

ESSAS – Ecosystem Studies of Sub-Arctic Seas

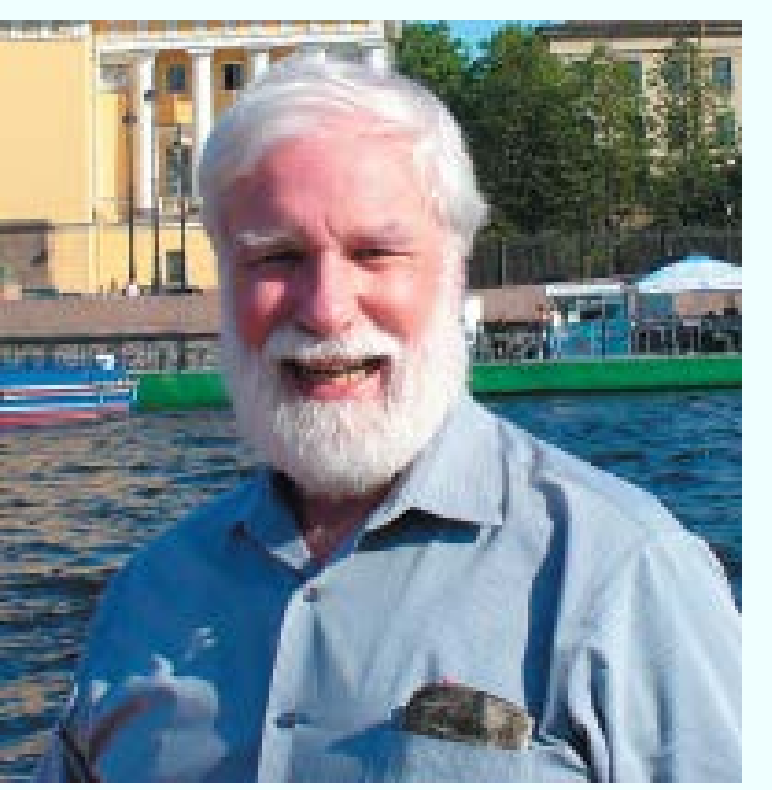


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1. Introduction

ESSAS is a comparative, ecosystem-based IMBER regional program. The ESSAS goal is *to compare, quantify and predict the impact of climate variability and climate change on the productivity and sustainability of Sub-Arctic marine ecosystems.*



2. Geographical Areas of Main Interest

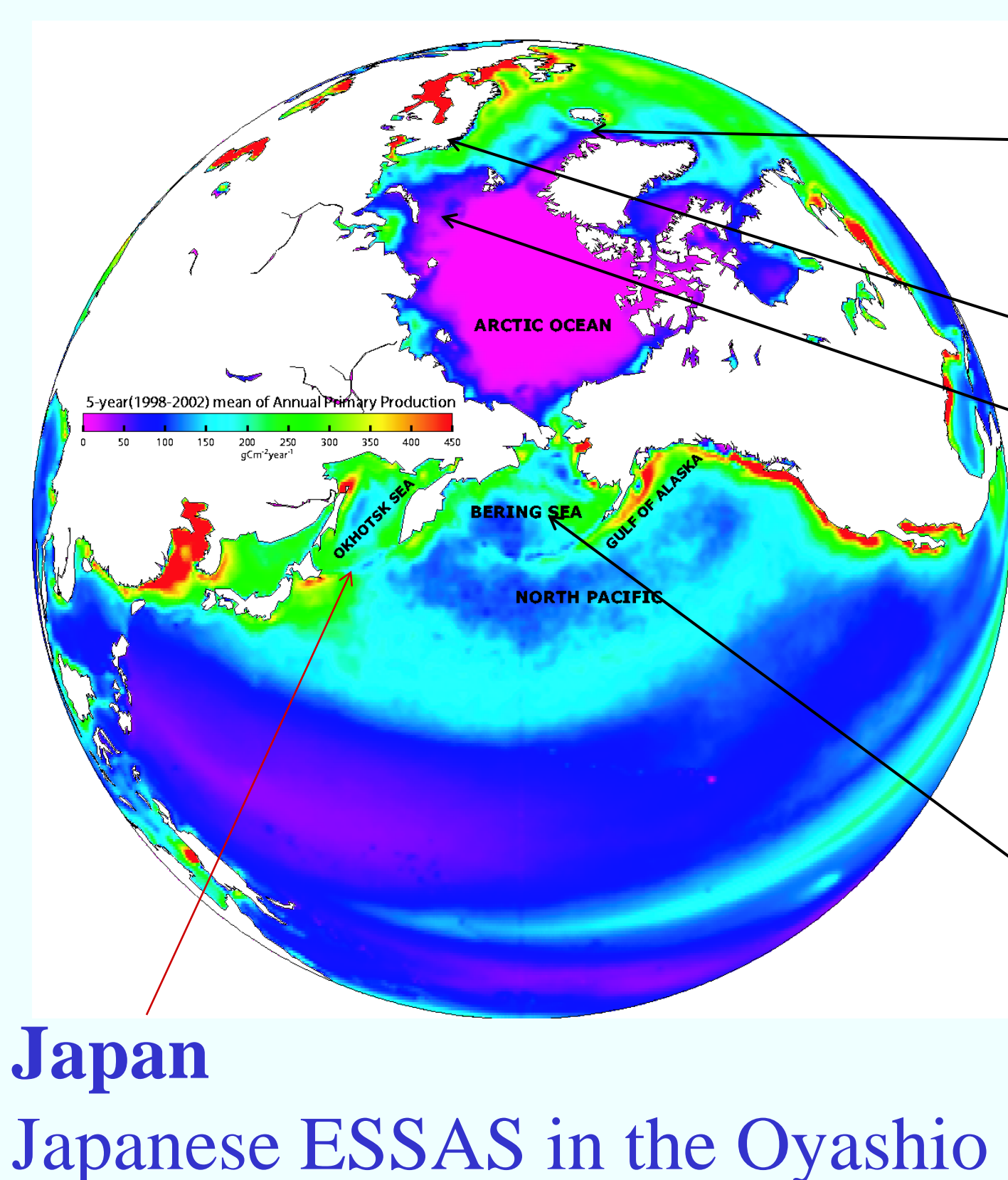
Pacific Ocean:

- Bering Sea; Oyashio; Sea of Okhotsk

Atlantic Ocean

- Barents Sea; Nordic Seas; Iceland Sea; Greenland shelves; Labrador Sea; Newfoundland/Labrador shelves; Gulf of St. Lawrence; Hudson Bay

3. Nationally Funded Past and Present ESSAS Programs



Iceland

- ISE (Iceland Sea Ecosystem) Project

Norway

- Norwegian ESSAS in the Barents Sea
- NESSAR (Norwegian Ecosystem Studies of Subarctic and Arctic Regions)
- TROPHARCT (Response of Trophic Relationships to Climate Change in Sub-arctic Seas)

USA

- BEST (Bering Sea Ecosystem Study)
- BSIERP (Bering Sea Integrated Ecosystem Research Program)

Japan

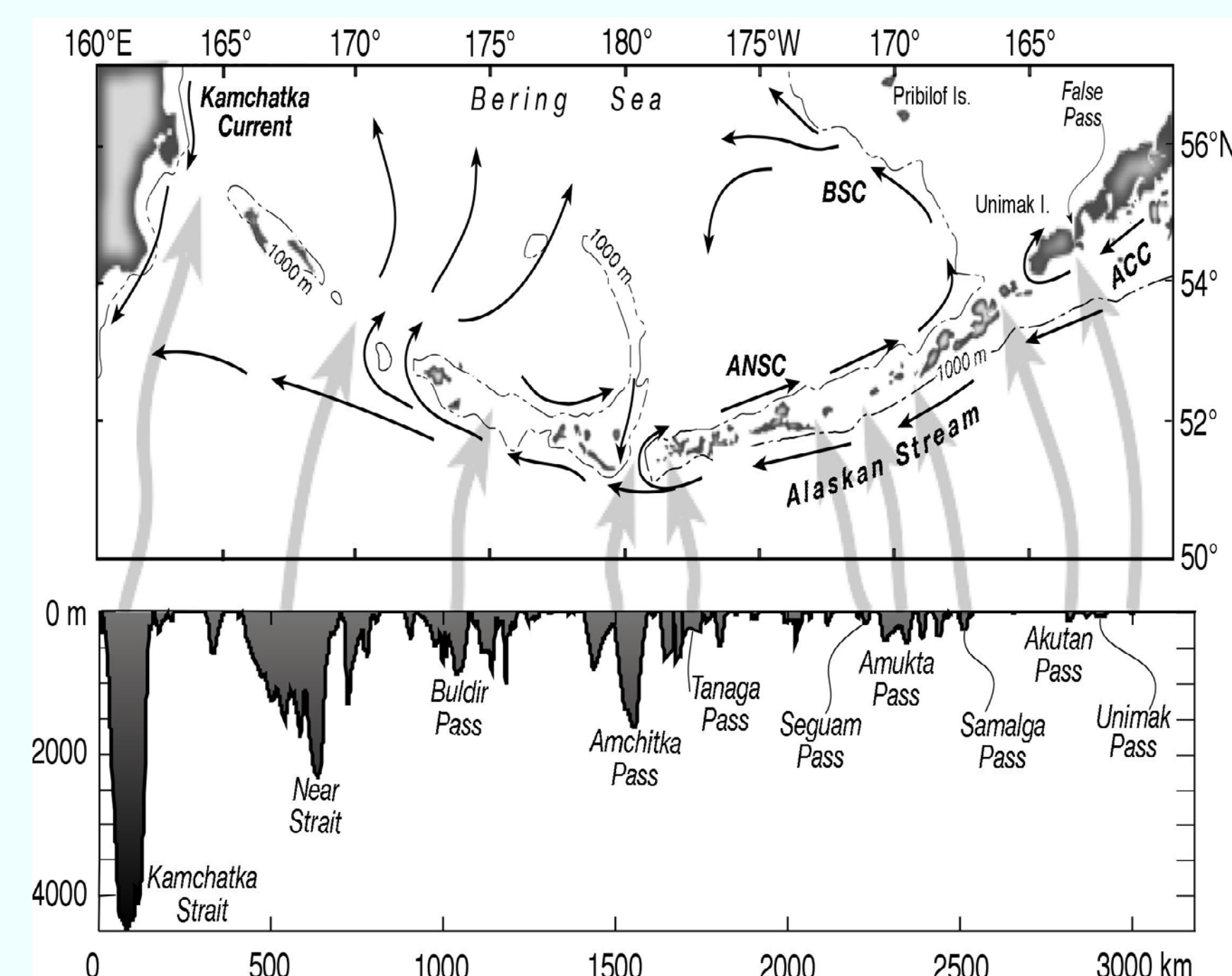
Japanese ESSAS in the Oyashio

5. Some Science Highlights from ESSAS Open Science Meeting

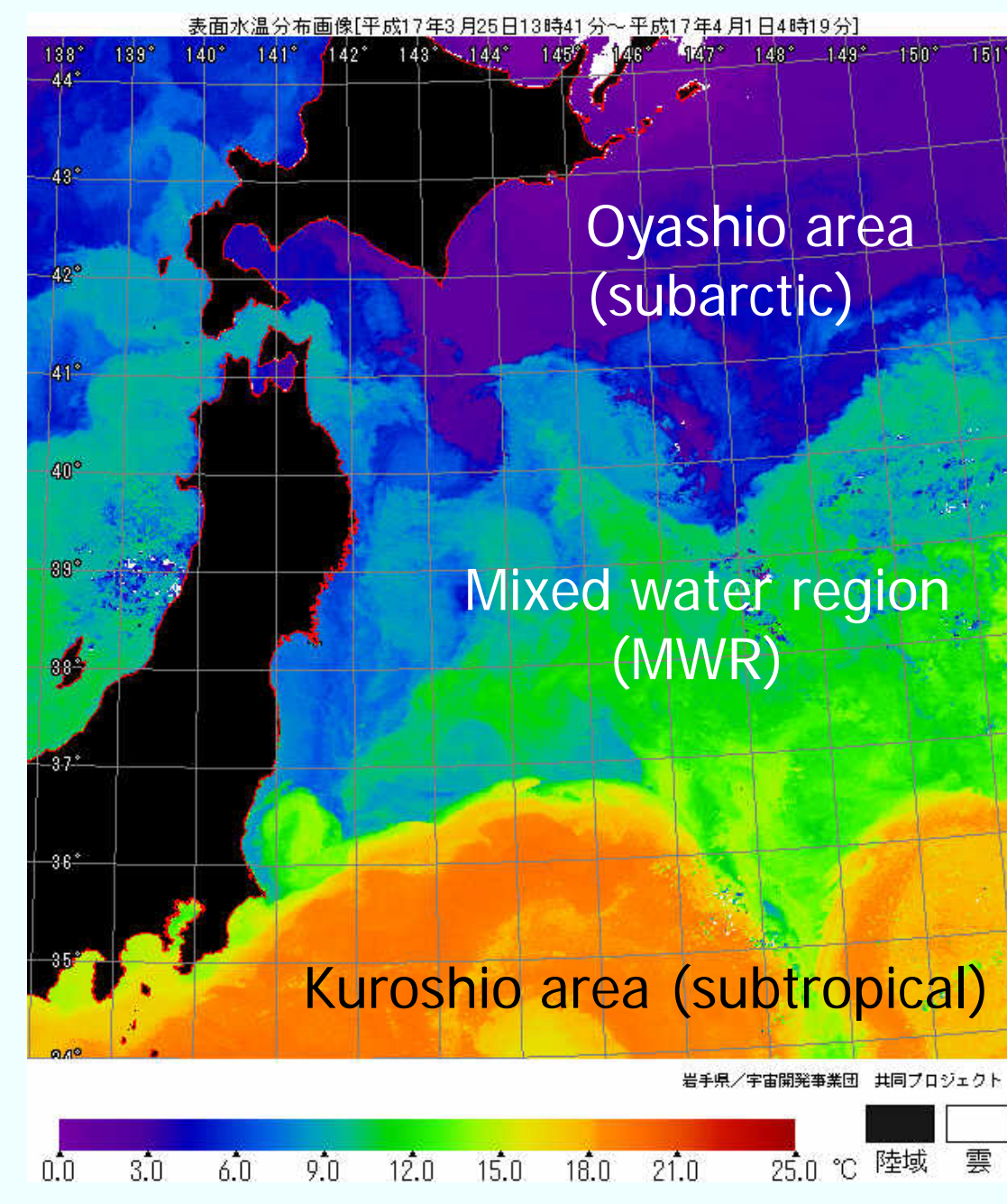
The 2nd ESSAS Open Science Meeting entitled *Comparative Studies of Climate Effects on Polar and Sub-Polar Ecosystems: Progress in Observation and Prediction* was held in Seattle on 22-26 May 2011 to highlight improved understanding of the these regions and identify present gaps in our knowledge.

Theme Sessions were held on:

Comparative Studies; Biogeochemical Processes in a Changing Climate; Results from International Polar Year Studies; Bering Sea; National ESSAS Programs; Interactions between Gadoids and Crustaceans; Modelling High Latitude Marine Ecosystems; and Socio-Economic and Policy consequences of Global Change in Polar and Sub-polar Regions.



Flow through the Aleutian Passes provide heat, salt, nutrients, zooplankton, larvae to the Bering Sea. The passes are also an important source of mixing. Stabeno



The coastal Oyashio intrusion transports sub-Arctic copepods to the mixed water region. Shimizu et al.

4. ESSAS Present and New* Working Groups

4.1. Modeling

- developing models to facilitate ecosystem comparisons

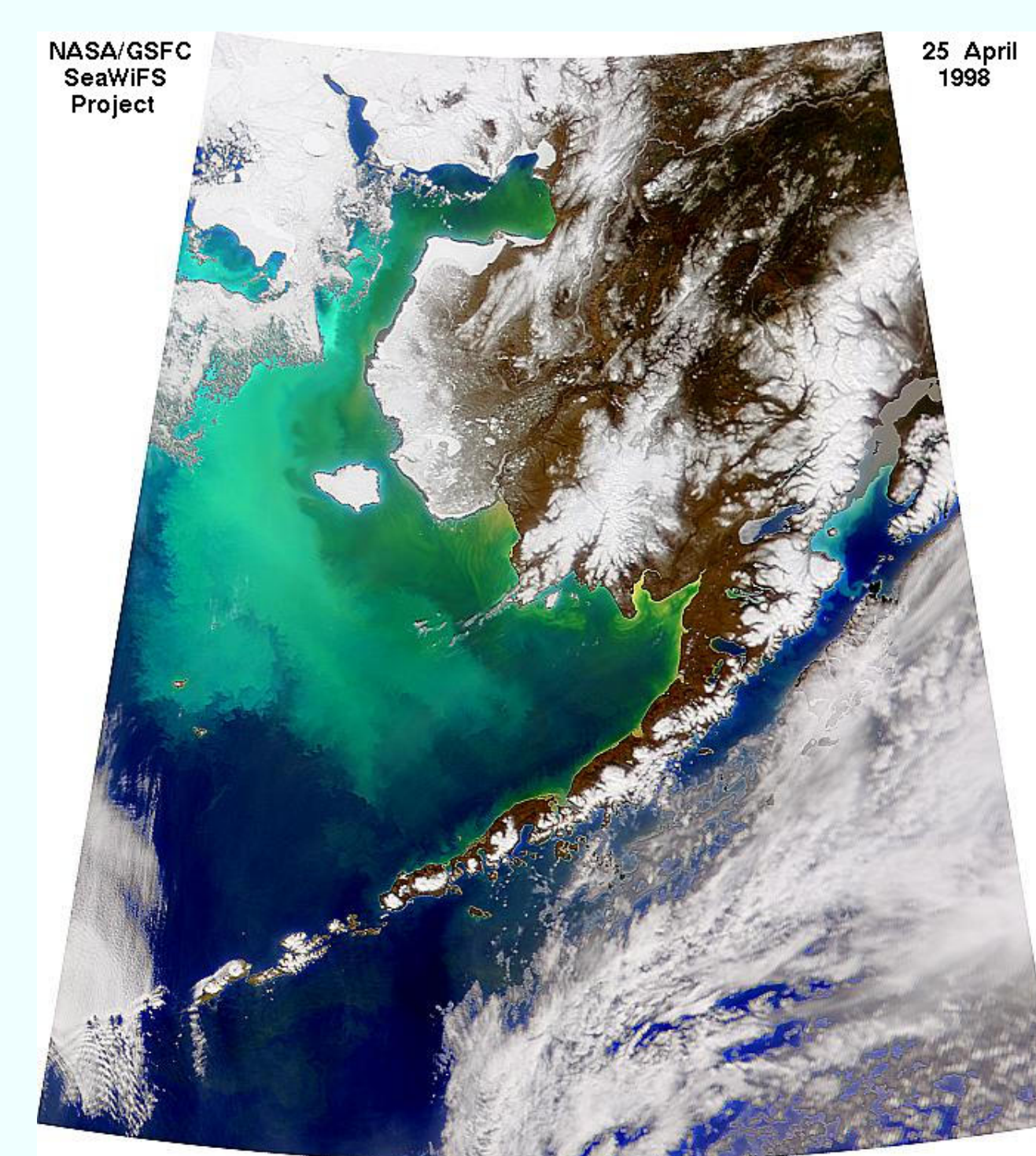
4.2. Invertebrate – Gadoid Interactions

- comparing invertebrate-gadoid interactions in different subarctic ecosystems

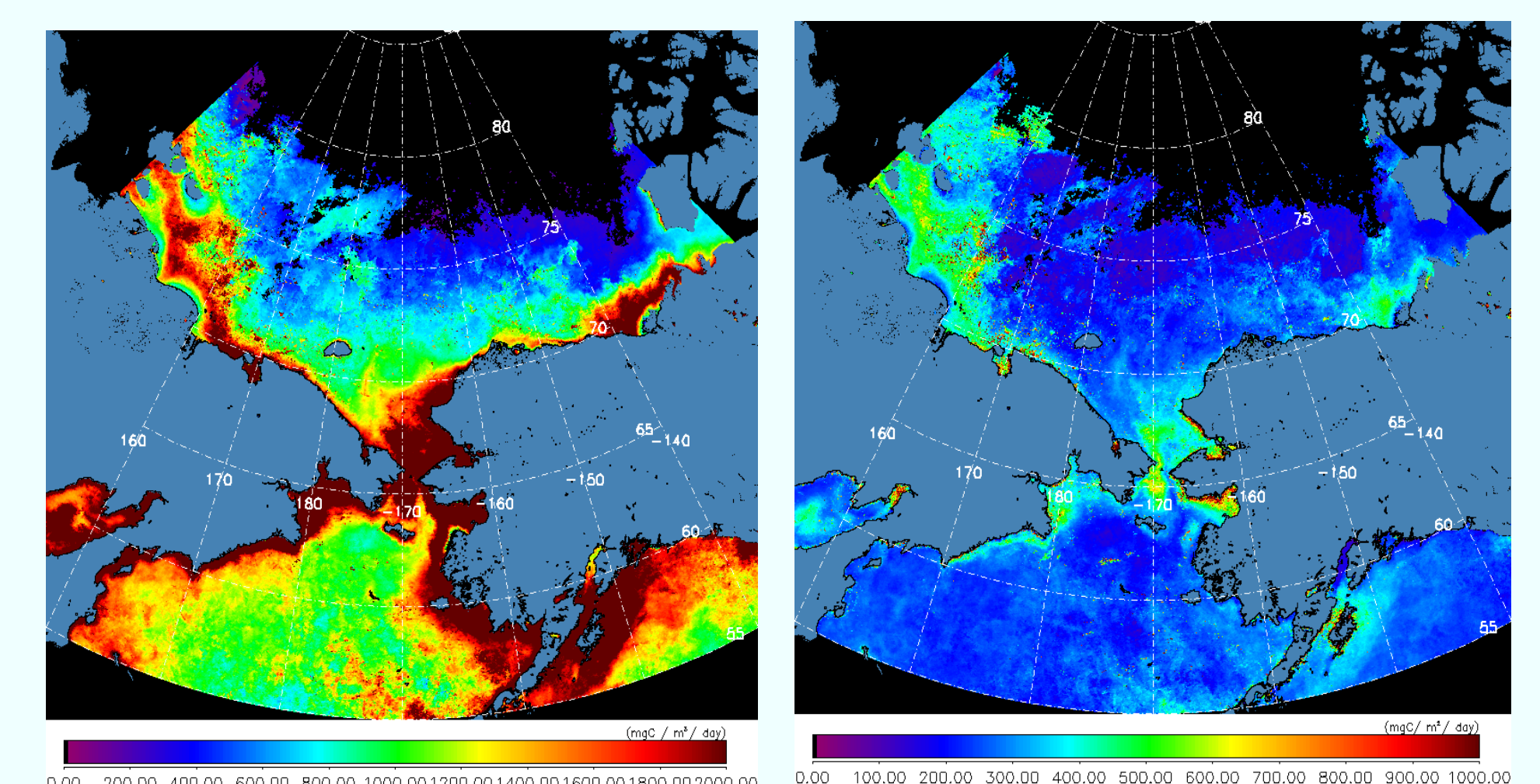
4.3. Arctic-Subarctic Interactions*

- investigating the physical and biological effects of advection between the Arctic and the Subarctic

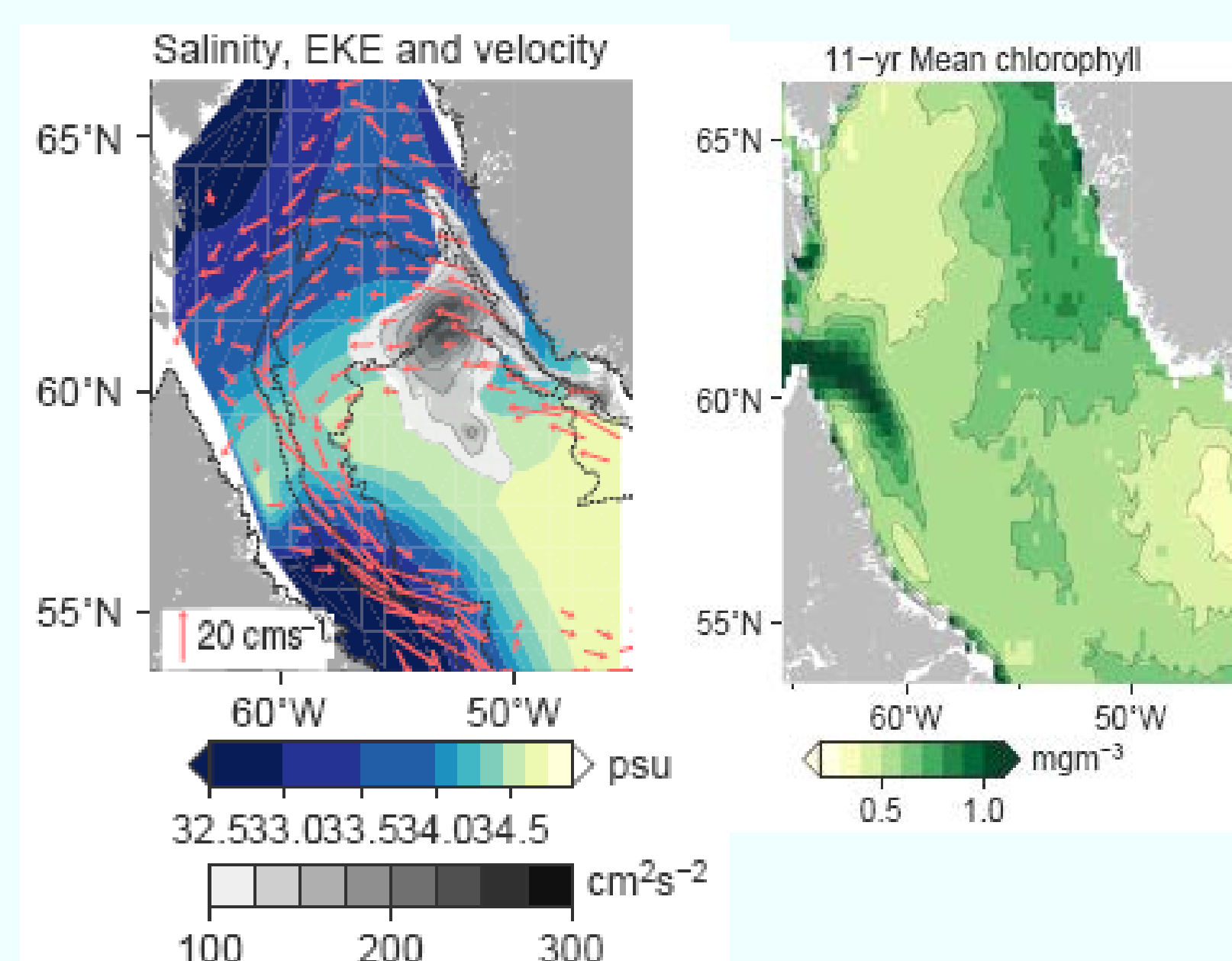
5. Further Science Highlights from ESSAS Open Science Meeting



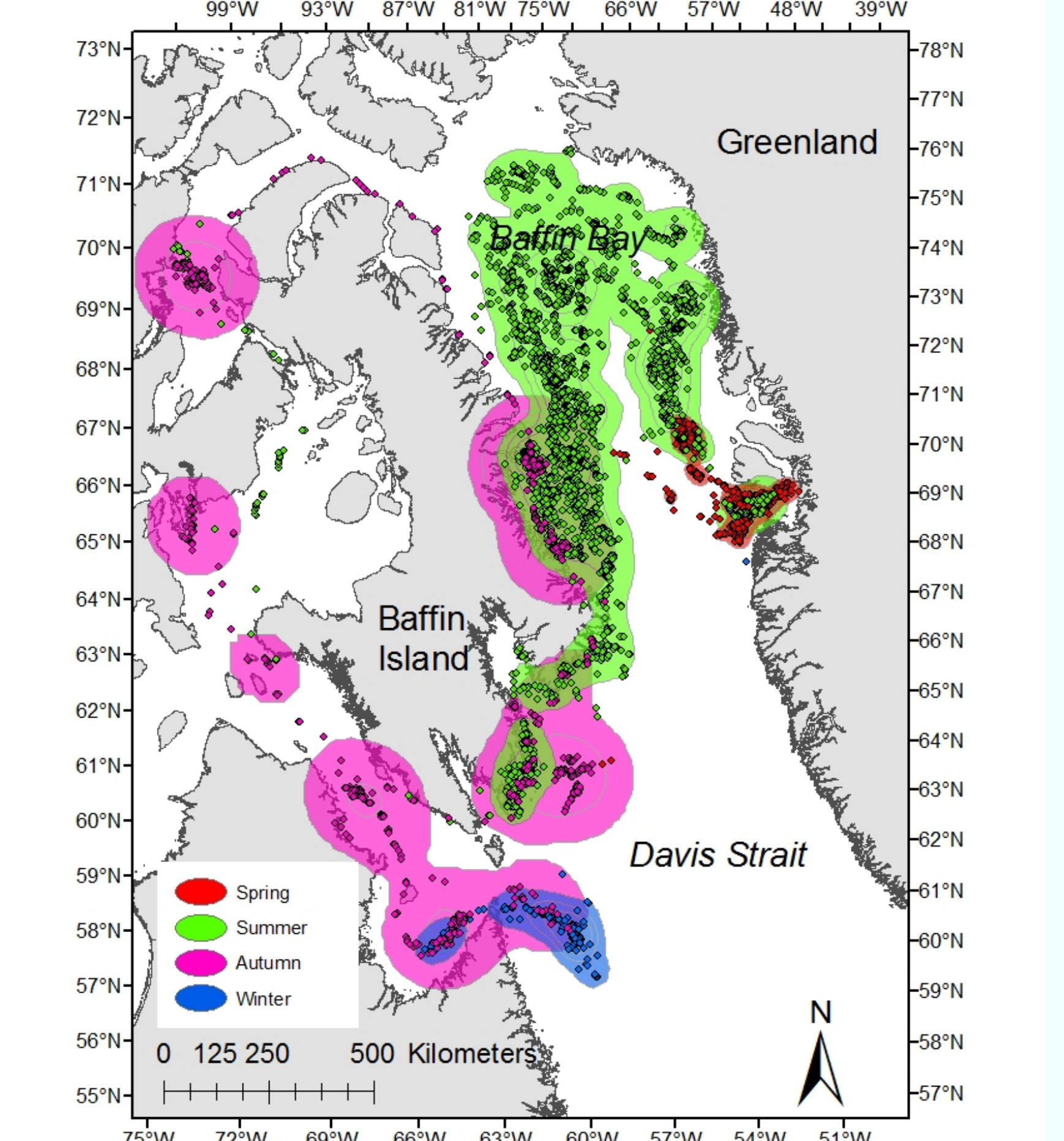
Since the launch of the SeaWiFS satellite in 1997 *E. milliana huxleyi* blooms been observed annually in the Bering Sea. Recent analyses of sediment samples reveal that *E. huxleyi* has been a significant feature there since the late 1970s. Harada et al.



New optical models that calculate inherent optical properties (IOP's) such as absorption and scattering coefficient from satellite reflectance data improve satellite derived primary production estimates. Hirawake et al.



Advection of low salinity shelf water from West Greenland Shelf affects timing and spatial distribution of Labrador Sea phytoplankton production. Williams et al.



Bowhead whale seasonal distribution patterns based on satellite tracked tags in the Northwest Atlantic. Laidre et al..

6. Publications in progress from ESSAS Open Science Meeting

- General Proceedings - ICES Journal of Marine Science
- BEST/BISERP Session – Deep Sea Research II
- Gadoid-Invertebrate Interaction Session – MEPS Section
- Modelling Session – Journal of Marine Systems

8. Acknowledgements

Thanks to the many co-sponsors of the ESSAS OSM: PICES, ICES, IMBER, NPRB, GOOS, NOAA, Arctic Section of NOAA, ADFG, NSF, NPFMC, and SAFS.

7. Future ESSAS Activities

- February 2012 Theme Session on Arctic-Subarctic Interactions, Ocean Sciences Meeting, Salt Lake City, USA.
- May 2012 (Pending) Workshop on Arctic-Antarctic Comparisons at 2nd Symposium on Climate Change in the World's Ocean, Yeosu, Korea
- September 2012 Theme Session on Arctic-Subarctic Interactions at ICES Annual Science Conference, Bergen, Norway
- January 2013 Annual ESSAS meeting, Hakodate, Japan