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# Focused fluid-flow processes through high-quality bathymetric, 2D seismic and Chirp data from the southern parts of the Bay of Biscay, France

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High-quality bathymetric, 2D seismic and Chirp data located in the southern parts of the Bay of Biscay, France, collected by the University of Bordeaux 1 (Cruises ITSAS 2, 2001; PROSECAN 3, 2006 and SARGASS, 2010) have recently been compiled. The survey area widely covers the Capbreton Canyon, which lies on the boundary between two major structural zones: the Aquitanian passive margin to the North, and the Basque–Cantabrian margin to the South which corresponds to the offshore Pyrenean front. The dataset revealed a large number of key seafloor features potentially associated with focused fluid-flow processes and subsurface sediment-remobilization. Focused fluid migration through sub-seabed sediments is a common phenomenon on continental margins worldwide and has widespread implications from both industrial and fundamental perspectives, from seafloor marine environmental issues to petroleum exploration and hazard assessments.

Our study analyses the relationships between seafloor features, deeper structures and fluid migration through the Plio-Quaternary sedimentary pile. The geometrical characteristics, mechanisms of formation and kinematics of four main groups of seabed features have been investigated. (i) A 150km2 field of pockmarks can be observed on the Basque margin. These features are cone-shaped circular or elliptical depressions that are either randomly distributed as small pockmarks (diameter < 20m) or aligned in trains of large pockmarks (ranging from 200 to 600m in diameter) along shallow troughs leading downstream to the Capbreton Canyon. Seismic data show that most pockmarks reach the seabed through vertically staked V-shaped features but some are buried and show evidence of lateral migration through time. (ii) A second field of widely-spaced groups of pockmarks pierce the upper slope of the Aquitanian margin. These depressions are typically a few hundred meters in diameter and seem to be preferentially located in the troughs or on the stoss sides of sediment waves. (iii) Several trains of small circular depressions are distributed along narrow channels that are up to 70 km in length and run downslope the south-western sides of the marginal Landes Plateau. (iv) The dataset also revealed isolated mega-pockmarks located on the Landes Plateau. These 1,5km-wide circular depressions exhibit a convex upward central part and show no evidence of underlying structure nor fluid migration pathways. However, collapsed strata within the infill sediments suggest that the structure is related to fluid expulsion.

Interestingly, our results show that the base level of initiation for many of these features corresponds to a transition in seismic facies that is also marked by a seismic unconformity. This boundary can be interpreted as reflecting drastic changes in the sedimentary record related to an important transition in climatic cycles (i.e. base of Quaternary or Mid Pleistocene Revolution) and/or changes in the Mediterranean Outflow Water (bottom current).