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DECODING TRANSPORT AND SOURCING OF PARTICULATE ORGANIC MATTER IN THE WATER COLUMN OF THE SW IBERIAN MARGIN

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Over continental margins, degradation of fresh organic matter (OM) during vertical export results in sharp particulate organic carbon (POC) flux attenuation with water depth. Nevertheless, the physical association of OM with mineral surfaces favors the translocation of POC from distal locations and the addition of laterally transported OC to OC accumulating in underlying marine sediments.

Here, we explore the geochemical signals of POC in the water column of the SW Iberian margin and compare them with those of OC from surface sediments. We aim to assess POC transport pathways and their contribution to signals recorded in continental margin sediments. POC from discrete water depths was collected on glass fiber filters with stand-alone pumps at 6 stations. In total, 38 POC samples were analyzed for radiocarbon (^{14}C) content ($\Delta^{14}C$) and age, stable carbon isotopes and carbon content.

Results indicate the incorporation of bomb ^{14}C in the POC of the upper 300 m. The rapid degradation of marine and labile POC is observed below 500 m, with OC and radiocarbon ($\Delta^{14}C$) content generally decreasing with depth at all stations until 1500 m. Samples intercepting the Mediterranean Outflowing Water (MOW) show ^{14}C ages between 500 and 1000 yr BP in the upper core of the MOW and ages > 1000 yr BP in the lower core. Below 1500 m, younger ages are observed at some stations. However, samples intercepting local turbidity maxima at any depth generally show the oldest ages (>2000 yr) and suggest the key role of intermediate nepheloid layers in transporting pre-aged OC.

The ^{14}C ages of sedimentary OC from 36 surface sediments vary between 875 and 4800 yr (1750 yr on average). By contrast, the ^{14}C ages of paired planktic foraminifera are typically younger and imply the incorporation of bomb ^{14}C in most samples.

Our results suggest lateral transport of POC is a significant flux component of particle export to the ocean's interior over the SW Iberian margin. Because advected OM is protected by mineral surfaces and vertical flux of OC is attenuated with depth, we conclude that signals of laterally transported POC appear to be preferentially preserved in sediments.