

The Periadriatic Fault

Neil Mancktelow and Jan Pleuger

Geological Institute, ETH Zurich, Switzerland

The Periadriatic Fault (PF) is the most prominent late fault in the Alpine chain and is exposed over some 700 km strike length from west of Torino in NW Italy to Slovenia. The PF crosscuts both nappe contacts and earlier shear zones/faults at a low angle and these pre-existing structures are bent asymptotically into near parallelism with the PF. As a result, it is not always straightforward to distinguish between passively rotated or reactivated earlier structures and shearing related directly to activity on the PF itself. The PF generally consists of two distinct zones of localized shear and strong foliation development: a northern mylonite zone (NMZ) and a southern mylonite or ultracataclasite zone (SMZ), separated by a relatively discrete surface (the Periadriatic "Line": PL). The NMZ and SMZ are developed exclusively from the northern or southern block protoliths: there is intense mixing of units within the zones, due to the strong shearing, but not across the PL itself. Movement on the PF is generally oblique dextral plus north side up, quite consistently in the NMZ but often with a distinct change in the predominant movement direction across the PL into the SMZ, where the vertical component is typically smaller (more dextral strike slip) and locally reversed (i.e. south side up). The N-side up vertical component has a maximum of 15-20 km south of the Lepontine Metamorphic Dome in the central Swiss-Italian Alps and decreases dramatically to the E and W. South of the Tauern window (i.e., east of the Brenner pass), the jump from pre-Alpine to Alpine (late Cretaceous to Tertiary) mineral ages occurs not on the PL but on the DAV Fault further north. Dextral Riedel faults with a (W)NW-(E)SE strike are both transected by the PL and locally offset it. Sinistral antithetic Riedel faults with a NNE-SSW strike are regionally developed but generally less obvious: the major exception is the important Guidicarie Fault in the Eastern Alps, which offsets the PL by some 15-20 km. Syn-magmatic shearing of the Bergell tonalite, Prasnella tonalite, and many smaller dykes establishes that the PF was already active around 32 Ma. Early Miocene pseudotachylite and fault gouge ages indicate a later period of enhanced activity, synchronous with regional orogen-parallel extension and major activity on the Simplon and Brenner low-angle normal faults, around 20-17 Ma. Dissection by both dextral and sinistral Riedel faults around 17 Ma limited further large displacement on the PL. Apatite and zircon fission track ages younger than ~10-13 Ma do not show any jump across the PF.