

## 'The BIG Questions' Lecture Series



# "Suspended" Particulate Organic Matter: A Major Unconsidered Carbon Sink in the Ocean?

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The majority of particulate organic matter (POM) in the ocean is thought to be formed by fine "suspended" (slow-sinking) particles (sPOM), which might be exchanged through isopycnal transport. Nevertheless, studies on organic carbon fluxes and biogeochemical models in the global ocean are mostly based on fast-sinking particles collected with sediment traps, in spite of the frequently reported imbalance with oxygen consumption rates in the dark ocean. Recent evidence indicates, however, that in eastern and western boundary currents sPOM is on average 4-5  $\mu\text{M}$  higher in the 200-2000 m than in the central Gyres, yielding a significant carbon pool susceptible of being respired or exchanged with the ocean interior. In the mesopelagic zone, marked peaks in sPOM, microbial abundances and metabolic activity are observed, coinciding with stability gradients between water mass interfaces or with frontal structures related to mesoscale features. Estimates of horizontal transport and consumption of suspended carbon (sPOC) in the subtropical Northeast Atlantic indicate that lateral sPOC fluxes in the mesopelagic zone may be up to three orders of magnitude higher than vertical fluxes collected with sediment traps, largely contributing to the dark ocean respiration. These results suggest that boundary currents may support higher lateral export of coastal-produced organic carbon than previously assumed. A large fraction of this sPOC would however be remineralized in the upper 1000 m of these regions instead being transported to the ocean interior of the subtropical Gyres: a hypothesis supported by recent findings of a preferential life mode of prokaryotes in association with suspended particles. If the lateral sPOC fluxes estimated in the NE Atlantic are confirmed for other boundary regions, the coastal-open ocean sPOC transport might play a key, but previously unconsidered, role in the global carbon cycle of the oceans.

Venue: GEOMAR westshore building, large conference room (großer Konferenzraum)

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