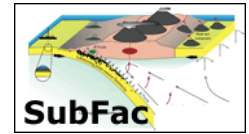


Pacific Plate Subduction beneath the central Mariana and Izu-Bonin Forearcs: New insights from an old margin



Award: 00-01798 (October 2001)

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New multi-channel seismic reflection and swath bathymetry data collected in 2002 from the central Mariana subduction system image the subducting plate from the outer trench slope to beneath serpentinite seamounts on the outer forearc. These data show that a significant change in dip of the incoming plate occurs within ~10 km of the trench axis, which is commonly a graben. We propose that the plate fails, rather than simply bends, to form this feature. Although there is evidence for small-scale off-scraping at the toe of the inner trench slope, our data support the conclusion that there has been no long-term sediment accretion in the central Mariana system. We find shallower dips (9-12°) and depths of the subducting plate beneath the outer forearc than previously estimated, indicating a thinner mantle wedge beneath the serpentinite seamounts and much less release of subducted water. We find an apparent lack of significant deformation of the outer forearc in response to the subduction of large Pacific Plate seamounts, and propose that this may be the result of a weak serpentinitized mantle wedge and/or progressive fracturing and degradation of the incoming seamounts as the plate breaks and increases in depth as it passes through the trench graben.

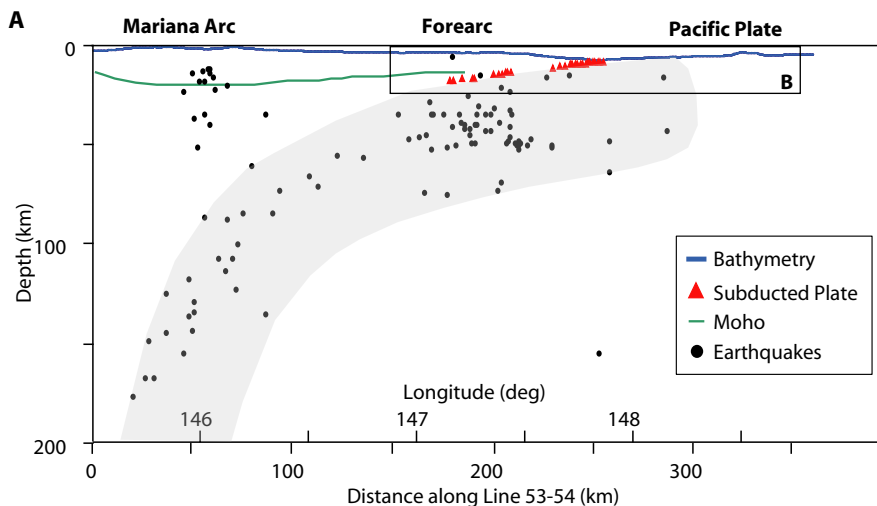
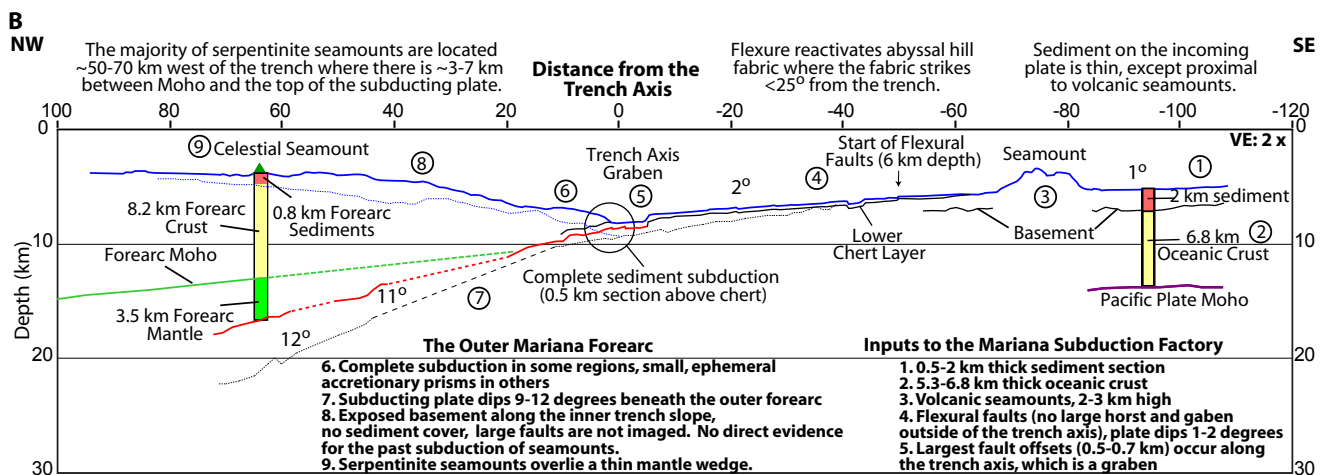


Figure: A. Cross-section of the Mariana Subduction System along MCS Line 53-54 (16.5° N) with bathymetry (blue), Moho (green, from Takahashi et al., 2007)*, top of subducted Pacific Plate (red, this study) and teleseismic earthquakes recorded within 50 km of the line (black dots, from Engdahl et al., 1998). No VE. B. Enlarged cross-section along MCS Line 53-54 of the outer forearc and subducting plate with numerically annotated features. To illustrate the deeper morphology south of 15°N, dotted lines show the bathymetry and subducted plate along MCS Line 79-80 (14.5°N).



Oakley, A.J., B. Taylor, and G.F. Moore (2008), Pacific Plate Subduction beneath the central Mariana and Izu-Bonin Forearcs: New insights on an old margin, *Geochemistry, Geophysics, Geosystems.*, 9, Q06003, doi:10.1029/2007GC001820.

Oakley, A.J., B. Taylor, E. Chapp, G. Moore, Imaging the subducting Pacific plate beneath the Mariana Forearc, *Eos Trans. AGU, Fall meeting Supp.*, Abstract T53A-1404, 2005.

*References listed in appendix A.

