Behrenfeld MJ. 2010. *Abandoning Sverdrup's Critical Depth Hypothesis on phytoplankton*

*blooms*. Ecology 91:977–89

This research challenges assumptions made by the long held views about the causes of vernal blooms that occur across many oceans. The Sverdrup Critical Depth model has been the standard model held by scholars for over fifty years but this model has been recently challenged. It holds that there exists a critical depth where the total phytoplankton production (P) exceeds the total respiration (R) and at this point blooming can occur if the mixed layer depth is less then this critical value.

Behrenfeld challenges these assumptions by utilizing nine years of satellite data from the subartic Atlantic. There were some very interesting results of this research that specifically challenge Sverdrup’s original model. One of these is that bloom initiation occurs during when; which is when the mixed layer depths are at a maximum. Another important finding was that the maxima of net population growth rates are as likely to occur in midwinter as they are in spring. To explain these findings Behrenfeld develops the Dilution-Recoupling Hypothesis which states that blooms are caused due to a decoupling between phytoplankton growth and loss.

This research could potentially be useful in that it appears to be a current area of research that is still not fully understood. It also utilized new computational methods to overturn a long standing theory in biological oceanography. Utilizing Behrenfeld’s methods and incorporating machine learning to analyze much larger sets of satellite data could help further understand this question.