Anatomy of Deep Oceanic Gateways: Architectural Elements, Processes and Facies

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Deep oceanic gateways are narrow conduits that cut across the sills between ocean basins and thereby allow the exchange of deep and intermediate water masses. In flowing through a constricted gateway, bottom current velocity can become enhanced leading to erosion and non- deposition, the development of scour, wave and other bedforms, as well as to the construction of different types of contourite drift in broader parts of the gateway and at its downstream exit.

Bottom current features, architectural elements and contourite facies are intercalated in time and space with those of downslope processes, including slides, slumps, debris flows and turbidity currents, as well as with background pelagic and hemipelagic sedimentation. Tectonic, sea- level, climatic and physiographic factors all influence the complex nature and distribution of sediment deposition and erosion in gateways.

Examination of 12 gateways for which data are available has allowed the identification of irregular to elongate patch drifts, elongate mounded drifts, sheet drifts and contourite fan drfits; the recognition of sediment wave fields, channels, moats, current smoothed and eroded rocky seafloor elements; and the documentation of muddy, silty, sandy and gravelly contourite facies, including those with terrigenous, biogenic and manganiferous composition. The challenge now is to elucidate past changes in bottom current flow through gateways by decoding the signatures recorded in contourite facies and their distribution.