Global size distribution of phytoplankton communities from space

*Takafumi Hirata[1], Yoshio Masuda[1], Koji Suzuki[1], Yasuhiro Yamanaka[1]

1. Faculty of Environmental Earth Science, Hokkaido University

We developed a remote sensing methodology to estimate size distribution of various pigment-based phytoplankton groups such as diatoms, peridinin-containing dinoflagellates, haptophytes, cyanobacteria etc. Our estimation was compared with a local in situ observation to show an agreement between them. According to our state-of-the-art remote sensing methodology, global size structure of the entire phytoplankton community could be divided into three classes to the first approximation, agreeing well with a conventional classification based on historical in situ observations. However, in contrast to historical size classifications (Sieburth et al, 1978), i.e. pico-phytoplankton (< 2 μm), nano-phytoplankton 2-20 μm, micro-phytoplankton (> 20 μm), we propose new size boundaries for these classes based on global satellite observation: pico-phytoplankton (< 1 μm), nano-phytoplankton 1-10 μm, micro-phytoplankton (> 10 μm). Size-diversity index of a given phytoplankton group, defined by a difference between logarithmic maximum and minimum sizes of the group, was largest for haptophytes than diatoms. The maximum size-diversity of a given phytoplankton group was not necessarily correlated to its dominance in chlorophyll abundance either. Our results are expected to cast light upon global marine biodiversity and marine ecosystem analysis.

Keywords: phytoplankton, biodiversity, size, ocean color, ecosystem, ocean

