Supplementary Material 1

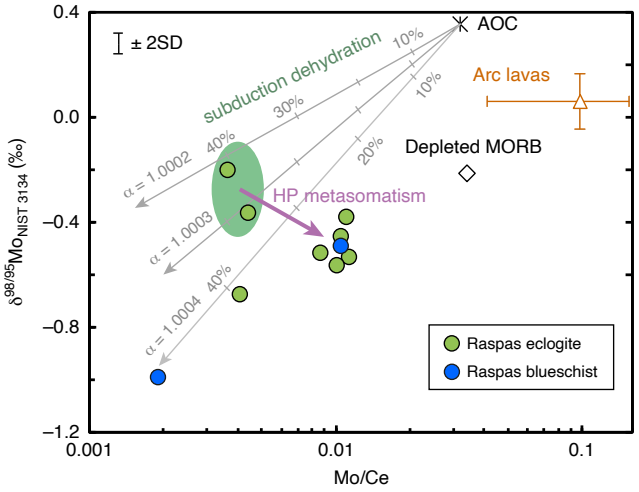

Fig. S1 Modified model for the Mo isotopic data of the Raspas blueschists and MORB-type eclogites reported by Chen et al (2019). Chen et al (2019) proposed that the Mo isotopic composition of the main group of MORB-type eclogites (Mo/Ce = 0.01, $\delta^{98/95}$Mo = −0.45‰) would reflect prograde dehydration of depleted MORB, whereas the two samples with low Mo/Ce were overprinted by the metasomatic flux of oxidized fluid sourced from dehydration of underlying slab serpentinite. Yet, the combination of stable isotope data, in particular the combination with B and Se isotopes, demonstrates that the two MORB-type eclogite samples with low Mo/Ce ≈ 0.004 ($\delta^{98/95}$Mo ≈ −0.3‰) best record subduction dehydration of altered oceanic crust (AOC). Metasomatism by the 'internal' fluid drove the Mo isotopic composition of the majority of MORB-type eclogite samples to isotopically lighter Mo ($\delta^{98/95}$Mo = −0.45‰) with the addition of Mo (Mo/Ce elevated to approximately 0.01). The two blueschist samples experienced 30-50% Mo loss during subduction dehydration and either started at different protolith compositions or released fluids with contrasting oxidation states of Mo.

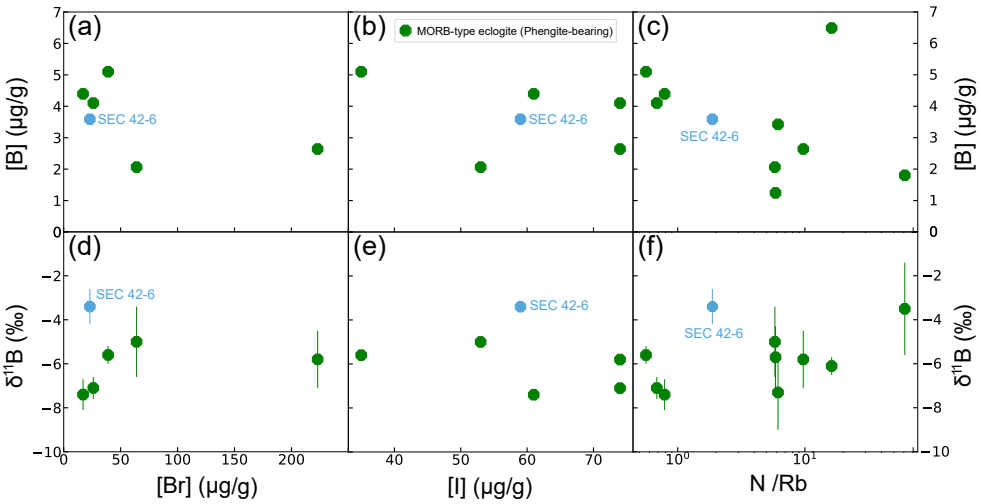

Fig. S2 Boron content of MORB-type eclogites versus (a) Br content; (b) I content; and (c) N/Rb ratio, and their B isotopic composition (δ^{11}B) versus (d) Br content; (e) I content; and (f) N/Rb ratio. Br and I data from Beaudoin et al (2022), and N/Rb ratios from Halama et al (2010).

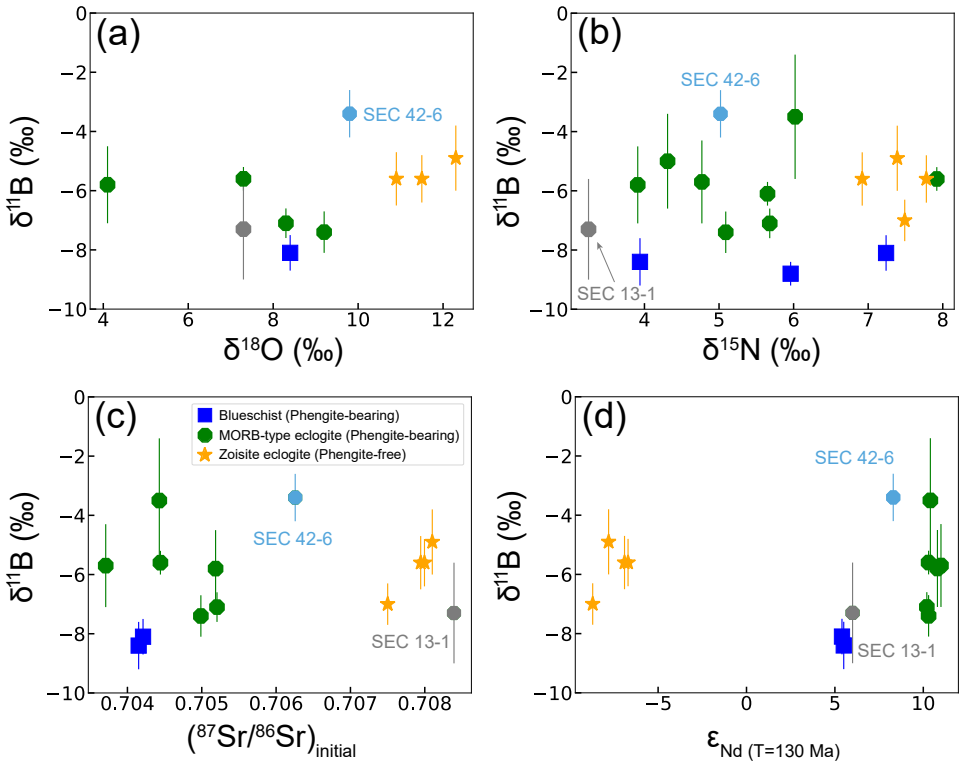

Fig. S3 Boron isotopic compositions (δ^{11}B) of MORB-type eclogites against (a) δ^{18}O (Halama et al, 2011); (b) δ^{15}N (Halama et al, 2010); (c) $(^{87}Sr/^{86}Sr)_{initial}$ (Halama et al, 2011); and (d) $\epsilon_{Nd(T=130Ma)}$ (Halama et al, 2011).

References

Beaudoin GM, Barnes JD, John T, et al (2022) Global halogen flux of subducting oceanic crust. Earth Planet Sci Lett 594:117750. https://doi.org/10.1016/j.epsl.2022.117750

Chen S, Hin RC, John T, et al (2019) Molybdenum systematics of subducted crust record reactive fluid flow from underlying slab serpentine dehydration. Nat Commun

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Halama R, Bebout GE, John T, et al (2010) Nitrogen recycling in subducted oceanic lithosphere: the record in high-and ultrahigh-pressure metabasaltic rocks. Geochim Cosmochim Acta 74(5):1636–1652. https://doi.org/10.1016/j.gca.2009.12.003

Halama R, John T, Herms P, et al (2011) A stable (Li, O) and radiogenic (Sr, Nd) isotope perspective on metasomatic processes in a subducting slab. Chem Geol 281(3-4):151–166. https://doi.org/10.1016/j.chemgeo.2010.12.001