



Alpine Palaeogeography: new constraints from detrital zircon geochronology

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Schardt's (1898) discovery of the "allochthony" of the Préalpes Médiannes and its exotic character, provided Alpine geologist with a first picture of Alpine palaeogeography: a Middle Jurassic sea divided in two branches by the rise of an emerged island. Later on, Schardt's island had been recognized at the scale of the Alpine belt and took the name of Briançonnais "geoanticline".

In many Alpine palaeogeographic reconstructions, the Briançonnais and its exotic character have played a crucial role (e.g. Stampfli 1993; Manatschal et al., 2006;). In particular some of them explained the exotic character of the Briançonnais facies by proposing a pre-Cretaceous position located far from the Helvetic domain. In this view, the Briançonnais terrain was related to the Iberian plate and entered the Central Alpine system only after a Lower Cretaceous eastward drift associated with anticlockwise rotation of Iberia, opening of the northern Atlantic and closure of the Vardar ocean.

In the Central Alps, the remnants of the northern Jurassic margin of the Alpine Tethys (sensu Stampfli) are contained in the Helvetic (s.l.) and Lower Penninic units. The basements and original substrate of these nappes are exposed in the crystalline external massifs and in the gneissic Lepontine dome. The highest, more internal, gneissic units within this dome are the Monte Leone, the Maggia and the Adula nappe. These units, as well as the autochthonous basement of the European margin, are characterized by large "Variscan" granitoids with ages between 290 and 330 Ma. The "ophiolite-bearing" units thrust on top of the Adula nappe are composed of Cretaceous and younger sedimentary rocks, with thin soles of Triassic and Jurassic strata. In addition to Variscan, Cambro-Ordovician and Proterozoic ages, detrital zircons in these soles show a peak at 260-280 Ma accompanied by a cluster of ca. 230 Ma zircons, similarly to what is observed in the Schams and Préalpes Médiannes nappes (Briançonnais s.l.). This is particularly evident in the Tomul nappe, located at the top of the Lower Penninic pile below Briançonnais-derived units and in the Piz Terri-Lunschana zone (PTLZ), tectonically located between the Adula nappe and the "ophiolite-bearing" Grava nappe. In the PTLZ a Permo-Triassic of Briançonnais type is in stratigraphic contact with a Lower Jurassic of Helvetic type. Detrital zircon signatures in the Lower Jurassic sandstones of the PTLZ are very similar to those of the Helvetic. In contrast, locally sourced Permian and Middle Jurassic strata of the PTLZ show two remarkable features: a peak at 260-280Ma and the scarcity or absence of Variscan zircons (gap between 290 and 350Ma). Considering the basement of the different alpine domains, this characteristic is best explained by a Briançonnais-type basement source that lacks widespread Variscan intrusions and is characterized by large "mid Permian" intrusions.

The occurrence of different types of Briançonnais DZ U-Pb signatures in the pre-Cretaceous stratigraphic record of the distal Helvetic-North Penninic margin favors a Jurassic palaeogeography with the Briançonnais domain located south of the Helvetic domain and not directly related to the Iberian plate and its Cretaceous tectonic juxtaposition.