Cadomian and Variscan metamorphic events in the Léon Domain (Armorican Massif) resolved by trace element analysis in monazite and garnet *Poster*

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The question, whether crustal domains are allochthonous terranes or not is crucial for plate tectonic models of the Ibero-Armorican segment of the Variscan belt. The Léon Domain in the Armorican Massif appears as a displaced crustal block as it bears a resemblance to the South Armorican Domain of the internal Variscan belt (Le Corre et al. 1989). In the central part of the Léon, the amphibolite-facies Conquet-Penze Micaschist Unit (CPMU) overlies the high-grade Lesneven Gneiss Unit (LGU). At the base of the LGU, a high-pressure stage at 700°C/>13 kbar, recorded by garnet-clinopyroxene assemblages in eclogites was followed by a high-temperature event at 800°C/8 kbar with garnet and cordierite in aluminous paragneisses. Maximal temperatures in the upper parts of the LGU were 630°C/6 kbar. In the micaschists of the Conquet-Penze Unit, microstructures indicate a crystallization of garnet and then staurolite during the development of S_1 and S_2 foliations. Zoned garnet in assemblages with staurolite recorded prograde P–T paths from 490–610°C at 5–8 kbar in the upper and at 6–9 kbar in the lower parts of the CPMU (Fig. 1A, B). The foliation S_2 was overprinted by shear bands with a top-to-SW directed normal sense of shear, corresponding to a dextral strike-slip movement (Balé & Brun 1986).

A younger population of monazite with variable Y contents displays Variscan Th-U-Pb ages (EMP dating method) between 340 and 300 Ma (Fig. 1C). In contrast, an older population of Cadomian monazite at 552–517 Ma is uniformly rich in Y and was observed in samples with only few or even no garnet. As the 330–340 Ma Saint Renan-Kersaint granite postdates the foliations S_1 and S_2 with peak metamorphic assemblages one can conclude that 340–300 Ma Variscan monazites should postdate garnet crystallization. In metapelites, the crystallization of garnet and accessory xenotime and monazite are linked by reactions with net transfer of Y. Trace-elements in garnet were analyzed by LA-ICPMS. Garnet Y, HREE and Li are low in high-grade gneisses. In amphibolite-facies micaschists strong zonations of Y and HREE are observed. Like Mn, both Y and HREE decrease from garnet core to rim at increasing temperature when garnet appears with xenotime and monazite, which are consumed. At low temperatures, xenotime is supposed to be a stable phase. In some samples, the Y is very low in the Mn-rich cores of garnet which crystallized at low temperatures. The Y contents strongly increase toward the inner rims, indicating that Y was initially bound in xenotime and/or monazite and then deliberated by the breakdown of these phases under prograde metamorphic conditions. This suggests that high-Y Cadomian monazite crystallized previous to the garnet and at high temperatures. Presumably, garnet did not crystallize at the Cadomian

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event due to coeval low-pressure conditions, but at Variscan medium pressures. Whatever, Cadomian monazite dates a distinct thermal event. One could speculate on a contact metamorphism in the vicinity of intrusions like the Pointe des Renards metagranitoid or a Cadomian regional low-pressure metamorphism as it was described from the St. Malo and Fougères units of the adjacent North Armorican Cadomian Domain (Ballève et al. 2001).

P-T paths in combination with the monazite ages underline that the central Léon units represent a normal crustal pile which was underthrusted towards the SE or E beneath the Central Armorican Domain during a Variscan collision, as proposed by Rolet et al. (1986). Then, the range of Variscan monazite ages is linking this event to a Late-Carboniferous stage with overprinting of the S_1–S_2-structures by dextral shearing. The finding of Cadomian remnants does not support a South Armorican provenance. The Léon units were rather parts of a suture zone along the northern boundary of the Armorican microplate,

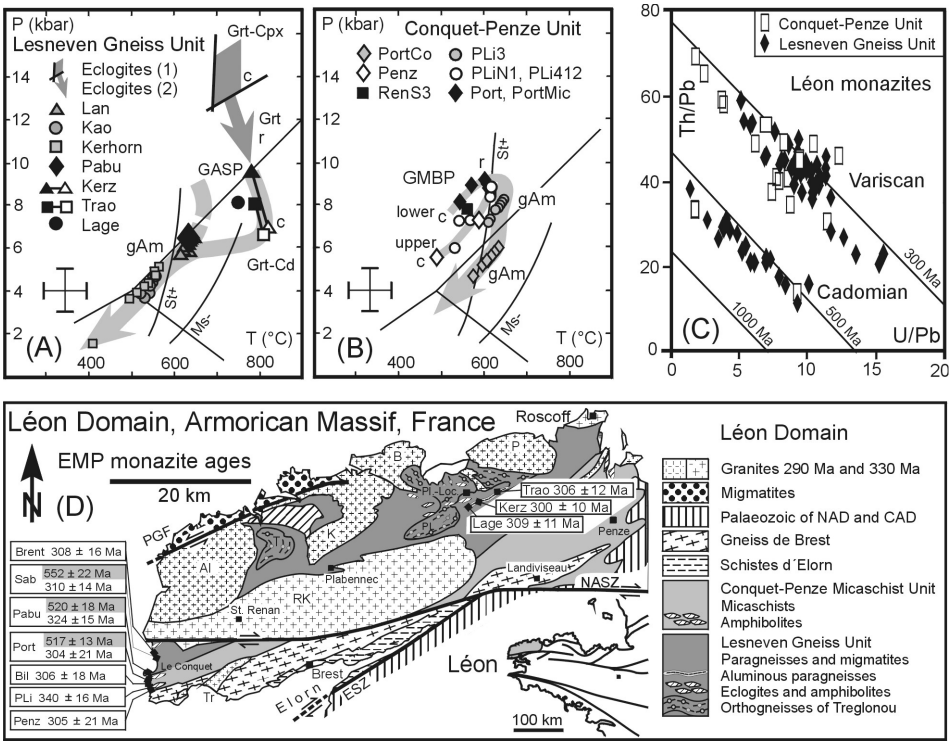

Figure 1: (A, B) P-T paths from the Léon. Garnet-clinopyroxene equilibria (Grt-Cpx) and relative evolution derived from garnet zonation trend. Data from green amphiboles (gAm). Data from garnet-sillimanite-plagioclase-quartz (GASP) and garnet-cordierite (Grt-Cd) equilibria, calculated with garnet core (c) compositions. Data from garnet-muscovite-biotite-plagioclase-quartz equilibria in micaschists (GMBP); prograde P–T paths derived from garnet core-to-rim (c, r) zonations. (C, D) Th-U-Pb monazite ages.

hence related to the margin of a former Rheic Ocean between Armorica and Avalonia.

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