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Pervasive influence of fine silt sediments on the radiocarbon age of bulk sedimentary OC, alkenones and GDGTs via hydrodynamic mineral sorting processes in continental margins.

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Since Ohkouchi et al. (2002) pioneering work, compound specific radiocarbon (^{14}C) dating has been largely used to explore ^{14}C age discrepancies between co-deposited sedimentary components in a wide range of depositional settings. Older ^{14}C ages of bulk organic carbon (OC) and alkenones relative to co-deposited planktonic foraminifera have been mainly attributed to lateral sediment transport processes by means of organic matter (OM)-mineral associations.

Definitive evidence for this hypothesis requires in-depth investigations at the mineral grain-size level. Here, we examine the radiocarbon signatures of OC and two molecular biomarkers widely used as paleothermometers (i.e., alkenones and glycerol diakyl glycerol tetraether (GDGTs)) associated to discrete sediment grain-size fractions collected from a range of continental margin settings. Our results evidence the pervasive influence of hydrodynamically-driven sorting processes on the OM content and composition of continental margin sediments, manifested in the ^{14}C age variability of OC, alkenones and GDGTs residing in bulk sediments corresponding grain-size fractions. We find that OC and both, alkenones and GDGTs, preferentially reside within the fine silt fraction, which accounts for a substantial fraction of the bulk sediment mass. Therefore, fine silt exerts a strong influence on the ^{14}C ages of these three components in bulk sediments. Given the propensity to resuspension and advection of fine silt under strong currents, the extent of its impact on the paleotemperature signal recorded by alkenones and GDGTs is also assessed.

Ohkouchi, N., Eglinton, T.I., Keigwin, L.D., Hayes, J.M., 2002. Spatial and Temporal Offsets Between Proxy Records in a Sediment Drift. Science 298, 1224-1227.