Two distinct modes of variability in the Euphotic depth in the Arctic ocean as revealed by satellite obsevation

*Takafumi Hirata[1]

1. Arctic Research Center, Hokkaido University

The Arctic region is known to have been experiencing a rapid change in natural environment and ecosystems due to climate change. However, the environmental and ecological data in the Arctic is sparse in general, due to cost for, and difficulty in, access. Hence, remote sensing technology plays a significant role in the Arctic research. Currently, most of biogeochemical /ecological factors are remotely observable only by optical remote sensing. While the passive optical remote sensing in the Arctic has a limitation in that its observation is not possible in wintertime, it still provides loads of valuable Arctic data during summertime. In addition, the solar radiation, available only in summer in the Arctic, drives seasonal events not only in physics but also in biogeochemistry and ecology. One of the events is primary production which heavily rely on the availability of the sun light, from the ocean surface down to the euphotic depth. Therefore, how the euphotic depth varies during summertime in a year is of particular interest in determining the Arctic ocean productivity and biological resource in the Arctic in that year. Our objective here is to evaluate how the Euphotic depth varies in the Arctic. Satellite remote sensing data over a decade (1998-2007) were used to estimate the euphotic depth using an inversion model, and its variability was investigated for the Arctic ocean. Two distinct modes of variability of the Arctic euphotic depth was found: variablity in the euphotic depth in many regions in the Arctic seas was regulated simply by the solar zenith angle, yet variablity in the euphotic depth in the Russian Arctic seas was characterized by seawater quality, especially suspended particles. The finding implies that climate change (i.e. warming) in the Arctic may eventually lead to a reduction of light availability for photosynthesis in the Russian Arctic seas.

Keywords: Arctic, Euphotic depth

