Supplementary Information

Vertical depletion of ophiolitic mantle decodes melt focusing and interaction in the asthenospheric column under oceanic spreading centers

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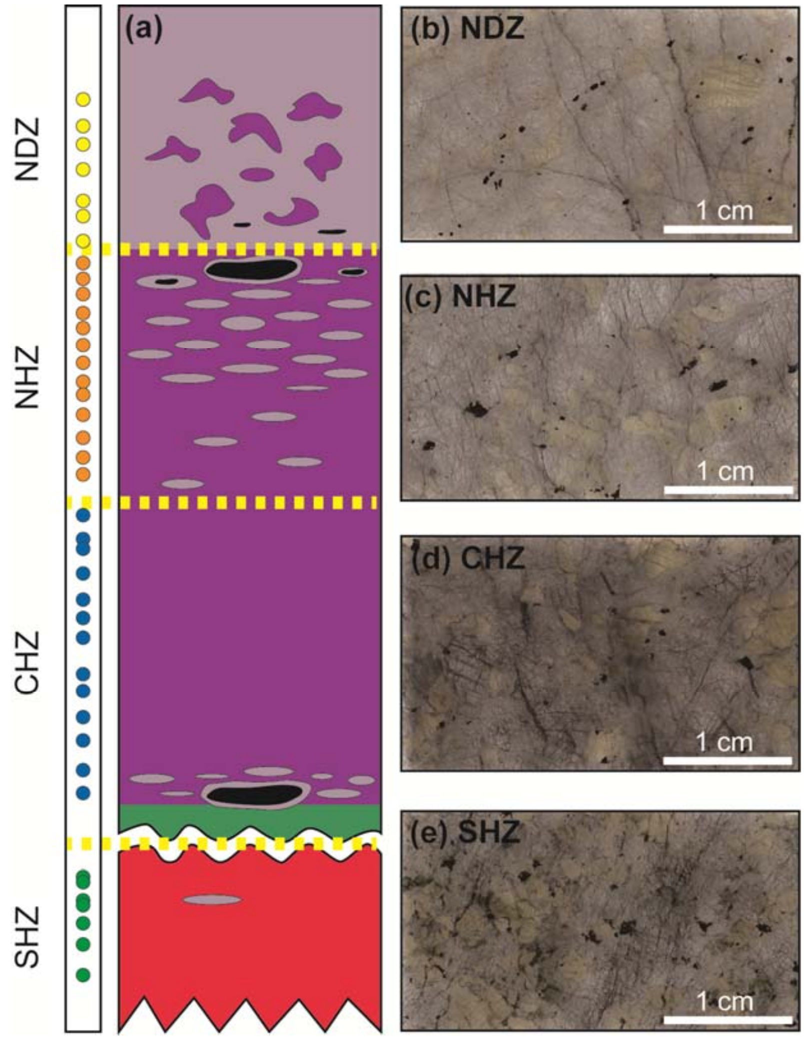
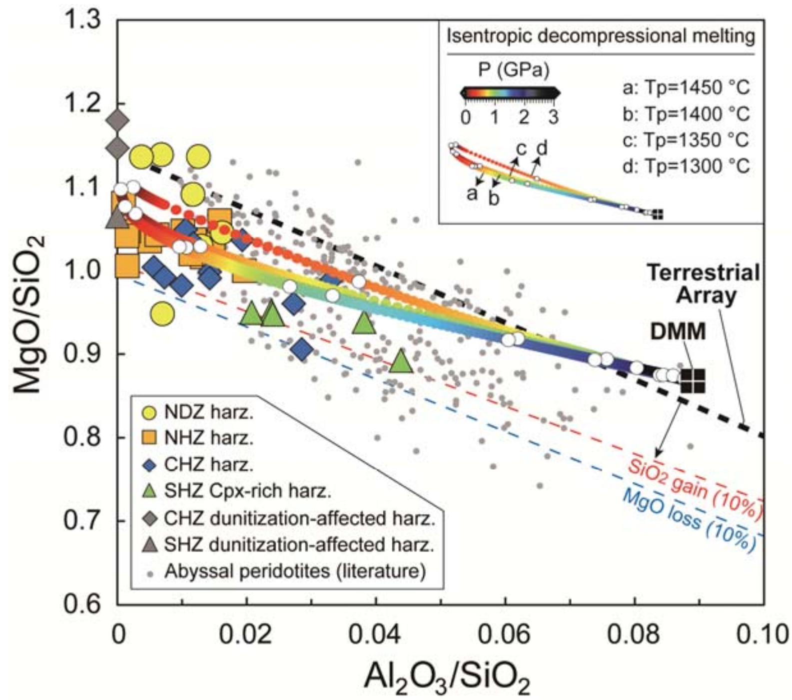
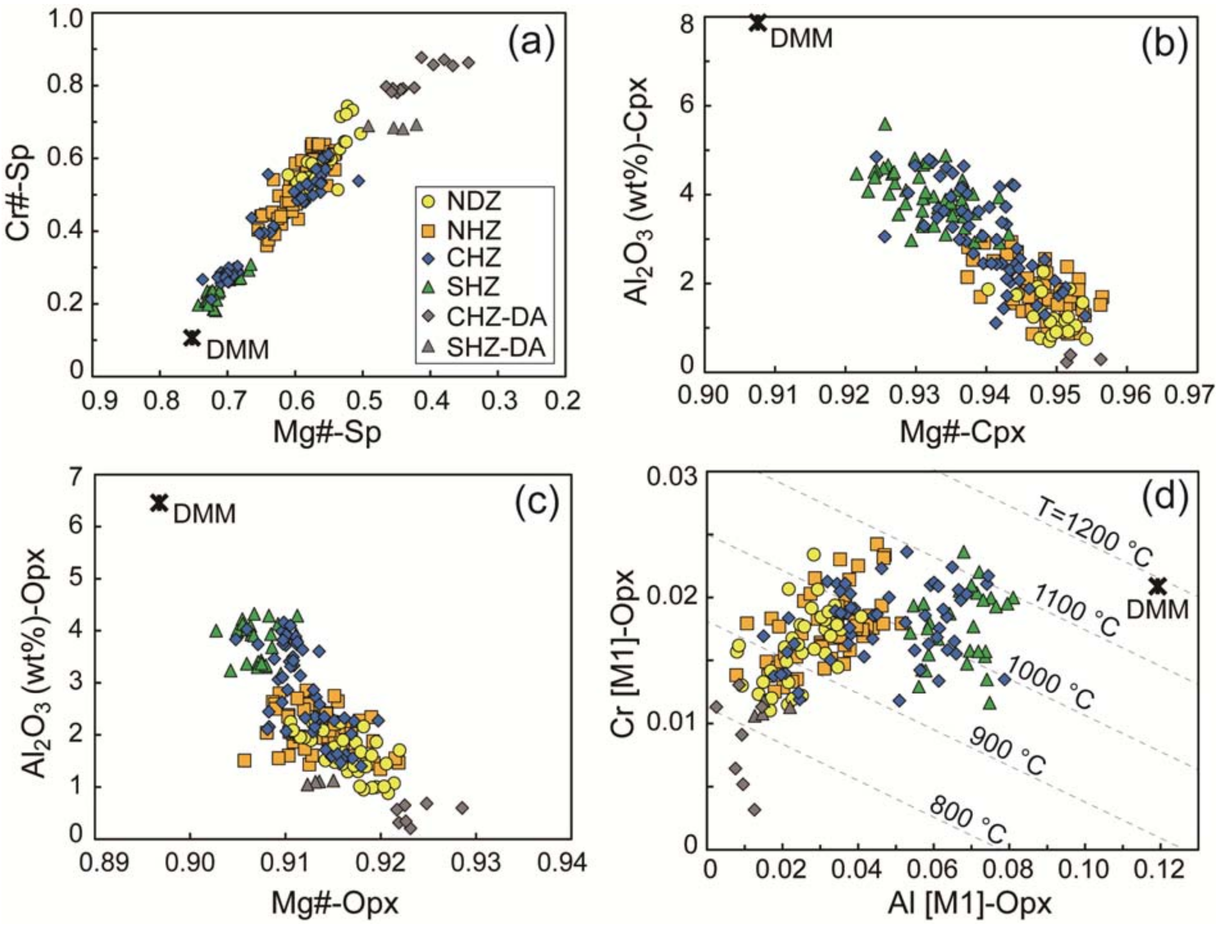
Supplementary Figures



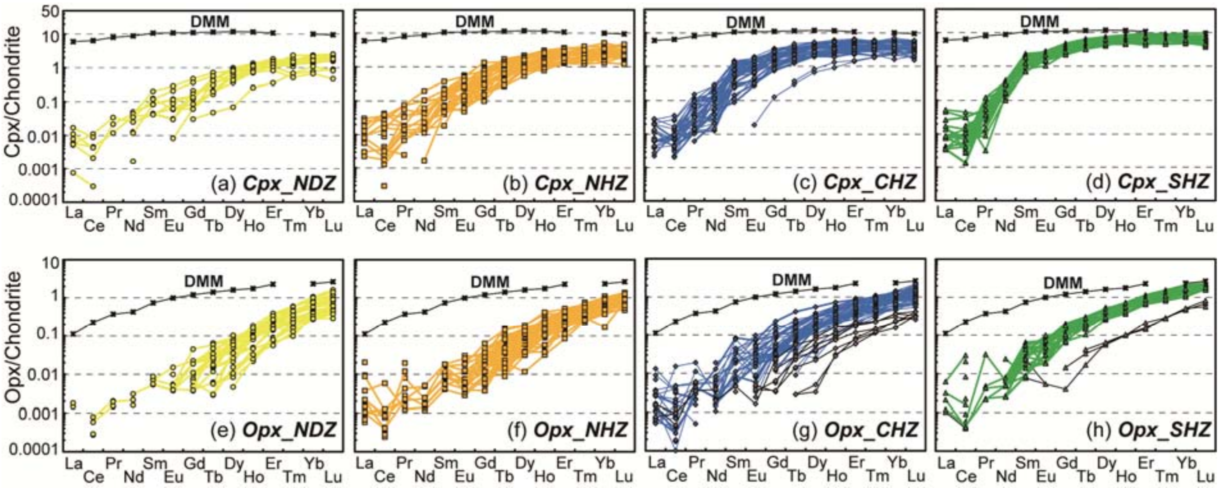
Supplementary Fig. 1 Reconstructed lithological column of the Kangjinla mantle section (a) and scanned petrographic photos of representative peridotites (b-e) from the four zones of the Kangjinla ophiolitic mantle (South Tibet). The legends in (a) are the same as those in Fig. 1. In (b-e), small black irregular dots are spinel, small light-green grains are clinopyroxene, large yellowish brown grains are orthopyroxene, and large light-grey grains are olivine. Some dark veins are magnetite-rich serpentinized boundaries or cracks. From the SHZ to the NDZ, the mode and size of pyroxenes decrease while those of olivine increase.



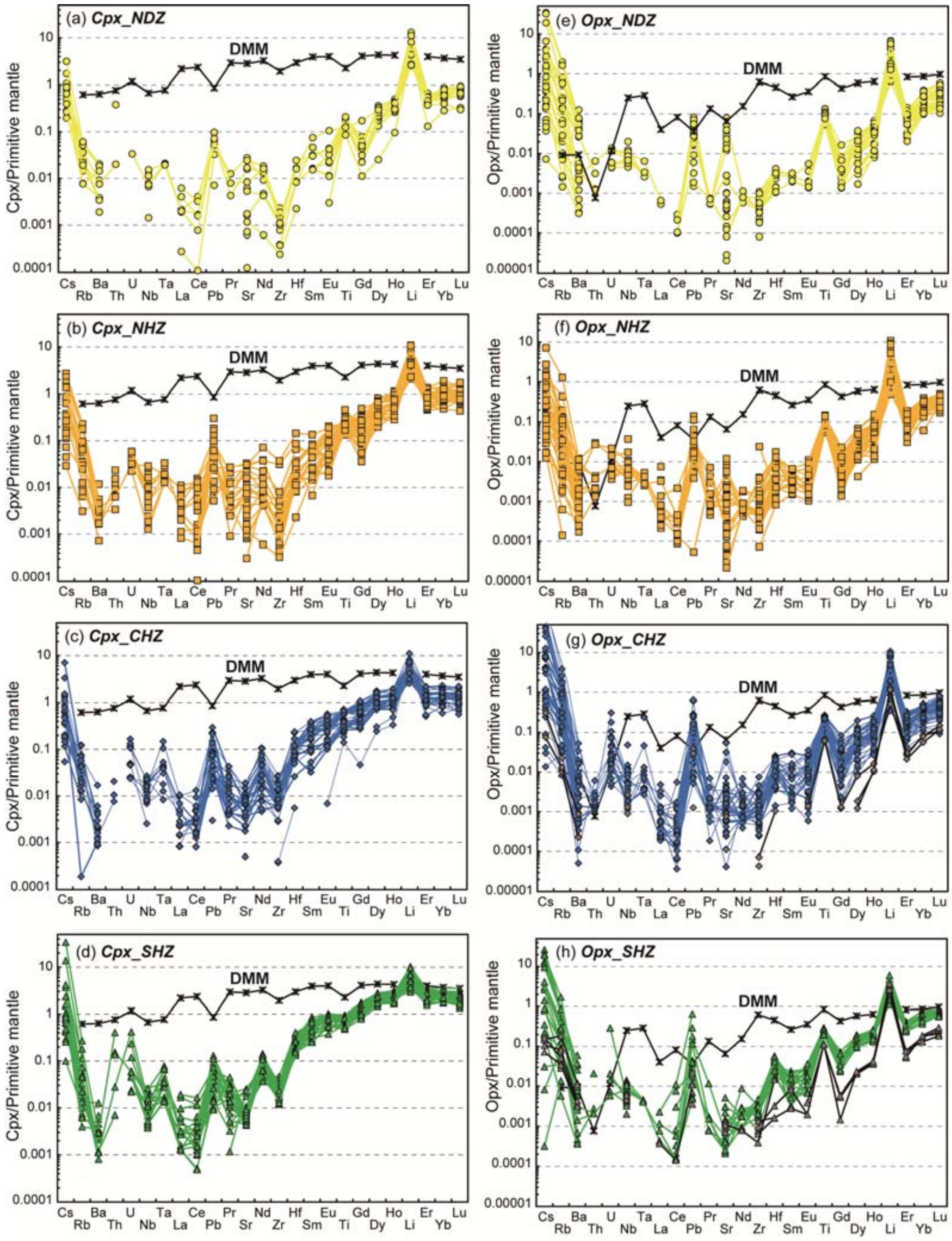
Supplementary Fig. 2 Variations of whole-rock Al_2O_3/SiO_2 versus MgO/SiO_2 for the Kangjinla ophiolitic peridotites (South Tibet). Grey diamond and triangle samples represent the Kangjinla harzburgites strongly affected by melt-peridotite interaction during dunitization. Isentropic decompressional fractional melting trends (color-coded) for residual peridotites from a depleted-MORB-mantle (DMM) source[1] were modeled using the pMELTS version[2] of alphaMELTS 1.9 program[3], with mantle potential temperatures of 1300 °C, 1350 °C, 1400 °C and 1450 °C. The color-coded pressure-decreasing gradient is of 0.1 kbar, and the white circles mark the pressure steps of 0, 0.5, 1.0, 1.5, 2.0, 2.5 and 3.0 GPa. The detailed melting conditions were listed in Supplementary Table 9. Black dashed thick line marks the terrestrial array[4,5]. Blue and red dashed thin lines show serpentinization modification resulting in 10% MgO loss and10% SiO_2 gain, respectively, relative to the terrestrial array[6]. Small grey circles represent global abyssal peridotites without those veined by gabbro, pyroxenite and dunite[7-9].



Supplementary Fig. 3 Variations of Mg# versus Cr# for spinel (a), Mg# versus Al_2O_3 (wt%) for clinopyroxene (b), Mg# versus Al_2O_3 (wt%) for orthopyroxene (b), and Al in [M1] versus Cr in [M1] for orthopyroxene (d) in the Kangjinla ophiolitic peridotites. DMM represents the minerals from the depleted MORB mantle[1]. In (d), Al and Cr in [M1] are the Al and Cr mole fractions in the Opx [M1] site, and the black dashed lines mark the temperatures estimated using T_{WS91} thermometer of Witt-Eickschen & Seck[10]. The symbols are the same as those in Fig. 2.



Supplementary Fig. 4 REE patterns of clinopyroxenes (a-d) and orthopyroxenes (e-h) in the Kangjinla ophiolitic peridotites, normalized to values of CI chondrites[11]. DMM represents clinopyroxene and orthopyroxene from the depleted MORB mantle[1]. The symbols are the same as those in Fig. 2.



Supplementary Fig. 5 Multi-element patterns of clinopyroxenes (a-d) and orthopyroxenes (e-h) in the Kangjinla ophiolitic peridotites, normalized to values of primitive mantle[11]. DMM represents clinopyroxene and orthopyroxene from the depleted MORB mantle[1]. The symbols are the same as those in Fig. 2.

Supplementary References

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