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Deformation bands in volcaniclastic rocks – insights from the Shihtiping tuffs, Coastal Range of Taiwan

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Abstract

Deformation bands have been extensively studied in sandstones, whereas far less is known about bands occurring in porous volcaniclastic rocks. Here we investigate spectacular outcrop exposures of late Miocene tuffaceous rocks in the Coastal Range of Taiwan, which host several deformation band types: (i) disaggregation-dominated, layer-bound, sub-vertically-dipping pure compaction bands (PCB); (ii) cataclastic, layer-bound, reverse-sense compactional shear bands (RCSB); and (iii) non-layer-bound and intensely cataclastic transverse-sense compactional shear bands (TCSB). RCSBs and TCSBs host discrete slip surfaces on individual bands. The bands formed in an overall compressive stress regime related to convergence of the Eurasian and Philippine Sea plates. PCBs and RCSBs formed first, whereas progressive burial caused a shift to a transverse stress state and formation of TCSBs. The occurrence of cataclasis in RCSBs but not PCBs is inferred to be shear-driven, rather than confining-pressure-driven. Our findings suggest that cataclasis in deformation bands in volcaniclastic rocks is