

## **Dissolved Organic Carbon (DOC) production by microbial populations in the upper ocean layer: spatial and temporal variability and relationship with planktonic trophic structure**

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Shifts in planktonic community structure are expected to take place on decadal or centennial time scales due to altered physical forcing as a result of climate change. In this scenario, unravelling the functional relationships between water column hydrodynamics, community structure and the circulation of energy and matter through the pelagic ecosystem is one of the major challenges of biological oceanography in the present decade.

In this investigation, we have measured DOC production rates over a wide range of productivity levels and phytoplankton size structures in the Atlantic ocean. Our aim was to elucidate the functional relationship between DOC production; planktonic community structure, as inferred from phytoplankton size; and phytoplankton-mediated carbon and oxygen fluxes.

Our results showed that the percentage of DOC production with respect to total integrated primary production (percentage of extracellular release, PER) is 3 times higher in oligotrophic, picoplankton-dominated waters (~ 21 %) than in productive waters, where large-sized cells formed the bulk of the phytoplankton biomass (~ 7 %). The close relationship found between PER, the rates of net community production; and phytoplankton size structure, suggests the importance of trophic processes in the release of dissolved organic matter in the upper ocean layer.