Sangeang Api volcano, Indonesia: Degassing and redox

BENJAMIN COOKE* AND JOHN FODEN

Centre for Tectonics Resources and Exploration (TRaX), University of Adelaide, Adelaide, Australia (*correspondence: benjamin.cooke@adelaide.edu.au, john.foden@adelaide.edu.au)

It is well established that subduction-related magmas are oxidised by comparison with those from other tectonic settings [1]. The still controversial origin of this oxidation has been variously attributed either to an oxidised mantle wedge and/or to near-surface processes. Sangeang Api (SA) volcano, erupted most recently in May 2014, and is located 6km to the northeast of Sumbawa in the eastern Sunda Arc (Indonesia). It erupts suites of shoshonitic lavas that transport a dense population of cumulate xenoliths (gabbros and clinopyroxenites). This xenolith suite provides a comprehensive record of magmatic crystallisation at crustal levels and allows potentially evolving oxidation conditions to be tracked.

Amphibole occurs in either cumulate or post-cumulate roles in the xenoliths and as phenocrysts in the lavas. Calibrations by Ridolfi, *et al*. [2] and Ridolfi and Renzulli [3] have made it possible to use amphiboles as geothermobarometers to calculate the physiochemical conditions (P, T, fO_2, wt.% H_2O and wt.% SiO_2) of the melts from which they crystallise. Amphiboles from SA reflect crystallisation over a wide range of crustal pressures, from the Moho (at ~900MPa) up to the mid-crust (at ~400MPa). Throughout this depth range there is a positive correlation between water content and pressure, suggesting that these magmas are continually degassing as they ascend. SA amphiboles record oxidation states of 1-2 log units above NNO. There is some indication from the amphibole dataset that magmatic degassing may be associated with relative oxidation. Oxidation may result from the hydrolysis of water vapour.

In contrast to the amphiboles, clinopyroxenes from SA display decreasing $Fe^{3+}/\Sigma Fe$ with decreasing Mg#, suggesting magmatic reduction associated to degassing, decompression and fractionation. We will discuss evidence that the SA magmatic system spans the full vertical section of the crust and that ascending melts are strongly affected by degassing processes.

[1] Christie, Carmichael & Langmuir (1986), *EPSL*, **79**, 397-411. [2] Ridolfi, Renzulli & Puerini (2010), *CMP*, **160**, 45-66. [3] Ridolfi & Renzulli (2012), *CMP*, **163**, 877-895.