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Active Devonian continental margin in the Variscan Bohemian Massif (the Mariánské Lázně Complex and Čistá pluton).

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The Mariánské Lázně Complex (MLC) crops-out at the boundary between the lower (Saxothuringian) and upper (Teplá-Barrandian) plates in the NW Bohemian Massif. Strongly retrogressed eclogite bodies in the MLC show peak eclogite-facies metamorphic conditions at c.390 Ma and are affected by HT extensional shearing at c.375 Ma connected with granulite-facies overprint and migmatization. To better understand the geodynamic context for this rapid transition from cold subduction to hot extension, rocks from the extensional zones have been studied. These rocks are dominated by amphibolite migmatites and contain unfoliated, fine- to coarse-grained rocks in which magmatic textures, including euhedral crystal shapes, magmatic bedding and/or dykes, are preserved. In places, the unfoliated structure of the magmatic rocks passes into magmatic foliation and locally to solid-state amphibolite-facies shear zones. The nature of these magmatic rocks ranges from amphibole gabbros to trondhjemites, the latter being previously dated giving a Devonian age. This magmatic event in the deep crust has a possible upper crustal equivalent in the granitoids of the Čistá pluton, intruding the hanging-wall Teplá-Barrandian domain. This study provides new whole-rock geochemical data including Sr-Nd isotopes and majorand trace elements, combined with zircon U-Pb geochronology and Hf isotopes, for the MLC and Čistá magmatic rocks. The calc-alkaline nature of the rocks, a pronounced negative Nb-Ta anomaly, relative enrichment of fluid-mobile elements (including LILE), strong fractionation of LREE over HREE and depletion of high field strength elements (HFSE) is evidence for an active continental margin origin. Low values of εNd data suggest either the presence of variable mantle chemistry at the base of the magmatic system, and/or implication of the lower crust. Zircons from the gabbro to trondhjemitic rocks of the MLC show magmatic overgrowths with ages ranging from 390 to 370 Ma and strong inheritance between 480 and 560 Ma. Zircons from the Čistá pluton show two peaks with age range of 350–380 Ma and 380−410 Ma, together with a weak 500−530 Ma inheritance for one sample. The results are interpreted in terms of a long-lasting magmatic activity covering most of the Devonian. During this period, magmas intruded the lower crust during the Middle and Late Devonian and were emplaced in the upper crust during the Early Carboniferous. Samples show strong involvement of the Cambrian lower crustal material, including the eclogites, and, based on variable relative enrichment of mobile elements (LREEs and LILEs) among the samples, a possible heterogeneous contribution of the subduction component into the system. Zircon in-situ Hf isotope study shows firstly that there was not only juvenile input to produce the Devonian magmatism, which is in accordance with the recycling recorded by the geochronology, and secondly, the model age of the oceanic lithosphere involved in the system is not Ordovician but older, showing at least late Neoproterozoic ages.