicated at other Javanese volcanoes (e.g., Merapi) and has important implications for the addition of crustal CO_2 to the magma volatile budget. To further investigate magmatic processes and the potential control of carbonate assimilation on whole-rock geochemical composition at Gede, we have conducted detailed textural and compositional (major and trace element) analysis of minerals within selected rocks along the assimilation trend. The major and trace element compositions and grain profiles in crystals present clear evidence for the interaction of distinct magmas. Reverse zoning in plagioclase and clinopyroxene along with clinopyroxene overgrowths on orthopyroxene suggest that influx of mafic magma is an important process at Gede and may trigger volcanic eruptions. Calculated melt compositions of plagioclase with different textures provide important constraints on the magmatic plumbing system at Gede Volcano and potential eruption triggers.