

Spatial Dynamic of Pico- and Nano-Phytoplankton Communities in the Mouth of the Seine River

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Abstract : Pico- and nano-phytoplankton are abundant and ecologically critical components of the autotrophic communities in the pelagic realm. While the role of physical forcing related to tidal cycle, water mass intrusion, nutrient availability, mixing and stratification on microphytoplankton blooms have been widely investigated, these are often overlooked for pico- and nano-phytoplankton especially in estuarine waters. This study investigates changes in abundances and community composition of pico- and nano-phytoplankton under different estuarine tidal conditions in the mouth of the Seine River in relation to nutrient availability, water column stratification and spatially localized currents. Samples were collected each day at high tide, over spring tide to neap tide cycle, from 21 stations homogeneously distributed in the Seine river mouth in May 2011. Vertical profiles of temperature, salinity and fluorescence were realized at each sampling station. Sub-surface water samples (i.e. 1 m depth) were collected for nutrients (i.e. N, P and Si), phytoplankton biomass (i.e. Chl a) and pico- and nano-phytoplankton enumeration and identification. Pico- and nano-phytoplankton populations were identified and quantified using flow cytometry. Total abundances tend to decrease from spring tide to neap tide. Samples were characterized by high abundances of *Synechococcus* and *Cryptophyceae*. The composition of the pico- and nano-phytoplankton varied greatly under the different estuarine tidal conditions. Moreover, at the scale of the river mouth, the pico- and nano-phytoplankton population exhibited patchy distribution patterns that were closely controlled by water mass intrusion from the Sea, freshwater inputs from the Seine River and the geomorphology of the river mouth. This study highlights the importance of physical forcing to the community composition of pico- and nano-phytoplankton that may be critical for the structure of the pelagic food webs in estuarine and adjacent coastal seas.

Keywords : nanophytoplankton, picophytoplankton, physical forcing, river mouth, tidal cycle

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