Journal of Geophysical Research: Solid Earth

Supporting Information for

Seamount and ridge subduction at the Java margin, Indonesia: Effects on structural geology and seismogenesis

Yueyang Xia[1,2], Heidrun Kopp[1,3], Dirk Klaeschen[1], Jacob Geersen[3], Bo Ma[1,4], Michael Schnabel[5]

[1]GEOMAR Helmholtz Centre for Ocean Research Kiel, Wischhofstr. 1-3, 24148 Kiel, Germany

[2]Now at Institute of Geophysics, China Earthquake Administration, 100081 Beijing, China

[3]Christian-Albrechts-Universität zu Kiel, Christian-Albrechts-Platz 4, 24118 Kiel, Germany

[4]State Key Laboratory of Marine Geology, Tongji University, 200092 Shanghai, China

[5]Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Stilleweg 2, 30655 Hannover, Germany

Contents of this file

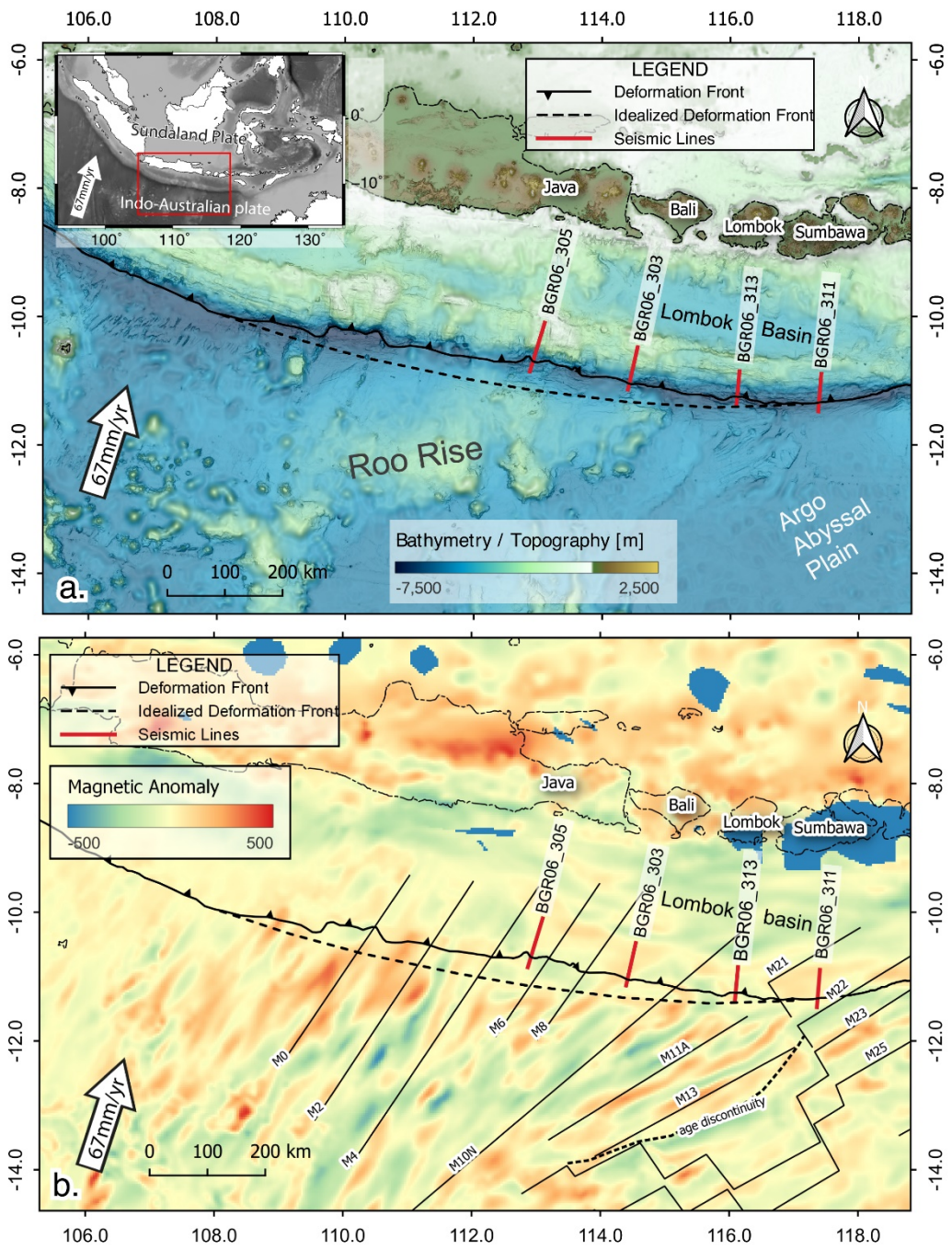

Figure S1. a. Regional tectonic setting and bathymetry of the study area. Red lines indicate the location of the four MCS profiles. The deformation front is shown in a black line with triangle marks, and the undisturbed idealized trend of the deformation front is shown by the black dashed line. **b.** Satellite magnetic anomaly in the Java and Lesser Sunda regions. Red lines indicate the location of the four MCS profiles. The deformation front is shown in a black line with triangles, and the undisturbed trend of the deformation front is shown by the black dashed line. Magnetic isochrons are indicated by black lines.

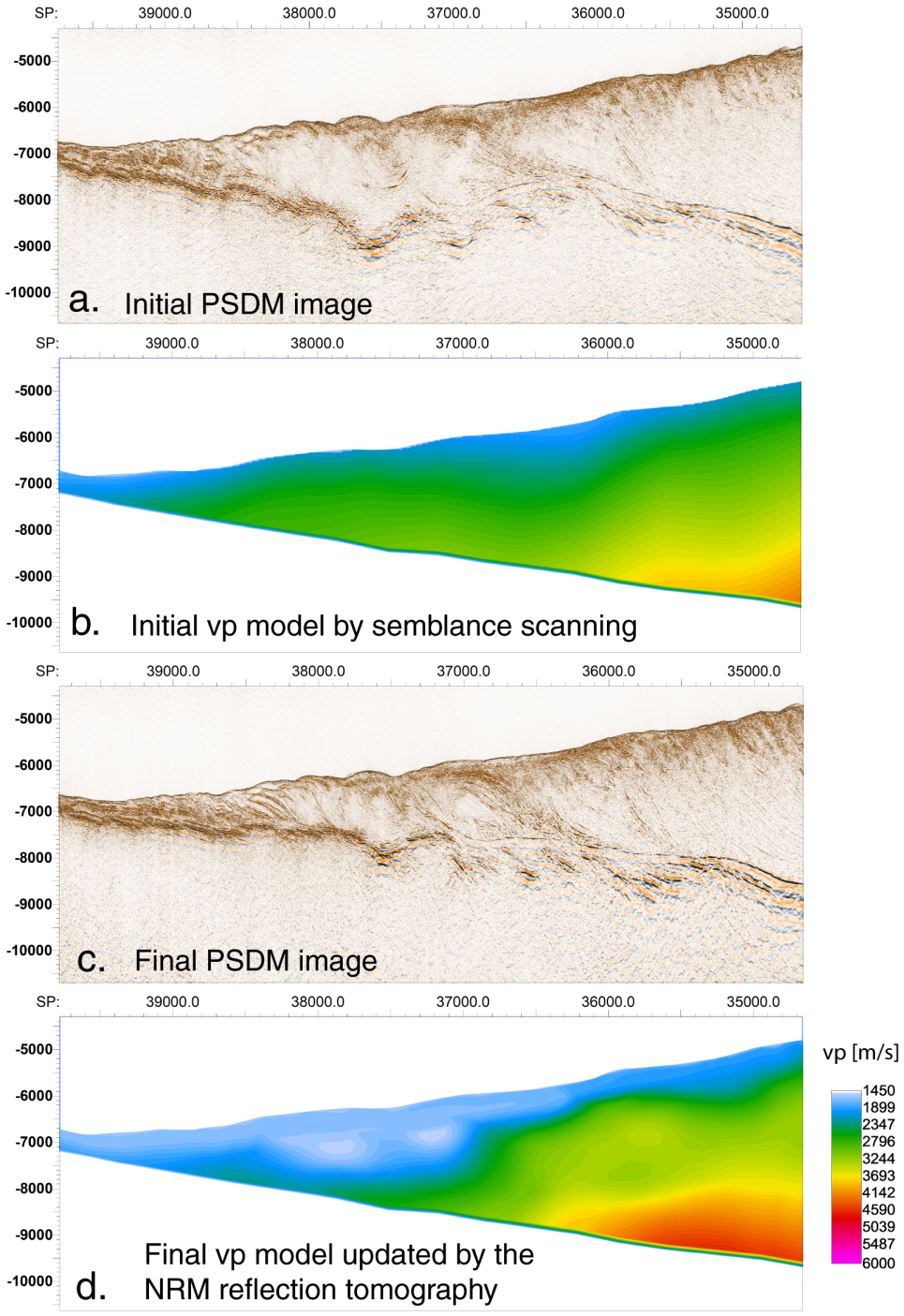

Figure S2. a. Initial PSDM section of line BGR06_311. **b.** The initial P-wave velocity of line BGR06_311. **c.** Final PSDM section of line BGR06_311. **d.** Final P-wave velocity of line BGR06_311 by reflection tomography.

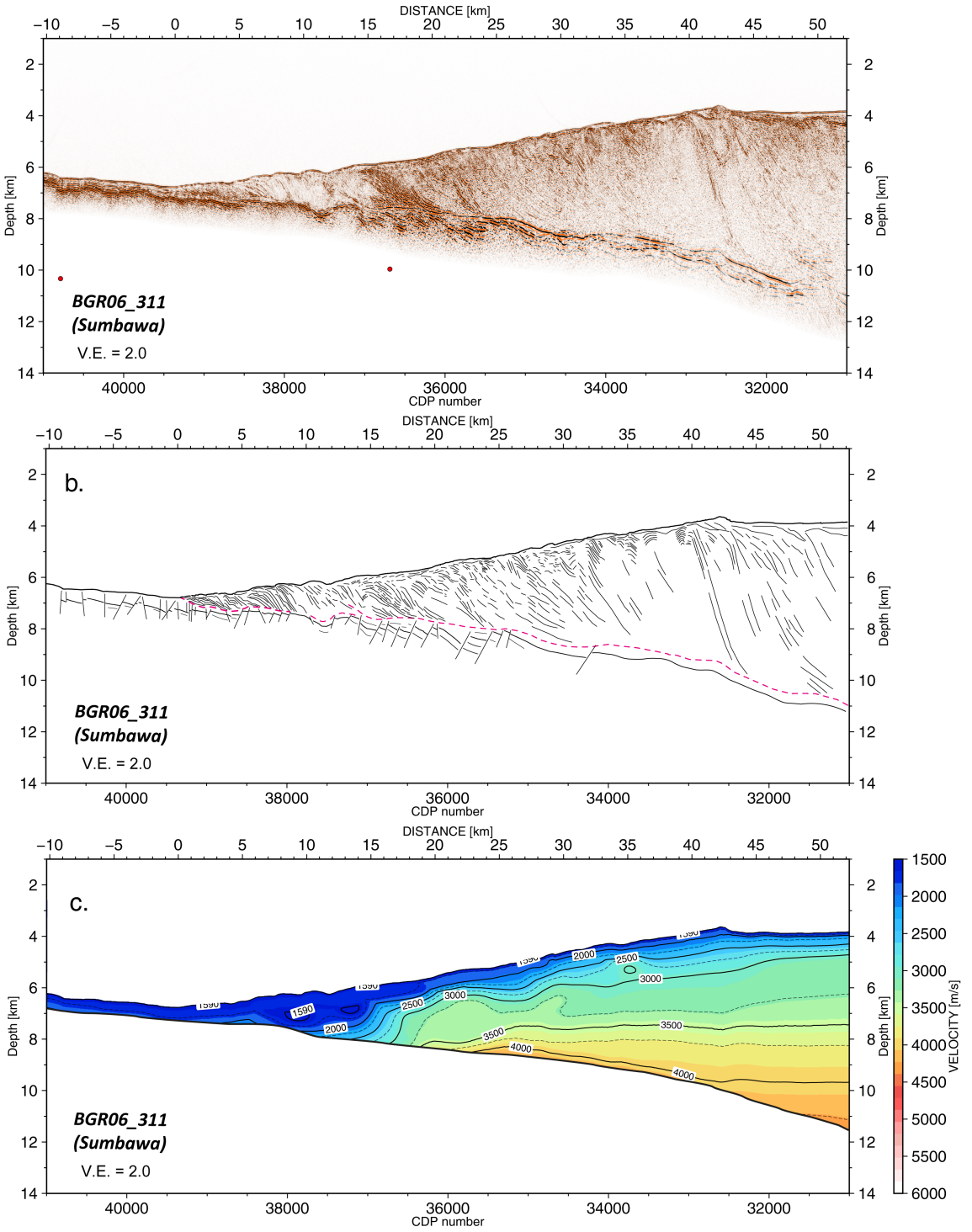

Figure S3. a. Uninterpreted depth section of BGR06_311. Red color points represent the local seismicity from the ISC-EHB bulletin catalogue. **b.** Line drawing of the seismic section. **c.** P-wave velocity model of the upper plate.

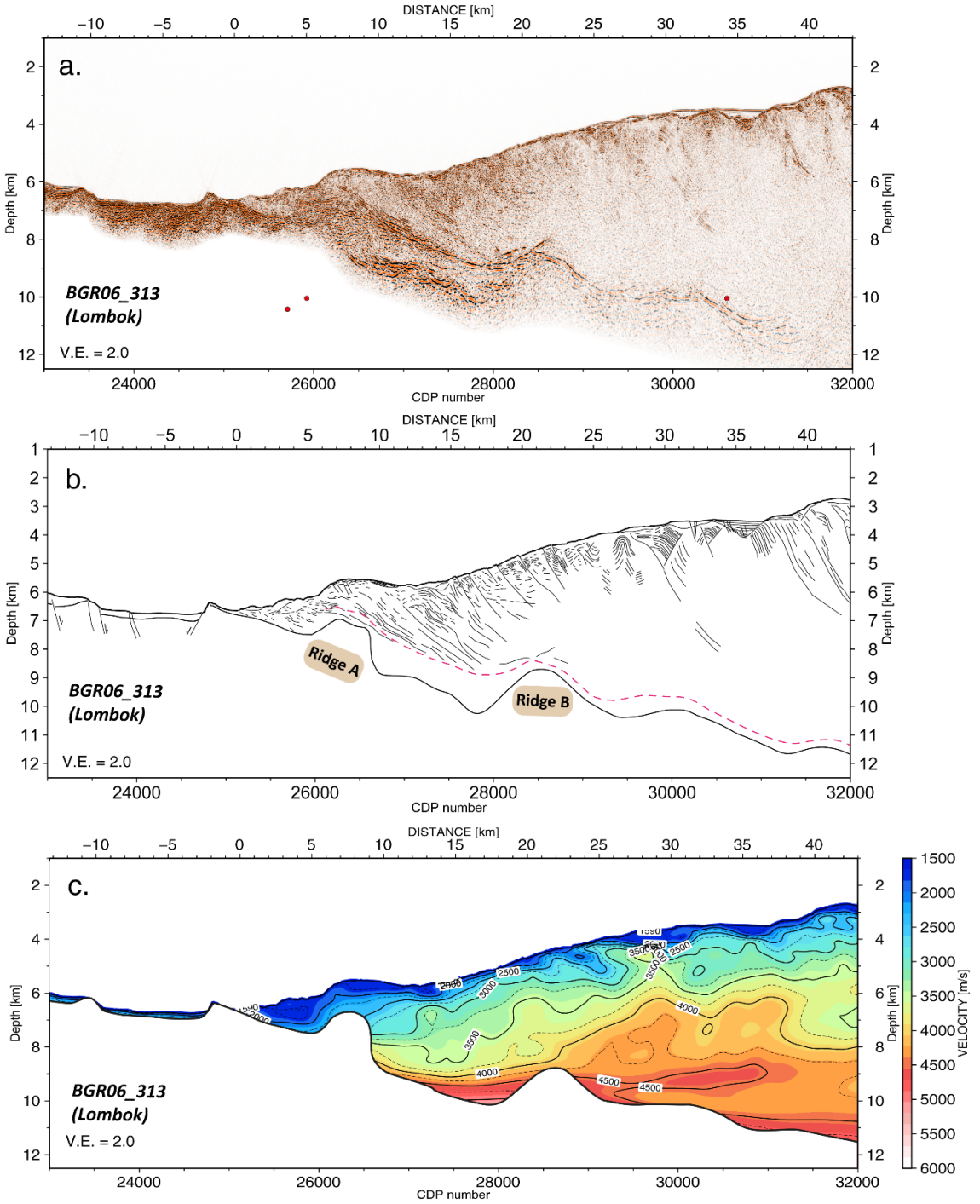

Figure S4. a. Uninterpreted depth section of BGR06_313. Red color points represent the local seismicity from the ISC-EHB bulletin catalogue. **b.** Line drawing of the seismic section. **c.** P-wave velocity model of the upper plate.

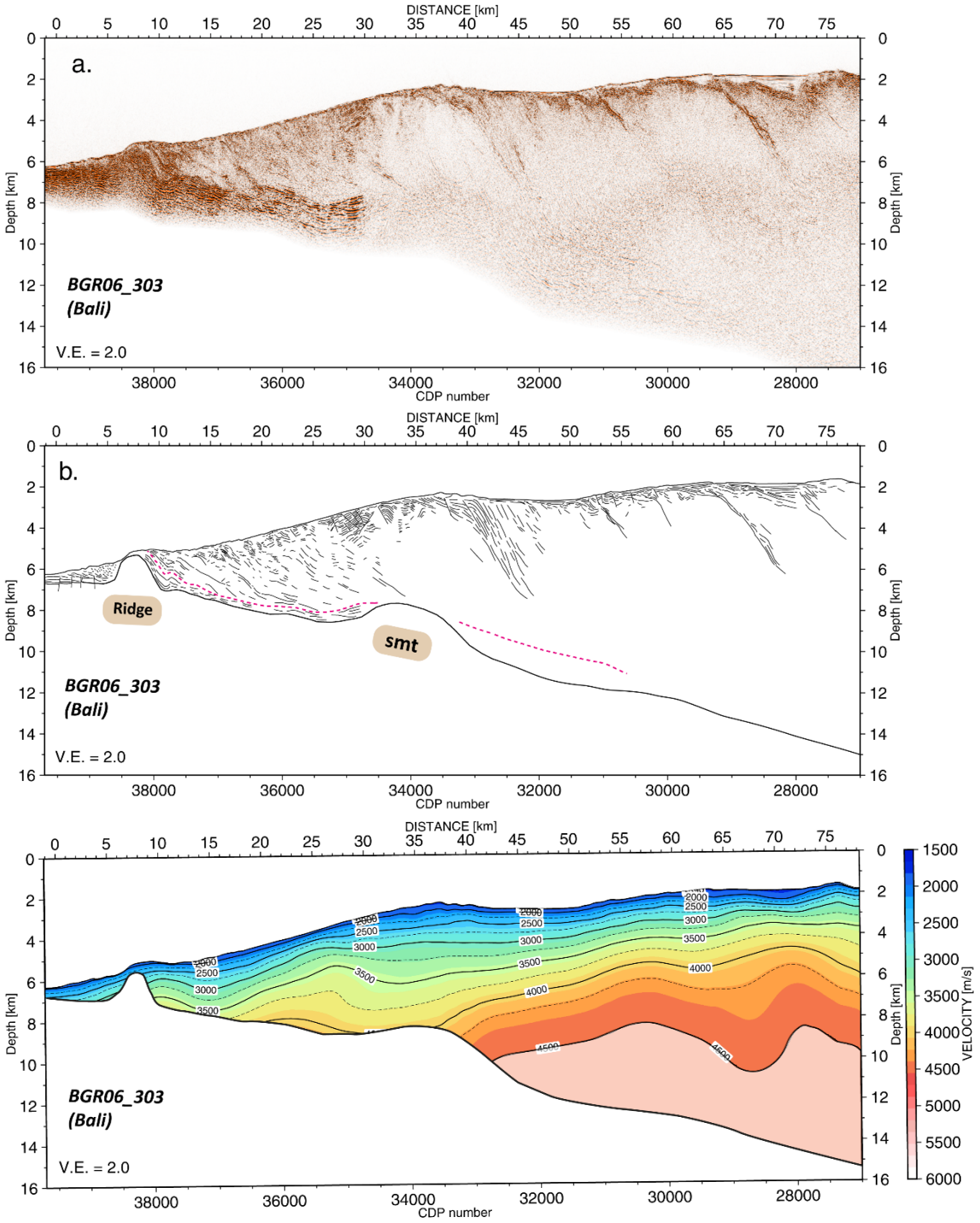

Figure S5. a. Uninterpreted depth section of BGR06_303. **b.** Line drawing of the seismic section. **c.** P-wave velocity model of the upper plate.

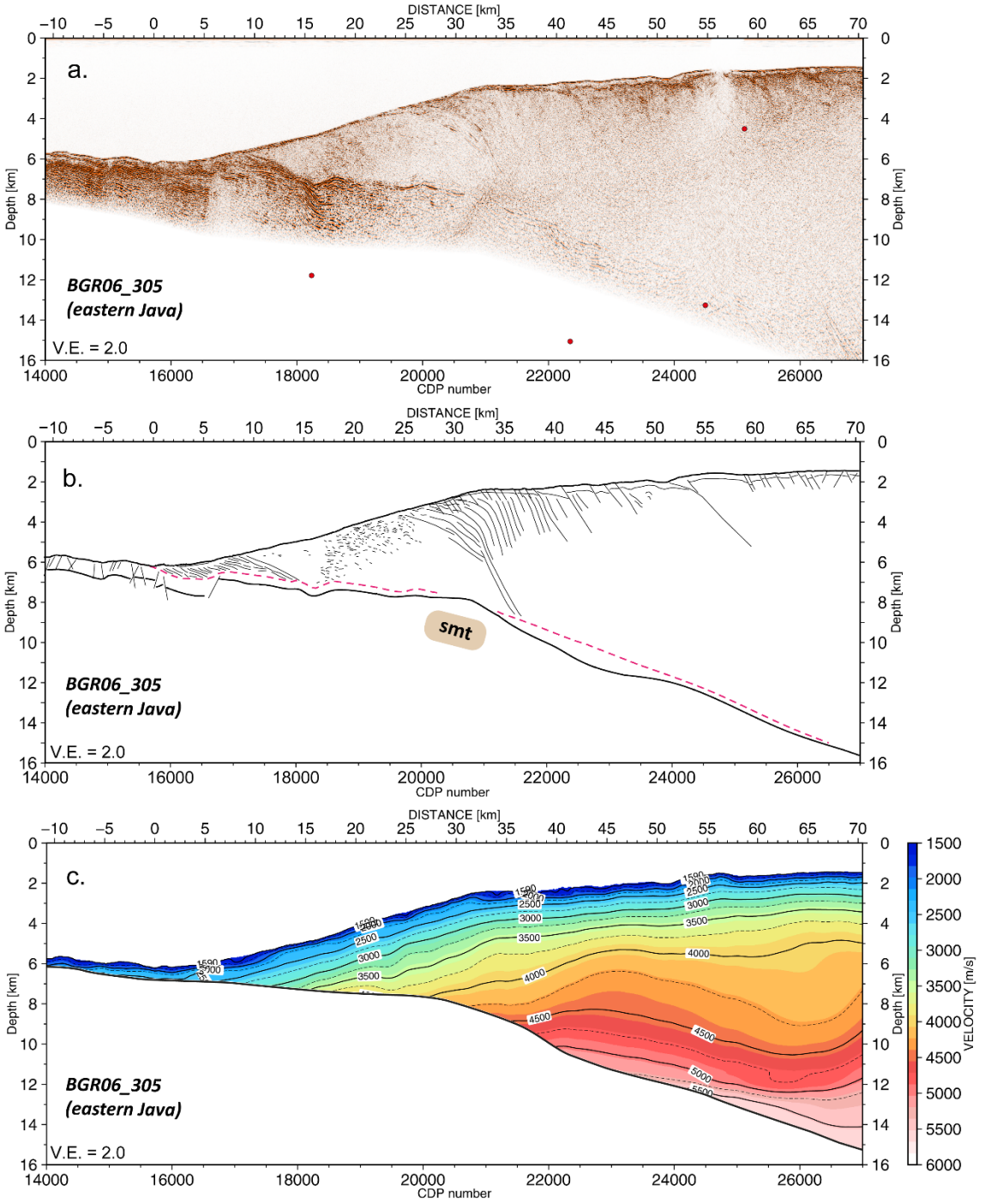

Figure S6. a. Uninterpreted depth section of BGR06_305. Red color points represent the local seismicity from the ISC-EHB bulletin catalogue. **b.** Line drawing of the seismic section. **c.** P-wave velocity model of the upper plate.

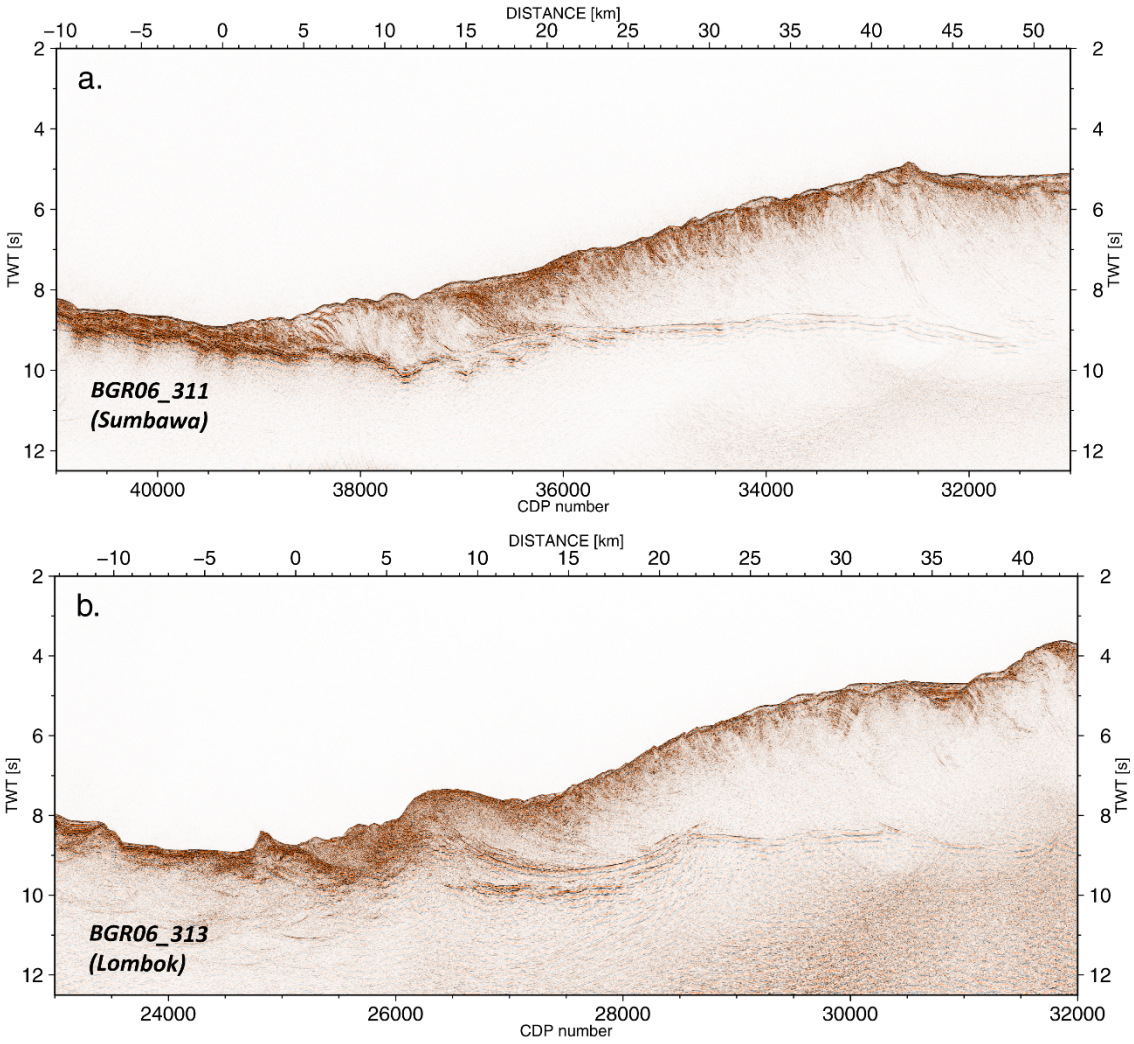

Figure S7. a. Pre-stack time migration image of line BGR06_311. **b.** Pre-stack time migration image of line BGR06_313. Please note that the deconvolution process is not applied in the time migration.

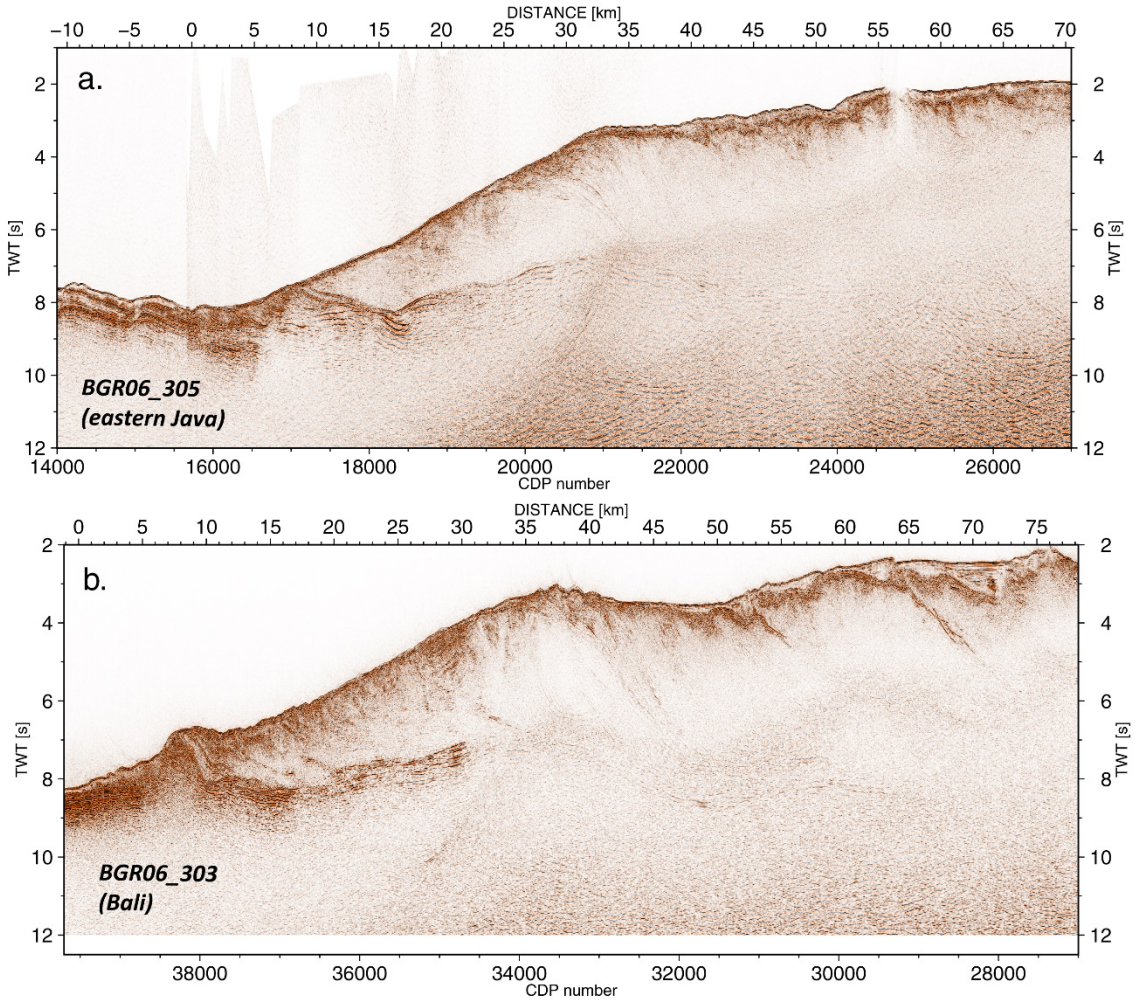

Figure S8. a. Pre-stack time migration image of line BGR06_305. **b.** Pre-stack time migration image of line BGR06_303. Please note that the deconvolution process is not applied in the time migration.

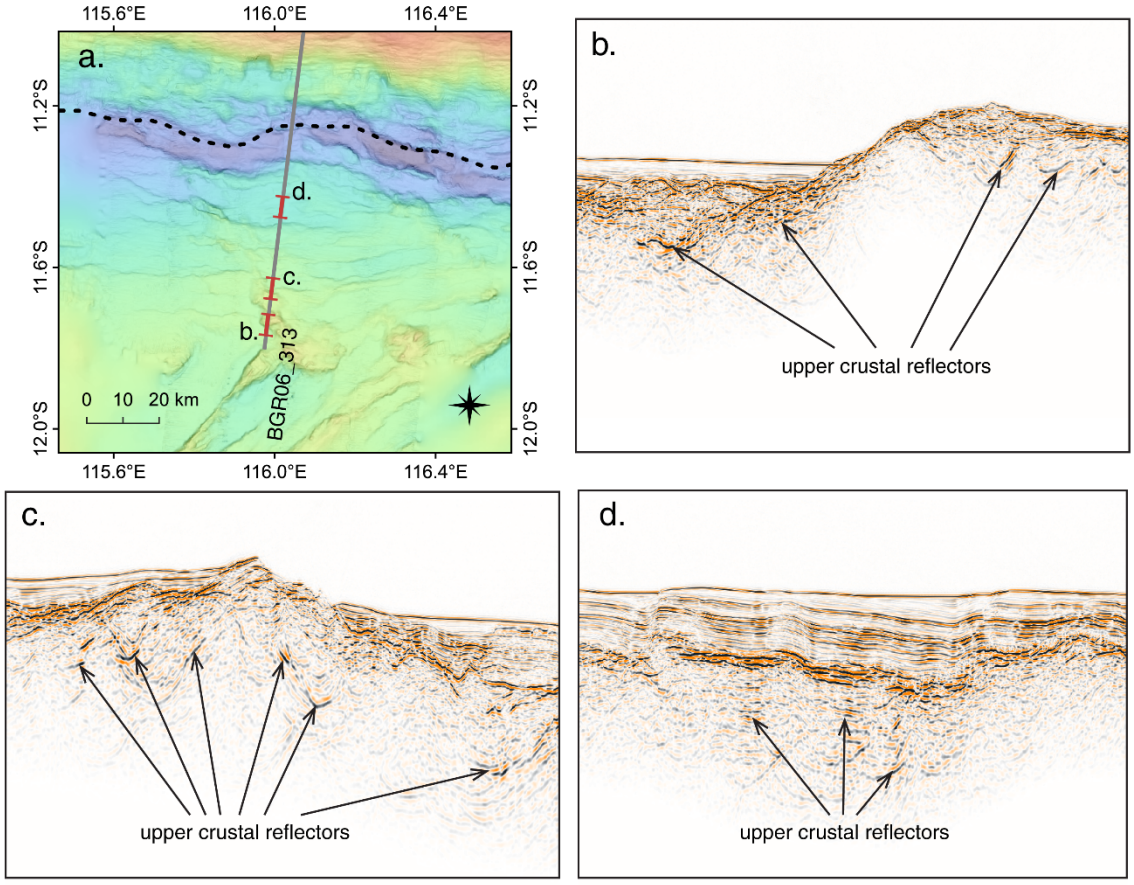

Figure S9. a. Oceanic crust bathymetry offshore Lombok Island. The grey solid line indicates the location of line BGR06_313. **b. c. and d.** PSDM images of the oceanic ridges and the oceanic crust. Please note the upper crustal scattered reflection indicated by the arrows.

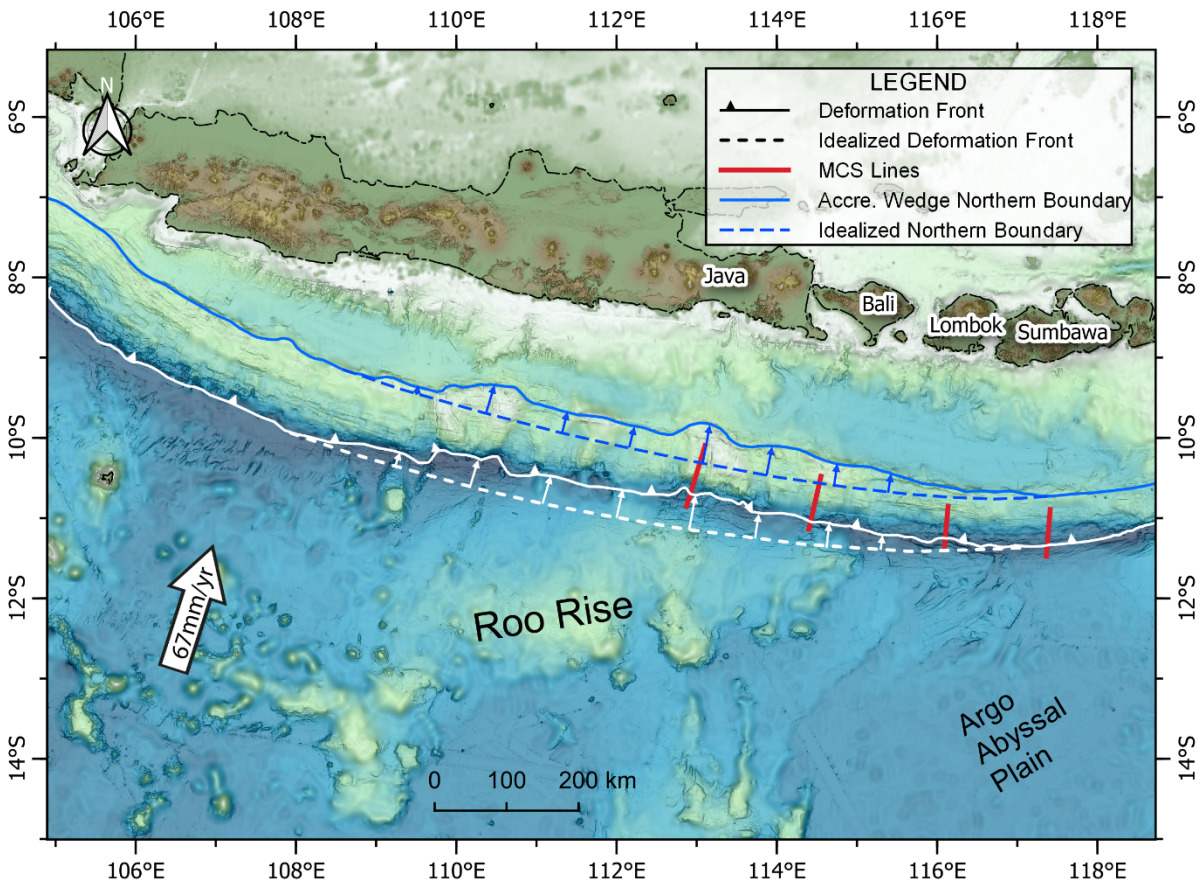

Figure S10. Bathymetry and topography map of the study area offshore Java and Lesser Sunda margin. Both the deformation front (marked in solid white line) and the northern boundary of the accretionary wedge (marked in solid blue line) deflected from their idealized trends (marked as a white dashed line and blue dashed line, respectively) in the arc-ward direction by maximum 50 km approximately over a broad region of 25,000 km^2 from 107.9° E to 117.1° E.

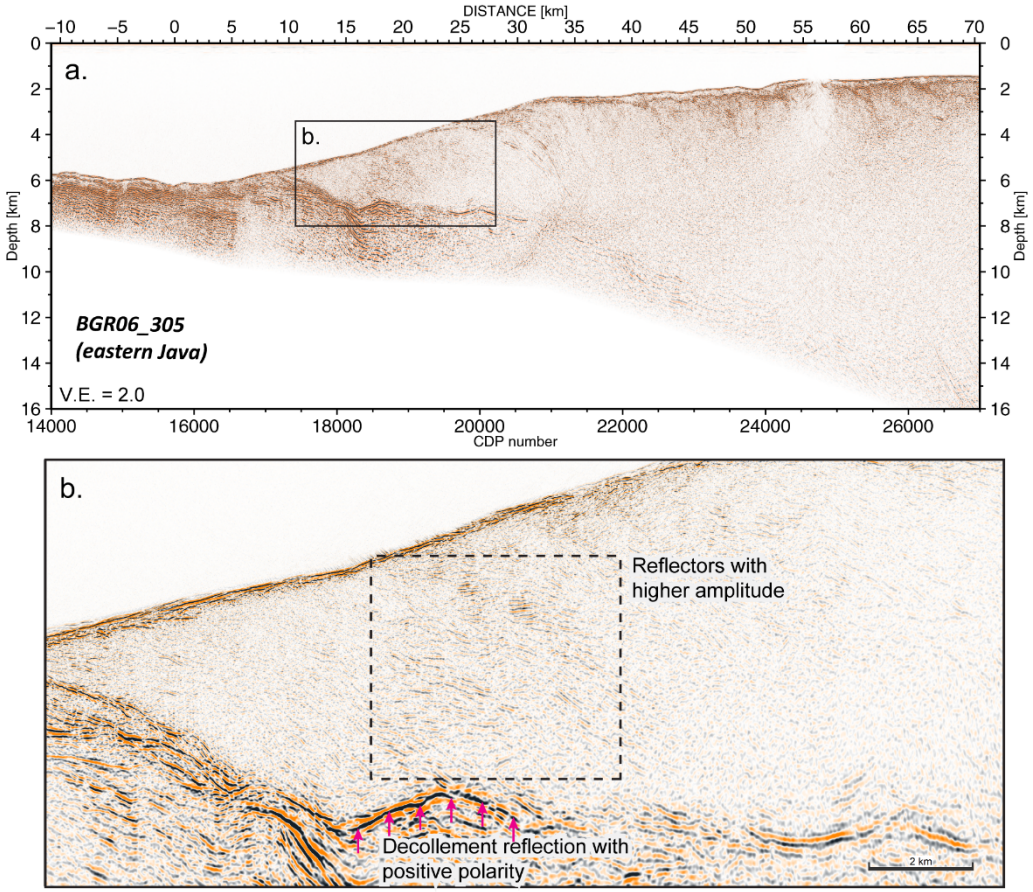

Figure S11. a. Pre-stack depth migration section of line BGR06_305. **b.** A closed-up view of the upper plate. The black dashed square indicates the region where the upper plate internal reflector amplitude is higher than adjacent regions. The pink arrows indicate the positive polarity plate interface reflection.

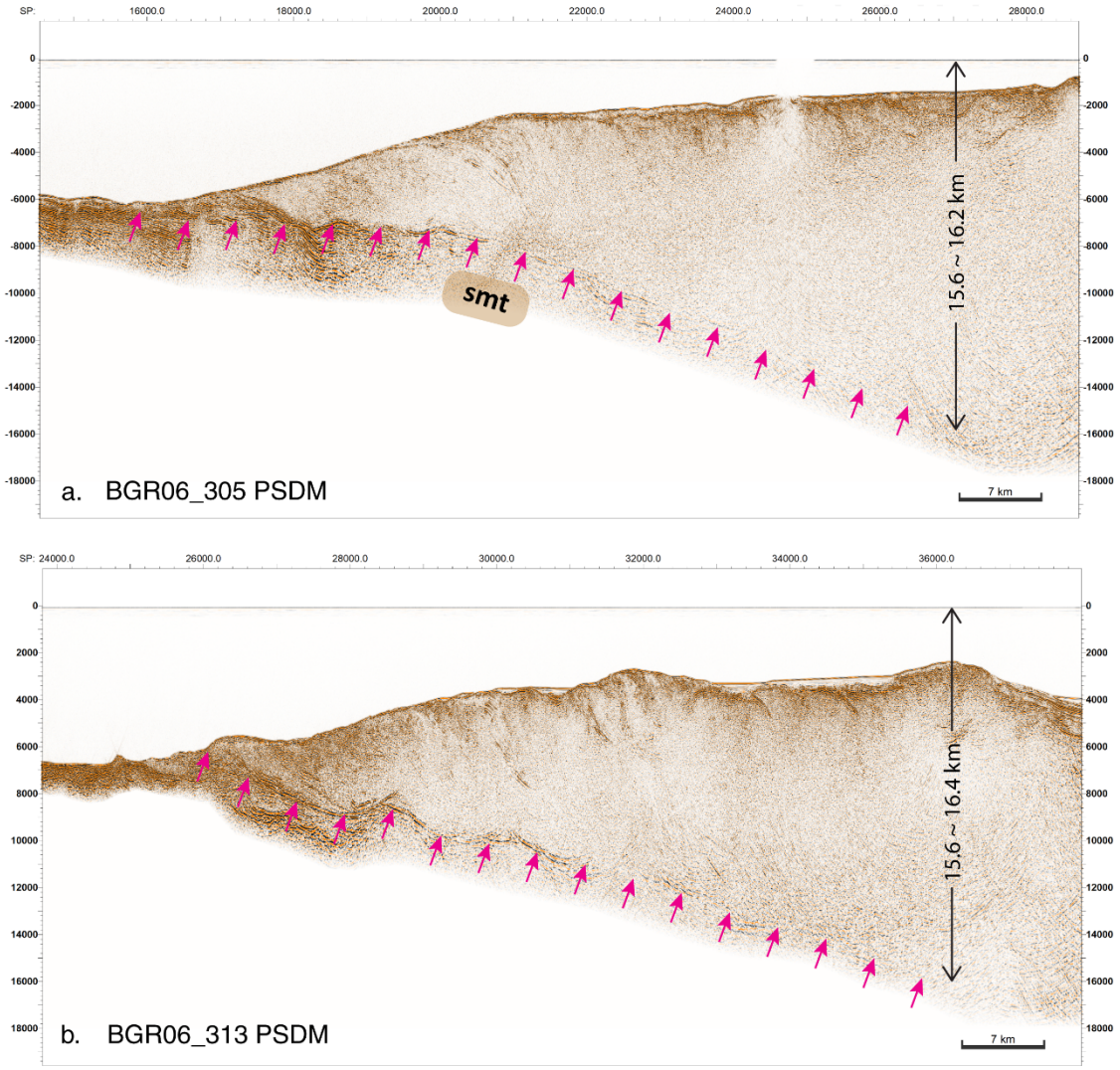

Figure S12. A comparison between PSDM sections of line BGR06_305 (**a**) and BGR06_313 (**b**). The pink arrows indicate the reflection of the plate interface of the two profiles.

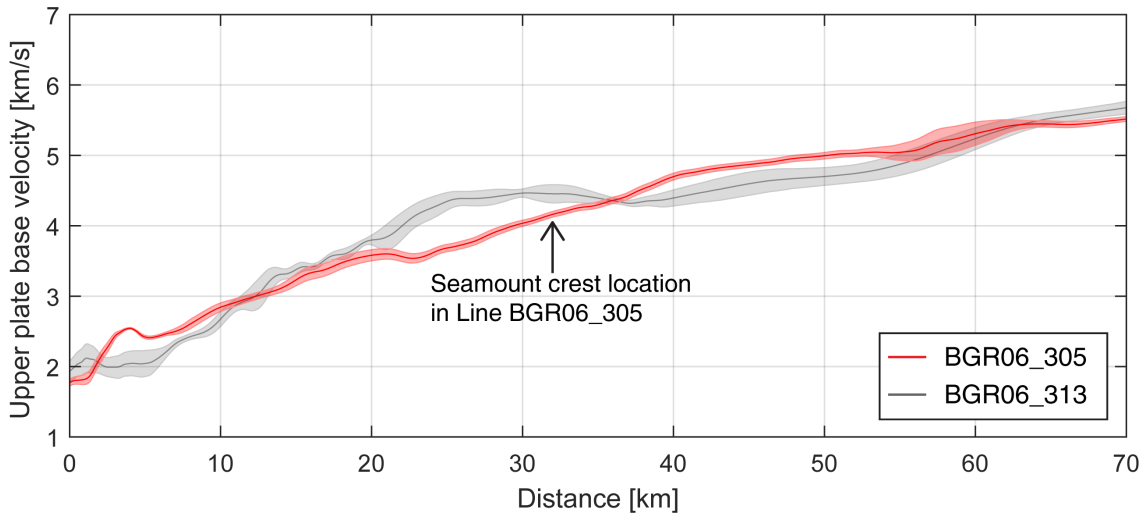

Figure S13. Upper plate base P-wave velocity of the line BGR06_305 and the reference line BGR06_313. The black arrows indicate the location of the subducted seamount's crest in line BGR06_305. Please note that the vp is larger at the seamount leading flank (km 36-60) compared to the reference model, and vp at the seamount trailing side (km 12-32) is smaller than the reference model.

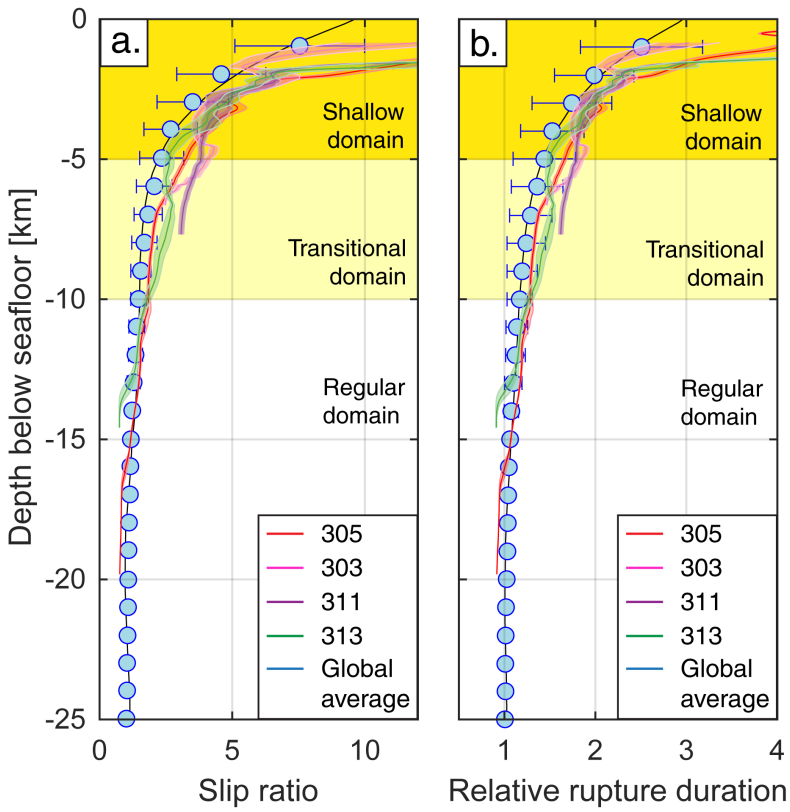

Figure S14. (a) Blue circles show slip ratio for an earthquake of a given magnitude as a function of interplate boundary depth. This value is calculated taking as reference unit the slip at a depth of 25 km. Red, pink, purple, and green lines show slip ratios at the locations of MCS lines in this study. (b) Blue circles and line show the global average rupture duration ratio for an earthquake of a given magnitude, as a function of depth. The duration is calculated taking as reference the rupture duration per unit length at a depth of 25 km.