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Contrasting Palaeozoic basements in the Western Alps: inferences for the geometry and kinematics of the eastern boundary of the Variscan belt.

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The boundary between the Helvetic and the Penninic (= Briançonnais) Zones has long been recognized as a major fault ("Penninic Front") in the Western Alps. A narrow oceanic domain has been postulated at least along part of this boundary (the Valaisan ocean). However, the information provided by the pre-Triassic basement has not been fully exploited, and will be discussed here in detail. The igneous and metamorphic history of the pre-Triassic basement shows significant differences between the External Massifs from the Helvetic Zone, with abundant late Carboniferous granites, and the basement of the Briançonnais Zone, including the Internal Massifs (Dora-Maira, Gran Paradiso, Monte Rosa), devoid of Carboniferous granites. A major coal-bearing basin, the "Zone Houillère", opened along this boundary. This limnic intramontane basin has never been properly investigated. The Zone Houillère is not comparable with the external, paralic, flexural, basins on both sides of the Variscan belt, but shows similarities with the Saar-Saale basin. Like the latter, we interpret the Zone Houillère as a transtensional basin opened along a major, crustal-scale, fault zone, namely the East Variscan Shear Zone. The Permian magmatism and sedimentation displays contrasting distributions, being absent or very localized in the Helvetic Zone, and widespread in the Penninic Zone. The above data indicate that the structural inheritance from the Variscan belt plays a major role in defining the future location of the Valaisan basin, i.e. the boundary between the European palaeomargin and the Briançonnais microcontinent. In addition, these data allow a better definition of the geometry and kinematics of the southern margin of the European Variscan belt.