



## **The role of Internal Solitary Waves on deep-water sedimentary processes: the case of up-slope migrating sediment waves off the Messina Strait**

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In the last decade joint marine geology and physical oceanography studies are demonstrating the inherited connection between deep-water sedimentary processes and dynamics of water masses in a fruitful exchange in which bedforms type and geometry highlight slow or periodic bottom current processes or event of and oceanography explains and predicts morphological and sedimentary pattern at the seafloor. We investigate the presence of an intriguing up-slope migrating and rotating sand waves observed off the north entrance of the Messina Strait by taking into account the main oceanographic process occurring in the Strait, namely the presence of tidal induced internal solitary waves (ISWs). We hypothesize that the observed deflected pattern of these sand waves is due to refraction of wave occurring at the LIW-MAW interface and that the motion of the grains is due to the increased particle velocity field during the passage of ISWs. We modeled their formations and compared the results with the observed geometries of the dune field. Our findings suggest an intrinsic relationship between the dune field and the presence of internal solitary waves, and provide some insights about their dynamics and migration rate as in accordance with previous measurements and analysis. We believe that our work represents an innovative and promising link between the geological and oceanographic communities, and gives some insights on the role of ISWs on sedimentary process.