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Basic Types of Turbidite Systems Based on Modern Sea Floor Images

Each turbidite system has its own tectonic, sediment supply and oceanographic controls; thus no single fan model can describe all scales and types of systems. However, there are some basic types of turbidite systems in both unconfined and confined basin settings. In unconfined basin settings, the smallest local drainages feed unchannelized sand-rich aprons that extend a few kilometers out from the base of the basin slope (i.e. caldera lake aprons); littoral drift cells and small rivers feed sand-rich channelized radial fans up to ~100 km in diameter (i.e. Navy Fan); intermediate sized rivers feed mixed fans of ~100-500 km (i.e. Astoria Fan); and large rivers feed elongate highly channelized mud-rich fans of ~500+ km (i.e. Mississippi Fan). In confined basin settings, these basic and other complex turbidite system types are found in locations such as active margins, rift basins, deep-sea trenches and continental slopes. For example: (1) Cascadia Basin along the active subduction zone margin contains aprons, mixed fans, tectonically confined bypass channels from 20 to 2000 km and unusual turbidite systems with plunge pools, sediment waves, channels and lobes; (2) Lake Baikal rift basin contains aprons on the border fault footwalls, sand-rich fans on the ramp hanging walls, and elongate mud-rich fans in axial basins drained by axial fault-confined channels; and (3) Gulf of Mexico slopes contain ponded mini-basins and bypass channels that sometimes traverse the slope to feed mixed fans of the Sigsbee Abyssal Plain where small sand-rich fans and large mud-rich fans also are found.