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The upper mantle beneath the Kumba plain (Cameroon Line), documented by spinel peridotites from basaltic lavas.

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Western part of Cameroon displays an alignment of Tertiary to Recent alkaline volcanoes, plutons and grabens extending for more than 1600 km: the Cameroon Line (CL). The CL has been considered as a huge lithospheric crack tapping a hot asthenospheric zone. The present study focuses on mantle peridotite xenoliths from alkaline basaltic lavas of the Kumba plain, a CL graben intercalated between the strato-volcanoes of Mt Cameroon and Mts Rumpi. Volcanics of the plain emplaced over Panafrican magmatic and metamorphic formations and are locally covered by Cretaceous continental sandstones. They commonly enclose mantle lherzolites composed of olivine (58-69%), orthopyroxene (14–26%), clinopyroxene (11–17%) and spinel (1-5%) and displaying protogranular and porphyroclastic textures. Olivine (Fo90.3-89.4), clinopyroxene ([Mg]: 89-91) and orthopyroxene ([Mg]: 90-91) display a narrow compositional range. Spinel [Mg] and [Cr] vary from 74 to 78 and from 8.8 to 14.1, respectively. Trace element compositions display several distinct REE patterns: (1) Lherzolites REE patterns are homogeneous for MREE and HREE but differ for LREE with patterns showing depleted LREE, enriched LREE or flat patterns. (2) Clinopyroxene REE patterns are enriched in LREE and MREE compared to HREE. Their HREE contents are always homogeneous. Lherzolite and clinopyroxene REE patterns of peridotites have similar

shape. This implies that (i) there is almost no contamination by host basalts and (ii) clinopyroxene is the mineral controlling the REE budget. The slight LREE depletion is attributed to partial melting while the LREE enrichment reflects cryptic metasomatism. The lack of HREE fractionation indicates that the partial melting occurred in the spinel lherzolite field. Clinopyroxenes of Kumba spinel lherzolites have REE patterns different from those of the host lavas. Consequently, they have not been totally equilibrated with such type of magmas. That does not imply that they did not experienced REE enrichment processes during reactions with similar magmas but in that case, percolation of small volumes of magmas and/or chromatographic effects probably occurred. The petrologic characteristics of the studied samples clearly point out that the Kumba upper mantle is essentially lherzolitic in composition and could represent a fertile subcontinental lithospheric mantle only affected by very low degrees of partial melting and cryptic metasomatism. Finally our data provide the first detailed insight into the upper mantle beneath the Kumba plain that appears to be homogeneous and normal by comparison to the one occurring beneath other CL localities.