



Vertical distribution of aggregates (>110 μm) and mesoscale activity in the northeastern Atlantic: Effects on the deep vertical export of surface carbon

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ABSTRACT: Spatial and temporal variability in the distribution of marine aggregates (>110 μm) was studied using underwater video profilers in an area off the Iberian Peninsula and Azores Islands dominated by mesoscale and submesoscale hydrodynamics in winter, spring, and summer 2001. In the 0-200-m layer, aggregates were most abundant in spring (100-120 mg dry weight [dry wt] m^{-3}) and lowest during summer and winter (1-10 mg dry wt mm^{-3}). In the deeper layers (down to 1,000 m), the seasonal pattern was different, with concentrations highest in spring and summer, and lowest in winter (e.g., at 800 m, 5-10 mg dry wt mm^{-3} in spring and summer; 1-5 mg dry wt mm^{-3} in winter). The seasonal change in the abundance of aggregates in the upper 1,000 m was consistent with changes in the composition and intensity of the particulate flux recorded in sediment traps and with seasonal changes in the surface phytoplankton community. In an area dominated by eddies, surface accumulation of aggregates and export down to 1,000 m occur at mesoscale distances (<100 km). The occurrence of a rich aggregate layer may be related to mesoscale activity in water flow that drives nutrient inputs, phytoplankton production, and the formation of large aggregates. Such spatially constrained zones of massive export may be typical of frontal open-sea systems, and may have been missed by conventional sediment trap moorings, which cannot resolve export at this mesoscale level.

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