

Possible mechanical and dynamical behaviors of the slabs beneath Taiwan

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Abstract

The subduction of the oceanic part (South China Sea) of the Eurasian lithosphere beneath the Luzon arc had led to collision between the arc and the continent at ~ 5 Ma. The shutdown of the continuous subduction must have triggered a series of activities in the mantle: slab detachment, mantle upwelling, and the related thermal events, as has been documented in other collision zones. Post-collisional, large-scale magmatism has not been observed on the Taiwan island, suggesting no or incipient breakoff of the SCS slab. Seismological evidence mounted recently does not help settle the issue. Body-wave tomography and amplitude analysis favor the continuation of subduction from surface to at least 200 km depths beneath central Taiwan, while Rayleigh wave inversion demonstrates no slab images in shallow upper mantle at the same spot. The contradiction is likely to result from the low resolution of the seismic data and the small aperture of the receiver coverage. We are employing waveform modeling techniques to compensate the lack of redundancy of data. The waveforms reveal subtle changes from central to southern Taiwan that could reflect upper mantle heterogeneity due to changes in slab configuration. Meanwhile, we have launched OBSs to attain constraints from the ocean side in order to better illuminate the upper mantle beneath the collision zone.