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Remotely-sensed phytoplankton size classes (PSCs) in the northern Bering Sea and the southern Chukchi Sea

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Phytoplankton size classes (hereafter, PSCs) were derived from satellite ocean color data using a present phytoplankton abundance-based optical algorithm in the northern Bering and southern Chukchi Seas to characterize the spatial and seasonal variations in the PSCs and investigate the contributions of small phytoplankton to the total phytoplankton biomass. The comparison results showed that the phytoplankton abundance-based method approach could reasonably classify the three PSCs (pico-, nano-, and micro-phytoplankton). The general spatial distribution showed that the large (micro-) phytoplankton were dominant in the coastal waters and the west side of the Bering Strait, while the small (nano- or pico-) phytoplankton were dominant in the open ocean waters. Nano- and micro-phytoplankton were dominant in May and October in most of the study area, while pico-phytoplankton were dominant in the summer months in the open ocean waters. The annual variation in the small phytoplankton dominance had a strong positive relationship with the annual mean sea surface temperature (SST), which is consistent with the increasing dominance of small phytoplankton biomass as water temperature increases. Micro-phytoplankton have an apparent increasing trend in the southeastern Chukchi Sea but slightly decreasing trends in Chirikov and St. Lawrence Island Polynya (SLIP). In contrast, there were increasing trends in pico-phytoplankton in Chirikov and SLIP, which seems to be related to increasing annual SST. It is crucial to monitor changes in the dominant groups of the phytoplankton community in the Bering and Chukchi Seas as important biological hotspots responding to recent changes in environmental conditions.