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STRATIGRAPHIC CORRELATION OF SOUTHERN CASCADIA TURBIDITES VIA PAIRING OF SUB BOTTOM PROFILES AND SEDIMENT CORE DATA

Details

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Abstract

In order to better assess the continuity of turbidite beds along the southern Cascadia continental margin, sub bottom profile data (3-5 kHz, CHIRP) has been incorporated with existing and 2009 sediment cores from the southern edge of the Astoria Fan southward to the Eel Canyon along the base of the continental slope. We observe a~15% reduction in Holocene section thickness compared with Rogue Apron due to reduced sediment supply off southernmost Oregon. Further to the south, at ~41.7N individual beds and the section thickness begins to increase southward with corresponding increases in grain size and density in correlative

beds, both for beds correlated to regional sandy turbidites at Rogue Apron and for mud turbidites limited to southern Cascadia. At 41.2N, correlation of key beds indicates an increase of ~170%, increasing to 260% of the Rogue Apron value at 41.02N. Individual beds may be correlated with reasonable confidence between cores sites which are more closely spaced than previous data. Our preliminary correlation of the new cores supports continuity of beds T1-T9, extending at least southward to Trinidad Pool and likely Eel Canyon using 14C, CT and physical property data. Exceptions to this are regionally correlated T4, and T6, which diminish in thickness, density and grain size southward. Regional events T2, T3 and T5 become more prominent southward to an extent greater than the regional trend. 11 Rogue Apron mud turbidites may be correlated southward to Trinidad Pool, a distance of 150 km, most of them becoming coarser and thicker sandy turbidites over that distance. High-resolution Chirp seismic profiles spanning the core sites and capable of ~15-18 cm vertical resolution reveal that turbidite stratigraphy along the base of the southern Cascadia continental slope is continuous, with little variation for several hundred kilometers along strike. Thin mud turbidites at Rogue Apron cannot be imaged directly at that site, but thicken southward and can be imaged at Trinidad plunge pool. Accommodation space for the beds not imaged remains present along strike, supporting their presence, along with the core data. Regional stratigraphy reveals that hemipelagic sedimentation rates and turbidite thickness and mass for regional turbidite beds are similar at widely separated sites, yet the total thickness of the Holocene section is greater by a factor of two in southern Cascadia at Rogue Apron. This difference is attributed to the presence of 23 mud turbidites at Rogue Apron. The mud turbidites are ubiquitous along southern Cascadia only, with only one possible example of a correlated turbidite limited to the northern margin. Correlation of thinner turbidites between widely separated sites, including an isolated lower slope basin and possible correlative turbidites in both coastal and coast range lakes supports a regional and synchronous triggering mechanism, probably subduction earthquakes of limited strike length.

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