PREHISTORIC BEACH ACCRETION RATES USED TO PREDICT LONG-TERM RESPONSE TO SEDIMENT DEPLETION IN THE COLUMBIA RIVER LITTORAL SYSTEM

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Low rates of prehistoric beach accretion (0.5 m yr^{-1}) differ radically from early historic (1870) conditions of rapid accretion (1-7 m yr^{-1}) near developed river mouths. Over decades to centuries, low rates of prehistoric accretion throughout the cell (160 km in length) imply extensive sediment redistribution alongshore. In this study we examine prehistoric beach reaction to great earthquake subsidence (mean recurrence interval 500 yr) to establish littoral system response to catastrophic changes in relative sea-level and sediment supply. Understanding how the shoreline responds to these changes is required to constrain models of continued and future erosion in this dynamic littoral system.

During the summer of 1997, Ground Penetrating Radar (GPR) traverses, sand-auger cores (130 sites), and preliminary radiocarbon dates (12 in number) were obtained to establish linear buried scarps and overlying dune ridges (earthquake features). Correlations of these linear features provide shoreline positions (time lines), used to establish net episodic-accretion rates.

Comparisons are made of historic and prehistoric accretion rates for boundaries of the four sub-cells:

Sub-cell	Boundary	Historic Rate (m yr-1)	Prehistoric Rate (m yr-1)
Ocean Shores	North	1.6	0.4
	South	6.6	0.3
Grayland Plains	North	2.3	0.3
	South	5.6	0.6
Longbeach	North	1.1	0.4
	South	5.4	0.4
Clatsop	North	3.6	0.6
	South	2.2	0.6

Historic accretion rates are 275 - 2000% of prehistoric accretion rates at same locations. It is yet to be established whether the early historic accretion is due to jetty construction or increased sediment supply. In any case, the areas of highest historic accretion are unlikely to remain stable under late-historic conditions of diminished sediment supply from Columbia River basin dams (more than 19 in number).