Mineral transformation and pore structural evolution during the burial process of basalt: a case from Liaohe Depression, Bohai Bay Basin, East China

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There are more than one thousand meters thick of Paleogene volcanic stratigraphy in Liaohe Depression, Bohai Bay Basin, East China. We can identify and divide these Paleogene volcanic stratigraphy into 14 stages (Huang et al., 2014; Feng et al., 2015).

We take samples of buried basalts from depth 1418m to 3951m, then use optical microscope, scanning electron microscopy (SEM), electron probe microanalyzer (EPMA) techniques to analyze mineral transformation during the burial process of basalt. Our goal is to establish a mineral transformation model of buried basalts in this area.

We summarized that pyroxene have no alter during burial; feldspar alteration sequence: plagioclase -- phillipsite/chabazite -- analite; olivine alteration sequence: olivine -- smectite -- mixed-layer minerals (chlorite and smectite) -- chlorite; calcium is precipitated while mineral transformation, which can form calcite and fill the pores.

We concluded that (1) from depth 2400m to 3700m (underground temperature 85~130℃), the effective micropores of phenocryst are mainly intra-crystalline pores of phillipsite; (2) below 3700m (underground temperature above 130℃) the effective pores are mainly calcite dissolved pores. This model may be suitable for portraying the mineral transformation and pore structural evolution during the burial process of alkaline series basalts in the alkaline environment (without the influence of organic acids).

References:
