Mass Transport Deposits in Offshore Morocco, Safi Haute Mer Area

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Recent detailed mapping in a 1,064 km^2 3D seismic survey acquired in offshore Morocco has revealed the presence of at least three regional mass transport complexes (MTCs) within the Cretaceous interval of the Safi Haute Mer area, in addition to a number of smaller and younger MTCs. Their extent (up to 100 km^2) and thickness (350 ms) is strongly influenced by surrounding structural features associated with regional tectonics and salt mobilization. The MTCs arecharacterized by chaotic, mounded seismic facies; however seismic attribute analysis has revealed some degree of internal organization. Depositional architectures identified within these units include (1) large-magnitude lateral erosional edges, (2) internal syndepositional thrusts, and (3) kilometer-scale transported megablocks. Detailed analysis of the internal architecture of the mega-blocks has reveal the presence of discrete low sinuosity, single thread channels that are 90 m wide in average. The clear expression of stacked channel complexes within the megablocks indicates that they have preserved their original stratigraphy and were likely rafted from upslope, possible 100's of kms distance from their source area. In addition to the regional MTCs, an important number of smaller and younger MTCs have been identified in the study area, essentially composed of localized slumps and slides. Based on limited data, these deposits are suggested to be late Cretaceous or earliest Tertiary in age.

Two working hypotheses address the issue of possible triggering mechanisms for these MTCs. The first one suggests that the causes of the mass failures are associated to the step relief along a narrow shelf, the presence of salt tectonics and the frequent occurrence of large earthquakes in the area. However, the long-distance transport of kilometer-scale, welllithified mega-blocks supports an alternative catastrophic model. The alternative hypothesis is that the failures were generated by mega-tsunamigenic forces associated with the K-T impact in the Yucatan Peninsula. Both hypotheses are currently under consideration.