Electronic Supplementary Material 7 – Supplementary figures S1-S6

Effects of melt depletion and metasomatism on the heat generation in the continental lithospheric mantle below Jagersfontein, South Africa

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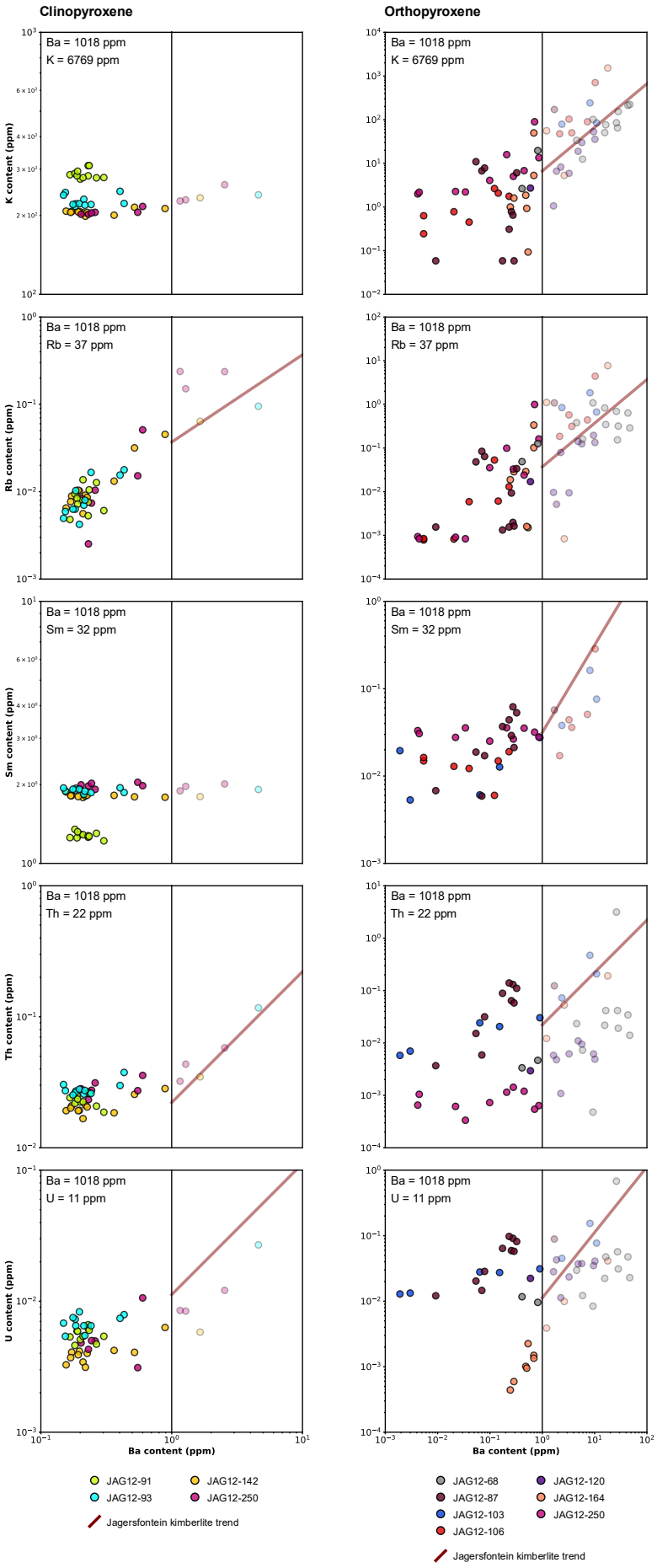
Clinopyroxene
Orthopyroxene
Ba = 1018 ppm
K = 6769 ppm
K content (ppm)
Ba = 1018 ppm
Rb = 37 ppm
Rb content (ppm)
Ba = 1018 ppm
Sm = 32 ppm
Sm content (ppm)
Ba = 1018 ppm
Th = 22 ppm
Th content (ppm)
Ba = 1018 ppm
U = 11 ppm
U content (ppm)
Ba content (ppm)
JAG12-91
JAG12-93
JAG12-142
JAG12-250
Jagersfontein kimberlite trend
JAG12-68
JAG12-87
JAG12-103
JAG12-106
JAG12-120
JAG12-164
JAG12-250
Jagersfontein kimberlite trend

Fig S1 Heat producing element concentrations for all pyroxene analyses with measurable Ba. Datapoints with contents higher than 1 ppm of Ba (transparent circles) were filtered out and not considered further in this study. Concentration of heat producing elements and Ba in the Jagersfontein kimberlite indicated in each plot

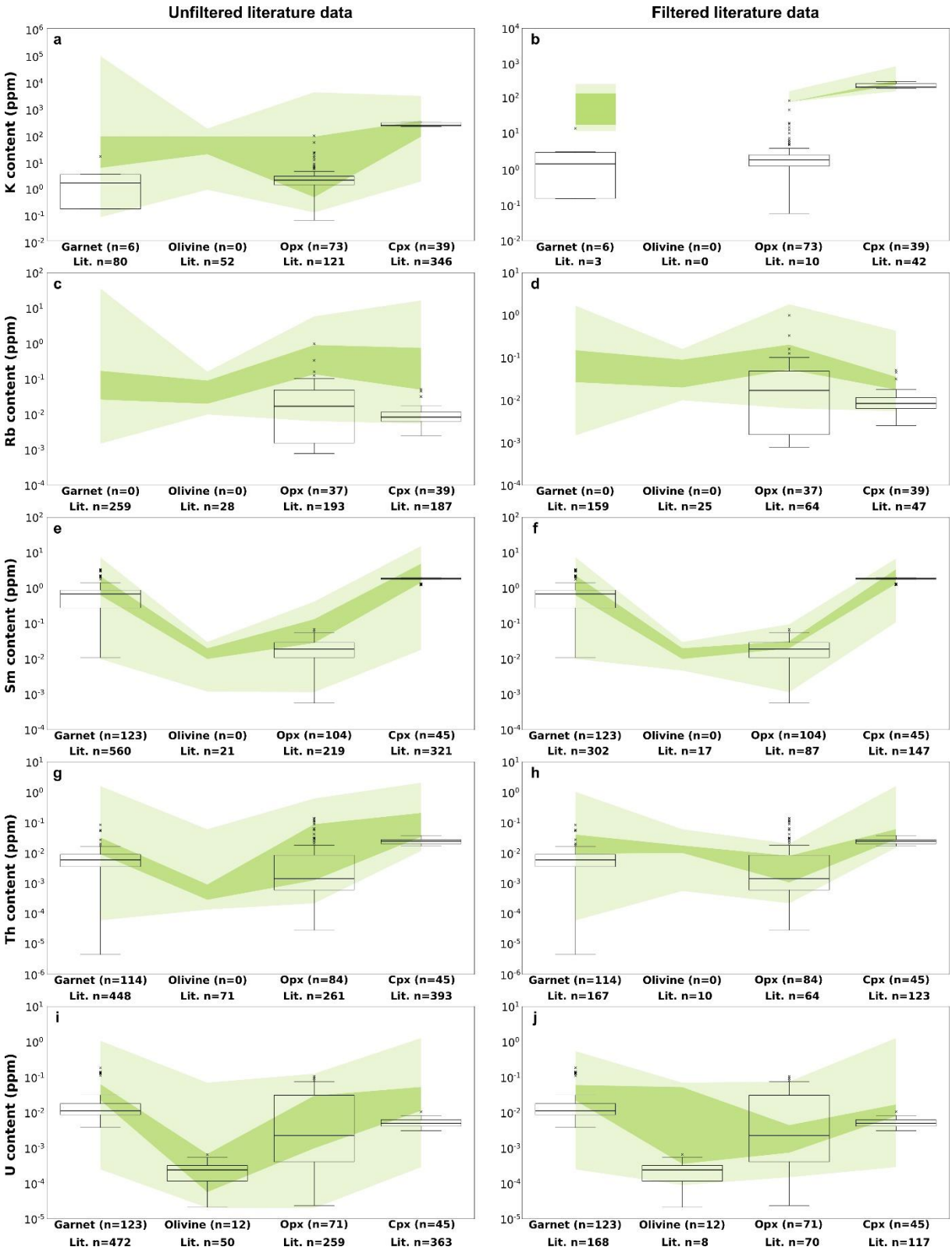

Fig. S2 Box and whiskers plots of mineral phases analyzed in this study compared to literature data for a-b) K, c-d) Rb, e-f) Sm, g-h) Th, and i-j) U. Literature data in figures b, d, f, h and j correspond to the same dataset in figures a, c, e, g and i, but only including data with Ba contents reported and below 1 ppm. Numbers in brackets besides the mineral labels

represent the number of spots with data >LOD from this study used to construct the box and whiskers, while the number of datapoints taken from the compiled literature data is shown below each label. Shaded areas correspond to the interquartile range (dark green) and minimum-maximum range (light green) of the literature data compiled. Literature data compiled from Basu and Tatsumoto (1980); Field et al. (1986); Hops (1989); Walker et al. (1989); Carlson and Irving (1994); Hoal et al. (1994); Burgess (1997); Simon et al. (2003, 2007); Grégoire et al. (2003); Irvine et al. (2003); Gibson et al. (2008); Baptiste et al. (2012); Peslier et al. (2012); Ionov et al. (2015); An et al. (2017); Branchetti et al. (2021); McIntyre et al. (2021); Heckel et al. (2022)

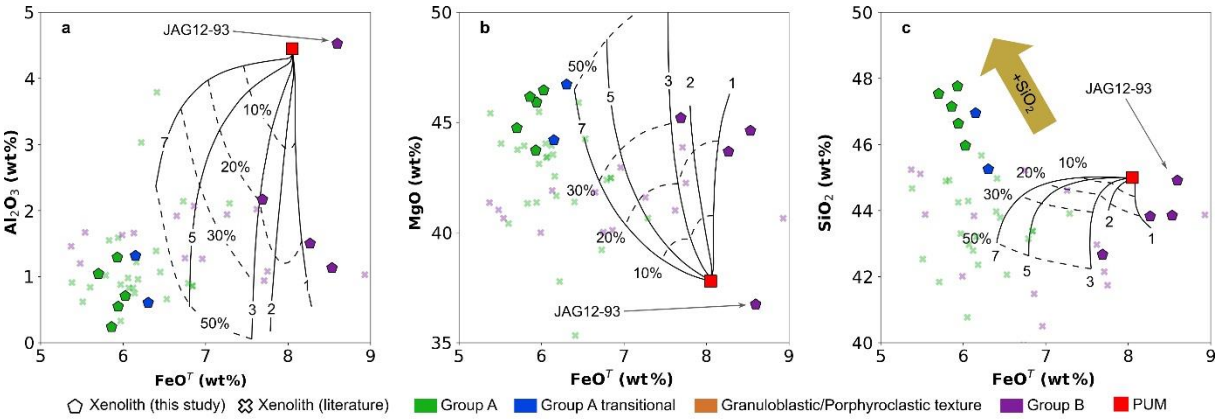

Fig. S3 Pressure (continuous lines) and degree of melt extraction (segmented lines) based on the batch melting models from Walter (2014) on bulk rock a) Al_2O_3 vs FeO^T, b) MgO vs FeO^T, and c) SiO_2 vs FeO^T

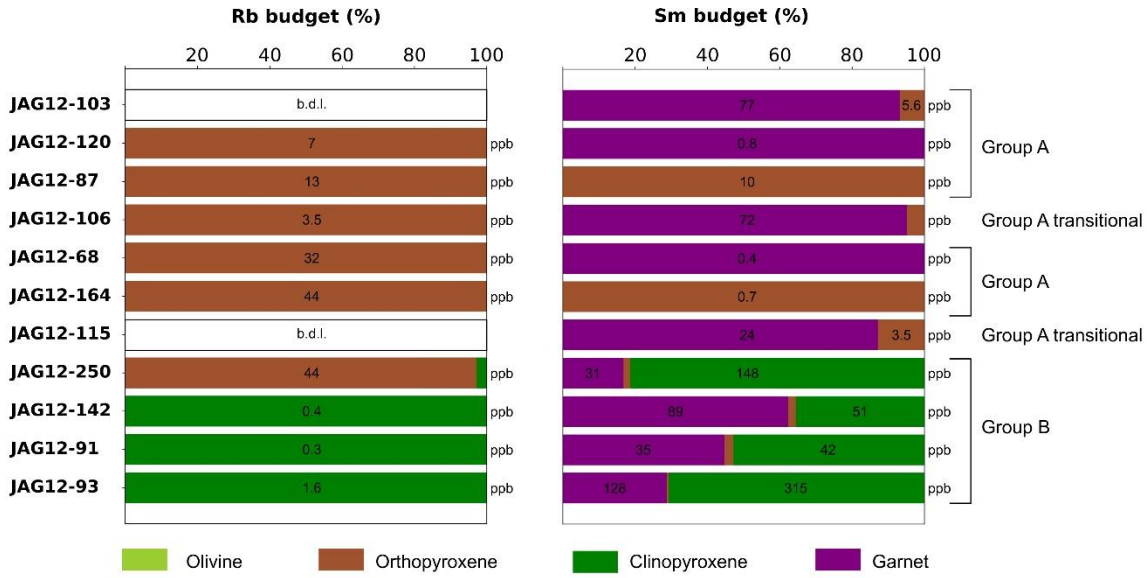

Fig. S4 Input in the bulk rock and budget of Rb and Sm by mineral phase present, with sample names sorted by increasing pressure. Rubidium content in all mineral phases of JAG12-103 and JAG12-115 was below detection limit; input of JAG12-250 clinopyroxenes in bulk rock = 1.3 ppb. Samarium input of orthopyroxenes in bulk rock: JAG12-106 = 3.7 ppb; JAG12-250 = 3.4 ppb; JAG12-142 = 3.1 ppb; JAG12-91 = 1.9 ppb; JAG12-93 = 2.1 ppb

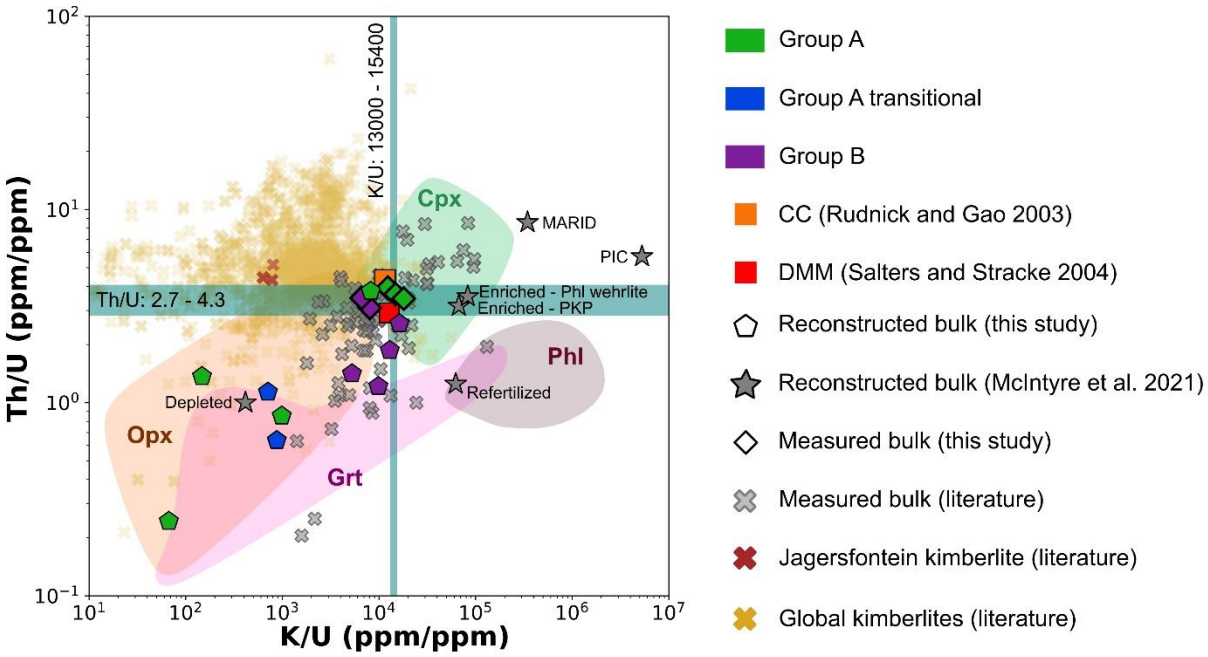

Fig. S5 Scatter plot of Th/U vs K/U in reconstructed and measured bulk rock. Mineral fields are inferred from literature data that reports Ba and with measured contents <1 ppm

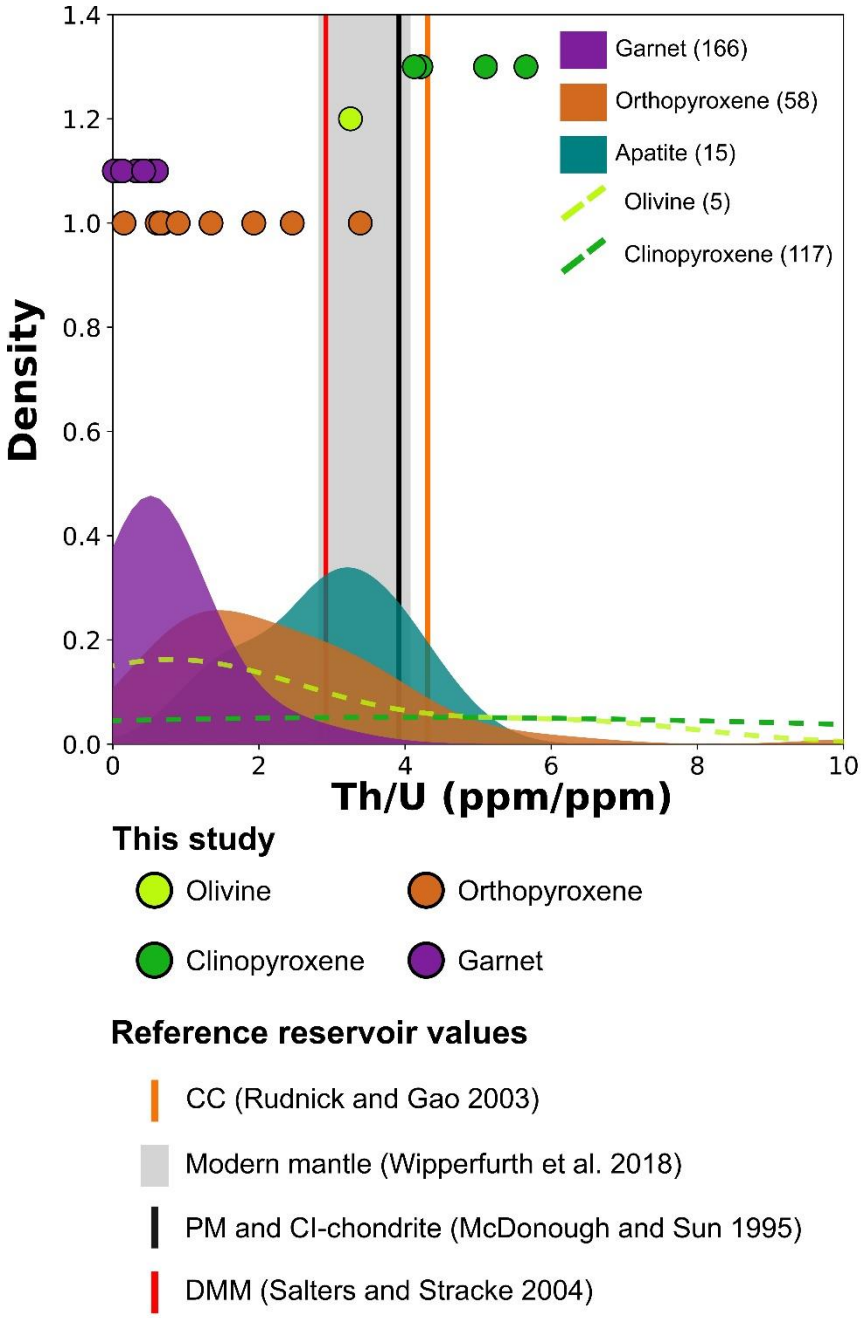

Fig. S6 Kernel density estimation of Th/U concentration ratios in common mineral phases found in cratonic peridotites. Literature data displayed has Ba contents <1 ppm

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