



Early Cretaceous rift-related volcanism in the Songliao Basin, NE China

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Following the amalgamation of the Siberian and North China cratons, NE China, as part of the Central Asian Orogenic Belt, underwent Late Mesozoic lithospheric extension that was associated with volcanic activity. The Songliao Basin is the most important rift structure formed during these processes and contains voluminous volcanic rocks interlayered with sedimentary infill. Mafic-to-intermediate lavas are associated with felsic ones. This study focusses on the geochemical compositions of the less widespread Early Cretaceous mafic-to-intermediate lavas in the Songliao Basin and compares them with the more abundant felsic rocks. Two mafic-to-intermediate magma series, one with alkaline one with subalkaline affinity were identified. High MgO and Cr contents, low Th/Nb, La/Nb ratios and variable but depleted Nd isotope compositions indicate that both magma suites were most likely formed by melting of enriched upper mantle sources. Subalkaline mafic-to-intermediate rocks and I-type rhyolites define a cogenetic magma series. This rock suite was produced by melting of subduction-modified lithospheric mantle and subsequent magma evolution as well as crustal melting during lithospheric extension. Alkaline mafic-to-intermediate rocks and A-type rhyolites form another cogenetic magma suite that was produced under within-plate conditions from an OIB-type mantle source, supposed to be the heterogeneous shallow asthenosphere and/or the lower lithosphere. Decompression partial melting of this mantle source requires a relatively thin lithosphere. The development of alkaline mafic rocks and A-type rhyolites as typical bimodal volcanic assemblage reflects that lithospheric thinning below the Songliao Basin reached its maximum, while basin rifting terminated afterwards.