

Changes in subsurface chlorophyll-*a* maximum in the Canada Basin, 2003-2019

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Rapid sea ice retreat and freshening have been observed in the Canada Basin since the 2000s. As a consequence, biological productivity has changed by altered light and nutrients availabilities. McLaughlin and Carmack (2010) found a deepening of the subsurface chlorophyll-*a* maximum (SCM) from 2003 to 2009, and a decrease in nitrate concentration at SCM from 2006 to 2009. Adding 10 years of observations, here we investigate changes in the depth of SCM and related chemical and physical environmental conditions from 2003 to 2019. The depth of SCM did not continue to deepen after 2009 and rather stabilized at around 60~70 m with larger special variability in 2010s than in 2000s (Figure 1). These interannual changes are similar to that of isopycnal depth, suggesting the controlling effect of the physical processes on SCM. Nitrate concentration of SCM also did not show any significant trend after 2009. Concentration of chlorophyll-*a* at the SCM decreased from 2003 to 2010 and then stabilized. The integrated chlorophyll-*a* content in 0-200 m layer decreased from 2003 to 2007 but increased after 2013 (Figure 2). These results show that deepening of the SCM has stopped at the end of 2000s and water column productivity has increased in 2010s. In order to understand causes of these findings, changes in environmental conditions such as sea ice concentration, PAR, stratification will be discussed in the presentation.

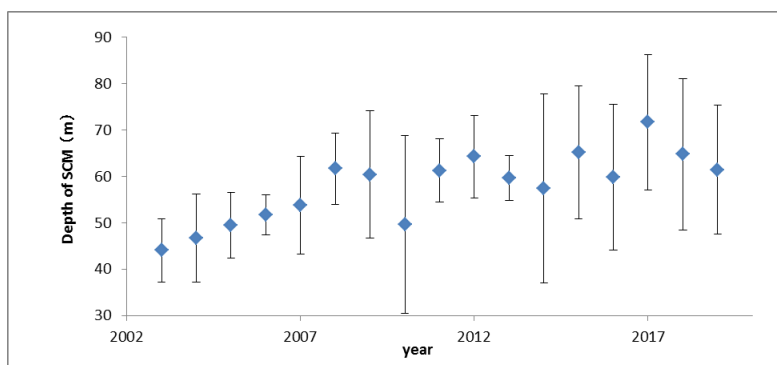


Figure 1. Time-series of the depth of SCM with standard deviation

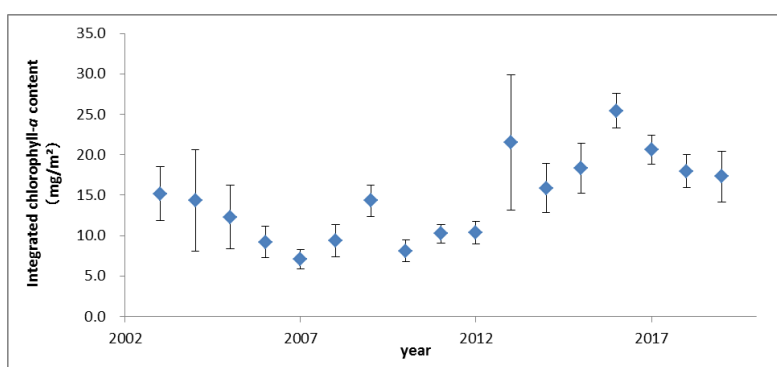


Figure 2. Time-series of the integrated chlorophyll-*a* content in 0-200 m layer with standard deviation

References

McLaughlin, F. A. and E. C. Carmack., Deepening of the nutricline and chlorophyll maximum in the Canada Basin interior, 2003–2009, *Geophys. Res. Lett.*, 37, L24602 (2010)