

## **EARLY PALAEOZOIC MAGMATISM IN THE EUROPEAN VARISCIDES: EVIDENCE FOR PLUME RELATED CONTINENTAL BREAK-UP**

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Early Palaeozoic bimodal rift-related magmatism is a characteristic of the European Variscides from the Polish Sudetes to Iberia. Contrasting P-T histories in different areas arise from dissimilar metamorphic pathways subsequently imposed by the Variscan orogeny.

This magmatism (e.g. in the N Bohemian Massif) comprises: Granitic magmatism (c 500ma) formed from differentiates of partial melts of recycled Cadomian crust, with an inherited VAG signature. Mafic-dominated bimodal magmatism (Cambro-Ordovician). Siluro-Devonian magmatism producing oceanic crust, partly preserved as obducted ophiolites. Compositional diversity in the mafic rocks, classified as alkali-basalts, tholeiitic basalts and low-Ti basalts, may result from mixing variably enriched and depleted asthenospheric sources, differential partial melting, low pressure fractional crystallisation and assimilation processes. The association of alkali basalts and enriched MORB may indicate plume activity in an extensional environment, as basalt trace element ratios (e.g. Th/Nb, Ce/Nb) are comparable with modern plume-generated basalts. Source heterogeneities may therefore record the presence of an upwelling mantle plume. Trace element modelling of associated felsic rocks indicates derivation from a LREE-enriched source, confirming previous Sm/Nd isotopic evidence for a continental crust component.

Contemporary bimodal magmatism elsewhere in the Variscides exhibits many chemical similarities with that in the Bohemian Massif, suggesting that combined tensional forces and mantle plume convection initiated rifting at the Gondwanan margin. This caused renewed fragmentation of the continental margin and subsequent development of a network of seaways or narrow oceans separating islands of the Armorican archipelago which migrated northward. This model provides the simplest mechanism for repeated early Palaeozoic separation of microcontinents from Gondwana.