

Marine Biogeochemistry:

The cycling of material associated with biological components in the ocean is mainly the result of interconnected effects of biological growth and microbial decomposition, geochemical processes, geological activities, and other processes. These processes mainly take place in the ocean and its interfaces with the atmosphere and sediment. The investigation of the mechanisms and processes of material cycling has become the main subject of marine biogeochemistry.

The two main characters in marine biogeochemistry are plankton and all of its essential nutrients (please distinguish each character in the figure). Plankton can only grow by relying on essential nutrients; at the other end, essential nutrients originate from the decomposition of plankton biomass. Their mutual interdependence not only supports the circle of life but also drives the continuous cycling of material in the ocean and on Earth.

Phytoplankton, through the process of photosynthesis, convert carbon dioxide into organic material, where almost all other organisms in the food chain take advantage of this hidden source of energy in organic carbon.



Compared to other major essential nutrients, carbon dioxide is plentiful in seawater and is rarely a limiting nutrient for phytoplankton growth in the ocean. Instead, nitrogen (mainly nitrate) and phosphorus (mainly phosphate) are not only the major elements found in plankton but are also the main limiting nutrients that regulate phytoplankton growth.

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