



## **Dominance patterns of competing phytoplankton groups in the wake of an island**

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We study the patterns of dominance of different phytoplankton species competing for the same nutrient in the wake of an island. These dominance patterns are a result of the interplay of biological growth with physical transport processes. We study the planktonic biological activity in the wake of an island which is close to an upwelling region providing nutrients for the growth of the plankton. Particularly we are interested in the competition of different plankton groups possessing different needs of nutrients for their growth. Our results are based on the numerical analysis of a simple kinematic flow mimicking the hydrodynamics in the wake coupled to a four component plankton model which consists of nutrients, two phytoplankton groups and zooplankton. We show that mesoscale hydrodynamic structures emerging in the wake of the island, e.g. vortices, can lead to spatio-temporal patterns in which each of the phytoplankton groups dominates in different regions of the ocean. We study the mechanism of the emergence of these inhomogeneous dominance patterns by investigating the nutrient transport in the flow and the interaction of hydrodynamic and biological time scales. We show that the composition of the plankton community is different inside and outside of mesoscale hydrodynamic vortices. Moreover we demonstrate that the time periodicity of the patterns can be different from the periodicity of the flow.