



Three-Dimensional Tectonic Model of Taiwan

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We built a three-dimensional model of the interactions of the Eurasian plate (EUP) the Philippine Sea plate (PSP) and the collisional orogen, in and around Taiwan. The model is based on the results of comprehensive, multi-prong TAIGER experiments on land and at sea as well as other existing data. The clockwise rotating PSP moves NWW at ~ 8 cm/year relative to the Taiwan Strait. Under northern Taiwan the northward subducting PSP terminates near the edge of eastern Taiwan and collides with EUP at increasing depth toward the north. Mountain building due to collision of EUP and PSP tapers off where the PSP goes below about 60 km. The PSP in the asthenosphere continues to advance NWW-ward. In central Taiwan PSP and EUP collide fully, lithosphere against lithosphere in the upper 60 km or so, leading to significant thickening of the crust to about 55 km on the Central Range side and about 35 km on the Coastal Range/Arc side. In between these "roots" a high velocity rise is found. Although a clear, steep dipping high velocity zone under Central Taiwan is detected, it is found not to be associated with seismicity. In southern Taiwan, mountains form over well-defined, seismically active subduction zone. The upper mantle high velocity anomaly appears to be continuous with that under central Taiwan, but here an inclined seismic zone is found. In this area the Luzon Arc has not yet encountered the continental shelf - thus arc-continental collision has not yet occurred. The orogeny here may involve inversion of the subducted South China Sea lithosphere, rifted Eurasian continent, and/or escape of continental material from central Taiwan. GPS and Leveling data reflect well the 3-D plate collision model.