Assessment, using Maradja 2003 Data, of typical submarine gravity instabilities (induced by earthquakes) in the Central Western Algerian margin Kramis Sedimentary Ridge

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Résumé

Important earthquakes occurred in the northern part of Algeria where the tectonic activity is focused in inverted coastal basins onshore (Ms 7.3 El Asnam 1980), in the slope and abyssal plain (Mw 6.9 Boumerdes 2003). Many studies highlighted that large earthquakes induce turbidity currents with high volumes of mass transport deposits (MTDs), tsunami and gravity flows. These events can change the submarine morphology, destroy onshore installations and affect harbors.
In fact, the studied area is the KDSF (Kramis Deep-Sea Fan), is known for its sedimentary ridge, an asymmetric super-developed levee.

Only MTD located at the NW of the KDSF are associated to turbidity currents like those trigged by the Orléansville's earthquake (1954. However, heterogenous lobed sediments failures and coarse are present from the crest to the deep basin.

Using bathymetric data, six gravity instabilities (S1 to S6) with different shapes, features and orientations are newly evidenced in the upper, middle and lower slope and tentatively related to structures. The use of Virtual Reality tools appears to greatly improve our capacity to detect and measure scars and MTD. A 2-5.2 kHz Compressed High Intensity Radar Pulse profiles were used to identify low amplitude reflection and chaotic echoes, revealing buried MTDs.
S4, located on the mid-slope, is the largest slide identified. Sediment volume involved calculated is about . It is expressed by accurate head and sidewall scarps from the slope break and displays bulges on the southern flank of the Aimeur diapir, a major salt structure at the margin toe. The headscarp is 20 m high and is associated with a 10% slope. The western lateral scarp is 12 km long, acting like a barrier between cyclic sediment waves field and smoothed displaced sediments on the mid-slope affected by the slide. Finally, we show that S4 is an impressive open slope slide that has been reactivated at least 4 times. Our interpretation is that the failed masses mobilized from various time slides are likely triggered by large nearby earthquakes and have moved forward until the flat part in the deep basin could be contained by the Ameur salt diapir.

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Mots-Clés: Kramis, gravity instability, tectonic, bathymetric map, CHIRP, Algeria western Mediterranean sea