Geophysical Research Abstracts
Vol. 15, EGU2013-8263-2, 2013
EGU General Assembly 2013

The Variscan accretionary prism in the Kaczawa Mountains (W Sudetes, SW Poland): lithostratigraphic, sedimentological, volcanic, metamorphic and structural evidence

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The Sudetes (SW Poland) at the NE edge of the Bohemian Massif (Central-European Variscides) are a structural mosaic comprising various basement units, some interpreted as fragments of a Variscan accretionary prism (Baranowski et al., 1990; Collins et al., 2000; Kryza & Zalasiewicz, 2008). The best example is the Kaczawa structural unit in the West Sudetes. Its accretionary nature is evident from:
Lithostratigraphy, sedimentology and volcanism. Neighbouring tectonic units of the Kaczawa Mountains contain different fragments of Palaeozoic successions: (a) a Cambrian (and Neoproterozoic?) – Ordovician volcano-sedimentary sequence (with WP type bimodal volcanic and shallow-water sedimentary rocks), (b) Silurian – Devonian MORB-type metabasalts, shales and cherts (with graptolites and conodonts), and (c) Late Devonian – Early Carboniferous polygenetic mélange bodies that record overlapping dynamic sedimentary and tectonic processes. This suggests evolving palaeotectonic environments, from initial rift within continental crust, through mature basin likely underlined by oceanic-type lithosphere, to a subduction setting (mélanges; Baranowski et al., 1990; Collins et al., 2000; Kryza & Zalasiewicz, 2008, and refs. therein).
Metamorphism. Diverse PT metamorphic paths detected in various tectonic units of the Kaczawa Mountains are strong evidence for the subduction/accretionary affinity. Relatively higher-grade metamorphic units bear evidence of blueschist-facies metamorphism, overprinted by a low-T greenschist facies event (pseudosection modelling yielded: ∼270oC and 8.5 kb for the peak-P, and ∼310oC and 6 kb for the peak-T stages). The estimated P/T gradient of ∼10 oC/km is typical of a subduction setting (Kryza et al., 2011). Other tectonic units, including the mélange bodies, experienced lower-grade metamorphic parageneses (e.g. widespread pumpellyite) and white-mica structural data (Kostylew et al., 2013; and refs. therein). The diverse metamorphic PT paths indicate various depths of subduction burial of particular units.
Structure. Our preferred regional palaeotectonic model (Collins et al., 2000; Kryza & Zalasiewicz, 2008; Kryza et al. 2011) implies late Devonian – early Carboniferous ESE-oriented subduction in the NE Bohemian Massif with WNW thrusting, followed by extension and ESE backward normal faulting. More coherent crustal blocks or microcontinents (e.g. Lusatia, Teplá-Barrandian, and smaller "terranes") became incorporated into the tectonic mosaic which subsequently was dissected by regional WNW-ESE trending strike-slip fault zones.

Acknowledgements: This study was supported by Research Grant N N307 062036 of the Ministry of Science and Higher Education in Poland, and by the University of Wrocław, Grant 1017/S/ING/12-II.

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