

# **Estimating long-term mass accumulation rates in marine sediments: A new approach considering syndepositional redistribution in areas of strong bottom current dynamics**

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Understanding oceanic particle fluxes from sediment records is vital for paleoceanographic research, guiding assessments of export production and terrigenous material supply rates. Traditionally, stratigraphy-based mass accumulation rates (BMARs), which are calculated by multiplying the sediment dry bulk density by the linear sedimentation rate between dated sediment horizons, estimate material fluxes to the seafloor. However, BMARs and the resulting paleoceanographic interpretations may need to consider the lateral redistribution of sediments to avoid substantial errors. Particularly in the Subantarctic Southern Ocean, lateral redistribution is common due to the strong bottom water circulation of the Antarctic Circumpolar Current, which impacts paleoceanographic interpretations. As a case study, we evaluate export production indicators over the past 1.4 million years at the Pacific entrance of the Drake Passage, correcting BMARs for sediment advection, we identify fluctuations in export production coinciding with major climatic events (The Mid-Pleistocene Transition and Mid-Brunhes Event). Additionally, the productivity response in the area was enhanced (weakened) during globally strong (faint) glacials or interglacials. Our study highlights the importance of considering lateral sediment movement for accurate paleoceanographic reconstructions and opens avenues for testing this approach in other oceanographic settings.