



Zircon provinces from Cadomia, Avalonia, Baltica, and West Africa as a tool for the reconstruction of Gondwanan Europe - Constraints from LA-ICP-MS U-Pb analysis of detrital and magmatic zircon

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Sediment provenances and magmatic events of Late Neoproterozoic (Ediacaran) and Lower Palaeozoic rock complexes from the Central European Variscides zone and adjoining palaeo-continents are constrained by new LA-ICP-MS U-Pb dating of detrital and magmatic zircons. These results in combination with the analysis of the plate-tectonic setting constrained from field observations, sedimentological and geochemical data, and trends of the basin development are used to reconstruct Cadomian and Avalonian orogenic processes during the Late Neoproterozoic and the earliest Palaeozoic. The fingerprint of Avalonia- and Cadomia-derived zircon provinces gives the chance for the reconstruction of the fragmentation and the spatial arrangement of peri-Gondwanan crustal domains during the Variscan orogeny.

The geotectonic history of Gondwanan Europe started with a plate tectonic interplay of Baltica, Amazonia, and West Africa at c. 750-800 Ma. Thus, initial input of detrital zircon was delivered from these cratons. Major crustal growth during the Pan-African events occurred during the time span of c.650 to c. 540 Ma and resulted in the formation of the Gondwana supercontinent. Most important crustal growth was finished at the end of the Precambrian. Palaeozoic orogenies mostly recycle the Precambrian-Early Cambrian crust and new crust is rare. Thus, the Palaeo-continents relevant to the formation of Gondwanan Europe are characterized by distinct zircon populations. Basically we can distinguish a West African, Amazonian, and Baltica zircon province. Zircons derived from Cadomian arc rocks form together with West African zircons form the Cadomian zircon province. Amazonian zircons mixed with Avalonian arc material are mirrored in the Avalonian zircon province. The Avalonian zircon province plus zircons from the docking of Avalonia onto Baltica at c. 450 Ma and, in addition, plus zircons from the Iapetus closure at c. 420 Ma are reflected in the Rheno-Hercynian zircon province. The Saxo-Thuringian zircon province is composed of the Cadomian zircon province which became added by Lower Ordovician rift-related zircons (c. 490 Ma) and by Upper Devonian zircons (c. 370 Ma) from Variscan collision events. Zircon provinces based on U-Pb ages are one of the most powerful tools for the reconstruction of Gondwanan Europe.