



Deep and Shallow Structure of the Taiwan Arc-Continent Collision

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The on-going oblique arc-continent collision in Taiwan between the Luzon arc and the Eurasian continental margin provides a classic spatial view of the temporal evolution of the collision. In addition Taiwan is a well-known site of critical-taper wedge mechanics and erosional forcing of deformation, leading to a mountain belt that is approximately in topographic steady state, with erosion balancing the compressive flux. This classic picture, based largely on surface and upper-crustal data, is now being illuminated at lower crustal and upper mantle levels with high-resolution local seismic tomography and earthquake locations. These new data document in 3D that the deep structure is remarkably independent of the shallow thinned-skinned mountain belt. Here we show that the lower crust and upper mantle of the Eurasian plate undergoes a transition from normal subduction and accretionary-wedge tectonics south of Taiwan to a strongly localized progressively bent geometry with a vertical to overturned plate interface. The lower crust and Moho of the Eurasian plate is vertical to overturned to depths of 70-80 km under central and northern Taiwan. In this region the deep plate shortening is accomplished by folding of both the Eurasian and Philippine-Sea lower lithospheres without a classic active subduction zone, whereas the crust of both plates above the main detachment is mechanically and kinematically separated from this deep shortening.