

Deformation, metasomatism and melt-rock reactions in the lithospheric mantle beneath the Hoggar swell (Algeria): mantle xenoliths from the Tahalgha, Eggéré and Manzaz districts

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We present the results of an integrated petrological, geochemical and petrophysical study of mantle xenoliths sampled by Cenozoic volcanism in the Hoggar massif (Algeria). The xenoliths were collected in three volcanic districts located at the periphery (Tahalgha and Eggéré) and in the central (Manzaz) part of the Hoggar massif. The Eggéré volcanism lies on the Eggéré-Alaksoud terrane while Manzaz spreads E-W across Azrou N'Fad terrane. The Eggéré-Alaksoud and Azrou N'Fad Paleoproterozoic tectonic blocks are part of the LATEA microcontinent (LATEA = Laouni, Azrou-n-Fad, Tefedest, Eggéré-Alaksod; Black *et al.*, 1994), bounded by NNW-SSE and NW-SE Pan-African shear zones. The Tahalgha district straddles a mega pan-African shear zone (the 4°35 fault) between two major structural domains of the Tuareg Shield basement: the Central Polycyclic Hoggar to the East (LATEA terranes) and the Western Hoggar domain to the West (Iskel block). The studied xenoliths provide information on the evolution of the lithospheric mantle from the late Pan-African orogeny to the Cenozoic events responsible for the topographic upwelling and volcanism.

The Pan-African heritage is preserved in xenoliths from the peripheral Tahalgha district. These samples are distinguished by low equilibrium T (750-900°C) and LREE-depleted clinopyroxene compositions. They are considered to represent the sub-continental lithosphere after the rejuvenation processes that occurred during the late stages of the Pan-African orogeny. They show well preserved deformation textures assigned to these events and characterized by preferential crystallographic orientations (CPOs) of olivine (axial-[010]) consistent with a transpressional regime. The Cenozoic events are marked by partial annealing of these textures, particularly pronounced in the Eggéré and Manzaz samples, as well as in the Tahalgha xenoliths equilibrated at medium to high T (900-1150°C). The Cenozoic events were also responsible for a change in olivine CPOs. The lithospheric modifications related to the Cenozoic event are observed either at the scale of the whole Hoggar swell, or at the small scale of magma conduits and their wall rocks.