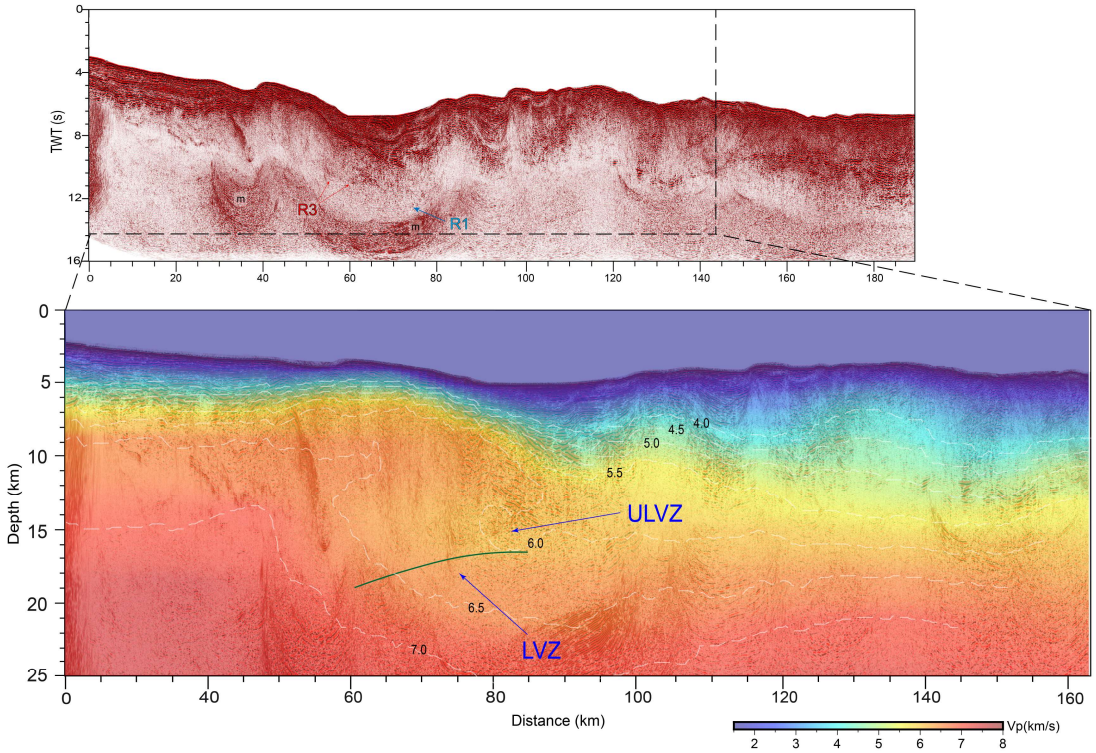
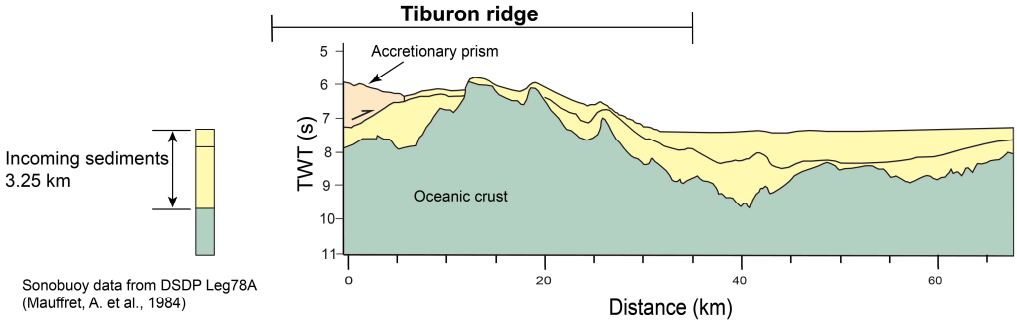
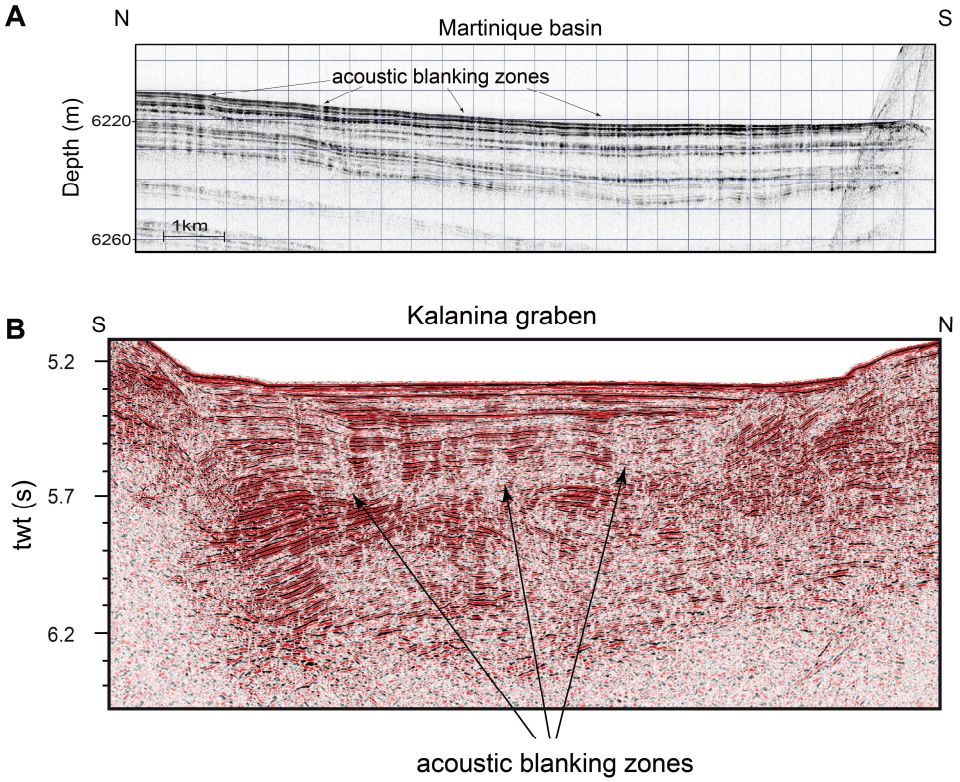


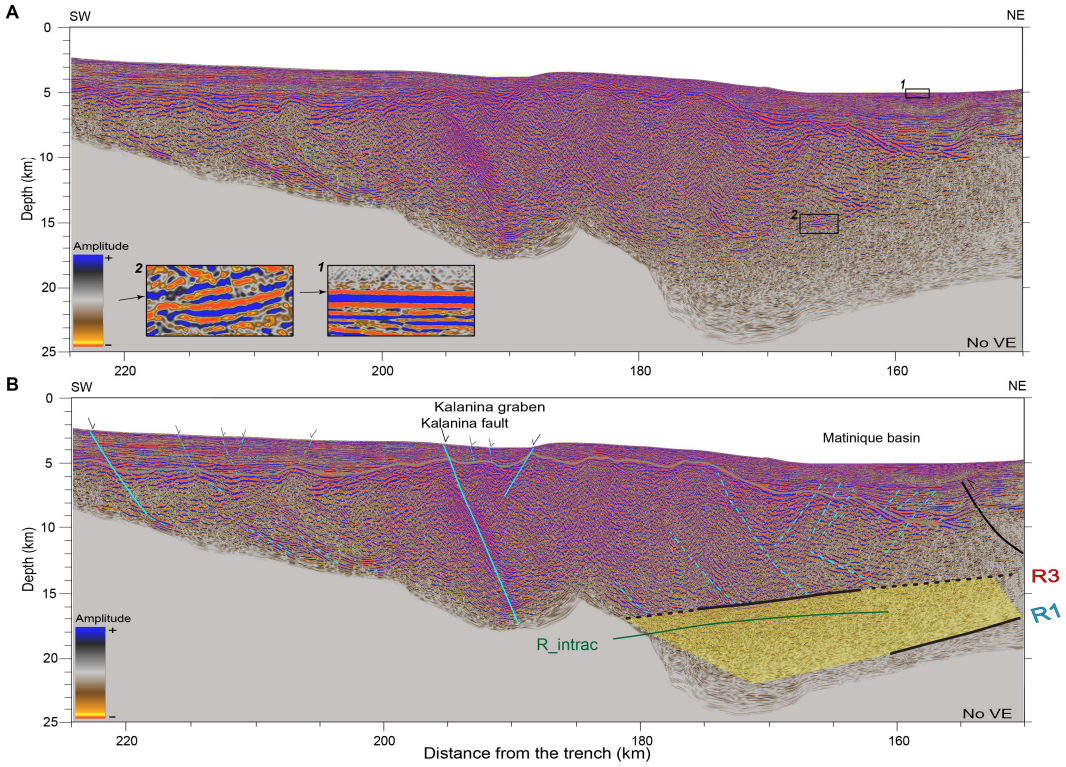
Supplementary Figure 1. Time-migrated image of the MCS profile and depth-converted image of the selected portion with Vp structure from wide-angle experiment[1]. The green line shows the intracrust reflector inverted from OBS-recorded wide-angle reflections[1]. M denotes the multiple.



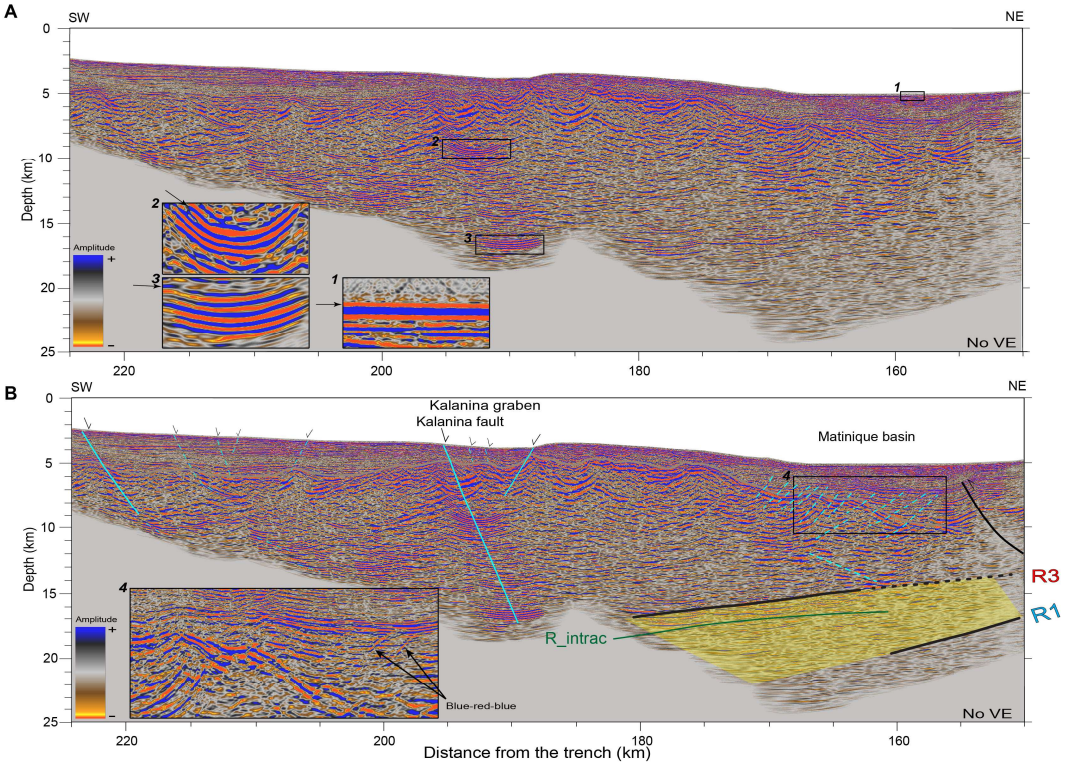
Supplementary Figure 2. Line-drawing of the profile transecting the Tiburon ridge outboard of the trench, modified from ref.[2]. B: The thickness of incoming sediments derived from Sonobuoy recording[3] at the south flank of the Tiburon ridge see Fig. 1 for location.



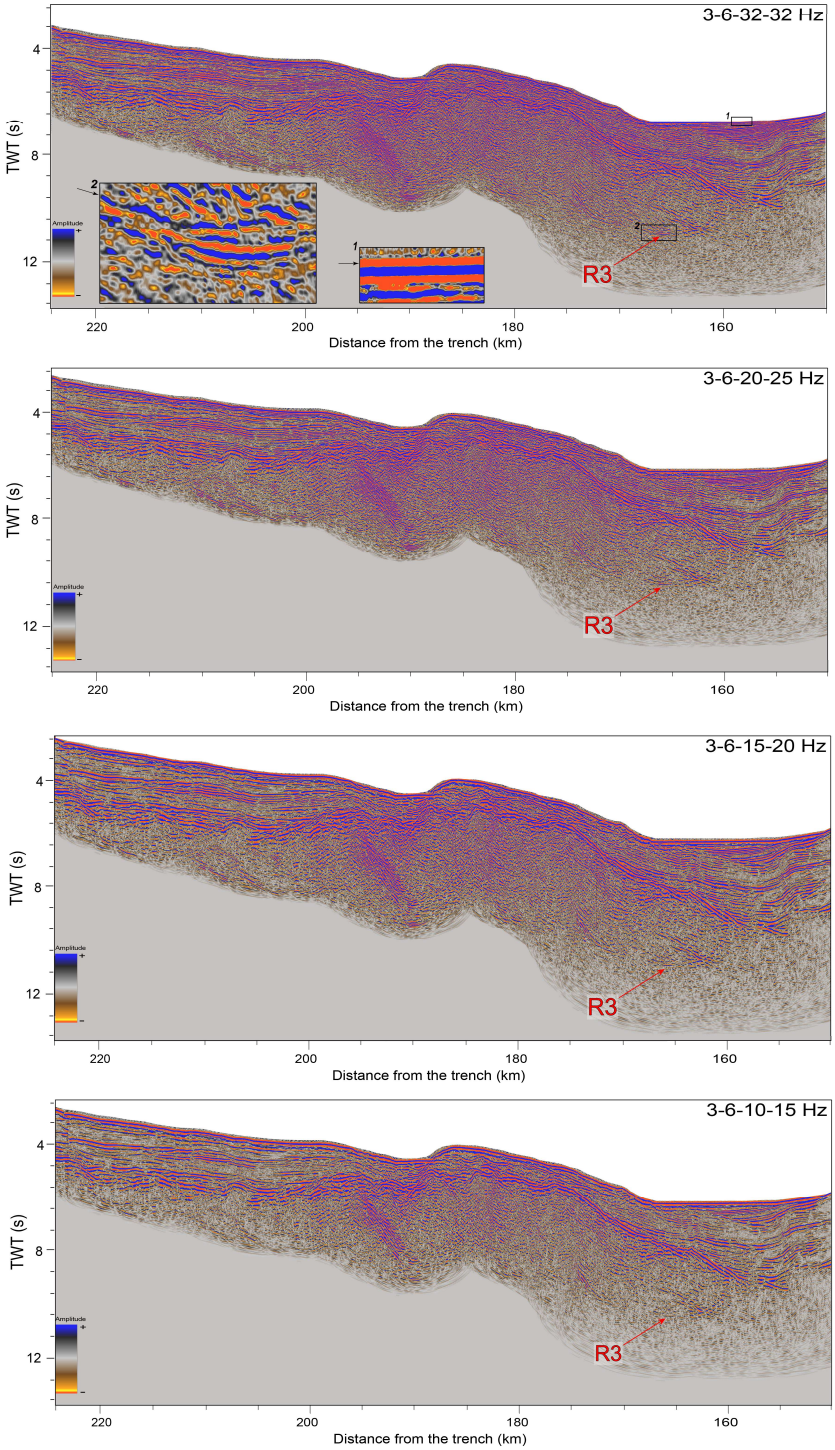
Supplementary Figure 3. Shallow seismic reflection profile and the chirp data reveal chimney-like structures in the upper most sedimentary cover. See Fig.2a for locations.



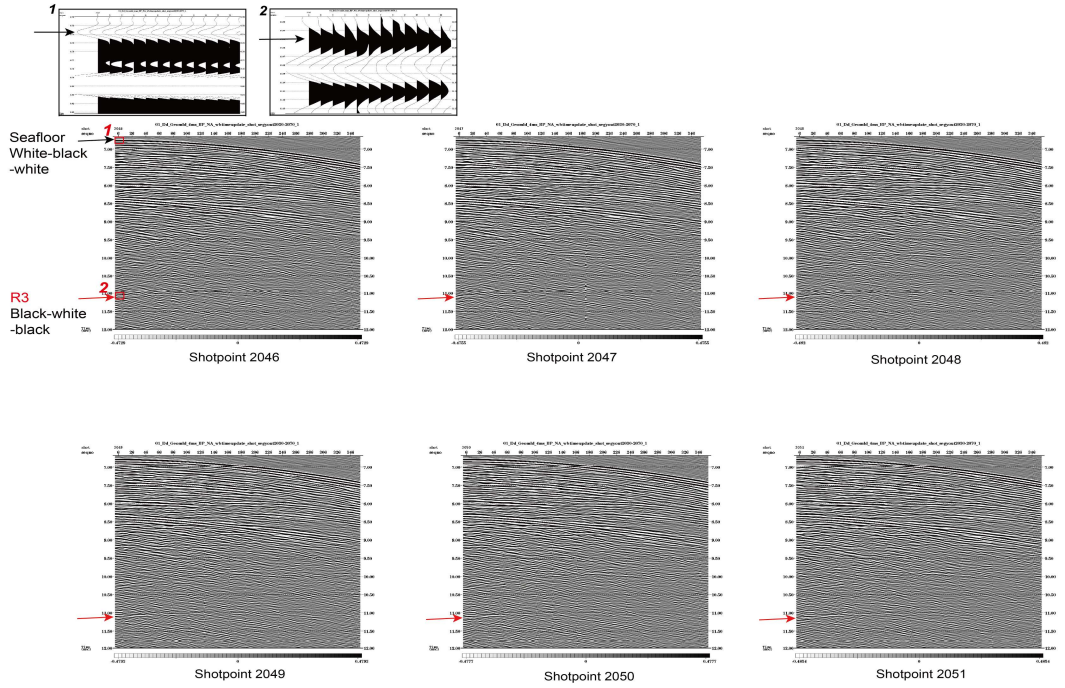
Supplementary Figure 4. A. Selected inner portion of the MCS profile in depth domain reveals abundant reflective amplitude anomalies in the inner forearc. Small boxes show R3 with reversed polarity (2) with respect to the normal polarity of the seafloor (1). Black arrow indicates the first break. B. Interpretation of the image. Green line indicates the reflector inverted from OBS-recorded PicP phase. Light blue lines indicate fluids-charged fault and fractures, which are apparently connected to the R3. Yellow areas correspond to the inferred interlayered sediments. See text for further details.



Supplementary Figure 5. A. PSDM image of the selected inner portion of the MCS profile reveals abundant reflective amplitude anomalies in the inner forearc. Small boxes show reflections with reversed polarities (2, 3) with respect to the normal polarity of the seafloor (1). Black arrow indicates the first break. B. Interpretation of the image. Green line indicates the reflector inverted from OBS-recorded PicP phase. Light blue lines indicate fluids-charged fault and fractures, which are apparently connected to the R3. The fractures can be traced in the Martinique basin showing arcward-dipping reflections of negative polarity. Yellow areas correspond to the inferred interlayered sediments. See text for further details.



Supplementary Figure 6. R3 is visible in the time domain of the MCS profile with frequency as low as 15 Hz. Bandwidths of bandpass filters are shown in top right corner.



Supplementary Figure 7. R3 shows negative polarity in raw shot gathers. Black arrows in the subsets of wavelets indicate the first break.

Supplementary References

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