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Sand-Rich Holocene Turbidite Systems Along the Active Transform Fault Margin of Northern California

Numerous turbidite systems along the northern California continental margin are influenced by the northern San Andreas Fault that parallels the coast near San Francisco Bay and underlies the northern continental margin. Multiple tributary slope canyons and proximal channels join downstream into large channels, and all systems are dominated by turbidite silt and sand beds. The northernmost Vizcaino Channel has its source in the littoral drift zone and contains 100% turbidite beds up to 1.5 m thick with coarse sand. In seven other major channel systems south of Vizcaino, net turbidite silt/sand bed % ranges between 50 to 80% and sand to shale ratios (hemipelagic mud compacted to 1/3 thickness) range from 3-13:1. In Noyo Channel, numerous AMS radiocarbon ages show that 30 turbidite beds have deposited in about 9,000 calendar years B.P. or an average frequency of 1/ 300 yr. Channels below tributary confluences are characterized by single turbidite beds with multiple coarse-grained sediment pulses that exhibit different mineralogic sources and bimodal texture. These multiple pulses, and the same typical rate of turbidite bed deposition (5/meter) above and below channel tributary confluences, suggest that there is synchronous triggering of many turbidite events in multiple canyon sources along 440 km of the northern California margin. The most logical cause of synchronous triggering is great earthquakes along the northern San Andreas Fault. However, this preliminary hypothesis must be confirmed by additional radiocarbon ages, mineralogic analysis, and correlation of turbidite beds. In Vizcaino Channel, additional turbidites appear to be triggered by sedimentologic events related to the littoral drift source.