Geophysical Research Abstracts
Vol. 19, EGU2017-500, 2017
EGU General Assembly 2017

Facies architecture and compositional variations of coves associated with recurrent mass wasting in the Norwegian North Sea.

Kamaldeen Olakunle Omosanya and Ståle Johansen

Department of Petroleum Geology and Applied Geophysics, Norwegian University of Science and Technology, Norway(Kamaldeen.o.omosanya@ntnu.no)

Coves represent incisions commonly found on the gliding plane of mass-transport deposits (MTDs). Their association with ramps and promontories together causes marked topographic shift at the base of MTDs. Over the past decades, the majority of previous studies have focused on ramps rather than the coves. A debate emanating from these works centre on the origin and mode of formation of ramps. Some authors favour ramps to be tectonic structures while others show that they are erosional features. In this work, we have employed high-resolution 3D seismic reflection dataset and seismic attributes to investigate the evolution, kind and composition of coves found beneath three MTDs. Our attention is not only on the coves but also on the ramps with which they are associated. To do achieve this objective, we have chosen an area characterized by recurrent mass wasting, where one of the biggest submarine landslide in history have been documented. We restored the coves to their depositional geometries by applying techniques of geomorphologic analysis to the tops and bases of the MTDs. Our results revealed the presence of several coves at the base of three major slides i.e. Storegga, Tampen and Slide S. Coves are rugged and scoured sections of the basal shear surface on seismic sections. Their internal architecture includes continuous to slightly deformed reflections, blocky and faulted to strongly deformed packages, and low amplitude chaotic failed mass corresponding to slides, slumps and debris flow deposits. Stratigraphic succession of these seismic facies vary and differ from one coves to another, an indication of the multifaceted flow transformation during mass wasting. Ramps marking the boundaries of the coves are serrated scarps in map view. Our geomorphologic analyses show that blocks within the coves have compacted and are now slumps or deformed reflections on present day seismic data. Slump folds in the coves are kinematic indicators for mass flow direction, which in this study is multidirectional for two of the MTDs. An initial WSW direction of mass flow was succeeded by NW flow during which the coves were filled up to match the topographic position or zenith of the adjacent ramps. We demonstrate that coves, ramps, and slump folds are non-tectonic in origin instead coves are excavation zones or erosional features beneath the MTDs, ramps are their sidewalls, and slump folds are sedimentary imbrications. The coves are formed preferentially on paleo highs where fluid-flow features are prevalent and result from a complex interaction of erosion, sediment loading, and compaction. In the study area, coves are to be found recurring with the three slides and have significant implication for sediment preservation and budget during mass wasting events.