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# HYDRODYNAMIC CONTROLS ON THE AGE AND COMPOSITION OF TERRESTRIAL ORGANIC MATTER DISTRIBUTED OVER THE WASHINGTON MARGIN

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Fluvial systems discharge complex mixtures of particulate and dissolved terrigenous materials to the oceans. Upon entering the marine realm, these materials are subject to a range of physical and biogeochemical processes. For particulate matter, hydrodynamic properties play a critical role in dictating where and how this material is distributed and deposited on the sea floor. Prior studies have shown that the organic matter composition of sedimentary particles on river-influenced continental margins differs markedly as a function of grain size and density. This implies that hydrodynamic processes which induce differential particle sorting will strongly influence the abundance and type of terrigenous organic materials distributed over the margin. The impact of these processes on the age distribution of sedimentary components has not previously been assessed. We have analyzed a suite of surface sediment samples collected along a transect from the mouth of the Columbia River across the Washington Margin to the Cascadia Basin in the northeast Pacific Ocean. Sediments were separated according to their grain size and hydrodynamic properties, and characterized in terms of their bulk elemental and isotopic properties. We observed systematic variations in organic matter age and composition across the different particle classes. Compound-specific radiocarbon analysis of vascular plant biomarkers in different grain-size fractions from two stations on the outer shelf and upper slope also revealed systematic relationships. Finer grain sizes carried younger terrestrial carbon than coarser fractions. These age differences can be explained in terms of the differing timescales over which surface and bottom currents redistribute coarse and fine-grained particles over the shelf and slope. In addition, terrestrial biomarkers in grain size fractions from slope sediments are systematically older than equivalent fractions recovered from the shelf. These observations suggest that timescales of across-margin transport of particulate organic matter can be gleaned from molecular-level radiocarbon measurements. Together, these measurements provide

insights into the role of hydrodynamic processes in dictating the distribution of terrigenous materials on river-influenced continental margins, and underline the importance of understanding these processes for the interpretation of corresponding stratigraphic records.