



Long-lived large-scale deformation under Central and Western Europe

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We investigate the past and present-day deformation pattern under Central and Western Europe through seismic anisotropy. We use all SK(K)S splitting results that have been so far presented for this region and compile an image of upper mantle deformation. A large-scale deformation pattern emerges where NE-SW fast orientations under the Aegean are smoothly changing to NW-SE beneath the Hellenides-Dinarides conjunction. NW-SE is the dominant pattern under the whole Carpathian-Pannonian region. Towards Bohemia, the pattern rotates to E-W. The rotation continues until the Rhine valley, and it continues further within the Alps, all the way to Southern France. Outside the Alpine-deformation-influenced region, we observe a jump in fast orientation, between the Ardennes and the Massif Central in France, where the fast axis orientation is back to NW-SE. That anisotropy pattern may correlate with the arcuate shape of Variscan orogeny. It agrees with the Rheic suture line, and the borders of two main tectonic units of European Variscides, Saxothuringian and Muldanubian. Previous studies on upper mantle anisotropy have interpreted and related such pattern mainly to frozen-in deformation from the past tectonic episodes. This has so far remained ambiguous though. Here we assess the relation between deformation at depth and shallower structure, as evidenced by stress field and topography. We discuss the presence of a long-lived large-scale upper mantle deformation, which has been acting ever since the Cambrian in different orogenic phases (Caledonian, Variscan, Alpine).