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Lithospheric mantle beneath Cerro de los Chenques documented by xenoliths from alkali basalts, Patagonia, Argentina.

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A suite of ultramafic xenoliths hosted in Cenozoic alkali pyroclastic basalts associated to a back-arc tectonic environment that outcrop in Cerro de los Chenques (44˚52'S, 70˚03'W), North Patagonia, have been sampled for this study. The suite of mantle xenoliths consists predominantly of spinel-bearing lherzolites and olivine-bearing websterites associated to only one spinel-bearing harzburgite, all of them without any hydrous phase. These mantle xenoliths exhibit porphyroclastic to equigranular textures and some samples present orthopyroxene crystals up to 1 cm in size. The clinopyroxene major element compositions show an evolution from more or less fertile lherzolites (Mg#: 91-93 and Al_2O_3 >5 %) to refractory harzburgites (Mg#: 94 and Al_2O_3: 2.3%). The websterite clinopyroxenes show lower Mg# (90-91) and higher Na_2O- and Al_2O_3-contents (>1.7% and >6%, respectively) compared to peridotite clinopyroxenes. This evolution is supported by the orthopyroxene, olivine and whole-rock compositions. The lherzolite and websterite clinopyroxene trace element compositions are similar. They display LREE-depleted patterns (Ce_N/Yb_N: 0.3-0.4; Ce_N/Sm_N: 0.3-0.7; Sm_N/Yb_N: 0.7-1), excepted for one lherzolite sample, which show a near-flat pattern (Ce_N/Yb_N: 1.1; Ce_N/Sm_N: 1.2; Sm_N/Yb_N: 0.9), while that of harzburgite displays a S-type pattern (Ce_N/Yb_N: 3.9; Ce_N/Sm_N: 2; Sm_N/Yb_N: 2) and have lower concentration relative to chondrite (CI x3 HREE to harzburgite against x 10 to others lithologies). All clinopyroxenes (peridotites and pyroxenites) are characterized by negative Ti and Nb anomalies, while only two samples (the harzburgite and one lher-

zolite) have negative Zr and Hf anomalies. Whole rock REE contents are always depleted, compared to the primitive mantle and at least 3 groups can be observed: Group 1) mainly represented by all websterites and one lherzolite shows enrichment in HREE compared to the LREE, Group 2) represented by one lherzolite and one harzburgite, in which the LREE content is higher than the HREE content (La/Gd around > 10), and Group 3) represented by two lherzolites, in which LREE content is also higher than HREE content (La/Gd < 10), but their total whole rock REE contents are higher than the Group 2. According to these data, together with Re-Os isotopic data, we propose a three-steps model for the evolution of the lithospheric peridotite mantle beneath the Cerro de los Chenques: (1) around 800 Ma (TRD, Re-Os ages), generation of harzburgite by partial melting processes; (2) around 500 Ma, percolation of fluid/melt, which modified the lherzolite clinopyroxene contents and crystallized the websterite, and (3) a last event related to the transport of the xenolith up to the surface, which produced features as melt pockets and enrichment of LREE in whole-rock.