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The tonalitic lamellae along the Giudicarie fault system: a multidisciplinary study

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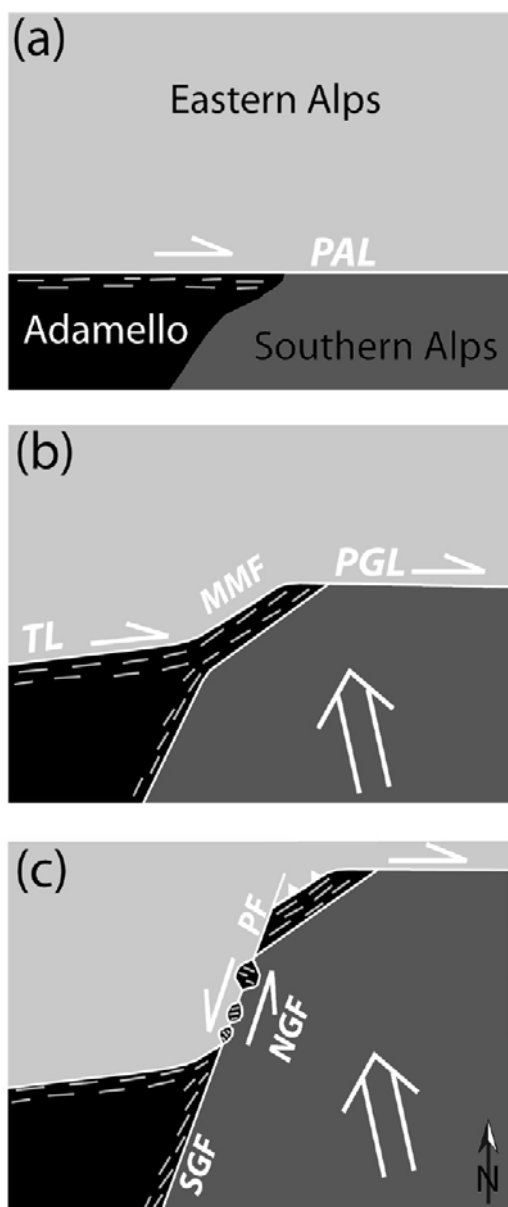
Numerous large and small magmatic bodies are exposed along the Periadriatic line (PAL) or close to it (e.g. Becke 1903; Rosenberg 2004). This study concentrates on small intrusions along two important faults of the Giudicarie fault system (GFS), the Northern Giudicarie (NGF) and the Meran-Mauls fault (MMF), summarised under the term tonalitic lamellae (Dal Piaz 1926).

Magnetic fabric analyses in combination with structural field data indicate dextral strike slip deformation along the NE-SW striking northern part of the GFS, the Meran-Mauls fault, overprinted by younger top-SE thrusting (Pomella et al. 2010). The regional stressfield was constantly oriented approximately NNW-SSE during Tertiary times. The distinctive change in deformation along the MMF from dextral strike slip to top-SE thrusting may be caused by a rotation or bending of the fault after the intrusion of the tonalites and the formation of their horizontal magnetic foliation.

U/Pb data on zircon (Pomella et al. 2010) show that some of the lamellae are of Oligocene (Rupelian), others of Late Eocene (Priabonian,) age. An amphibole-gabbro lens occurring on the Meran-Mauls fault provides a Middle Eocene (Bartonian) age. Among the major Periadriatic plutons, only the southern units of the Adamello batholith also intruded in the Eocene which suggests a strong correlation between the tonalitic lamellae and the Adamello batholith.

New zircon fission track data (Pomella 2010) show a corridor of young, Miocene zircon fission track ages from the tonalitic intrusions along the Northern Giudicarie fault. This corridor connects Early Miocene (17-23 Ma) Zircon fission track

ages of the NE-Adamello with the Miocene (23-9 Ma) zircon fission track ages of the Meran-Mauls basement and the Tauern window. To the SE the narrow corridor is bounded by Southalpine sediments characterized by only partially reset zircon fission track ages and towards NW by Oligocene zircon fission track cooling ages found in the Austroalpine units.



This multidisciplinary study provides evidence for a polyphase deformation along the Giudicarie fault system:

Oligocene (Fig. 1(a)): Intrusion of the northeastern units of the Adamello batholith adjacent to the straight, dextral strike-slip PAL. Late Oligocene / earliest Miocene (Fig. 1(b)): The NNW-ward movement of the Southalpine indenter leads to a bending of the fault, material from the northeastern part of the Adamello batholith is squeezed to the NE along the bent part of the fault. Early Miocene (Fig. 1(c)): The brittle Passeier fault, Northern and Southern Giudicarie fault dissect the bent part of the PAL. Along the northern part of the bend (MMF) a nearly continuous tonalitic body persists, whereas along the NGF only small boudinaged bodies rotated during brittle faulting are present

Figure 1. Schematic illustration of the emplacement of the tonalitic lamellae along the Giudicarie fault system (Pomella et al. 2010). PAL = Periadriatic line, MMF = Meran-Mauls fault, TL = Tonale line, PGL = Pustertal Gailtal line, NGF = Northern Giudicarie fault, SGF = Southern Giudicarie fault, PF = Passeier fault.

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