

FIGURE 1 (a) Simplified map of the northern Chilean subduction zone with large historical (dashed grey ellipses) and instrumental (dashed red rectangles) earthquakes with their date and magnitude. AFS: Atacama Fault System. (b) Sketch map of the quaternary faults affecting the Mejillones Peninsula, in the central part of the Atacama Fault System. (c) Landsat Image (Google Earth) of the Mejillones peninsula with examples of uplifted marine terrace (white triangles), beach ridges (small black triangles), fault scarps (black arrows) and tension gashes (white arrows)

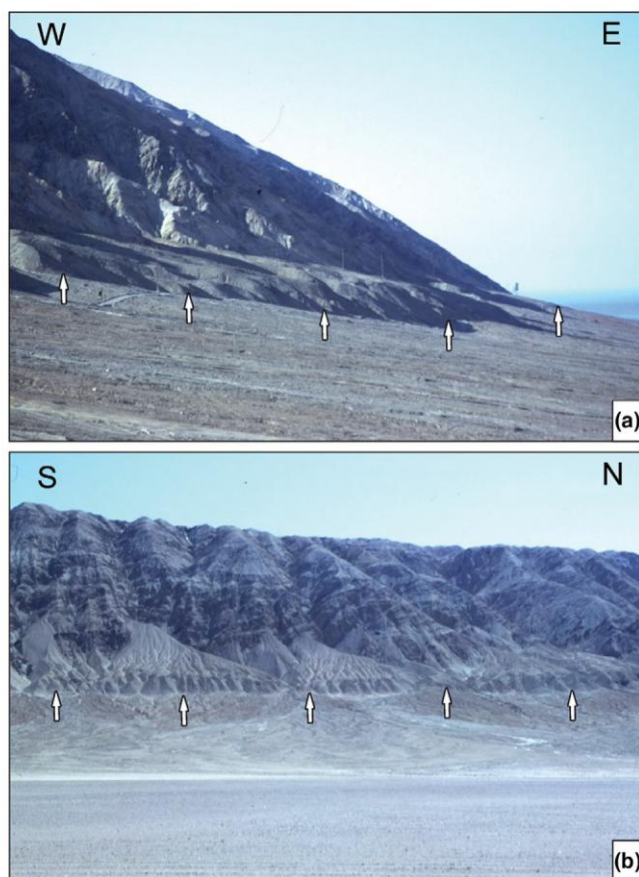


FIGURE 2 Field views of the Mejillones normal fault scarp within its northern part (a) and its central part (b). White arrows point out the base of the scarp (coordinates of picture shots; (a) 23° 8.865'S, 70° 29.715'W; (b) 23° 6.963'S, 70° 29.705'W; see also Figure 3 for location)

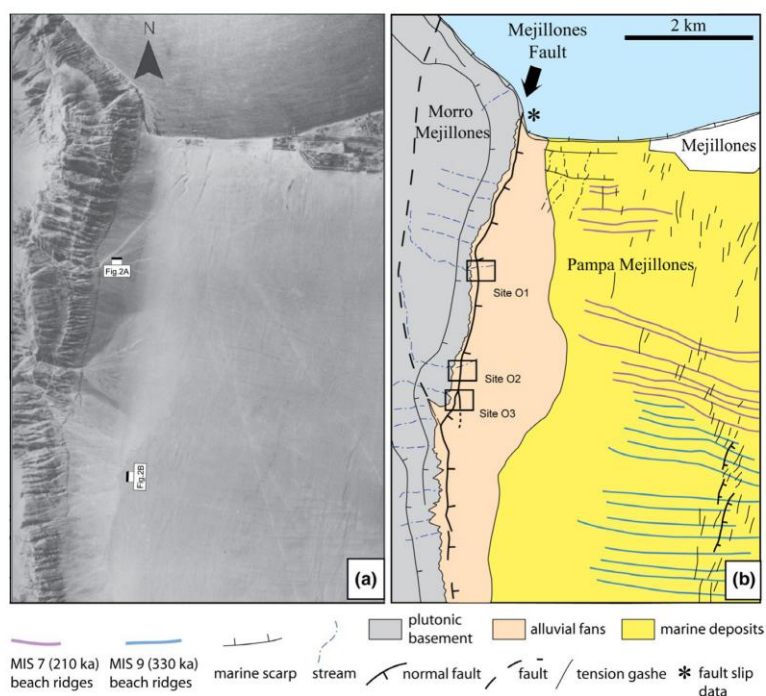


FIGURE 3 Aerial photograph (a) and corresponding geological interpretation (b) of the Mejillones Fault within its northern termination. The three studied sites (O1, O2 and O3) are indicated by the black frames. The black star indicated the site where fault slip data were measured along the main fault plane

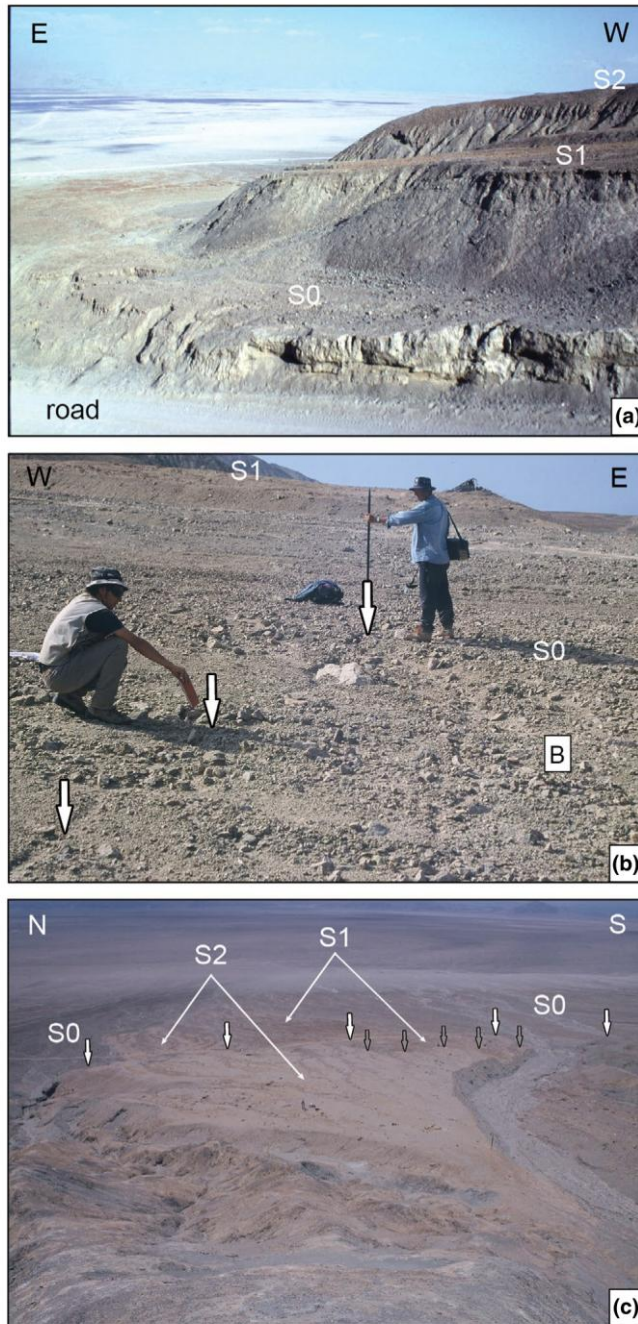


FIGURE 4 (a) Field picture showing S2 and S1 alluvial surfaces displaced by the Mejillones Fault in Site O1. (b) Fissure affecting surface S0 immediately to the south of studied Site O3. (c) Downslope view of Site O3, showing the occurrence of S1 and S2 surfaces on both sides of the fault, with S1 inset in S2, both in the footwall and the hangingwall (white arrows point out the main fault scarp; grey arrows a secondary scarp; see also the corresponding DEM in Figure 5)

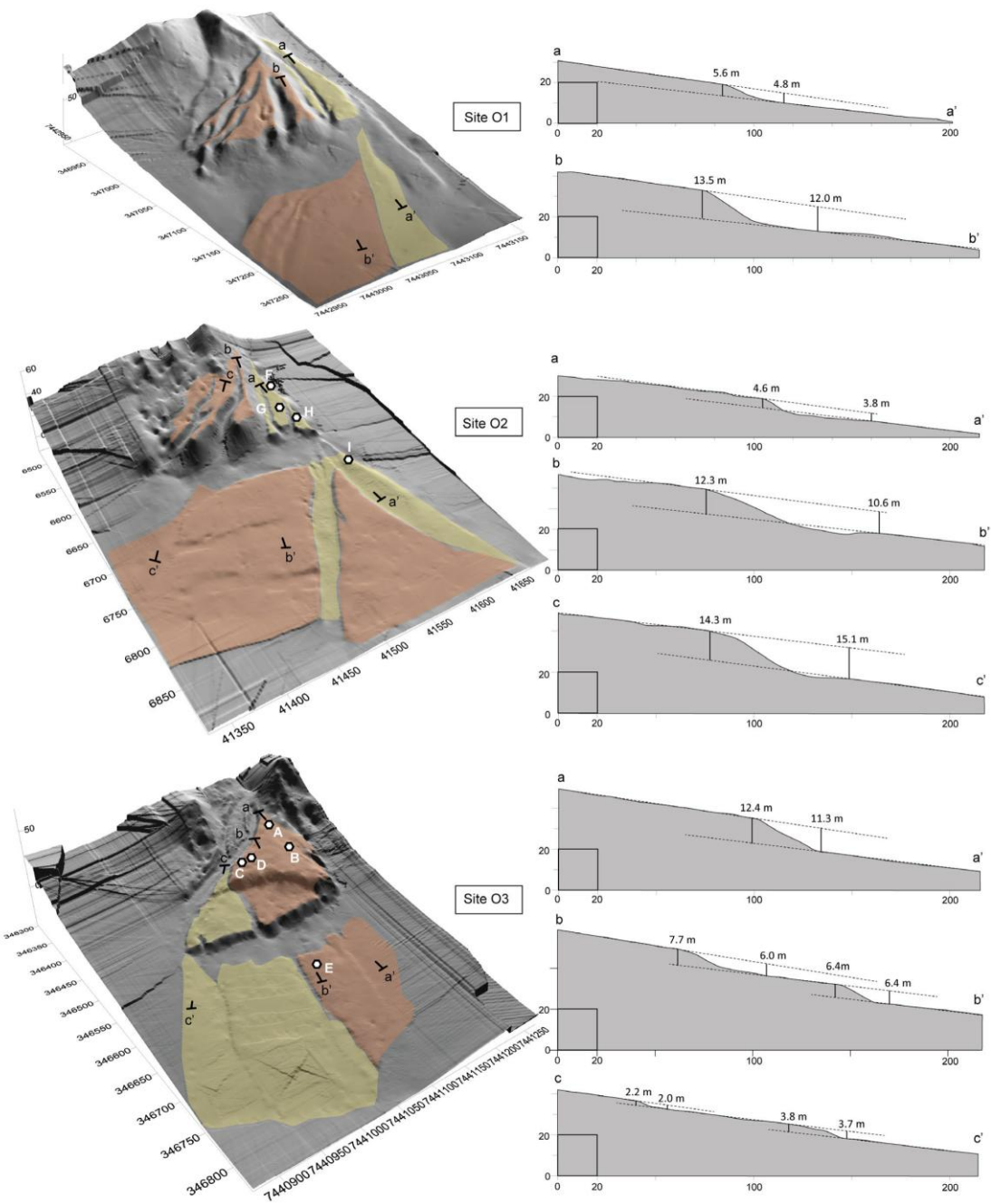
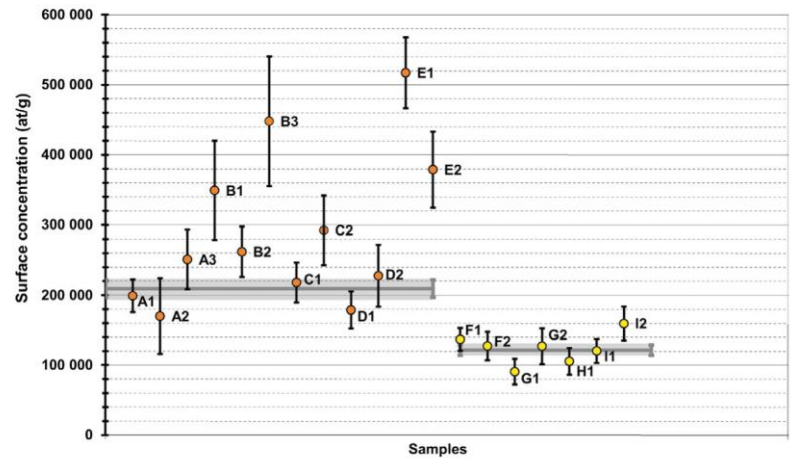


FIGURE 5 Oblique view of the Digital Elevation Models of the three studied sites O1, O2 and O3, built up from DGPS survey (see also Figures S1-S3 in Supplementary Material). Topographic profiles across the fault scarps allow estimating maximum and minimum offsets values for S1 (yellow) and S2 (orange) fan surfaces. Capital letters A to I indicate samples locations

FIGURE 7 ^{10}Be concentrations from boulders sampled on S2 (boulders A–E) and S1 (boulders F–I) fan surfaces. Grey lines represent the mean weighted minimum concentrations



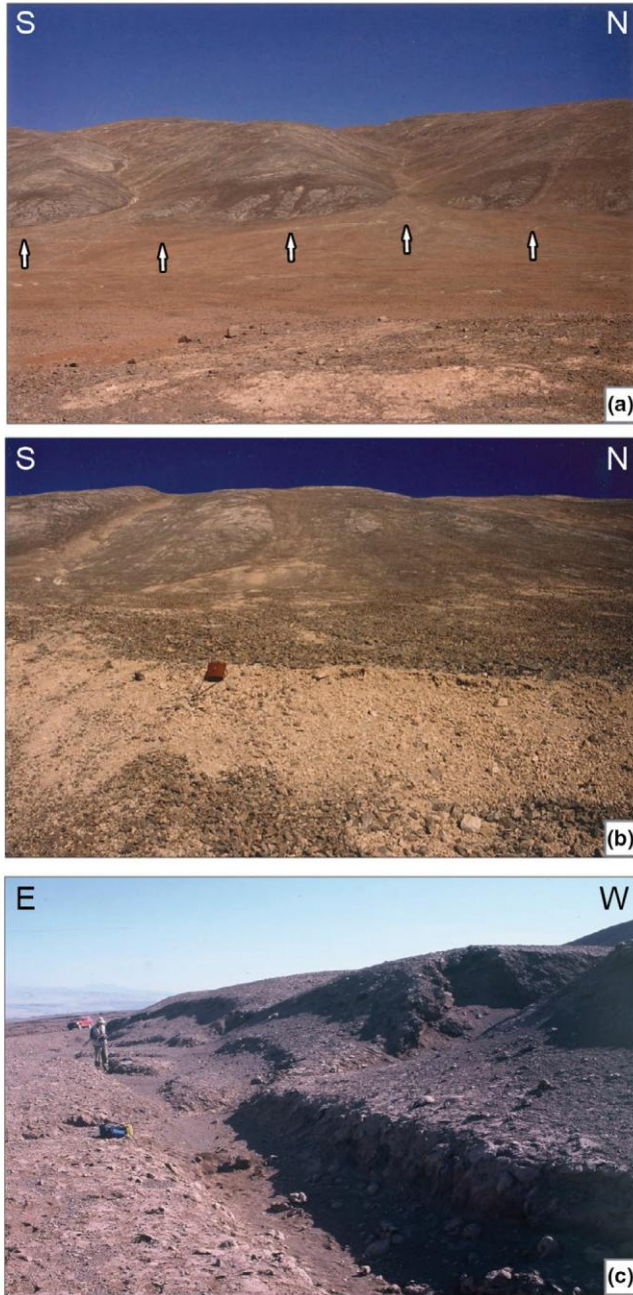


FIGURE 8 (a and b) Pictures showing the surface rupture observed along the Paposo fault within the AFS (~100 km southwards of the Mejillones Peninsula), which was contemporaneous with the 1995, Mw 8.1 Antofagasta earthquake (see Figure 1a) (field pictures after Delouis et al., 1998). (c) Picture showing the fault scarp observed along the southern part of the Salar del Carmen fault (see Figure 1b for location). The free faces (in shadow) attest of the latest, metric vertical coseismic displacement

