Active kinematics and tectonic geomorphology of the Lavanttal Fault

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The Lavanttal Fault System is one of the major faults in the Eastern Alps, which formed during Miocene lateral extrusion. The NNW-striking fault has accumulated some 12 km dextral and several kilometers vertical offset since the Miocene. It hosts several Miocene basins such as the Lavanttal Basin, which formed along releasing bends and overstepping fault segments. Kinematic data from microtectonic structures along the fault system indicate a complex fault history including older dextral strike-slip faulting and a younger phase of fault inversion with sinistral slip. At present, the fault system delimits the morphological Lavanttal Basin from the adjacent crystalline basement of the Koralpe and Saualpe ranges. Comparison of morphological features and geomorphological indices from the mountain fronts east and west of the basin show marked differences, which are related to active strike-slip and normal faulting along the faults delimiting the Lavanttal Basin to the E (i.e., to the Koralm Massif). Active faulting is evident from features such as low mountain sinuosity, triangular facets and debris cone morphologies along the faulted mountain front. Valley shapes in the Koralm Massif provide additional proof of footwall uplift (valley-floor width-to-height, V-ratio, stream gradient). Features are indicative for the uplift along a releasing fault bend of an active dextral fault. The western mountain-piedmont junction of the basin differs markedly by its very high sinuosity and the valley shapes, which are not indicative for faulting along the mountain front. Geomorphological evidence for active dextral faulting is in line with both the regional pattern of moderate seismicity (ML ≤ 5.1, I0 ≤ 7), two available fault plane solutions of small earthquakes (ML 3.6 and 4.4; Reinecker & Lenhardt, 1999), and macroseismic data (isoseismal maps) with isoseisms paralleling the fault.