

Deriving Ecosystem Properties from Large-Scale Distributions of Primary Biological Oceanographic Variables

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Abstract: A few biological oceanographic variables are documented at large horizontal scales. These primary variables include: phytoplankton biomass (PB, i.e. chlorophyll a) and production (PP), as estimated from remotely sensed ocean colour; dissolved organic matter (DOM), and bacterial biomass (BB) and production (BP), which come from compilations of ship surveys; and mesozooplankton (MZ), which either come from compilations of ship surveys, or systematic sampling with the plankton recorder. Unique information on large-scale ecosystem properties can be extracted from such primary variables, by combining theoretical developments and data analyses. For example: combining PB and PP can be used for identifying the dominant processes (physical versus biological) in pelagic ecosystems; combining water temperature, DOM, BB, BP and MZ provides information on bacterial and community respiration, and food-web structure; applying empirical allometric relationships to taxonomic MZ data gives indications on the fate of organic carbon, i.e. grazing versus sinking to deep waters. Theoretical efforts are required to expand such applications, which add considerable value to the primary data.