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ABSTRACT

In order to identify phytoplankton taxonomic compositions by optical characteristics, we examined a relationship between the pigment composition and the excitation fluorescence spectrum using purely cultured species (Cyanophyceae, Bacillariophyceae, Raphydophyceae, Chlorophyceae, Dinophyceae). Excitation spectra and phytoplankton pigments were measured by a spectrofluorometer and a RP-HPLC with a phtodiode array detector. Cyanophyceae showed a characteristic spectrum caused by phycobili-protein pigments (PB). The fluorescent intensity was extremely high from 545nm to 600nm, and it varied depending on the ratio of phycocyanin and phycoerythrin. Bacillariophyceae, Raphydophyceae and Dinophyceae had a broad peak at around 530nm, which reflected the existence of light-harvesting-carotenoids (LHCs) in chloroplast. On the other hand, Chlorophyceae did not have any peak at the longer wavelength region than 500nm, because there is no PB and LHCs which absorbs light at the wavelength region. From these excitation fluorescent features, these five classes could be characterized to three groups; Cyanophyceae, Chlorophyceae, and carotenoid-contained class (e.g. Bacillariophyta, Raphydophyceae and Dinophyta). Finally, we resulted that three fluorescent intensity ratios; [f(490)/f(530)], [f(545)/f(440)] and [f(545)/f(440)], enabled the identification of the three groups. Our results showed that the fluorescence-excitation-spectra measurement was helpful to classify phytoplankton-taxa based on the pigments composition. This information will be appreciable to develop an in-situ excitation fluorometer for automatic identification of phytoplankton groups.