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Giant slide in the South Alboran margin: Upper Miocene margin inversion or Messinian sea level fall?

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A series of submarine slides, from different periods and origin, were identified offshore Morroco using a new seismic reflection database available in the South Alboran Sea. The latest seismic reflection survey, used for this study, was acquired during the Marlboro-1 cruise (July 2011). This high resolution, two dimensional seismic data , provide evidence for a giant submarine landslide (mega-slide) with a volume of 200 km3, an area of 550 km2 and a maximum thickness of 540 m. It extends for over 40 km from the Xauen/Tofino banks at 200 m water depth to the deep basin floor of the Western Alboran Basin. The landslide is located on a steep, tectonically active margin and confined between structural highs. The seismic data allow a detailed imaging of internal structures, erosional headwall and the basal sliding surface of this mass transport deposit (MTD). The landslide is a complex deposit, involving a chaotic matrix, and preserved continuous reflectors evoquing floating giant blocks. The basal sliding surface reveals that significant amounts of seafloor erosion occured that cut into the Upper Miocene sediments. We will discuss the factors triggering the slope failure and the mechanism that caused the weakening. The origin of the mega-slide is the Xauen-Tofino banks bounded by thrust faults whose tectonic activity is recorded since the late Miocene. An acceleration of the uplift and compressional activity is evidenced during the Messinian with an increase of the volume of mass transport at the front of these thrusts. The top of the mega-slide is eroded by the Zanclean (5.33Ma) flooding event and thus occurred before or during the Messinian crisis. This timing correponds in the South Alboran Sea to a peak of tectonic activity and a huge and rapid sea level fall (about 1000m). We propose that both have played a role in triggering the South Alboran mega-slide.