

Mineralogy and geochemistry of mantle derived xenoliths and host rocks from Ethiopia (M.Sc research at PML)

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Abstract

Tertiary and Quaternary basaltic lavas, the so-called East African Rift Igneous province form a voluminous and wide spread volcanic province that extends from about 3,000 kilometers, stretching from Malawi in the south through Tanzania, Kenya, and Ethiopia connecting with the Red Sea and the Gulf of Aden. The character of the Rift changes from a faulted rift valley in Kenya becoming more like a mid-ocean ridge in the northern Afar Depression, where magma rises to create the floor of an embryonic ocean. Between 45-22 Ma Volcanic activity in Ethiopia plateau was characterized by fissural flows of flood basalt. Central volcanoes covered the fissural flows beginning at about 30-13 Ma and erupted intermittently into the Pleistocene.

The alkali basaltic lavas of the Ethiopian Plateaus contain a wide variety of mafic-ultramafic xenoliths. These xenoliths can provide important and direct information on the nature of the lithosphere beneath Ethiopian Plateaus and are well exposed in the central Main Ethiopian Rift (Debrezait and Butajira), southern Main Ethiopian Rift (Megga and Megado), Afar depression and in the northwestern plateaus (Dedessa, Injibara and Ras Dashin).

This study will be focused on mineralogy and geochemistry of mantle xenoliths that are collected from three areas: northwestern plateaus (Injibara and Dedessa) and southern Ethiopia Rift (Megga). The largest xenoliths occurrences are found in the lava flows of northwestern Ethiopia plateau, Injibara. Most of the xenoliths are rounded and range in size from 1 to 15 cm in diameter. From the handspecimen observation the Injibara and Megga xenoliths are coarse grained and show layering with Olive green to deep green colour whereas the xenoliths from Dedessa are grayish green, fine grained and are weathered.

Petrographical studies show that these xenoliths are represented by spinel bearing peridotites. The host lavas are aphyric to porphyritic basalts. So future work will be based on petrogenetic study of these xenoliths and their host lavas by analytical facilities at PML. The data can be used to constrain on characteristics of mantle lithosphere beneath Ethiopian flood basalt province.