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Structural complexities in the Alishan area of the Taiwan fold-and-thrust belt inherited from the margin's shelf-slope transition

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The Alishan area of Taiwan includes a sector of the fold-and-thrust belt that spans the transition from the platform with full thickness of the Eurasian continental margin in the north to the thinning crust of its slope in the south. This part of the fold-and-thrust belt with the highest elevations includes important along-strike changes in structure, stratigraphy, and seismic velocities. Here we present the results of new geological mapping from which we build geological cross sections both across and along the regional structural trend. Fault contour, stratigraphic cut-off, and branch line maps provide 3-D consistency between the cross sections. Minimum shortening is estimated to be 15 km, with displacement overall to the northwest. A P wave velocity model helps constrain the structure at depth by providing insight into the possible rock units that are present there. P wave velocities of $\geq$ 5.2 km/s point toward the presence of basement rocks in the shallow subsurface throughout much of the south-eastern part of the area, forming a basement culmination. The changes in strike of thrusts and fold axial traces, the changing elevation of thrusts and stratigraphic contacts, and the growing importance of Middle Miocene sediments that take place from north to south are interpreted to be associated with a roughly northeast striking lateral structure coincident with the northern flank of this basement culmination. These transverse structures appear to be associated with the inversion of Eocene- and Miocene-age extensional faults, deeply rooted in the pre Cenozoic basement that were along what was the shelf-slope transition in the Early Oligocene. Inversion causes uplift of the margin sediments and their higher P wave velocity basement during Pliocene-Pleistocene thrusting.