



Supplement of

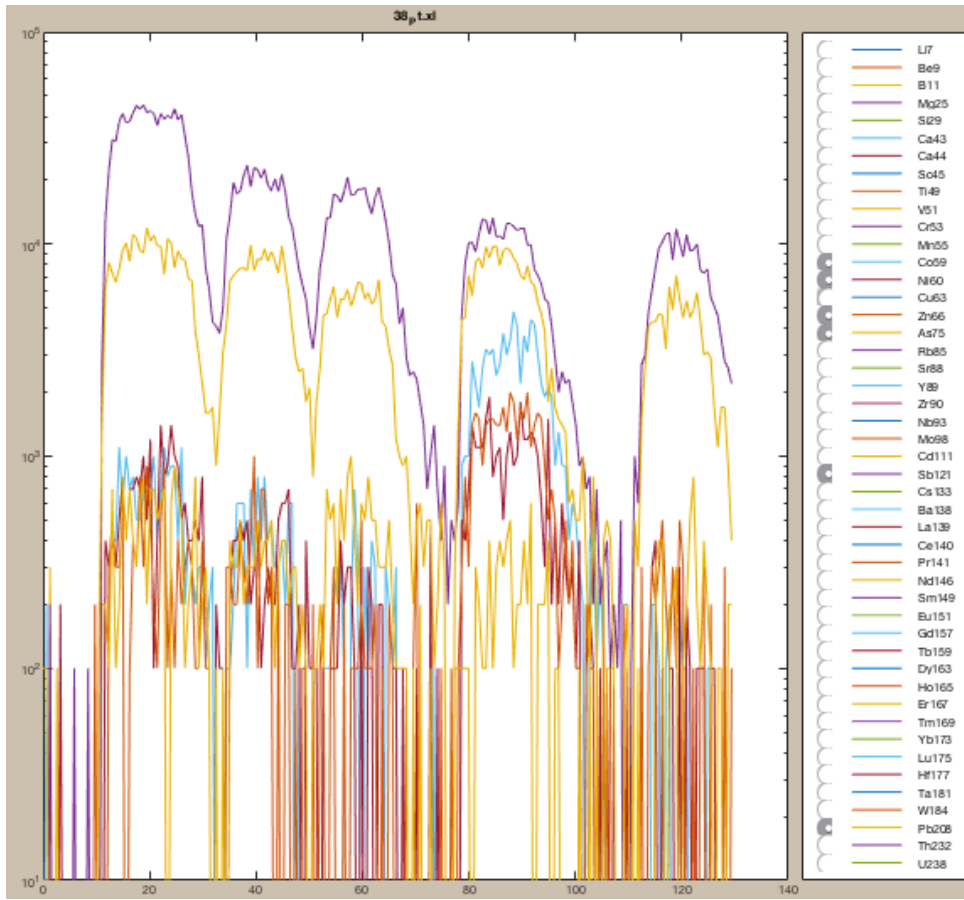
The influence of oxygen fugacity and chlorine on amphibole–liquid trace element partitioning at upper-mantle conditions

Enrico Cannà et al.

Correspondence to: Enrico Cannà (enrico.canna@unimi.it)

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Exp 17-8HM



Exp 18-15HM

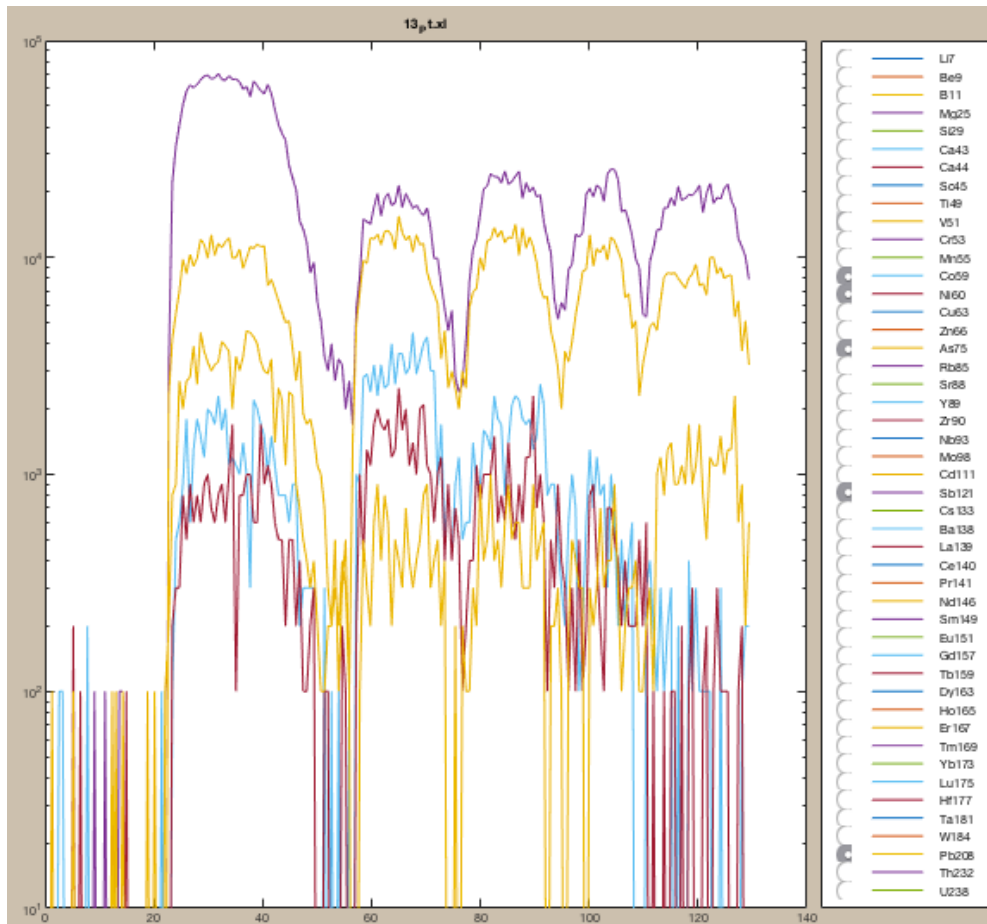


Figure S1. Raw time-integrated trace elements data of several LA-ICP-MS spots performed in the Pt inner capsule for the experiments 17-8HM and 18-15HM. The figures show the signals of the selected As, Sb, Pb, Co, Ni and Zn elements that are partially loss into the Pt capsule during the experimental run. The calculated amphibole/glass partition coefficients for Pb, Co, Ni and Zn in these experiments are comparable with those of the experiments where the starting materials were not in direct contact with the Pt capsule (see **Fig. 7** and **Table 5**). However, signals for As and Sb are 1 to 2 orders of magnitude higher compared to other elements suggesting that their amphibole/glass partition coefficient are not reliable.

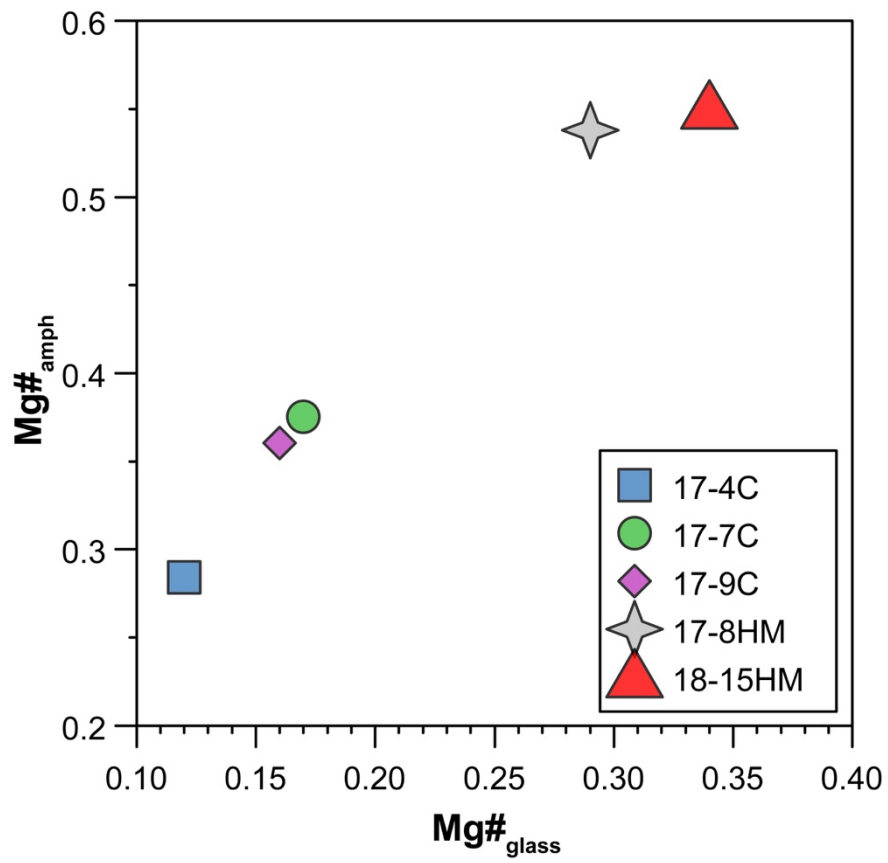


Figure S2. Correlation between $Mg\#$ of glasses and amphiboles suggesting conditions close to equilibrium. Errors are within the symbols.

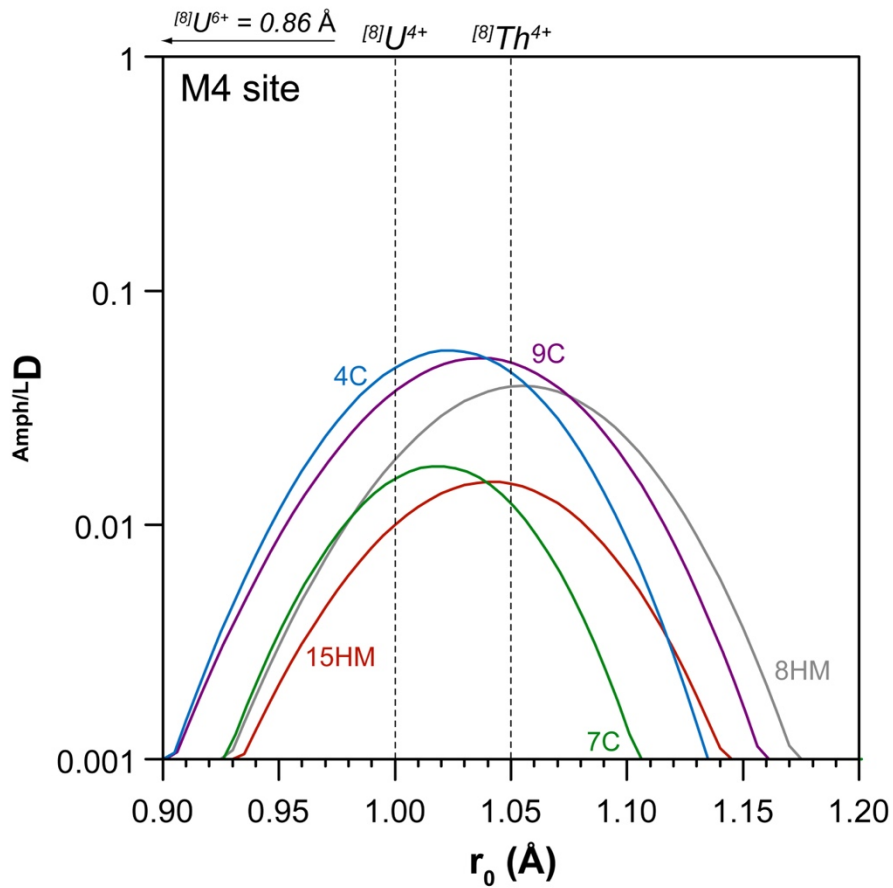


Figure S3. Calculated partition coefficients and fitted solution to the lattice-strain model for the $M(4)$ site (*i.e.*, Onuma diagrams) in amphibole for all experiments. The shift to higher r_0 of the $M(4)$ site in experiment with high Cl content (*e.g.*, 9C vs. 7C – 0.88 vs. 0.31 wt.%, respectively) enhance the incorporation of Th^{4+} ($r_{\text{Th}} = 1.05 \text{ \AA}$) with respect to U^{4+} ($r_{\text{U}} = 1.00 \text{ \AA}$). See also **Fig. 12**. The calculations of the fitted solution for the actinide assume a Young's modulus (E) ca. 2.5 times stronger than that for the 3+ cations in the $M(4)$ site (*i.e.*, REE), as often shown by literature data (*e.g.*, Adam and Green, 2006).