A low-angle detachment fault revealed

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DOI:
DOI: 10.1016/j.eps1.2018.04.012

Supplementary Information for: A low-angle detachment fault revealed: Three-dimensional images of the S-reflector fault zone along the Galicia passive margin

SI.1. Seismic data acquisition

The Galicia 3-D seismic reflection volume was acquired during the summer of 2013 onboard the *R/V Marcus G. Langseth*. This vessel is owned by the U.S. National Science Foundation and it is operated by the Lamont Doherty Earth Observatory of Columbia University.

The *Langseth* was configured to have four 6-km streamers spaced 200 m apart. The streamers were towed at the depth range of 12-15 m. Each streamer included 468 hydrophones for a total of 1782 channels. The sources were made up of two arrays of 18 airguns. The airguns had a capacity of 3300 cu in. These arrays were 100 m apart and towed at a depth of 9 m. These airgun arrays were fired in alternating order. This was repeated every 37.5 m. This configuration resulted in 8 common midpoints in line form, with 50 m spacing. The resulting seismic volume has an area of 68.75 km by 20 km, comprised of 801 inlines and 2751 crosslines.

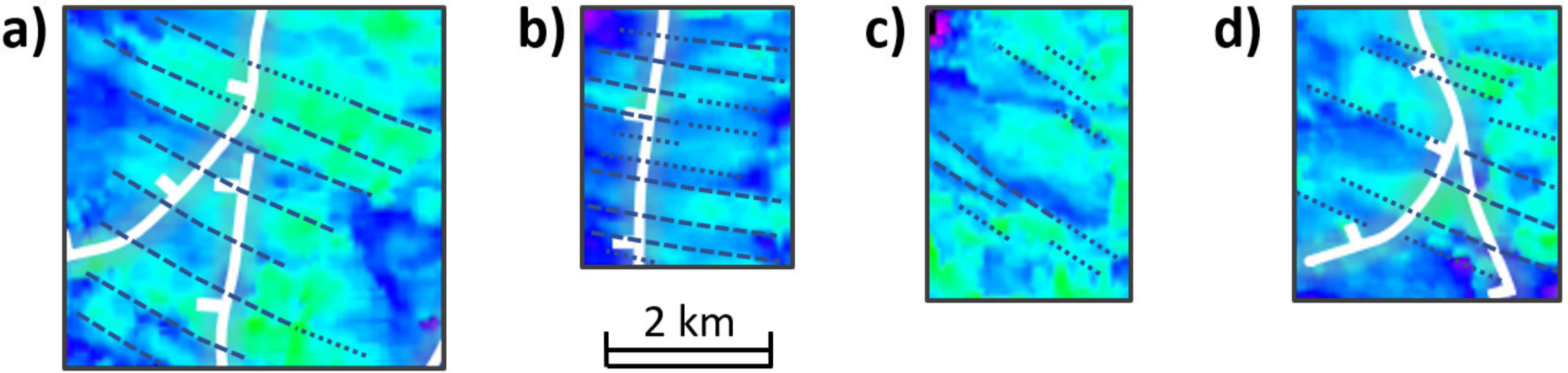
SI.2. Seismic data processing

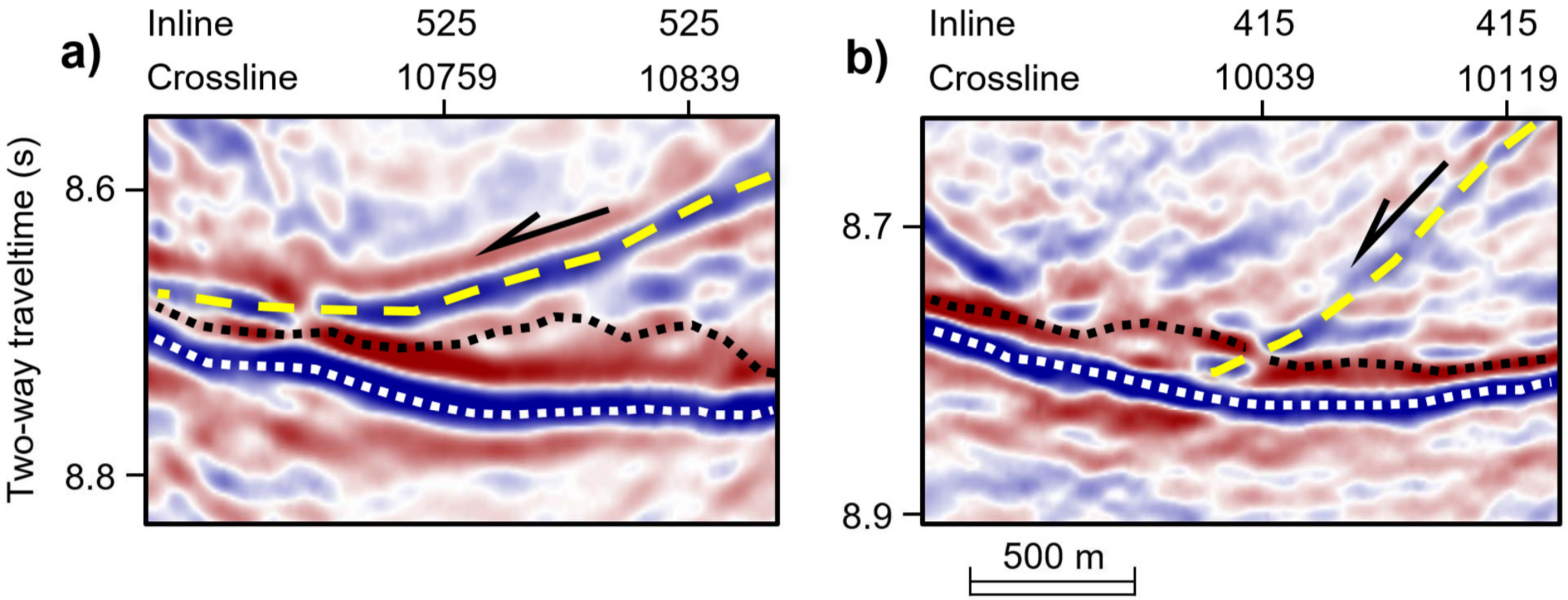
Repsol S. A. processed the 3-D volume to time migration. Their workflow comprised of: 12.5 m by 12.5 binning, gain recovery $(t/250)^{1.5}$, low-cut filter, swell noise filter, zero-phase de-signature, linear noise attenuation, surface-consistent amplitude correction, 3-D surface-related multiple elimination (SRME), radon demultiple, diffracted multiple attenuation, time destripping, 3-D regularization, pre-stack time migration (PSTM), residual moveout correction, and time-variable filtering. Chevron Exploration Technology Company applied noise reduction on the time-migrated volume. Interpretations were carried out on this pre-stack time migrated and denoised dataset using Petrel™.

SUPPLEMENTARY FIGURE CAPTIONS

Figure S1. Enlargements of boxes A-D from Fig. 3b that show corrugations. Brighter colors are deeper. Dashed and dotted black lines have been added to highlight corrugation orientations. Corrugations maintain their continuity across fault intersections in boxes A, B and D. Corrugation azimuths for (a), (b), (c), and (d) are ~115°, ~100°, ~130°, and ~110°, respectively.

Figure S2. Representative seismic reflection profiles of the S-interval layer in areas of overlying fault intersection. Dotted white and black lines represent *S* and *S'* surfaces. Dashed yellow line represents overlying crustal fault. (a) displays a case where S-interval is thicker in the footwall of the overlying fault whereas (b) shows thicker S-interval accumulation beneath the hanging wall.


a)
b)
c)
d)
2 km


a)
Inline
525
525
Crossline
10759
10839
8.6
8.8
Two-way traveltime (s)
b)
Inline
415
415
Crossline
10039
10119
8.7
8.9
500 m