



Lead Author e-mail: maslowsk@nps.edu

Title: *On oceanic processes of relevance to large-scale Arctic sea ice cover variability and trends – model perspective and observational needs*

Wieslaw Maslowski¹, Jaclyn Clement Kinney¹, Stephen Okkonen², Robert Osinski³, Andrew Roberts¹

¹**Naval Postgraduate School, Monterey, CA, USA**

²University of Alaska, Fairbanks, AK, USA

³Institute of Oceanology, Polish Academy of Sciences, Sopot, Poland

The Arctic has experienced major climate changes, including declining cryosphere and warmer air and ocean temperatures, which provide partial evidence of its amplified response to global warming. At the same time, changes in the Arctic sea ice cover and regional air-sea interactions can influence the global surface energy and moisture budgets, atmospheric and oceanic circulation and feedbacks. Finally, large natural variability and sensitivity of Arctic climate to global change make the attribution of those changes difficult.

We synthesize results from a hierarchy of regional and global climate models together with limited observations in the pan-Arctic region to characterize some of the critical small-scale oceanic processes contributing to large-scale sea ice concentration and thickness distribution, their variability and long-term trends. In particular, we focus on the transport of warm water from lower latitudes, shelf-basin exchanges and the annual cycle and interannual variability of the upper ocean heat storage in relation to the decline of the Arctic sea ice cover and warming climate. The main goal of this study is to advance a system-level understanding of critical processes and feedbacks in the Arctic and their links with the Earth System. The secondary, yet an equally important objective, is to identify important areas from which to obtain new or additional observations to better understand some of these processes and to help constrain models.