Early J_2 basalts in SE China: The incipience of large-scale late Mesozoic magmatism

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Magmatism in SE China was dormant during 204~180 Ma, but was reactivated in 180~170 Ma (early J_2), and then became more and more intensive towards the end of early Cretaceous. The small-scale early J_2 magmatism is the incipience to long term and large-scale magmatism in this region. A near east-west (EW) trend volcanic belt distributed across south Hunan, south Jiangxi and southwest Fujian was formed during early J_2 time. Along this belt from inland toward coast, the lithology of basalts changes from alkali into tholeiite, and the amount of erupted volcanic rocks and the proportions of rhyolites coexisting with the basalts increase. On the basis of geochemical characteristics of these basalts, we infer that the melting degree of source rocks and the extent of fractional crystallization and crustal contamination all increased whereas the depth of mantle source decreased from inland to coast, which led to the variations of geological characteristics of the volcanic belt. In early J_2, the western spreading Pacific plate began to subduct underneath SE China continental block, reactivating near EW trend deep fault that was originally formed during Indosinian event. The stress of the western spreading Pacific plate and the extent of asthenosphere upwelling increased from inland to the coast, which is consistent with the generation and evolution of early J_2 basalts.

References

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Petrogenetic similarities of East Molokai and younger Kea-trend Hawaiian volcanoes as they migrate away from the hotspot

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The Hawaiian plume is heterogeneous in radiogenic isotope ratios of Sr, Nd and Pb; there are systematic geochemical differences between the < 2 My shields that define the Kea and Loa trends. The overlap in Sr, Nd and Pb isotope ratios of recent Kilauea lavas and 550 Ka Mauna Kea lavas has been used to argue that Kea-trend shield volcanism samples a vertically continuous, geochemically distinct streak which persisted in the source for 550 Ka [1, 2]. As Kea volcanoes migrate away from the hotspot and evolve from the shield to postshield stage there are systematic changes in isotope ratios. We use lavas from East Molokai, the oldest Kea volcano, to address the question – are postshield lavas from Kea volcanoes similar in radiogenic isotopic ratios? We find that Sr, Nd and Pb isotopic ratios in late shield/postshield lavas from Mauna Kea (< 350 Ky) and East Molokai (~1.5 My) are similar [3] thereby showing that the isotopic differences between lavas erupted at the plume center and periphery remained the same during formation of Kea volcanoes. Therefore the spatial zonation of the plume persisted during growth of Kea volcanoes. Like rejuvenated-stage lavas erupted at other Hawaiian volcanoes, rejuvenated-stage East Molokai lavas have relatively low $^{87}Sr/^{86}Sr$ and high $^{143}Nd/^{144}Nd$. Based on positive correlations of $^{87}Sr/^{86}Sr$ versus $^{206}Pb/^{204}Pb$ and negative correlations of these isotopic ratios with Nb/Zr, a smaller proportion of this depleted component also contributed to the late shield/postshield lavas erupted at East Molokai and other Kea volcanoes. This depleted component has Kea-trend Pb isotopic characteristics, relatively low $^{208}Pb/^{204}Pb$ at a given $^{206}Pb/^{204}Pb$, and it is probably not related to oceanic lithosphere or the source of mid-ocean ridge basalt.

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