Slump-initiated and controlled syndepositional sandstone remobilization: an example from the Namurian of County Clare, Ireland

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Sedimentology., 49,25-41

http://onlinelibrary.wiley.com/doi/10.1046/j.1365-3091.2002.00430.x/abstract

Abstract

Remobilization of sandstones can dramatically reconfigure original depositional geometries and results in very unusually shaped sandstones, which resemble little, if any, of the original geometry. A number of deformational sandstone bodies, dykes and volcanoes from the upper part of the Carboniferous Ross Formation are described, which offer the opportunity to examine a suite of field-scale reconfigured sandstones. These structures are located in close proximity to the Ross Slide, which outcrops along a 2-km section on the northern coast of the Loop Head Peninsula, County Clare, Ireland. Dome- and ridge-shaped deformational sandstone bodies, dykes and volcanoes are interpreted to be the product of remobilization of a turbiditic sandstone. Liquification and remobilization were triggered by translation, cessation and loading of the underlying turbiditic sandstone by the Ross Slide. Deformational sand body, dyke and volcano development occurred in an asynchronous fashion with deformational sand bodies formed during slump translation. Sand dykes and volcanoes developed after the cessation of slump movement. During slump translation, the minimum principal stress (σ3) was orientated vertically and the slump behaved in a `ductile' manner. After slump arrest, the minimum principal stress was oriented horizontally, and the unit regained shear strength to behave in a `brittle' manner. The relative change in rheological states with changing applied shear stress is indicative of thixotropic-like behaviour within the slump mass. Ridge-shaped deformational sand bodies are aligned parallel to slump folds, and their morphology is inferred to be controlled by compressional slump deformation associated with heterogeneous cessation of slump movement that was initiated by frontal arrest of the translating mass.