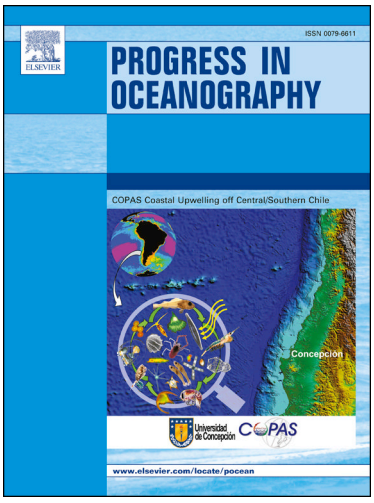
Accepted Manuscript



Unraveling the intricate dynamics of planktonic Arctic marine food webs. A sensitivity analysis of a well-documented food web model

Blanche Saint-Béat, Frédéric Maps, Marcel Babin

PII: S0079-6611(17)30246-X
DOI: https://doi.org/10.1016/j.pocean.2018.01.003
Reference: PROOCE 1895

To appear in: *Progress in Oceanography*

Received Date: 25 July 2017
Revised Date: 2 December 2017
Accepted Date: 9 January 2018

Please cite this article as: Saint-Béat, B., Maps, F., Babin, M., Unraveling the intricate dynamics of planktonic Arctic marine food webs. A sensitivity analysis of a well-documented food web model, *Progress in Oceanography* (2018), doi: https://doi.org/10.1016/j.pocean.2018.01.003

Unraveling the intricate dynamics of planktonic Arctic marine food webs.
A sensitivity analysis of a well-documented food web model

Blanche Saint-Béat[1*], Frédéric Maps[1], Marcel Babin[1]

[1]Takuvik Joint International Laboratory, Laval University (Canada) - CNRS (France), Département de biologie et Québec-Océan, Université Laval, Quebec, Quebec, Canada,

* corresponding author : blanche.saint-beat@takuvik.ulaval.ca

Abstract

The extreme and variable environment shapes the functioning of Arctic ecosystems and the life cycles of its species. This delicate balance is now threatened by the unprecedented pace and magnitude of global climate change and anthropogenic pressure. Understanding the long-term consequences of these changes remains an elusive, yet pressing, goal. Our work was specifically aimed at identifying which biological processes impact Arctic planktonic ecosystem functioning, and how. Ecological network indices (ENA) reveal emergent ecosystem properties that are not accessible through simple *in situ* observation. These indices are based on the architecture of carbon flows within food webs. But, despite the recent increase in *in situ* measurements from Arctic seas, many flow values remain unknown. Linear inverse modeling (LIM) allows missing flow values to be estimated from existing flow observations and, subsequent reconstruction of ecosystem food webs. Through a sensitivity analysis on a LIM model of the Amundsen Gulf in the Canadian Arctic, we were able to determine which processes affected the emergent properties of the planktonic ecosystem. The analysis highlighted the importance of an accurate knowledge of the various processes controlling bacterial production (e.g. bacterial growth efficiency and