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David Hodgson[1], Stephen Flint[1], Kevin Pickering[2] (1) University of Liverpool, Liverpool, United Kingdom (2) U.C.L. (University College London), London, United Kingdom

Variations in Turbidite Bed-thickness Distributions as a Function of Basin Confinement and Submarine Fan Environment

Turbidite systems readily lend themselves to a rigorous quantitative approach due to the large variation in bed thickness preserved within the range of submarine fan sub-environments. Bed-thickness and grain-size distributions primarily depend upon the depositional setting (including fan environment, basin geometry, intrabasinal topography and tectonic setting), rather than the (stochastic versus deterministic) emplacement processes. At present, there is no agreement on the most appropriate statistical model to account for bed-thickness (and/or inter-bed grain-size) distributions within unconfined or unchannelised settings. More work is needed to quantitatively identify the 'pure' turbidite bed-thickness distribution (i.e. in an unconfined basin-floor setting). From this, however, the statistical deviation in bed thickness distribution of turbidites could be used as a diagnostic tool in the identification of submarine fan environment and the degree of basin confinement from core, as well as outcrop, datasets. To test this theory, turbidite bed-thickness measurements were collected from two well-understood high-resolution (<1-cm) core datasets (the Ainsa Basin, Spanish Pyrenees, and the Tanqua Basin, South Africa). The turbidite bed-thickness distributions vary as a function of position relative to the maxima in channelisation, inter-bed erosion, non-deposition, and bed amalgamation and, therefore, fan sub-environment, and the degree of confinement and/or ponding of turbidity currents in the depositional system.