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K-Ar age data of clay fault gouges from some major Neoalpine faults

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In the Central Alps, the Insubric Phase in the sense of Argand (1916, Eclogae geol. Helv. 14, 145-191) was related to underthrusting of South Alpine units below the Penninic nappes along the Periadriatic Fault. Several other large-scale faults were active during the same, though not always the entire, Oligocene to Miocene time span. These faults form an array interpreted as to result from the partitioning of strain induced by the crustal convergence between the European and Adriatic plates (e.g. Handy et al. 2005, Geol. Soc. Spec. Publ. 243, 249-276). With ongoing Alpine convergence and deformation during exhumation there is a general progression from ductile to brittle behaviour on the Periadriatic Fault and kinematically related faults further north (e.g. the Simplon Rhone Fault and a diffuse, discontinous zone of generally dextral strike-slip movement on the southern boundary of the Aar massif). K-Ar dating of fine grained illite from clay fault gouges provides a reliable method for establishing the approximate time of faulting. New results establish that brittle faulting on the northeastern segment of the Canavese Fault (i.e. the part of the Periadriatic Fault SW of Val d'Ossola) occurred around 20 Ma, with south-side-up kinematics. An age of ca. 17 Ma for the crosscutting Giudicarie Fault in the Eastern Alps is effectively identical with an already published pseudotachylyte age and places a lower limit on major and continuous strike slip movements the Periadriatic Fault. The age of brittle faulting further north, on the southern border of the Aar massif, is from 13.6$\pm$0.3 to 8.3$\pm$1.1 Ma, consistent with the younger cooling and exhumation in this area. The dominantly dextral brittle faulting becoming younger to the north reflects the continued indentation and anticlockwise rotation of Adria as Alpine units become exhumed and progressively welded to the southern block. In contrast to the eastern Alps, there is no field evidence for (westward) lateral extrusion of Alpine units relative to Adria and the European foreland.