UNEXPECTED, post-rifting extensional events in the BRIANÇONNAIS paleomargin of the WESTERN ALPS. And what about in the KABYLIAN and ALBORAN domains?

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Extensional tectonics occurs in various geodynamic contexts, from rifting (typically pre-orogenic) to syn-orogenic collapse (either supra-subduction or syn-collisional), and was widely studied during the last decades (e.g., Froitzheim et al., 1997; Selverstone, 2005; Mohn et al., 2022; Pye et al., 2022). Here we present for the first time a case of extensional tectonics affecting the lower plate of a subduction zone. This unexpected setting characterizes the Briançonnais passive margin domain of the Western Alps during the Albian-Campanian times (Michard et al., 2022). We further consider the potential occurrence of the Briançonnnais-type Cretaceous extension in the West Mediterranean Alpine belts, as all of these belts have broadly the same genealogy (i.e., Pangea breakup, spreading, then closing of the Alpine Tethys or Ligurian-Maghrebian Ocean, between Europe/Iberia and Africa/Adria).

In the French-Italian Alps, the European paleomargin consists of a proximal part extending in the Helvetic/Delphino-Provençal domain, and a distal part formed by the Briançonnais *s. l.* (NW tip of Iberia during the Mesozoic). Most of the Briançonnais was subducted together with oceanic units (ophiolites and metasediments) down to ~100 km depth (Dora-Maira eclogite-coesite facies unit) beneath Adria between ~40-33 Ma (Michard et al., 2022, and references therein). The most proximal, Classical Briançonnais nappes were only moderately subducted, whereas the Acceglio-type and the Prepiemonte-type units further to the east exhibit blueschist-facies metamorphism. The Sinemurian unconformity over the faulted Norian to Hettangian carbonates heralds the main step of the Pangea rifting there. The break-up unconformity is bracketed between Toarcian and Bathonian stages. Extension resumes during Callovian-Oxfordian times. Thin pelagic deposits veil the Briançonnais paleomargin up to Albian-Cenomanian times, which record the beginnings of the Cretaceous extensional faulting. Then, the Turonian-Campanian calcschists show widespread intercalations of micro- or chaotic breccias and turbidites linked to normal faults systems whose escarpments were still preserved during the Eocene flysch sedimentation up to ~45 Ma. *In other words, a new rifting-like event affected the Briançonnais paleomargin when it was about to encroach the subduction zone.* Two different mechanisms (possibly combined) were proposed to explain this extensional event, (i) slab pull increase due to its avalanching in the lower mantle (Capitanio et al., 2009), and/or (ii) curvature of the subduction zone increasing tensile stress in the subducting plate extrados (Mallard et al., 2016). In contrast, the conjugate, Adria margin was affected during the same period by a compressional deformation (Australpine thrusts) followed by extensional deformation in the opposite sense.

Does the Briançonnais case could offer an inspiring example for a new interpretation of the homologous, Maghrebian and Betic paleomargin relics? Such relics of the southern paleomargin of the Iberia-derived "AlKaPeCa" terranes north of the (Ligurian)-Maghrebian Ocean are observed in the Dorsale (Frontal) units of the Peloritani, Kabylias and Alboran domains

(Leprêtre et al., 2018, and references therein). Based on the literature (Vila, 1969; Raoult, 1974; Naak et al., 1989; Naak, 1996) and on unpublished observations (J.P. Bouillin, person. comm., 2022) we notice the occurrence of coarse breccias and conglomerates in the Upper Cretaceous calcschists of the Lesser Kabylia and Djurdjura (Greater Kabylia) External Dorsale units, formerly limited by normal faults from the more proximal Dorsale. Similar breccias occur in the Mauretanian Flysch adjacent to the External Dorsale. In the Gibraltar Arc, Cretaceous normal faults affected the External Dorsale units of the Alboran Domain (Mégard, 1969; El Hatimi and Duée, 1989; Olivier, 1990; Jabaloy-Sanchez

et al., 2019). In the easternmost Maghrebides, the Peloritan Dorsale exhibits paleofault scarps that did not experience compressive deformation from Liassic to Eocene times (Bouillin et al., 1999).

Hence, an extensional setting would have prevailed in the Alboran-Kabylia-Peloritani blocks until the late Eocene shortening. However, trying to apply the Briançonnais model to these segments of the Maghrebides and Gibraltar Arc raises a difficulty about the dip of the subduction of the Tethyan lithosphere linked with the convergence of Africa toward Europe and Iberia since ~85 Ma. It is currently admitted that subduction began during the Late Eocene beneath Iberia with a NW-ward dip, being responsible for rifting of these continental blocks off Iberia and back-arc extension of the Mediterranean basins (Molli, 2008; Leprêtre et al., 2018; Aerden et al., 2022). Thus, we must speculate on the possible activity of a SE-dipping subduction zone during the Late Cretaceous along the North African margin. A Subduction Polarity Reversal would have occurred during the Late Eocene, possibly triggered by the collision of a continental allochthon against Africa (cf. South China Sea case; Linang et al., 2022), or by the older age of the oceanic lithosphere close to AlKaPeCa margin. Compression of the North-African margin remained moderate at that time.

To conclude, the Dorsale (Frontal) units of the Maghrebian-Betic belts would deserve renewed study of their Late Cretaceous evolution in the perspective of their extensional deformation, potentially linked to an early, Alpine-type south-dipping subduction zone.

Keywords: Extension – Subduction Polarity Reversal - Western Alps – Tethys - Cretaceous.

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