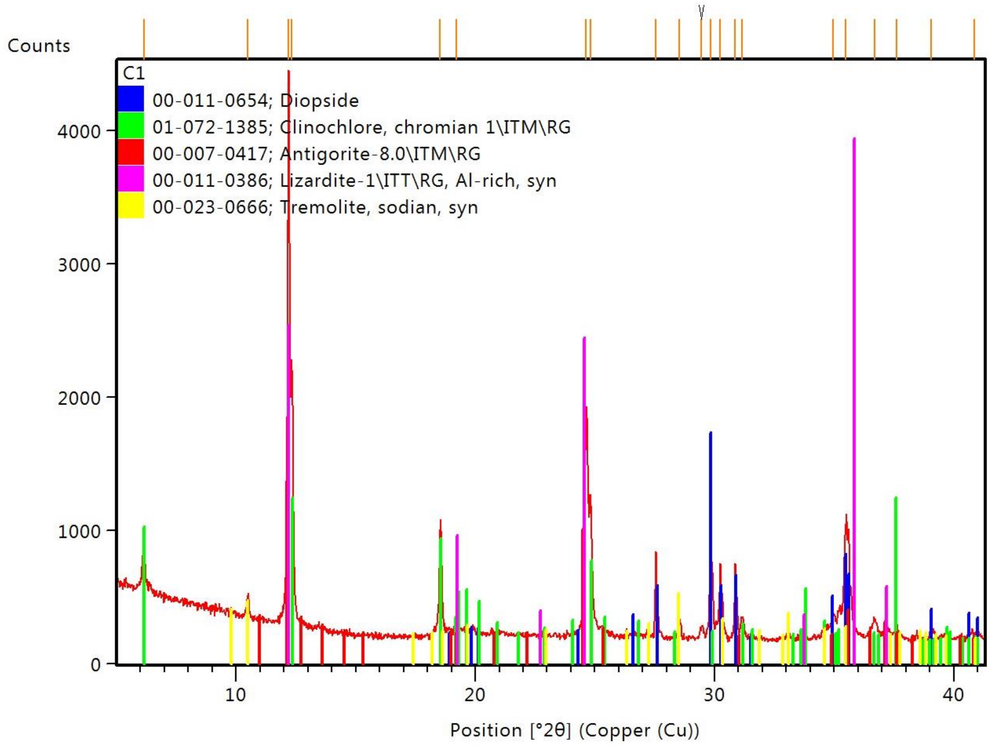
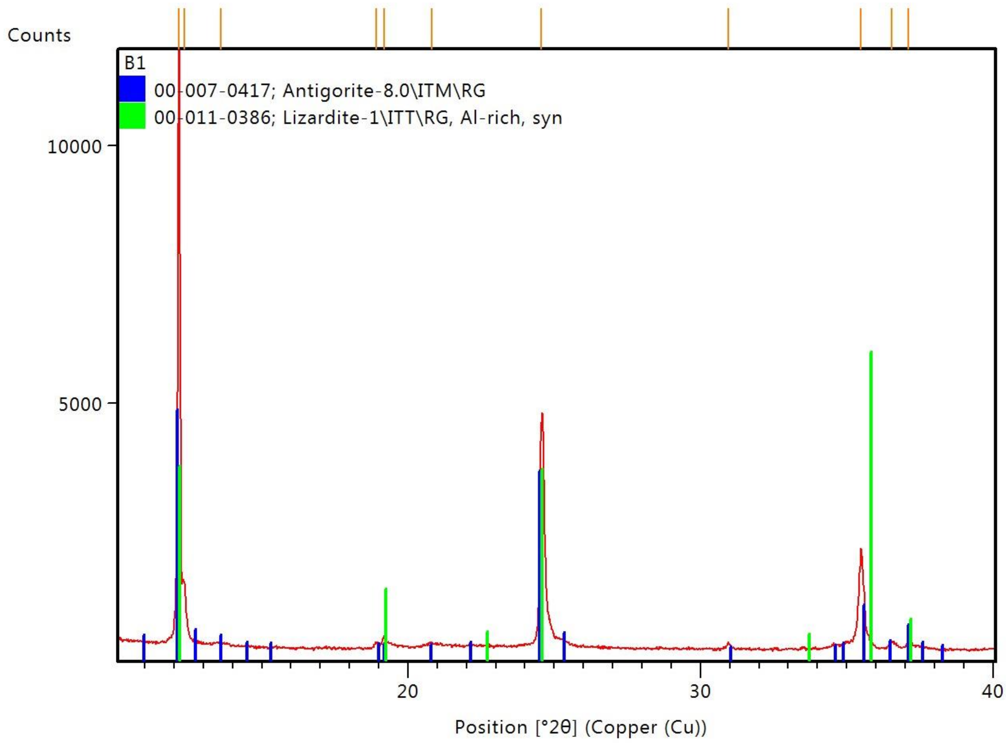
Figure S1: X-ray powder diffraction (XRD) patterns of the three analysed serpentinite samples C1 (massive serpentinite, a), B1 and C2 (foliated serpentinite, b and c respectively).

(a)



(b)



(c)

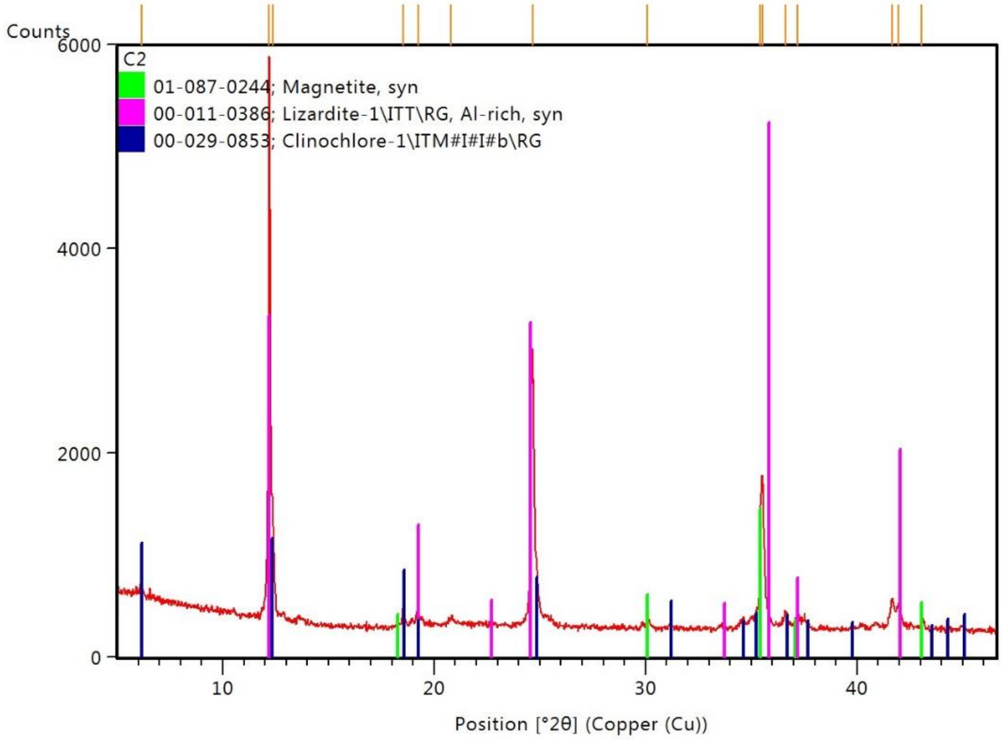
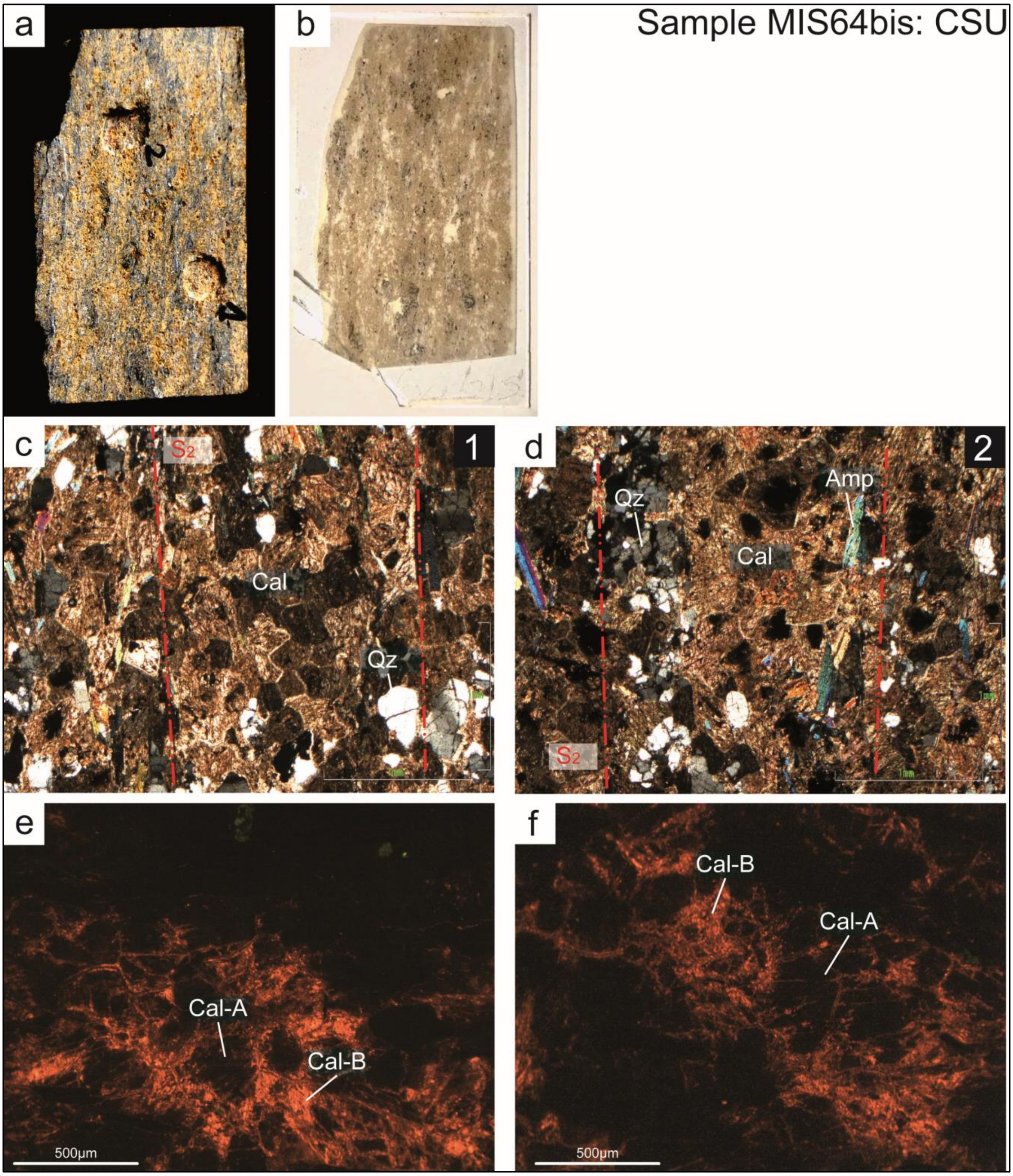
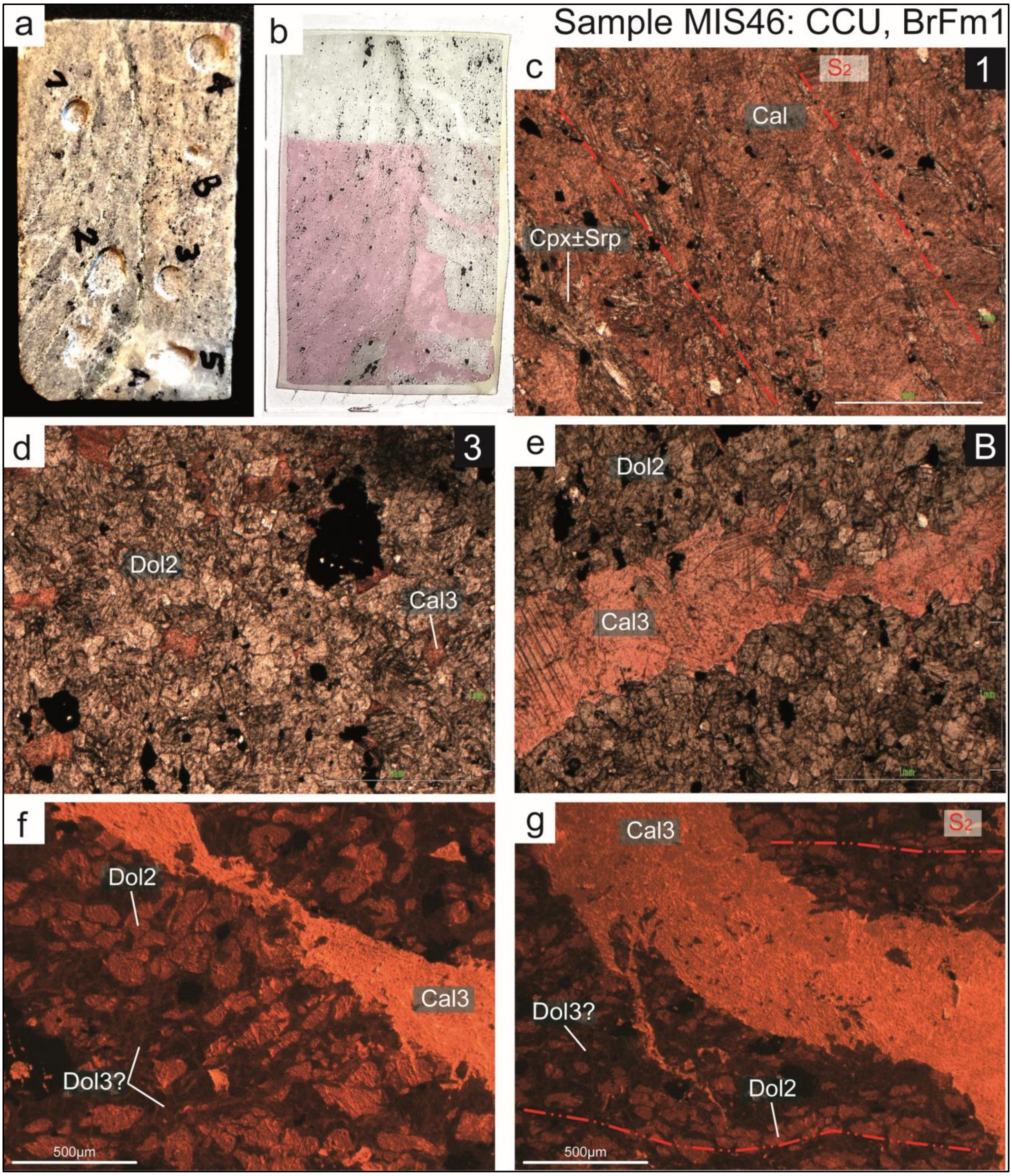

Counts
6000
4000
2000
0
C2
01-087-0244; Magnetite, syn
00-011-0386; Lizardite-1\ITT\RG, Al-rich, syn
00-029-0853; Clinochlore-1\ITM#I#I#b\RG
10
20
30
40
Position [°2θ] (Copper (Cu))

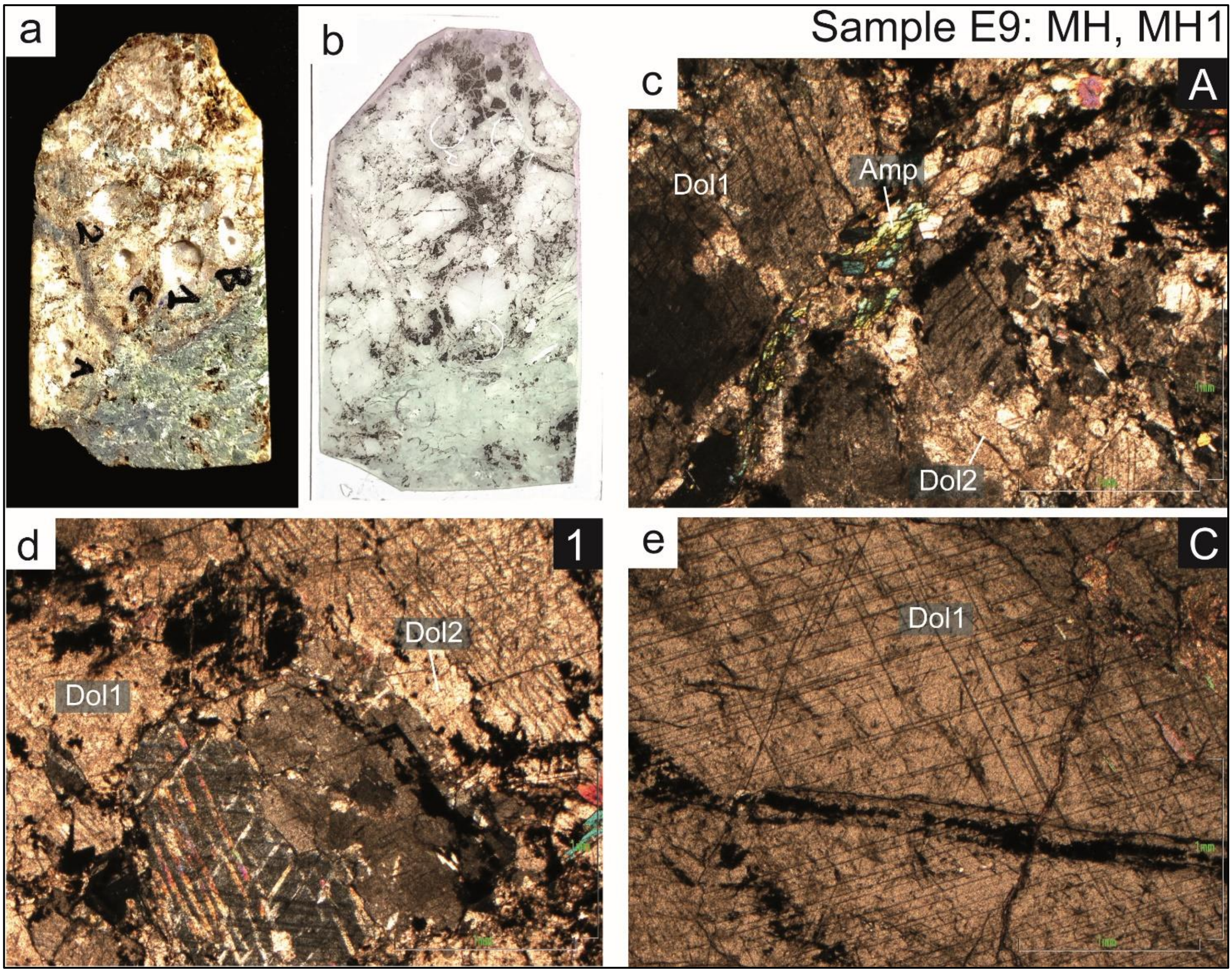
Figure S2: Samples analysed for the stable isotope compositions of carbonates (see Tab. S7), with cathodoluminescence (CL) analyses performed on samples MIS64bis and MIS46 to distinguish the carbonate stages of crystallization.



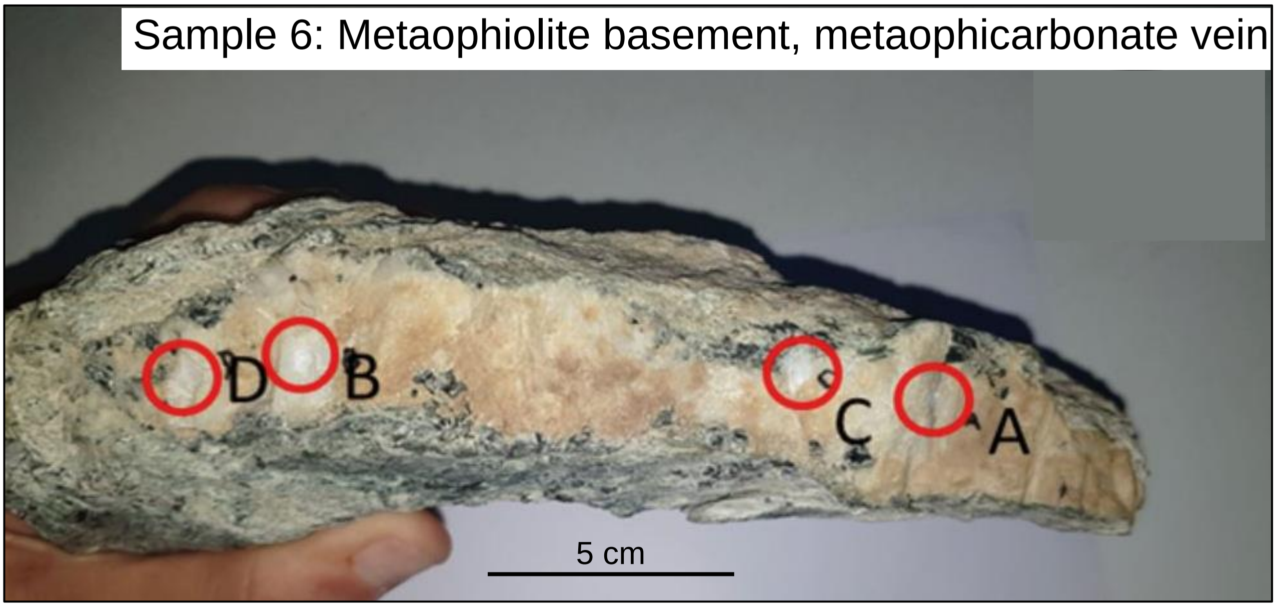
SAMPLE MIS64bis: (a) rock billet and (b) thin section (2.8 x 4.7 cm) with the drilled sites. Photomicrographs in cross-polarized light, 2.5x zoom: (c) site 1, Cal fine-grained polygonal aggregate within calcschist microlithons; (d) site 2, Cal aggregate with Qz+Wm±Chl; (e-f) cathodoluminescence (CL) imaging of calcite microlithons, Cal-A generation is constituted by euhedral turbid crystals from dull to non luminescent, Cal-B limpid generation is the final growth rims of Cal-A crystals with bright luminescence.



SAMPLE MIS46: (a) rock billet and (b) thin section (2.8 x 4.7 cm) with the drilled sites.
Photomicrographs in plain-polarized light, 2.5x zoom: (c) site 1, Cal equigranular aggregates replacing primary mineralogy within ultramafic clast; (d) site 3, Dol2 fine-grained matrix replaced by Cal3; (e) site C, coarse-grained Cal3 filling a late, exhumation stage vein that crosscut the Dol2 matrix. "Alizarin Red S" (ARS, chemical formula: $C_{14}H_8O_6$) dye has been used to discriminate calcite from dolomite because of their different staining response (calcite becomes pink orange; dolomite does not react; Dickson, 1966). (f-g) Cathodoluminescence (CL) imaging of Dol2 matrix and late Cal3 vein. Dol2 is made of turbid, subhedral grains from bright to dull luminescent, marking the S_2 foliation with their SPO, and of a dull to non luminescent matrix (subsequent Dol3 recrystallization?) embedding the Dol2 grains. Cal3 is bright luminescent indicative of abundance of Mn^{2+} due to precipitation in reducing environment.



SAMPLE E9: (a) rock billet and (b) thin section (2.8 x 4.7 cm) with the drilled sites.
Photomicrographs in cross-polarized light, 2.5x zoom: (c) site A and (d) site 1, Dol1 porphyroblasts with some dynamic recrystallization and Amp at grain boundaries; (e) site C, coarse-grained Dol1 porphyroblast, with opaque inclusions and fractures. “Alizarin Red S” (ARS, chemical formula: $C_{14}H_8O_6$) dye has been used to discriminate calcite from dolomite because of their different staining response (calcite becomes pink orange; dolomite does not react; Dickson, 1966).



SAMPLE 6: hand sample of metaophicarbonate from the metaophiolite basement. Red circles: drill sites within an intrafolial syn-D_2 carbonate (calcite) vein.

Figure S3: Raman spectra of the three different serpentine polymorphs taken as reference for this study (sample L2-C1 for lizardite and chrysotile; sample L2-C5 for antigorite; from Campomenosi, unpublished data). Lz = lizardite; Atg = antigorite; Ctl = chrysotile. (a) shows the low wavenumber region (100 – 1100 cm^{-1}) related to the internal lattice vibrations while (b) shows the high wavenumber region (3500 – 3800 cm^{-1}) pertaining to the OH vibrations.

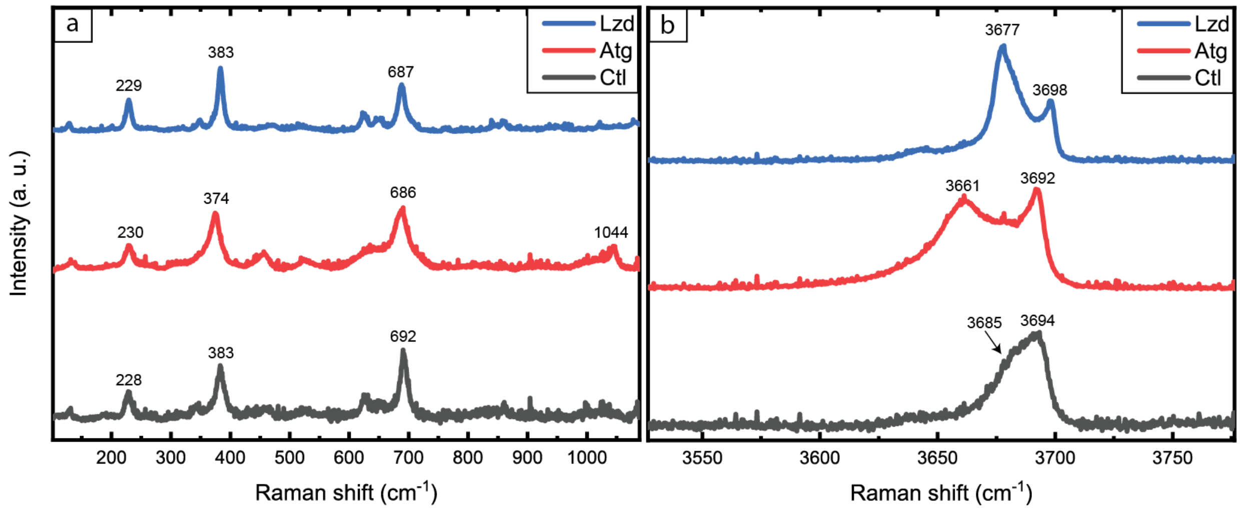
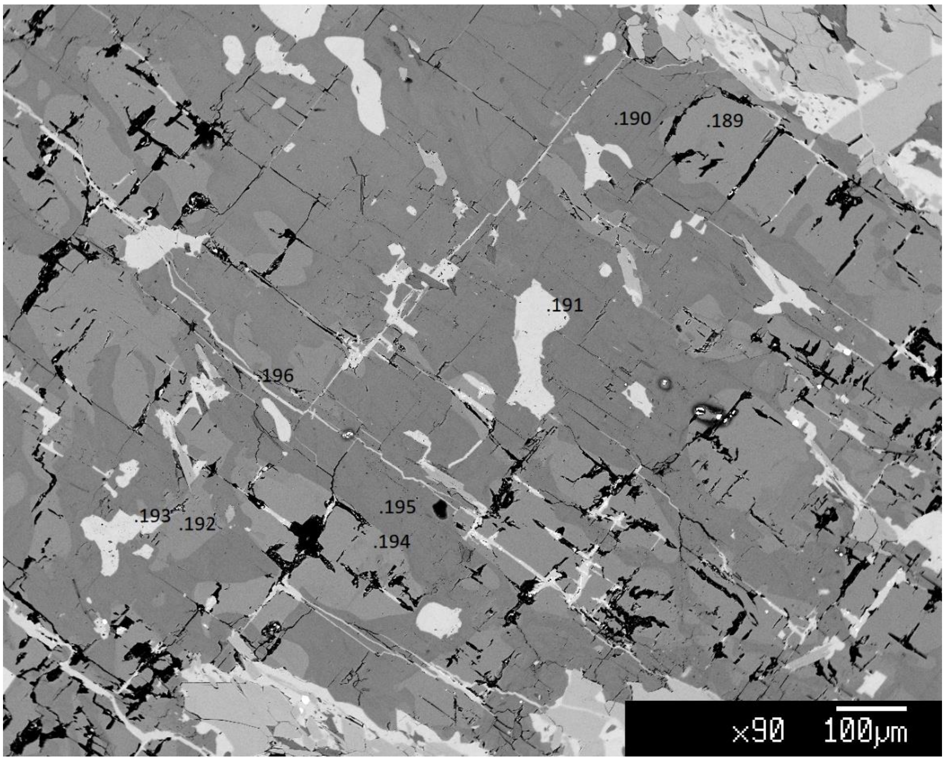


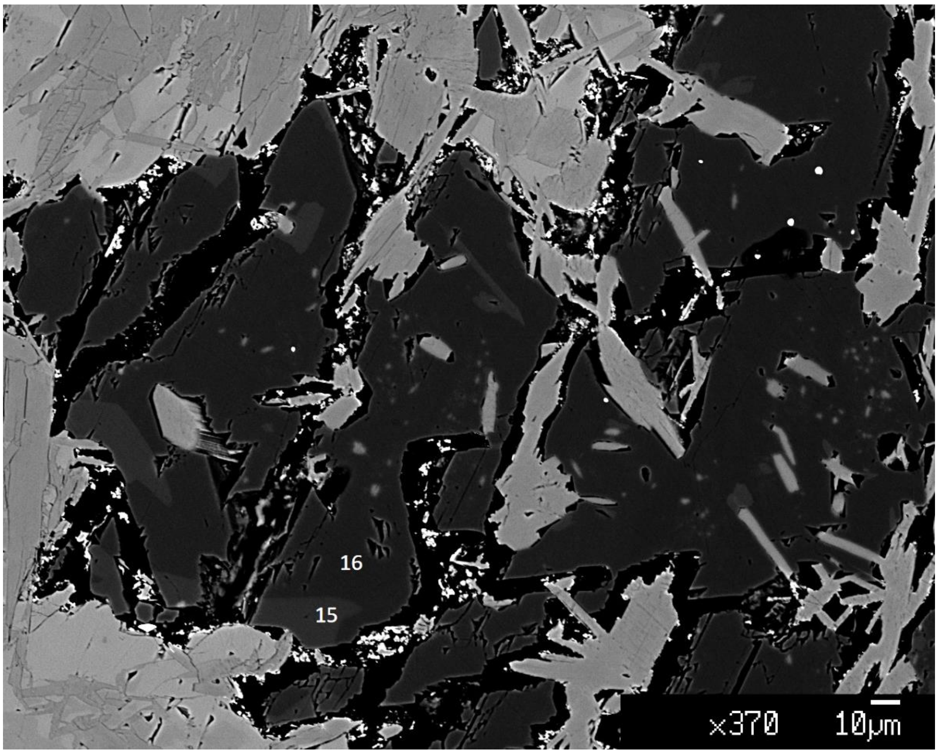
Figure S4: BSE images of zoned Dol in MH1 (a, sample B5) and zoned Mgs in foliated serpentinite (b, sample B1). See also Table S3 for analysis points.

(a)



Dark grey (e.g., analysis point 195, 190): Dol1 zoned core.
Light grey (e.g., analysis point 194, 189): Dol1 zoned rim.

(b)



Dark grey (e.g., analysis point 16): Mgs zoned core.
Light grey (e.g., analysis point 15): Mgs zoned rim.