

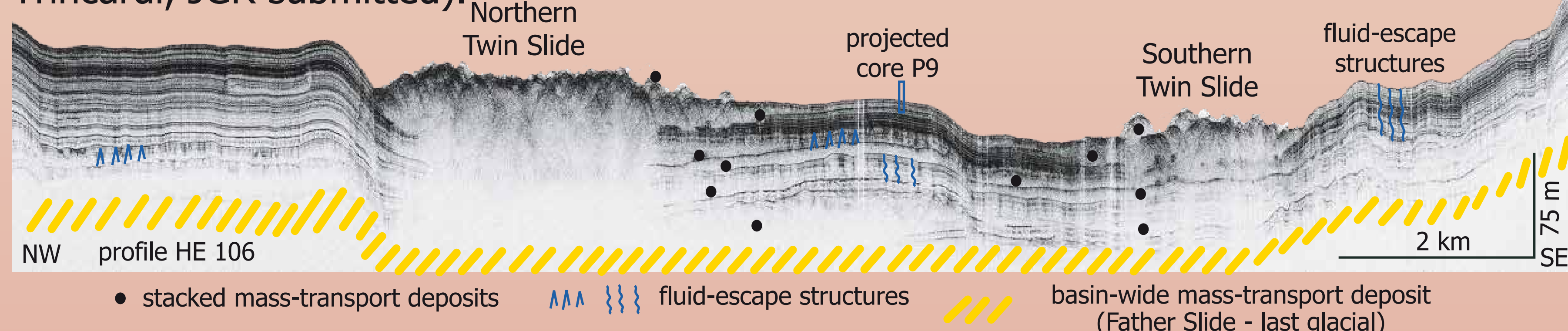
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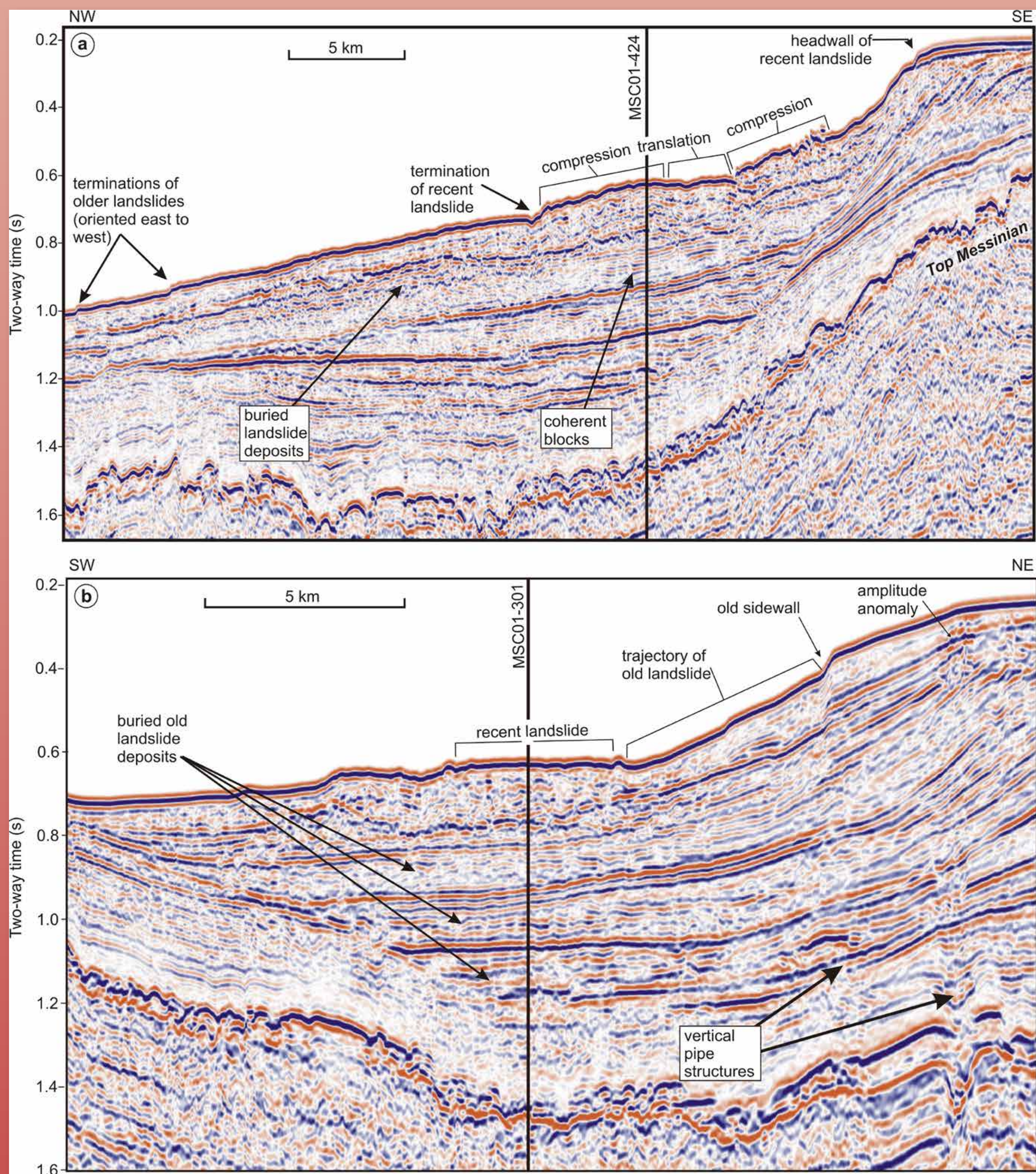


Basin-wide correlation of Father Slide (generated on the onset of the Last Glacial Maximum) allows definition of at least six younger failure events (black dots) during the last 24 ky.

This evidence implies a remarkable recurrence interval of ca. 4 ky (Minisini & Trincardi, JGR submitted).



Integration of multibeam and seismic data shows that at least four different mass transport complexes (MTCs) developed since the Pliocene. Three large scale MTCs, are buried at a depth of up to 500 m below the seafloor. They are characterized by chaotic to discontinuous seismic facies and pinch out against the foreland ramp. The forth and most recent MTC is exposed at the sea floor and has been imaged with multibeam bathymetry and high resolution Chirp profiles. This MTC has a variety of seafloor textures, morphologies and internal deformational geometries. They represent the different elements of landslide movement: exposed failure plane, extensional blocks, debris flows, and blocky debris flow lobes. In the toe region of the landslide exists a confined compression zone indicated by the presence of pressure ridges



CONCLUSIONS

- 1) On the eastern flank of the Gela Basin six mass-transport deposits derived from the same slope area during the last ca. 24 kyr BP (i.e.: since the LGM low stand) and imply a failure return interval of ca. 4 kyr, a value two orders of magnitude higher than on the best-known continental margins.
- 2) The high recurrence of failure along the flank of Gela Basin reflects a combination of: a) inherited westward-dipping Mesozoic ramp; b) rapid deposition of Quaternary units with progressively increasing slope angles; c) slope over-steepening induced by the first extensive failure event (Father slide) during the LGM; and d) high sediment accumulation causing high pore-pressure gradients within the slope deposits and inducing fluid expulsion.
- 3) Preferential failure planes are provided by the surfaces of marine onlap at the base of the low-stand progradational wedges or at the base of the post-glacial sediment drift deposits.
- 4) Where failure affects only sediment drift units it generates mudflow deposits of reduced volume and thickness; where failure affects older, consolidated, units it results in more complex deposits including slide blocks and pressure ridges.

The margins of Gela basin, a 1000-m-deep slope basin in the Sicily Channel (Central Mediterranean), show evidence of widespread and recurrent sediment failure during the late Quaternary.

The eastern slope of Gela basin coincides with the steep Mesozoic flank of Malta Plateau, an inherited limit between basin sequences (to the west) and carbonate platforms (to the east).

Quaternary mass transport features (including evacuation head scarps and accumulation zones) extend over 85 km, along this inherited basin margin and range between 200 and 900 m.

Mass-transport deposits are up to 30 m thick and appear either shallowly buried or exposed at the seafloor. In both cases individual mass-transport deposits mobilize relatively small sediment volumes (typically in the order of 0.1-1 km³) and display modest run outs:

- high-resolution multibeam data reveal several coalescing shallowly buried or exposed slides
- CHIRP sonar profiles document recurrent failure events since the last glacial (about 20-25 ky BP).

Where exposed at seafloor, failed masses show an extreme morphological complexity with massive slide blocks, pressure ridges and hummocky surfaces.

In particular, three recent slides occur at the sea floor and present similar fall height, run out, and displaced volume but markedly distinct morphology of the resulting mass-transport deposits.

The remarkable difference among the three deposits likely reflects the sediment units involved in failure: these units become progressively older proceeding south along the margin.

Where older and more consolidated units are mobilised, they result in more blocky slides, while younger and shallower units generated mudflow and plastic deformation of seafloor sediment resulting in distinctive pressure ridges in the toe region.

Legend

SUBMARINE SLIDES

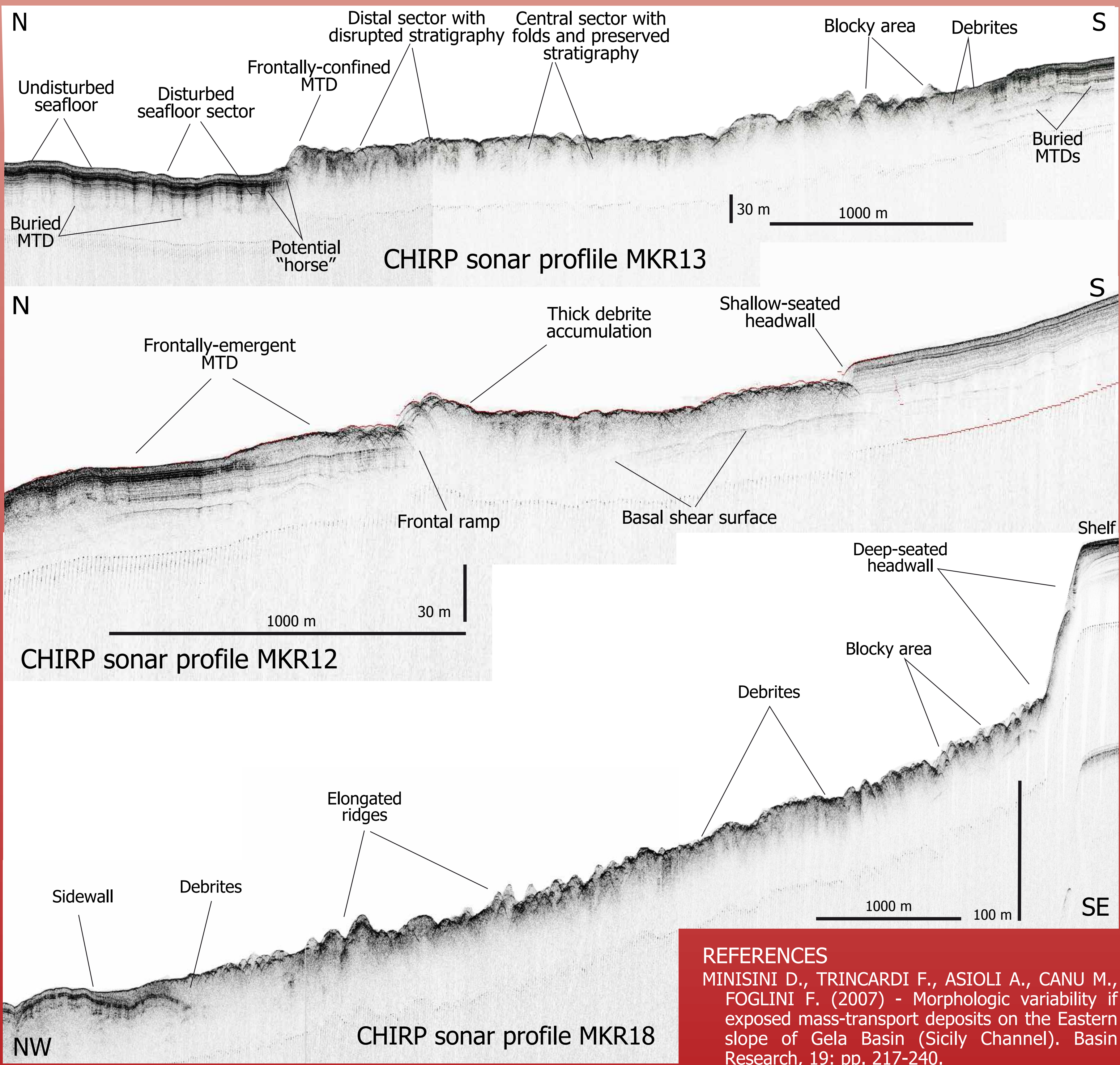
 Exposed

 Buried

failure affecting
both post-glacial
sediment drifts
and older
deposits:
**pressure ridges
& slide blocks**

failure affecting
only the flanks
of post-glacial
sediment drift deposits:
thin skinned mudflows

Chirp profiles show that the main deposit of the MTC is the result of a large landslide, overlain by several depositional lobes due to smaller scale slumps that remobilized the sediment displaced during the main mass wasting event. A hemipelagic cover of the deposit is largely absent suggesting a very recent age of the landslide. Interestingly, also the seafloor adjacent to the MTC, which has not been directly involved by the slope failure, exhibits evidence of subtle mobilization in the form of small thrust and fold geometries.



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