

*[Geochemistry, Geophysics, Geosystems]*

Supporting Information for

**[Footwall geology and deformation at flip-flop mid-ocean ridge detachment faults:  
64°35'E Southwest Indian Ridge (SWIR)]**

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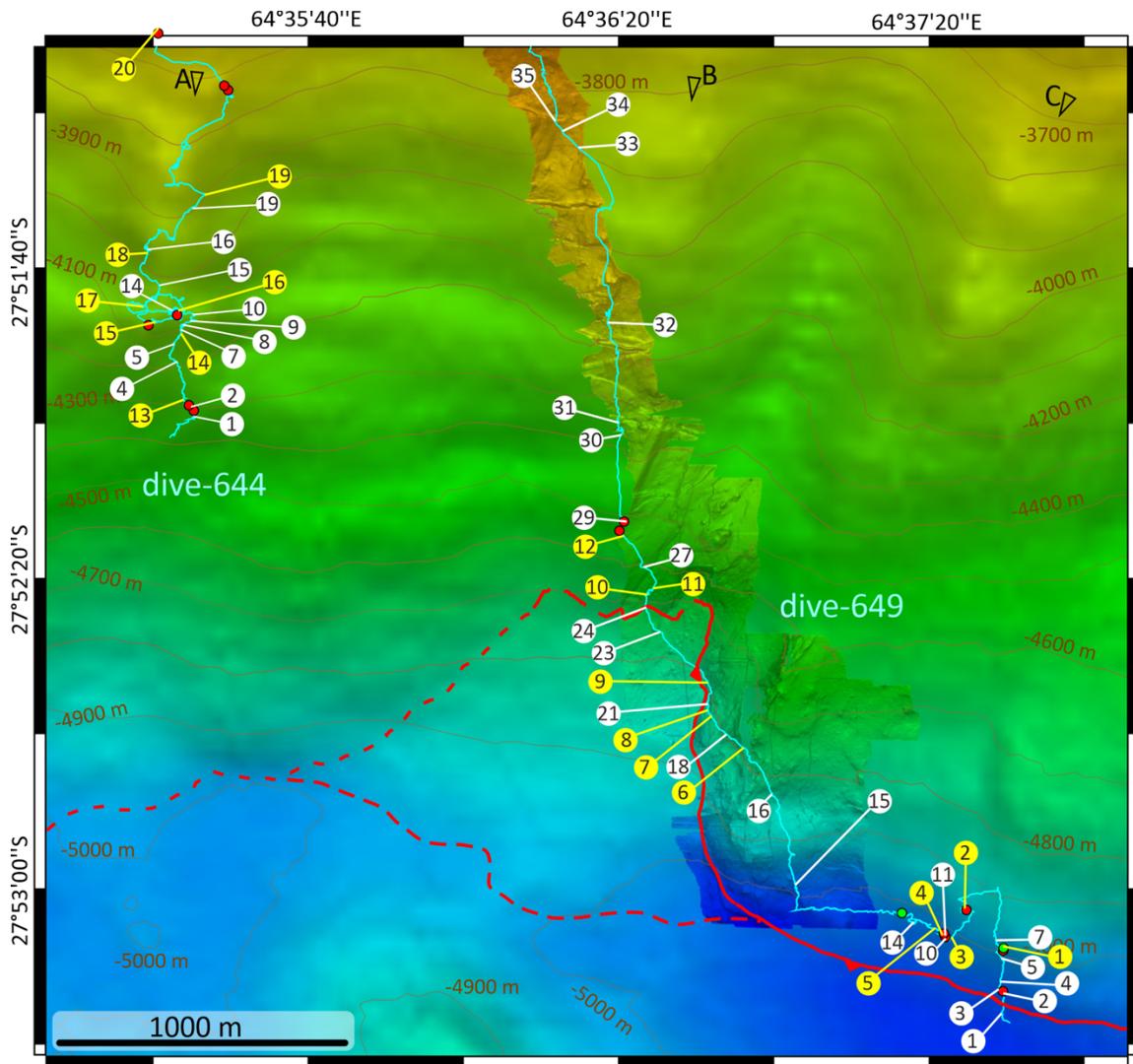
[Université Paris Cité, Institut de Physique du Globe de Paris, UMR 7154 -CNRS, Paris, France]

**Contents of this file**

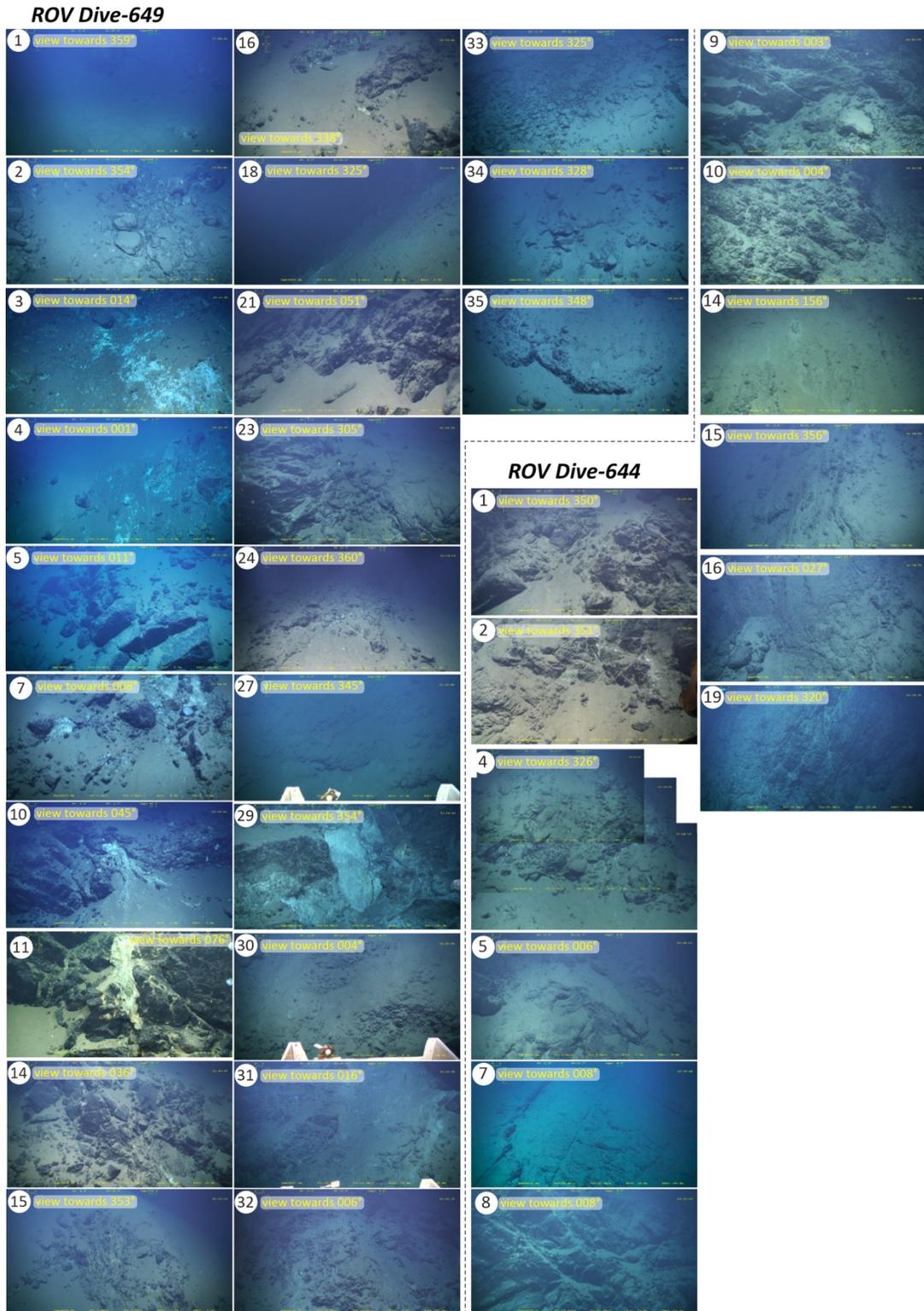
Figures S1 to S7

**Introduction**

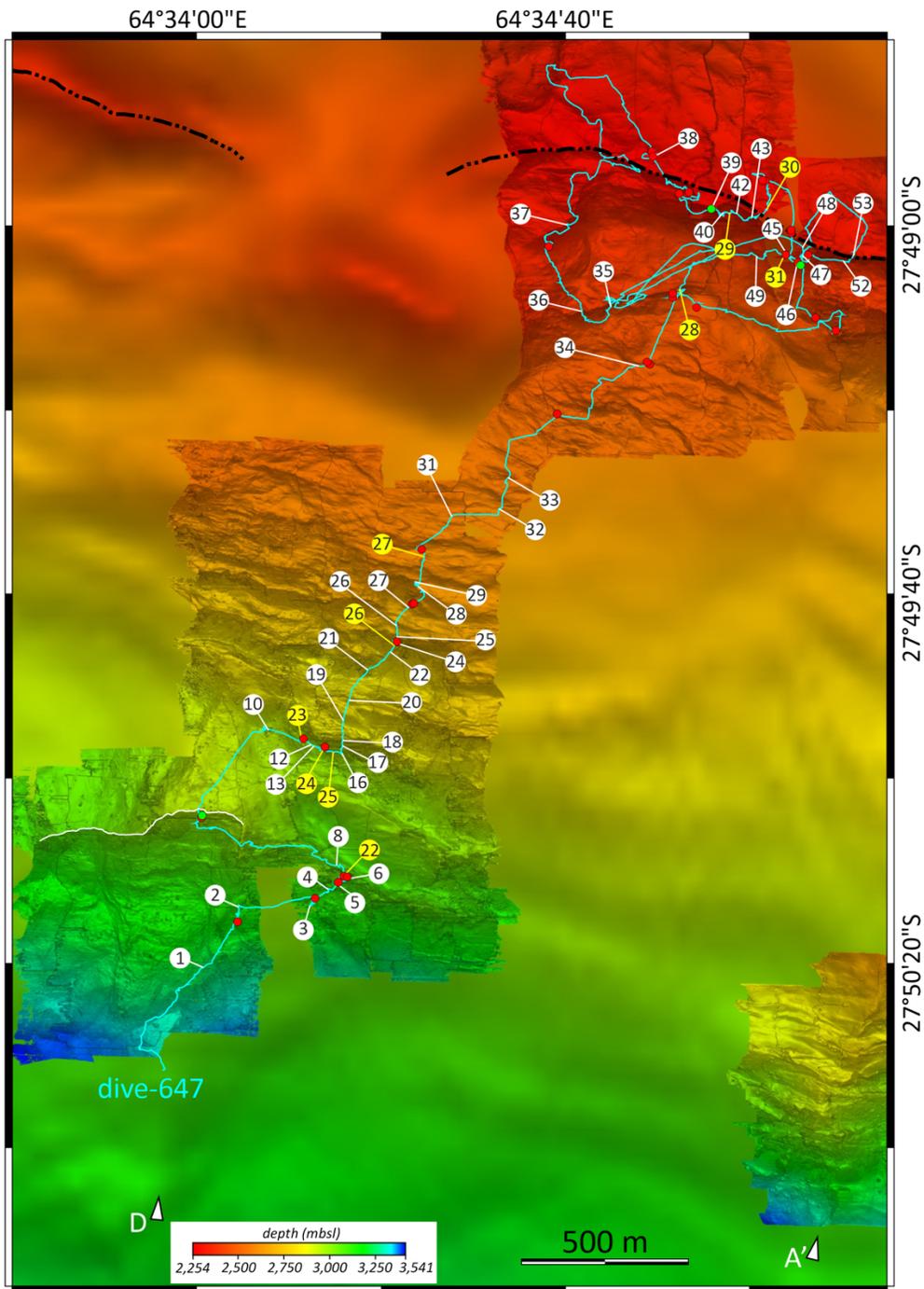
[The figures below display shipboard bathymetry, high-resolution overlapped bathymetry data, and five series of video snapshots showing detailed geological observations along corresponding ROV dive paths for ROV dive 649, 644, 647, and 643.]



**Figure S1.** The bathymetry map shows the lower slopes of the D1 detachment footwall, same as Figure 3a, and locations of seafloor video snapshots (in white and yellow circles) from ROV dives 649 and 644. The microbathymetry (map-650, located in Figure 1) along dive-649 is overlaid on the shipboard bathymetry. The white circles numbered 1 to 35 indicate the locations of video snapshots from Figure S2 for dive 649, while the white circles numbered 1 to 19 indicate the locations of photographs for dive 644. Additionally, yellow circles indicate the locations of seafloor video snapshots used in Figures 4, 5, 6, 7, and 8.



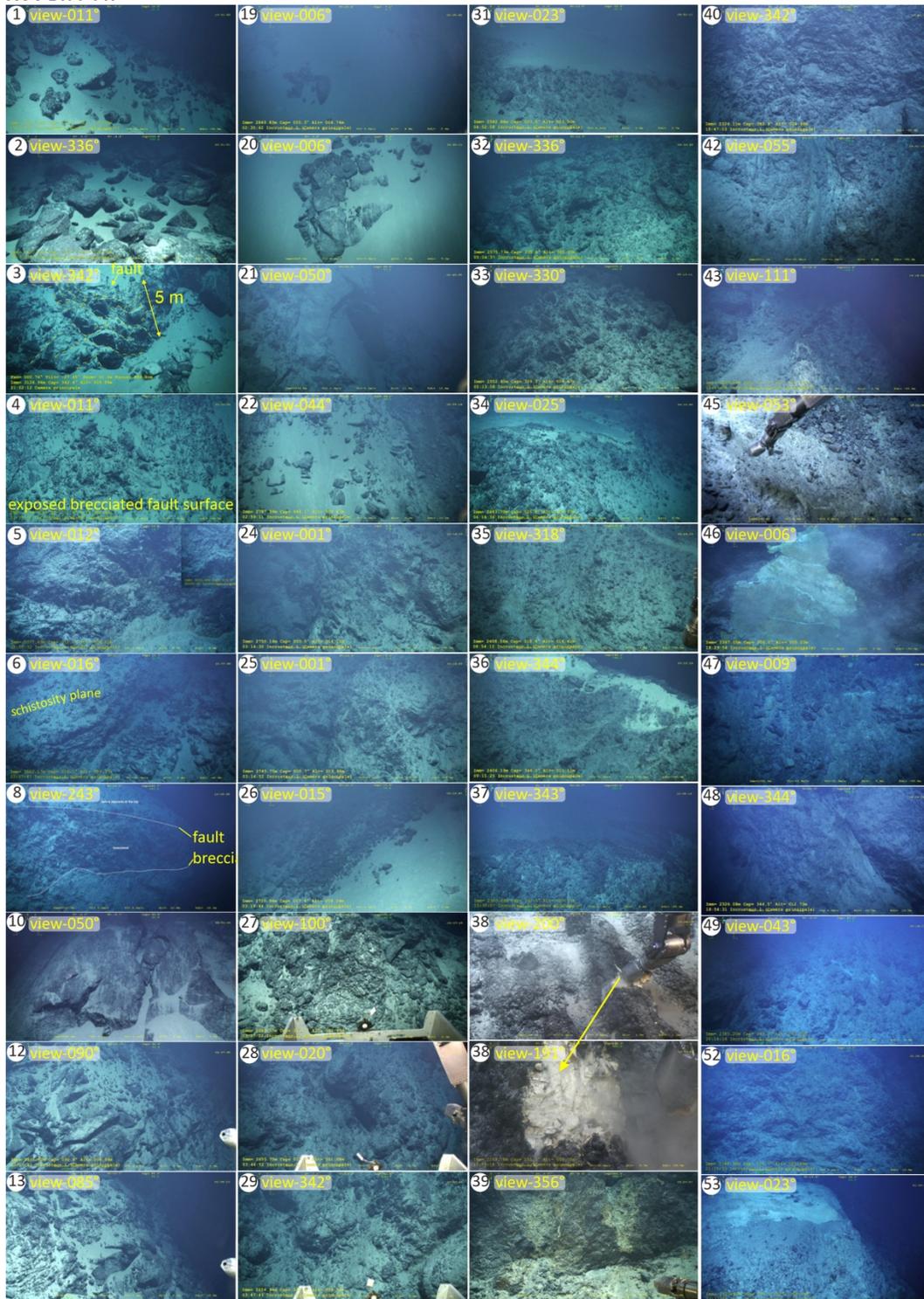
**Figure S2.** Video snapshots from ROV dive 649 and 644 (white circles, located in Figure S1) show outcrop structures of the exhumed D1 detachment fault zone.



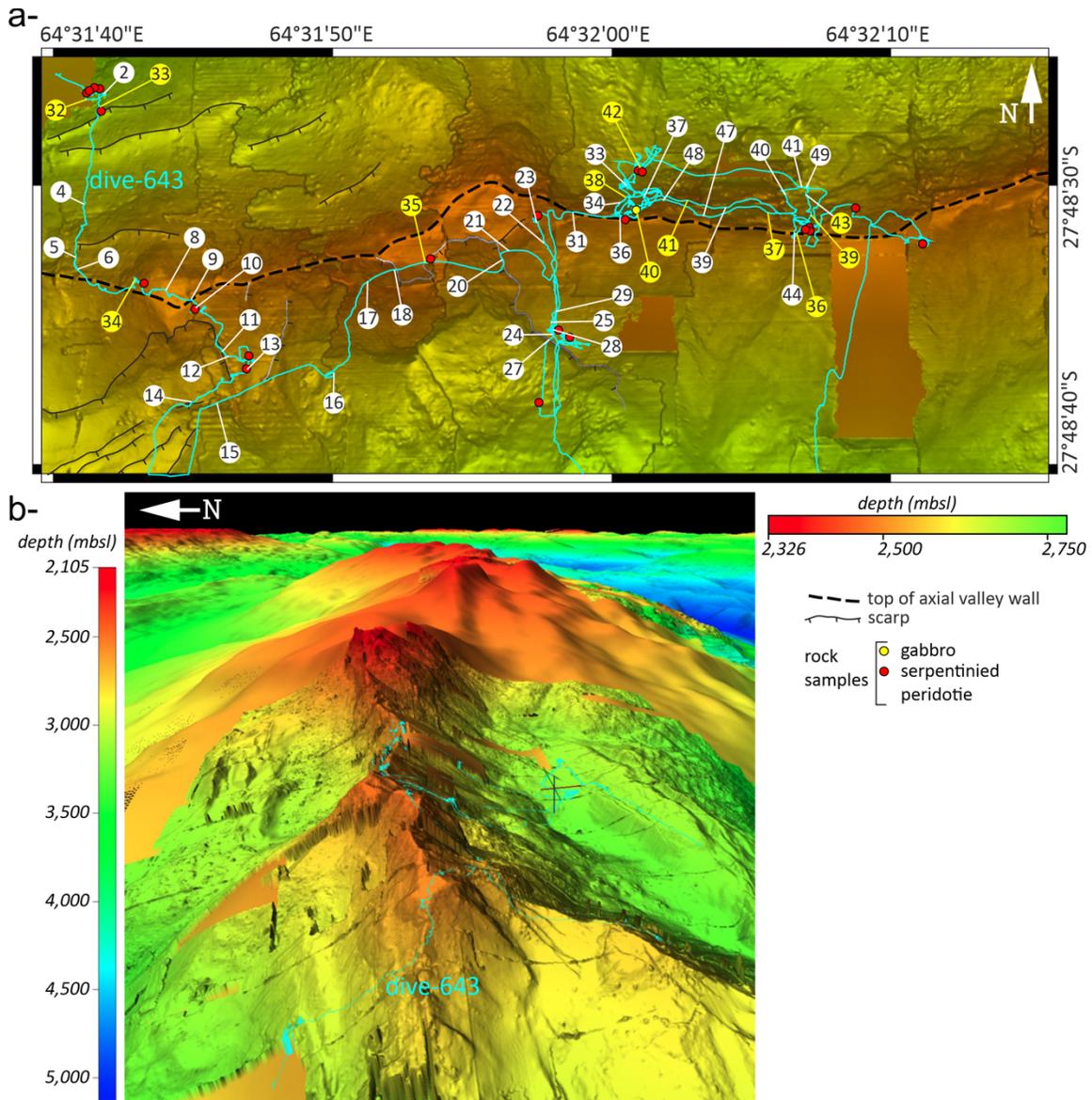
rock samples [ ● serpentinized peridotite  
● tectonic breccia

**Figure S3.** Middle and upper slopes of the axial valley wall along the ROV dive 647. The microbathymetry (map-642, located in Figure 1) along dive-647 is overlaid on the shipboard bathymetry. The white circles indicate the locations of video snapshots from Figure S4 for dive 647; additionally, the yellow circles indicate the locations of seafloor video snapshots used in Figures 9, 10, and 11.

ROV Dive-647

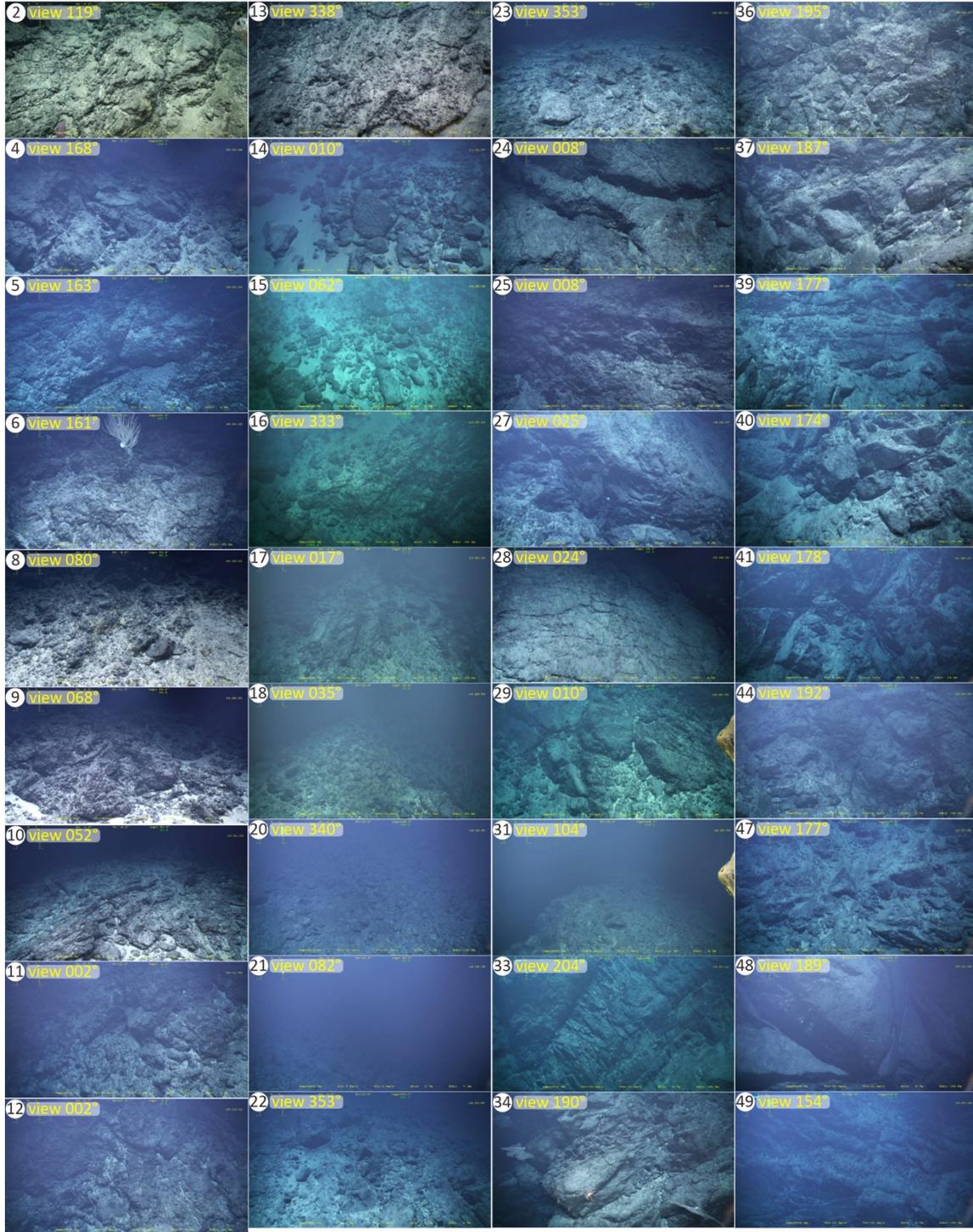


**Figure S4.** Video snapshots from ROV dive 647 (white circles, located in Figure S3) showing outcrop-scale structures of the D1 exhumed fault zone (photos 3-8), degraded exposed fault zone (photos 10-29), and degraded breakaway (photos 31-53).

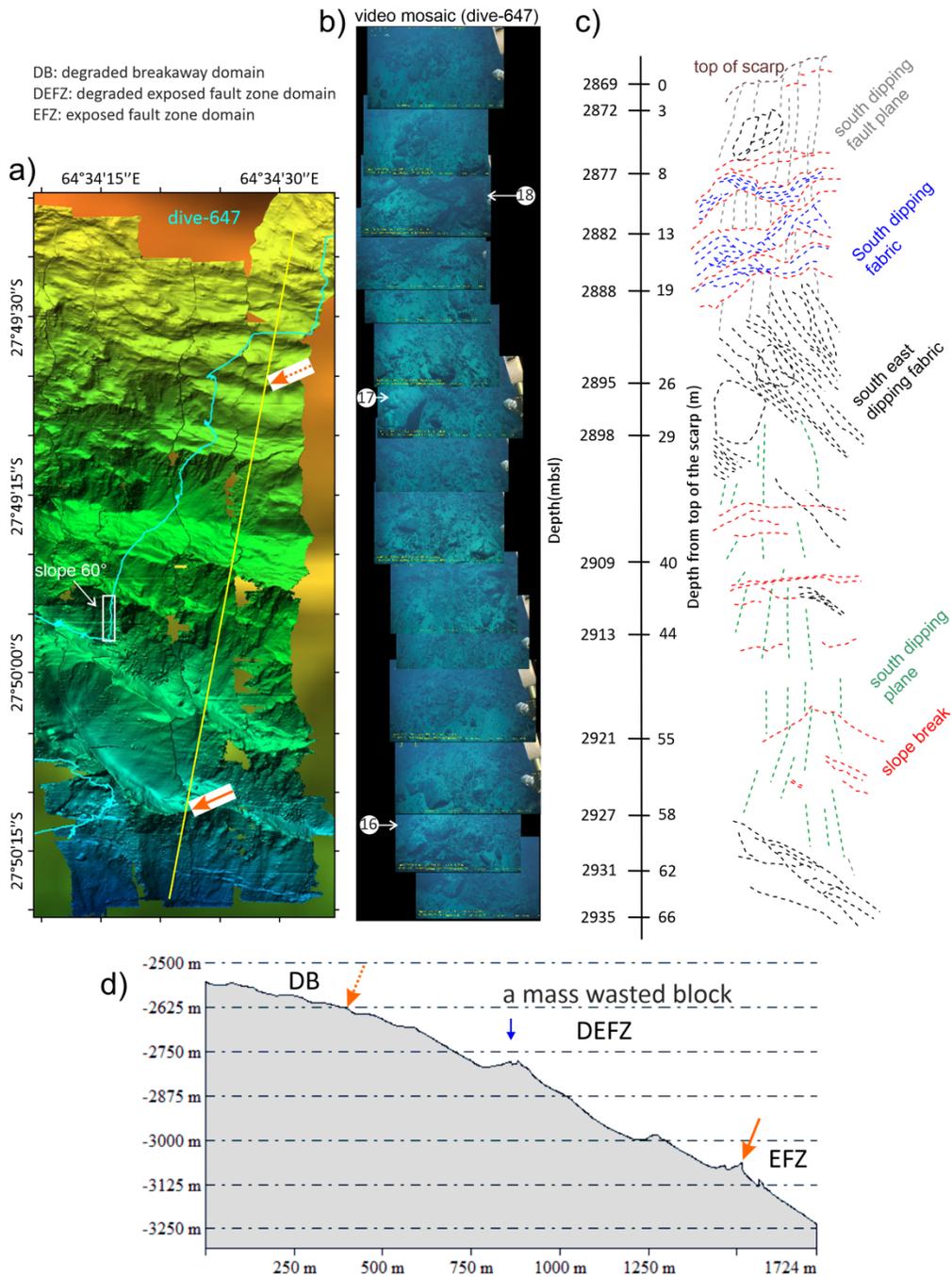


**Figure S5.** Top of the axial valley wall and 3D perspective view of it from west to east. (a) Microbathymetry map-639, located in Figure 1 along ROV dive track 643. The white circles indicate the locations of video snapshots from Figure S6 for dive 643; additionally, the yellow circles indicate the locations of seafloor video snapshots used in Figures 13 and 14. (b) Narrow ridge structure of the top of the axial valley wall.

**ROV Dive-643**



**Figure S6.** Video snapshots from ROV dive 643 (white circles, located in Figure S5a) showing outcrop-scale structures of the D2 exhumed fault zone.



**Figure S7.** The figure presents a high-resolution microbathymetry map (a) of the degraded exposed fault zone (DEFZ) along the ROV dive track 647 (located in Figure S3). Zooming in on a ~60° south-facing slope within the DEFZ (marked in Figure S7a), panel (b) shows a video mosaic of the area; video snapshots 16, 17, and 18 are in Figure S3. Panel (c) provides a corresponding interpretative sketch highlighting the rock fabrics visible along the ~70-meter-high section. Finally, panel (d) shows the DEFZ topography along the yellow line in Figure S7a.