

Noble gas composition of Patagonian subcontinental lithospheric mantle

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Noble gas composition of mantle xenoliths from Pali-Aike Volcanic Field and Gobernador Gregores, Patagonian subcontinental lithospheric mantle (SCLM), reflects three-component mixing between air, SCLM and MORB-like. Pali-Aike mantle xenoliths represent the intrinsic local SCLM reservoir with higher (U+Th+K)/(³He, ²²Ne, ³⁶Ar) ratios compared to MORB source. This mantle reservoir is characterized by radiogenic ³He/⁴He_{AVERAGE} = 6.87 ± 0.04 R_A and nucleogenic mantle neon with ²¹Ne/²²Ne average of 0.090, with ³He/²²Ne ratios (up to 13.66 ± 0.37) higher than depleted MORBs (8.31–9.75). ⁴⁰Ar/³⁶Ar ratios range from near-atmospheric ratio (510) up to 16400, with mantle ⁴⁰Ar/³⁶Ar reaching 54000. Mantle ¹²⁹Xe/¹³²Xe reach up to 1.11, whereas ¹³⁶Xe/¹³²Xe up to 0.40. Gobernador Gregores mantle xenoliths represent the SCLM metasomatized by MORB-like component with ³He/⁴He_{AVERAGE} = 7.24 ± 0.09 R_A, slightly less nucleogenic mantle neon with ²¹Ne/²²Ne = 0.065, ³He/²²Ne = 8.39 ± 0.14, and ⁴⁰Ar/³⁶Ar ratios usually less than 4000. The MORB-like component is related to asthenospheric mantle upwelling in response to the opening of a slab window, which is consequence of South Chile Ridge subduction. Although Pali-Aike SCLM displays MORB-like metasomatism, it could have been homogenized during the last 14 Ma, after rapid passage and northward migration of the Chile Triple Junction and its slab window at this latitude.