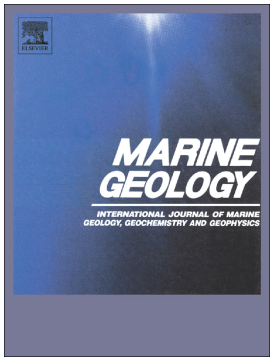

Formation of sediment waves by turbidity currents and geostrophic flows: A discussion

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Formation of sediment waves by turbidity currents and geostrophic flows: A discussion

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Abstract

A condition for the existence of sediment waves under turbidity currents as antidunes with the requirement of a slope gradient $\geq 3.0 \times 10^{-3}$ is deduced. Data show no such waves on slopes $< 2.5 \times 10^{-3}$, but some contourite mudwaves occur on slopes as low as 4.4×10^{-4}. However the latter also occur on slopes $> 3 \times 10^{-3}$ so no clear distinction is possible. Where turbidity current channels cross sediment drifts, or geostrophic flows traverse turbidite fans, the origin of most mudwaves will need to be determined by reference to internal features and context. A key problem is deposition of mud as antidunes from turbidity currents where even the waning flow is probably well above the critical *erosion* velocity for a *clear* flow. Deposition must occur from high concentration flows well above clear water critical depositional stresses. Once a wavy bed is set up, subsequent deposition may occur via the lee-wave mechanism proposed for contourite waves under a gradient Froude Number >1. A steep angle (<45°) between crest and flow axes is typical of GF waves, which may be dunes or antidunes, whereas TC waves tend to be orthogonal, but data on this discriminant are sparse.

Keywords

mudwaves, sediment waves, antidunes, contourites, turbidity currents, geostrophic flow.