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The Semail Gap Fault Zone of the Oman Mountains and its postobductional evolution

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Between the Jabal Akhdar Dome to the west and the Saih Hatat Dome in the east, the ∼70 km long, NNE-striking Semail Gap Fault Zone is located. The Semail Gap Fault Zone has a long-lasting history, which has been deduced by different Neoproterozoic and Phanerozoic lithologies on both sides of the fault zone. The latest activity of this fault zone is characterized by dextral transtension, related to the doming of the Jabal Akhdar and Saih Hatat areas. The latest phase of doming of the Saih Hatat and Jabal Akhdar areas occurred during the Late Eocene to Early Miocene (Hansman et al., 2017) preceding Late Cretaceous obduction of the Semail Ophiolite. Along the fault zone, seismicity is negligible and no Quaternary deposits have been displaced. Thus, activity at the Semail Gap Fault Zone must have preceded the Quaternary. However, ongoing uplift of the study area during the Quaternary amounts to at least 40 m as shown by partly eroded wadi terraces. Postobductional vertical and horizontal displacements along the fault zone are at the order of ∼5.5 and ≥3.5 km, respectively. The vertical displacement was quantified by the separation of the base of the ophiolite, and the horizontal displacement by the offset of a dextral Riedel fault. Dextral transtension resulted from uplift and orogenic/gravitational collapse of the two domes. The respective hanging-wall blocks moved away from the two domes, which best explains dextral transtension along the Semail Gap Fault Zone. The Semail Gap Fault Zone has a sinistral transtensional counterpart at the southwestern margin of the Saih Hatat Dome. Age, geometry, shear sense and the amount of vertical displacement of the Semail Gap Fault Zone matches that of the nearby Frontal Range Fault (Mattern & Scharf, 2018).

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