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Phytoplankton growth stimulation and nutrient pulse by natural rainfall during spring and summer in Sagami Bay, Japan

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To assess the consequences of high-nutrient freshwater input on the phytoplankton community structure during the rainy season, the phytoplankton levels were monitored daily together with environmental factor variables from 12 April to 22 July 2003 in Sagami Bay, Japan. The low salinity conditions lasting 2-3 days after heavy rainfalls resulted in a significant loading of nutrients, such as dissolved inorganic nitrogen (DIN), into the coastal area. Also, a few days after the decrease in salinity, increases in Chlorophyll-*a* (Chl-*a*) concentration were frequently observed. Based on the high values of total Chl-*a* concentration, the time was divided into three periods, which were from 1 to 11 May (Period A), from 26 May to 9 June (Period B) and from 30 June to 22 July (Period C). The phytoplankton assemblages during Period A were dominated by two dinoflagellates, *Ceratium furca* and *Ceratium fusus*. Prior to the blooming of these species, the heterotrophic dinoflagellate *Noctiluca scintillans* was dominant. During Period B, the phytoplankton communities were dominated primarily by the diatoms *Rhizosolenia delicatula, Hemiaulus sinensis* and *Navicula* spp. Finally, *Cerataulina dentate, Rhizosolenia* spp., *Lauderia borealis* and *Neodelphineis pelagica* were the dominant species during Period C. After increases in the phytoplankton abundances, the available nitrogen (N), and phosphorous (P) were consumed and exhausted, which was considered as a potential cause of the shift in the dominant organisms from large diatoms to pico- and nano-plankton in the low Chl-*a* environment. In particular, silicate (Si) was not a major limiting factor for phytoplankton production, since the plots of the Si: DIN and Si: P ratios clearly demonstrated that there were not any potential stoichiometric limitations created by Si, and almost all silicate concentrations were > 2.0 μM during this study. This indicates that high Si availability contributes favorably to the maintenance of diatom ecosystems in Sagami Bay.