

Supporting Material for:

## Incipient Subduction at the contact with stretched continental crust: The Puysegur Trench

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For EPSL

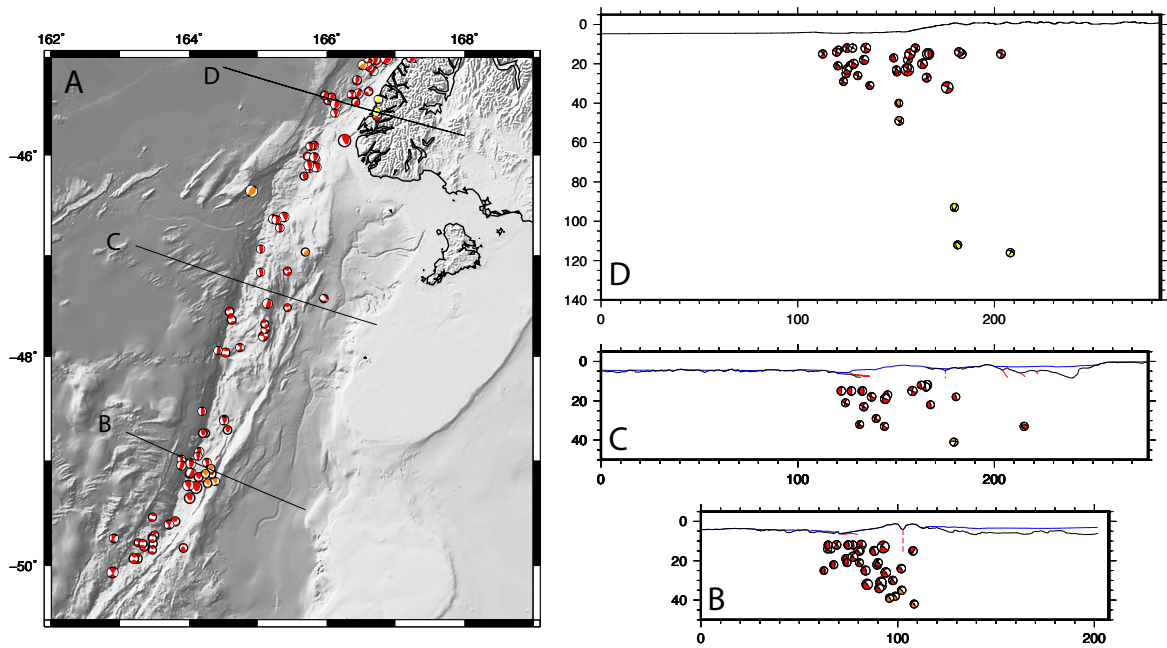


Figure S1. A. Earthquake locations using the gCMT Catalog [Ekström *et al.*, 2012] overlain on top of the NIWA bathymetry/topography [Mitchell *et al.*, 2012]. The focal mechanisms are color coded by depth (red for 0-35 km, orange for 35-70 km, and yellow for > 70 km). Thin black lines show the locations of three cross sections labeled with B, C and D off to the right. B. Cross section aligned with the SISIE-1 seismic line with a width of 100 km showing the projected gCMT locations with the depth converted top of sediment (blue), basement (black), décollement (red), and interpreted strike-slip fault (dashed red) shown with no vertical exaggeration. gCMT depths greater than 12 km are assigned a default minimum depth of 12 km [Ekström *et al.*, 2012]. C. Same as B except for section aligned with SISIE-2. D. A cross section through the plate margin at the latitude of Fiordland.

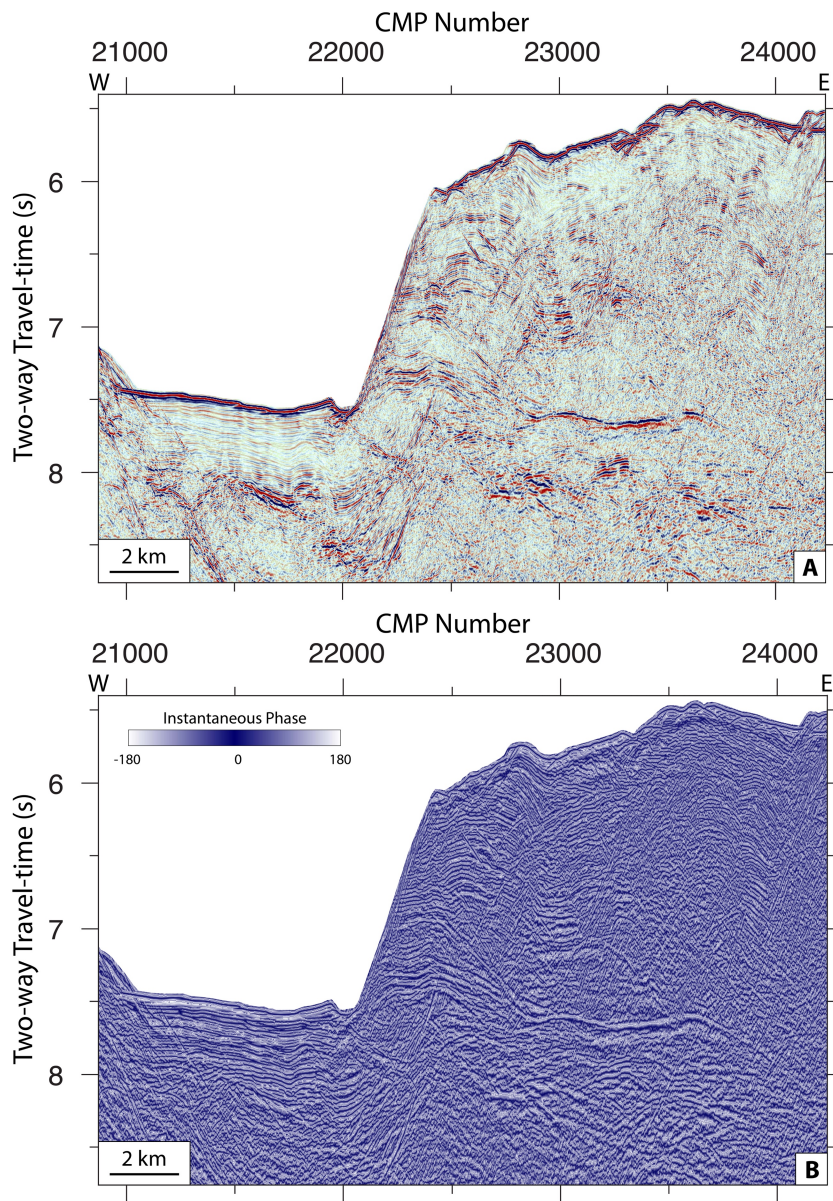


Figure S2. A. Higher resolution MCS image of the trench region which better shows the seismic reflectivity of the décollement and subducting sediments. See Figure 5 for the location of this region. B. Instantaneous phase image created by Hilbert transform of the post-stack image in A. This image emphasizes the coherency and continuity of subducting sediments, the décollement, and accreted sediments.

## References

Ekström, G., M. Nettles, and A. M. Dziewonski (2012), The global CMT project 2004-2010: Centroid-moment tensors for 13,017 earthquakes, *Phys. Earth Planet. Inter.*, 200-201, 1-9, doi:10.1016/j.pepi.2012.04.002.

Mitchell, J. S., K. A. Mackay, H. L. Neil, E. J. Mackay, A. Pallentin, and P. Notman (2012), Undersea New Zealand, 1:5,000,000, NIWA.