

Surface uplift and erosion related to emplacement of large-scale mafic sills: Examples from Yanliao Basin in the North China Craton

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Pre-magmatic uplift is a common process associated with LIPs, mantle plumes and rifting^[1]. The LIP-related pre-magmatic uplift is usually regional domal uplift associated with buoyant plume uplift^[2-4]. Recognizing associated uplift is very important evidence for linking a LIP (and its sills, dykes and lava flows) with a mantle plume and continental breakup events.

Our previous results show that the ~1320 Ma Yanliao LIP in Yanliao Basin in the North China Craton is associated with pre-magmatic uplift started ~20 Ma prior to the LIP^[5]. This pre-magmatic uplift is represented by the disconformity between Changlongshan and Xiamaling formations previously termed as Yuxian Uplift^[5]. However, the pre-magmatic uplift model can not explain the erosion surfaces between the Cambrian limestone and ~1320 Ma dolerite sills identified from the eastern part of the Yanliao Basin (Figure 1).

Since dolerite sills are shallow-depth emplaced, emplacement of thick dolerite sills will result significant surface uplift and erosion of sedimentary basins. A preliminary analysis on thickness of dolerite sills in the Yanliao Basin shows that the eastern part of the basin with cumulative thickness of dolerite sills >1000 m has suffered from significant syn-magmatic surface uplift during emplacement of the Yanliao LIP. This surface uplift resulted in erosion of ~1320 Ma dolerite sills and their host sedimentary rocks and formation of the erosion surfaces between the Cambrian limestone and dolerite sills in eastern part of the Yanliao Basin. Therefore, in addition to the pre-magmatic uplift, the eastern part of the Yanliao Basin was also influenced by surface uplift and erosion related to emplacement of large-scale mafic sills.

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