

Development of algorithms to estimate primary productivity and to discriminate phytoplankton functional types

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ABSTRACT:

Objectives of this work are to establish algorithms for estimation of primary productivity (PP) and for discrimination of phytoplankton functional type (PFT). Prototype algorithms for the polar region were constructed using optical properties of water such as light absorption and scattering coefficients derived from reflectance at the sea surface. The PFT algorithm performed well and represented the seasonal variation of PSR in the Arctic and sub-Arctic seas. In the Arctic Ocean (Chukchi Sea), larger phytoplankton index in the area of phytoplankton bloom (high chl.a) shifted from low (small) in spring to high (large) in summer and autumn. However, effect of extremely high absorption by colored dissolved organic matter (CDOM) on estimation of phytoplankton absorption was still crucial issue. Erroneous PSR was also found in south of 35°N where there is no in-situ data. The PP algorithm was also validated using new in-situ data and showed good performance. However, problems on the difference of absorption and primary productivity between SO and temperate waters was remaining: lower quantum yield in the Southern Ocean than temperate waters.