



Timing and recurrence of failure within NE Gela Basin, Sicily Channel

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Submarine mass movements represent a common phenomenon in the evolution of continental margins. In order to enhance knowledge on trigger mechanisms and assess the geologic risk of slope failure, many studies focus on extensive and voluminous slide complexes, since these may have catastrophic and largely unpredictable consequences for offshore infrastructures and coastal communities alike. However, rather thick and complex deposits often hinder the definition of internal structures and hence the recognition of individual failure events. Small-scaled slide complexes are uniquely positioned in this context, as full data coverage often allows for a more detailed evaluation of the timing and recurrence rates of failure. We present evidence from a multidisciplinary study combining high-resolution acoustic data with deep-drilled core material (MeBo type) from a prominent example – the NE portion of Gela Basin within Sicily Channel, Central Mediterranean Sea. Morphological data (Kongsberg Simrad EM120 and EM1002 multibeam echosounder) and subsurface imagery (Atlas parametric sediment echosounder) from this submarine landslide complex between 200 and 700 m water depth reveal multiple slope failures and stacked mass transport deposits of varying thicknesses and lateral distributions. Correlations of the acoustic data to 14C-dated core material (GeoB14401, 35.5 mbsf) drilled through the stacked mass transport deposits suggest the occurrence of four major failure events within the basin during the last ~30 ka. Failure times of these events relate to different palaeo-environments including (1) the MIS2/3 boundary, (2) the Last Glacial Maximum [LGM], (3) the deposition of Sapropel S1 equivalent, and (4) the late Holocene. In addition to these major events, the occasional presence of reworked shelf-benthic foraminifera species within the core sedimentary record hints towards the presence of additional, small-scaled events during the period of the LGM chronozone. Frequent failure of limited sediment volumes might have counteracted the development of major events during this time. However, the fact that these features, indicating sediment instability, are not resolvable in the acoustic record highlights the benefits of an integrated/multidisciplinary approach in identifying individual failure events within a slide complex.