Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.30106

Lateral Sediment Redistribution and Bottom Water Dynamics over the last 200 ka: A Paleoceanographic Perspective Using ^{230}Th and Sortable Silt

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Understanding oceanic particle fluxes from sediment records is crucial for paleoceanographic reconstructions, as it provides the most accurate assessments of export production and terrigenous material supply rates. Traditionally, stratigraphy-based mass accumulation rates (derived from the multiplication of the bulk density and the linear sedimentation rates) are used to estimate material fluxes to the seafloor. However, these estimates and their paleoceanographic interpretations may not account for the lateral redistribution of sediments and may thus be partly misleading.

In particular, regions such as the Northern and Western Atlantic and the Southern Oceans, characterized by strong bottom currents, may experience sediment redistribution that influences paleoceanographic interpretations. To examine the relationship between sediment redistribution and bottom water circulation changes over the last two glacial-interglacial cycles, we calculated ^{230}Th-derived focusing factors (indicating lateral sediment redistribution) and sortable silt (a proxy for past bottom current strength) from seven sediment cores in the deep Atlantic and Southern Oceans. Our findings reveal variations in focusing factors and bottom current strength that align with major climatic events of the last 200 ka. Additionally, we observe a correlation between the degree of lateral sediment redistribution and terrigenous grain size distribution. However, no consistent relationship between sortable silt and ^{230}Th is found, suggesting that other factors, such as local topography, and the overall grain-size distribution beyond sortable silt, may also play a role.