

STRUCTURAL AND GEOCHRONOLOGICAL EVIDENCE CONSTRAINING THE GEOMETRY, KINEMATICS, AMOUNT OF DISPLACEMENT AND TIMING OF THE GIUDICARIE FAULT SYSTEM (ITALIAN EASTERN ALPS)

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The Giudicarie fault system (Giudicarie *sensu stricto*, Meran-Mauls, Passeier, Thurnstein and Jaufen faults) represents a sharp break in the generally E-W strike direction of the orogen-scale Periadriatic fault system. Establishment of whether this break in strike is an inherited structural feature (pre-Oligocene) or a late, collision-derived structure is crucial for estimating the maximum possible amount of accumulated dextral shearing along the Periadriatic fault. The Giudicarie fault system is therefore a key element in understanding the Late Oligocene to Neogene evolution of the Alpine chain. In this study, the kinematics, timing and magnitude of movements on the various component segments of the Giudicarie fault system are considered, based on a detailed structural investigation combined with zircon and apatite fission-track analysis from closely spaced samples. Two main tectonic phases are established (see also Prosser, 1998, 2000; Müller et al., in press): a) back-thrusting of the Austroalpine units over the Southern Alps around 32 Ma, recorded by basement and limestone mylonites along the Giudicarie and Meran-Mauls faults with transport directions towards 100–110°, and b) later sinistral transpressive displacement, characterized by structures at the ductile-brittle transition, which overprinted the top-to-E/ESE thrust-related mylonites but also partitioned into a major system of transcurrent faults in the Southalpine domain. It was during this later event (b) that the Periadriatic fault attained its present-day geometry. However, the amount of sinistral displacement along the Giudicarie system was only ~15–20 km. The magnitude is established from the sinistral offset of the Jaufen mylonites across the Passeier brittle fault and the discontinuous distribution of Oligocene tonalitic

lamellae along the Giudicarie fault. A direct structural connection is also established between the Brenner and the Jaufen faults. This constrains the timing of phase (b), since it must postdate the main exhumation phase of the Tauern Window at 20–18 Ma (Fügenschuh et al., 1998). The results of this study argue strongly against an originally straight Periadriatic fault. The Giudicarie fault formed a restraining bend in this part of the Periadriatic fault system since at least the Late Miocene and probably since the Late Oligocene.

References

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