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3D Seismic Geomorphology and Stratigraphy of Deep-Water Debris Flows

Extensive deep-water debris flow deposits are observed both in slope as well as basin settings. Debris flow deposits commonly characterize the base of deep-water depositional sequences. These deposits can occur as sheets, lobes, and channels, can reach 150 m or more in thickness, and are observed to extend seaward across basin floors as far as turbidite deposits. This report documents several debris flow examples imaged by 3D seismic data.

Debris flow deposits can be recognized seismically by certain seismic geomorphologic as well as seismic stratigraphic characteristics: 1) surfaces underlying debris flow deposits commonly are characterized by extensive scour, commonly taking the form of extensive linear grooves up to 20 km in length, 0.75 km wide, and 40 m deep, that diverge downsystem. These grooves are inferred to be caused by blocks imbedded at the base of the debris flow mass that are dragged across the sea floor. 2) In section view, debris flow deposits are characterized by transparent to chaotic seismic reflections. The upper bounding surface commonly is characterized by irregular to hummocky relief, and the lower bounding surface by low to high relief grooves. Debris flow units commonly amalgamate, although surfaces between successive debris flow units can be obscure. 3) The morphology of debris flow deposits can be channel or lobe form. Debris flow channels are relatively straight and characteristically floored by a grooved base. Debris flow lobes commonly are flat on top, steep on their flanks and can be either relatively narrow or wide. In some instances debris flow lobes are characterized by extensive low-angle thrust faults associated with compression as the flows decelerated.