Session 7.F - Subaqueous mass movements and their consequences: from scientific knowledge to geohazard assessment Sponsored by S4SLIDE-IGCP640)

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Subaqueous mass movements occur in lakes, fjords and oceans of the world, playing a key role in the evolution of coastal areas and continental margins as they represent one of the most efficient mechanisms of sediment transport from coastal to deep basins. The mapping and characterization of such processes has also significant implications for geohazard assessment, because such events can directly impact coastal and offshore infrastructures as well as cause local but destructive tsunamis. The aim of this session is to provide a forum to discuss field (outcrop, core and geophysical), experimental and numerical studies that advance our knowledge on the occurrence, failure and post-failure behavior of subaqueous mass movements. Particularly we encourage multidisciplinary contributions aimed to assess and mitigate the geohazard potential associated to these processes both at local and regional scale.

Alboran Contourite (SW Mediterranean). a geotechnical approach for their stability analysis

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The occurrence of extensive contouritic deposits along the Alboran Sea (SW Mediterranean Sea) is well known and described. Sedimentary instability linked with contouritic depositional systems has been observed around the world. Erosive processes associated to bottom currents may, in fact, cause undermining slopes and instability but contouritic sediments may be also prone to failure because of their composition (i.e., well-sorted) and geometry. They often develop excess pore pressure due to high sedimentation rates and/or relatively high organic-carbon content. The aim of this work is to study the morphological, sedimentary and geotechnical characteristics of a contouritic drift located on the Spanish margin of the Alboran Sea, between the Guadiaro and Baños submarine canyons. Geotechnical and sedimentological properties have been determined along two profiles across the contouritic drift, where 14 in situ geotechnical tests (CPTU) and several gravity cores were recovered in the framework of Fauces project. Sedimentological and geotechnical tests, such as grain size analysis, Atterberg limits, oedometric, direct shear and triaxial have been carried out at different intervals of sediment cores.The drift is shaped by a contouritic terrace mostly formed by sediments that contain poorly and very poorly sorted coarse medium sand (2.6 Ø medium size). The sand fraction (74%) is mainly composed of relict bioclastic fragments (30%), mixed with glauconite grains (44%). In the rest of the drift, sediments can be defined as high plasticity silts that, in general, are fine-grained towards the distal parts of the drift (> 96% of silts and clays) and coarser towards the shallow parts (30-40% of silts and clays); the plasticity also increases towards the deepest areas (Plasticity index from 4 to 28). This zoning across the drift has also been observed in geotechnical properties. CPTU tests allowed to determine the undrained shear strength (Su), obtaining values up to 10-15 kPa in the distal areas of the drift, and very high values for the coarser sediments. On the other hand, the direct shear tests (CD) results provide, for the silty sediments, an effective cohesion between 3.8 and 7.4 kPa and an effective friction angle between 25° and 28°.The results of the geotechnical and sedimentological tests allowed to model the stability of the contouritic drift, adding in some cases a seismic acceleration characteristic of the area. Although no significant number of sedimentary instabilities has been observed and described along the drift, its geotechnical properties indicate that they could be triggered. The discrepancy can be explained by: 1) small seismic accelerations can favour the consolidation of surficial sediment and therefore the increase of its strength; 2) the cyclic loading pulses induced by the formation of solitons in the Strait of Gibraltar could also favoured strength increase; 3) the drift can be affected by small surficial landslides, that are under the resolution of bathymetry, which would produce a stable and slightly overconsolidated seafloor; and 4) the geometry of the drift, shaped by an upper contouritic terrace would makes the whole deposit more stable.