

## Is gold solubility subject to pressure variations in ascending arc magmas?

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Magmas play a key role in the genesis of epithermal and porphyry ore deposits, notably by providing the bulk of ore metals to the hydrothermal fluid phase. It has been long shown that the formation of major deposits requires a multi-stage process, including the concentration of metals in silicate melts at depth and their transfer into the exsolved ore fluid in more superficial environments. Both aspects have been intensively studied for most of noble metals in subsurface conditions, whereas the effect of pressure on the concentration (i.e., solubility) of those metals in magmas ascending from the sublithospheric mantle to the shallow arc crust has been quite neglected. Here, we present new experimental data aiming to constrain the processes of gold (Au) dissolution in subduction-linked magmas along a range of depth. We have conducted hydrous melting experiments on two dacitic/adakitic magmas at 0.9 and 1.4 GPa and ~1000°C in an end-loaded piston cylinder apparatus, under  $fO_2$  conditions close to NNO. Experimental charges were carried out in pure Au containers, the latter serving as the source of gold, in presence of variable amounts of H<sub>2</sub>O and, for half of the charges, with elemental sulfur (S) so as to reach sulfide saturation. Au concentrations in melt quenched to glass were determined by LA-ICPMS. When compared to previous data obtained at lower pressure, our results show that in both S-free and S-bearing systems melt Au solubility is independent of depth variations since no effect of pressure can be perceived between data at 0.12 GPa and 1.4 GPa for a given  $fO_2$ . The present study confirms that Au dissolution is mainly controlled by  $fO_2$  in S-free melts and by a complex interplay of  $fO_2$  and  $fS_2$  in S-bearing melts, at given temperature. The concentration of gold in deep magmas is therefore believed to be chiefly governed by the conditions of partial melting of the source as well as the partitioning of gold between the silicate melt and the crystallizing sulfides (which itself might be subject to pressure variations).