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North Pacific Biogeochemical Processes

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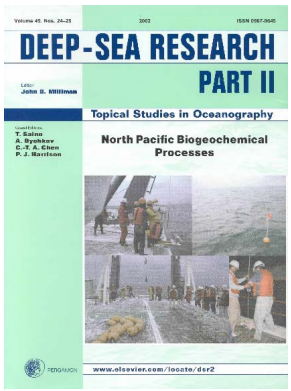

This volume of DSR II is dedicated to the Joint Global Ocean Flux Study (JGOFS) North Pacific Process Study (NPPS), coordinated by the JGOFS North Pacific Task Team. Following the studies conducted by Canadian JGOFS in the eastern subarctic Pacific, the JGOFS NPPS focused mainly on the western subarctic Pacific. The goals of the JGOFS NPPS were to quantify CO_2 drawdown by physical and biological pumps in the northern North Pacific by identifying and studying the regional, seasonal to inter-annual variations of the key processes, and to understand their regulating mechanisms. The NPPS was composed mainly of Japanese programs conducting extensive surveys, intensive biogeochemical process studies, time-series observations at station KNOT at 44°N, 155°E, ocean color satellite observations, and modeling. This volume covers CO_2 intrusion to the intermediate waters, biogeochemical time-series observations at station KNOT, vertical fluxes in the water column, and the east–west Pacific Ocean comparison of ecosystems and biogeochemical regimes.

The North Pacific can be viewed as the largest global estuary in which a steep halocline at 100–120-m depth separates the surface from deeper waters. Nutrient concentrations in deep waters are the highest in the global ocean because it is the terminal region for the abyssal circulation. This setting provides a unique situation in the northern North Pacific where high concentrations of nutrients are located below the shallow halocline with very large concentration gradients with depth. This region is also known as a region of intense winter cooling due to air–sea interactions with the monsoonal wind, in that the winter cooling takes place to a greater extent in the western subarctic Pacific. The regional difference is also noted in the ecosystem structure in the eastern and western subarctic Pacific. It is well documented that the spring blooms, mainly consisting of diatoms, occur only in the western part of the subarctic Pacific. The intense air–sea interactions in winter cause CO_2 exchange that needs to be evaluated quantitatively in the context of the global carbon cycle.