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Sill-and-Fill Systems: Deep-Water Submarine Slope and Basin-Floor Systems that Become Increasingly Confined Through Time

The Tabernas-Sorbas Basin is one of several elongate intramontane basins that formed narrow corridors of partially linked depocentres across the Betic Cordillera, S.E. Spain, on stretched metamorphic rocks during the Neogene. The basin provides the basis for generating slope basin evolution models that describe the tectono-stratigraphic evolution of complex submarine slope systems whose morphology becomes increasingly complex and restricted through time: 'sill-and-fill' systems. A simple 'sill-and-fill' model of these basins is presented where differential subsidence and uplift progressively partitions the submarine slope system. The 'sill-and-fill' stratigraphic evolution is seen in both the Tabernas sub-basin and the Lucainena sub-basin within the Tabernas-Sorbas Basin. The sub-basins record the bathymetric evolution from slope incision and bypass (erosional confinement) to the destruction of the slope and the formation of topographically enclosed mini-basins with contained sheets (basin-scale topographic confinement) leading to the rapid filling of accommodation. Depending on the relationship between the height of the downslope barrier to sediment flux the sedimentary system may subsequently 'spill' into the next segmented depocentre. This did not occur in the Tabernas-Sorbas Basin, partly because the Messinian Salinity Crisis led to a rapid drop in relative base level. The generic implications of this study relate to the improved understanding of the tectono-stratigraphic evolution of slope basins that evolved within increasingly topographically restricted settings, e.g. foreland and forearc basins, trench slope basins, and oblique-slip basins. The stratigraphic change in the sedimentological characteristics of the depositional system is the converse of the Gulf of Mexico and the Gres d'Annot, S.E. France.