A UNOLS High-latitude Research Vessel: Scientific justification

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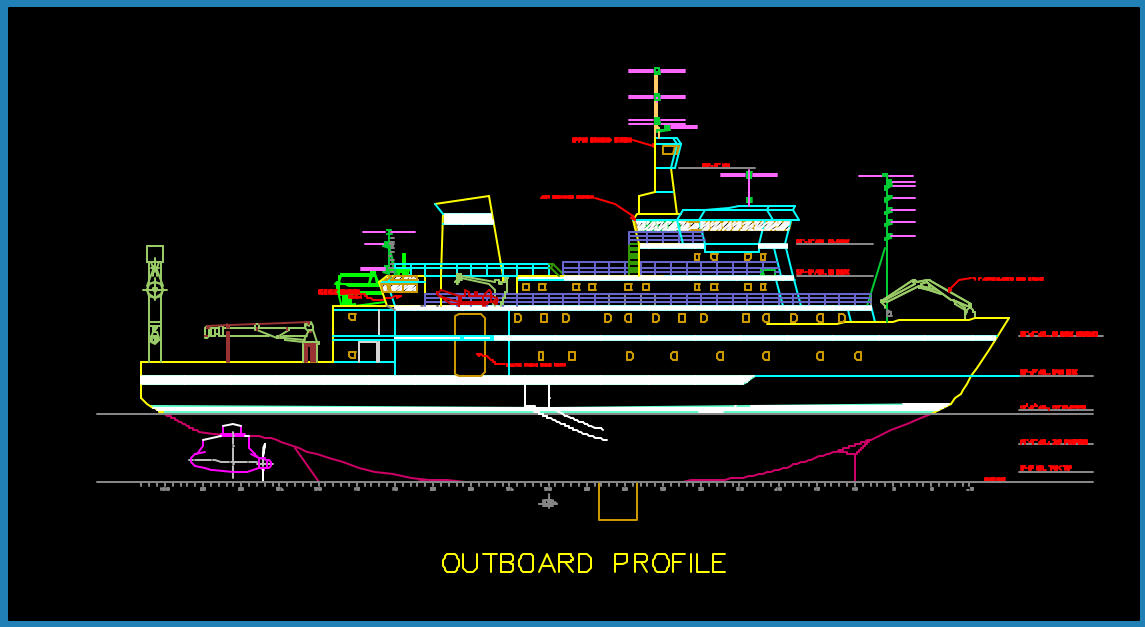


Outline

1. Alaska regional waters (the ARRV)

2. General issues in the context of the sub-polar North Atlantic

Alaska regional waters

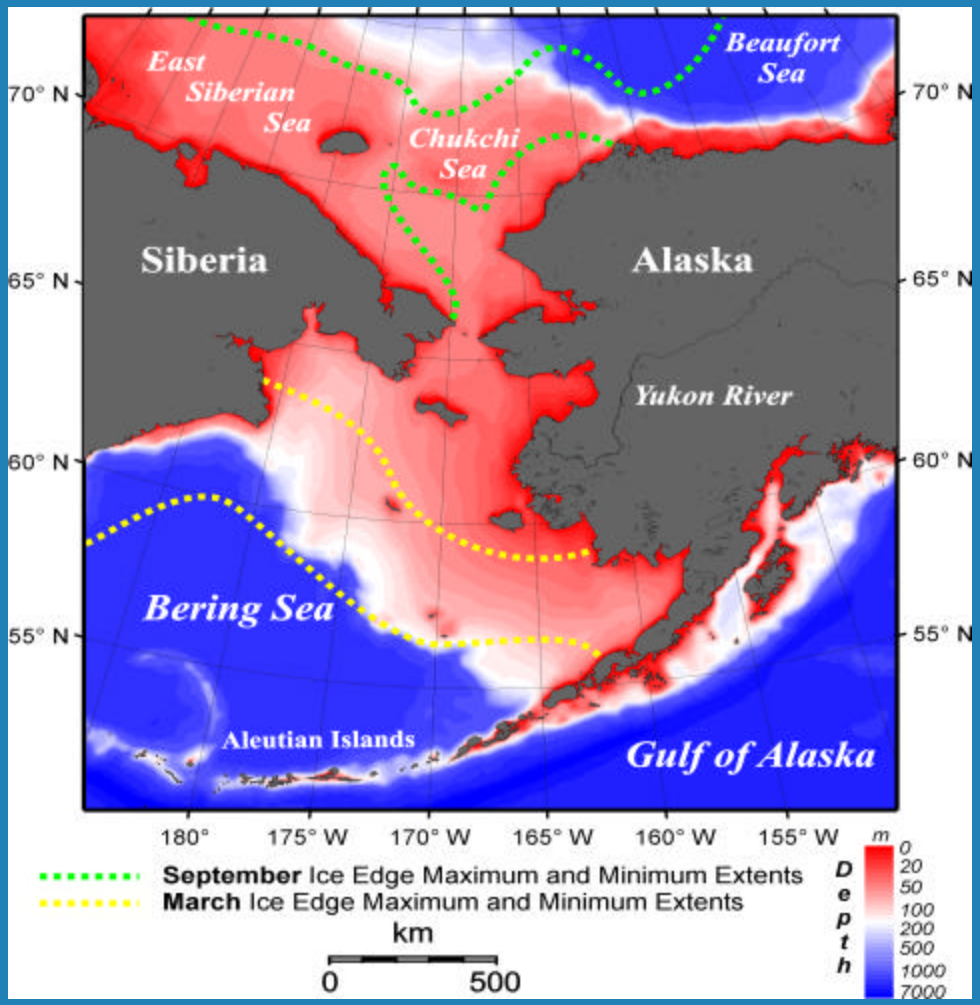
1. Sea-ice constraints on operating area

2. Vessel icing

3. Sea keeping / weather limitations

4. Science capabilities (deck operations, lab configurations, etc.)

Ice constrains on operating area



Summer and winter ice edge extent

--many important problems in/near ice

e.g. Water mass transformation

Primary production

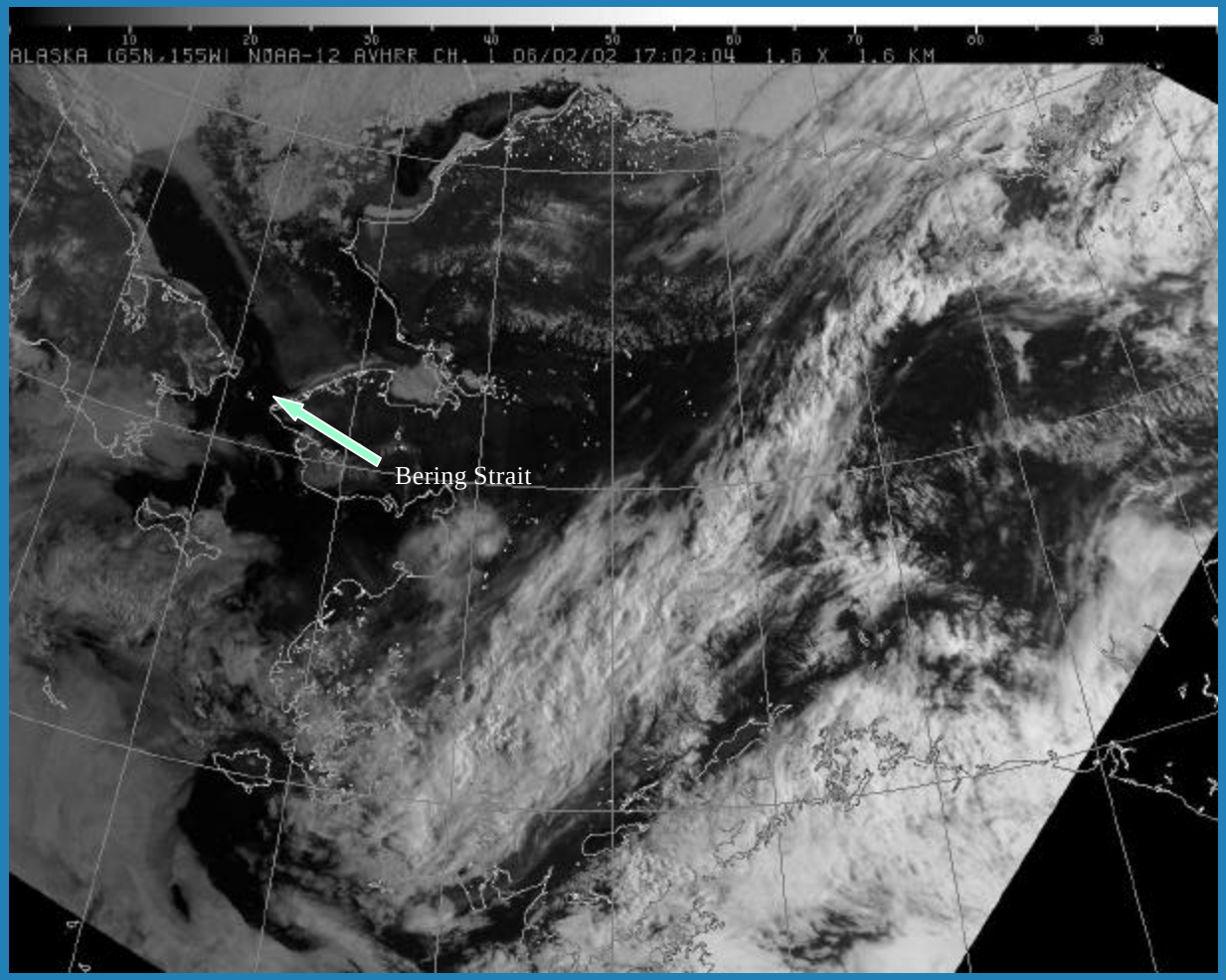
Fish distributions

Whale habitat selection

--Russian recognition of ice classification

--desire to operate in Beaufort Sea

Threat of being beset in the ice…

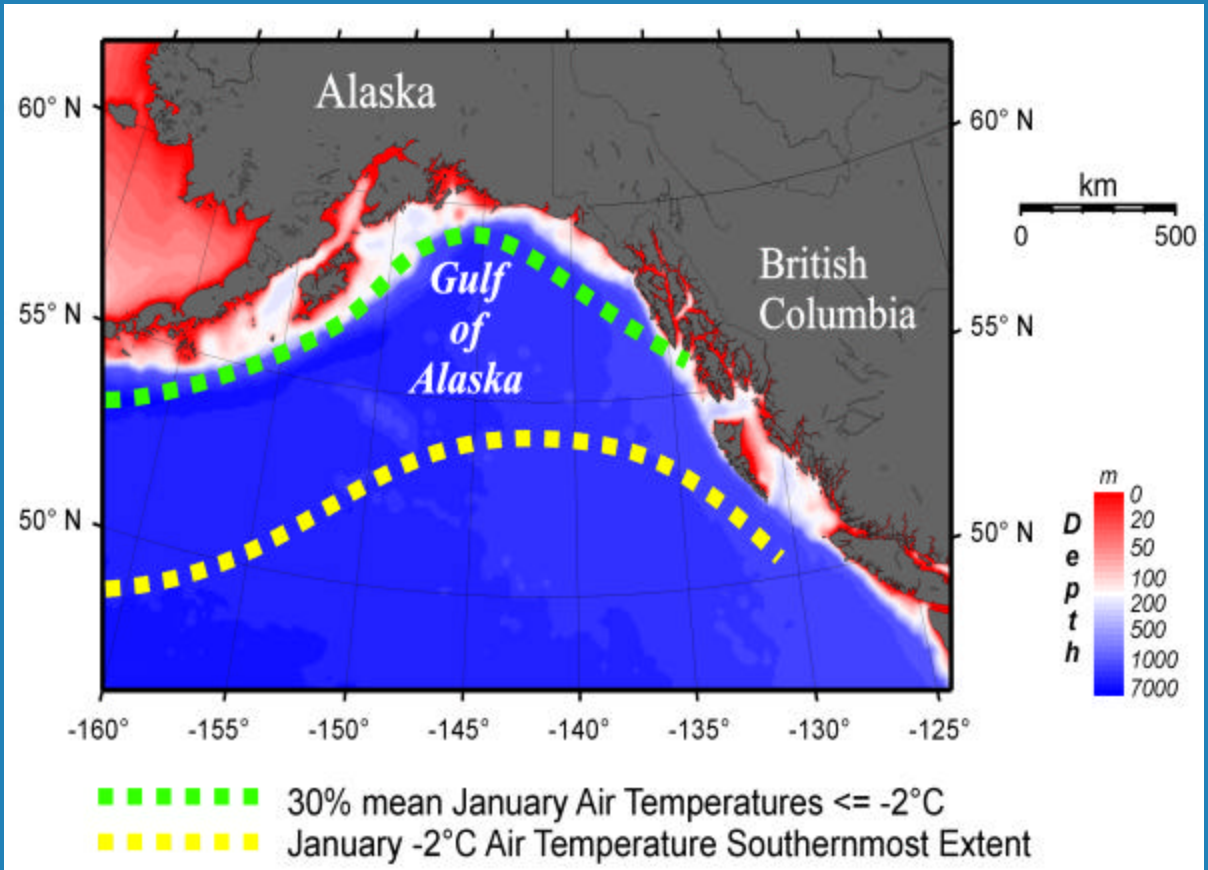


2 June, 2002: Visible image from NOAA polar-orbiting weather satellite

--Northern Alaskan corridor

--Desire for open water operations

Vessel icing



Region of potential icing in Gulf of Alaska

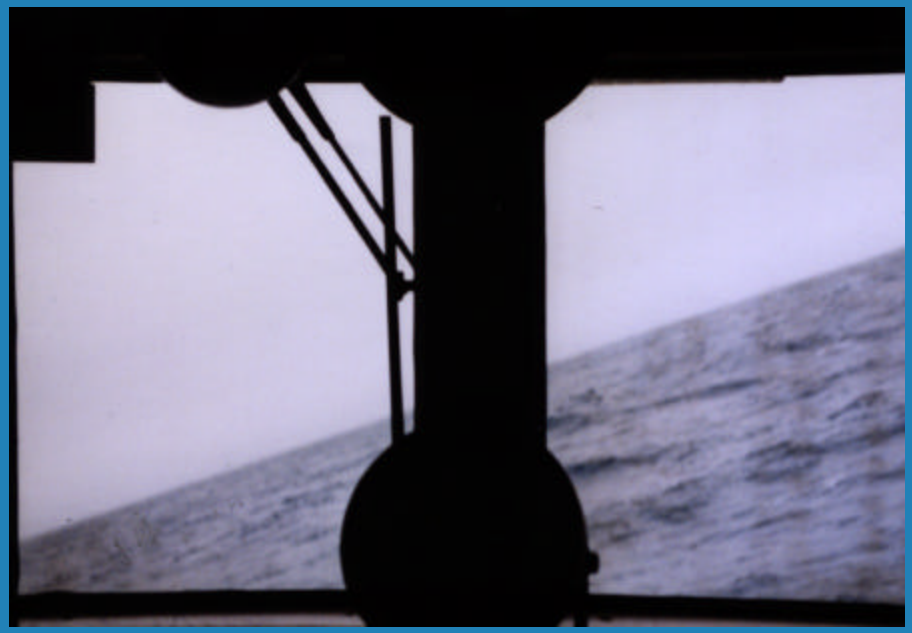
--Much of area prone to icing

e.g. Chukchi off limits after 1 Oct

--Ability to steam into the seas

Sea keeping / weather limitations

Gulf of Alaska



--Harsh weather year-round

--Need for longer operating season

--Less weather days, more science

--DP for precision surveys

Science capabilities

--Larger volume hydrographic sampling

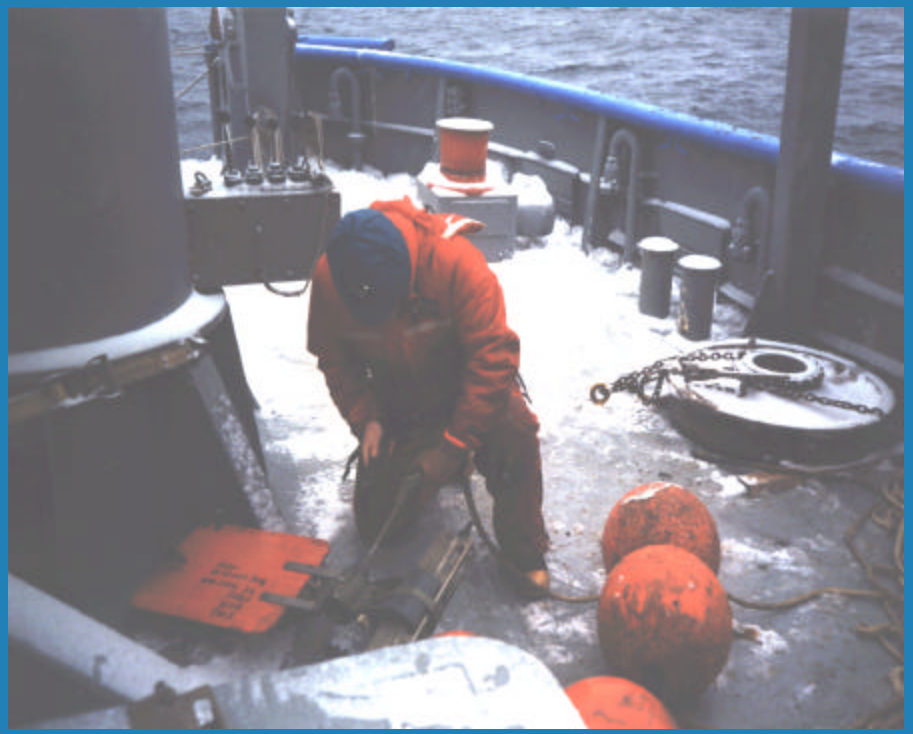
--Safer, more sophisticated mooring ops

--Vans, temp. controlled lab

--Storage space, multi-leg cruises

--Effective acoustic sampling

--Simultaneous fisheries work



Onboard the R/V Alpha Helix

General Issues in the context of the Sub-polar North Atlantic

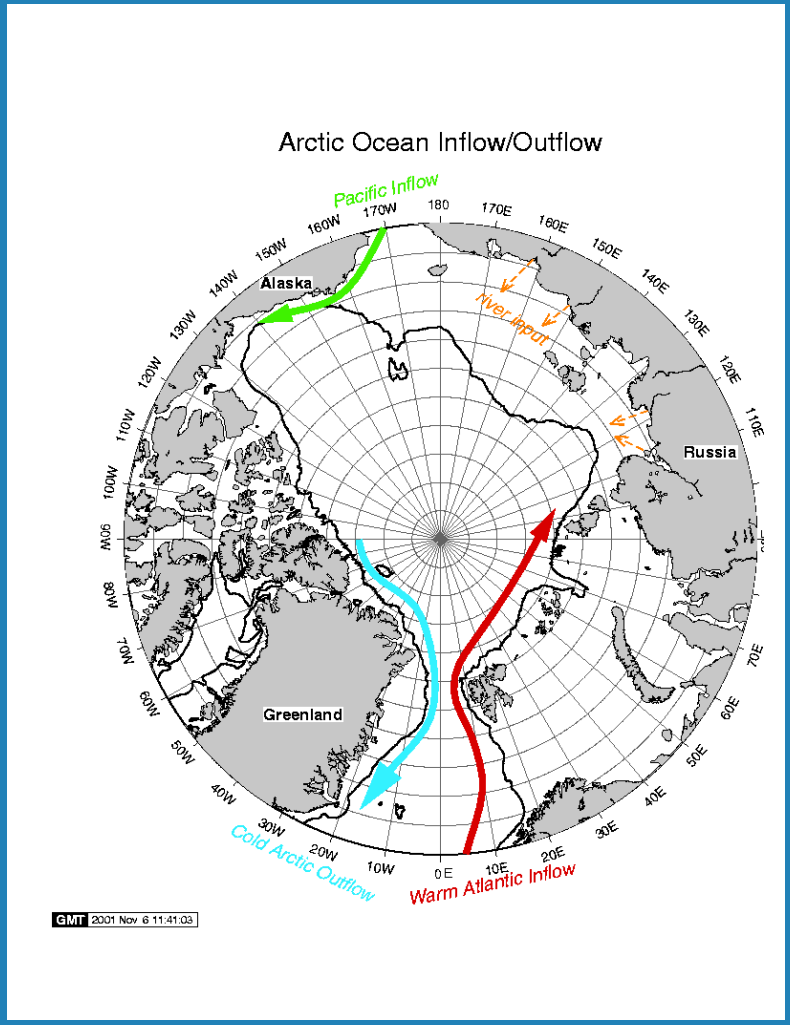
1. Climate change Research at high latitudes

2. Fieldwork near continental margins…ice in all seasons

3. Wintertime weather

4. Optimizing the platform

Climate change research at high latitudes



--Large ongoing/proposed programs

--Arctic/sub-arctic regions critical

--Continental margins of particular interest

--Multi-disciplinary research

Fieldwork near ice

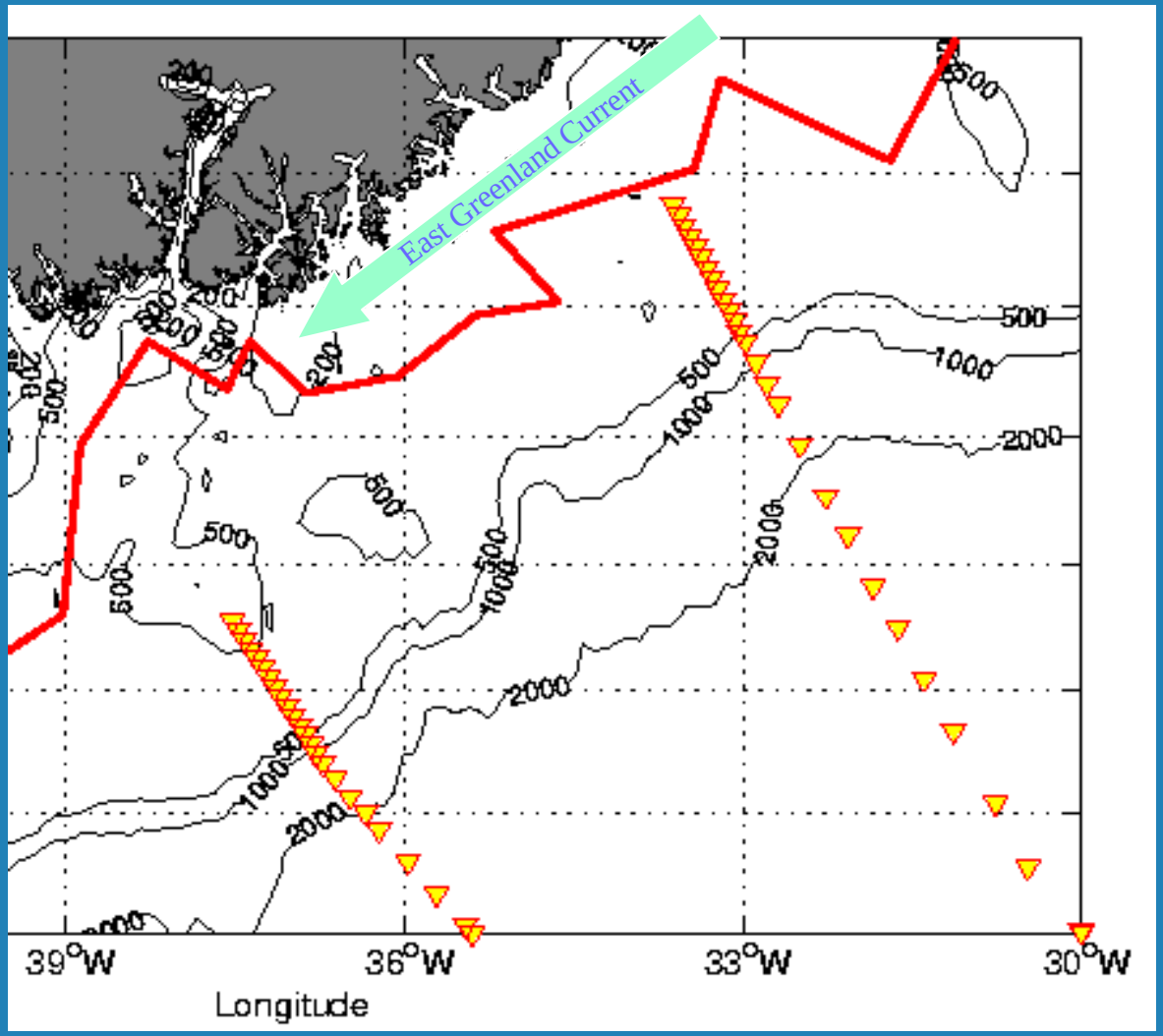
--Land-fast ice

--Pack ice

--Marginal ice zone

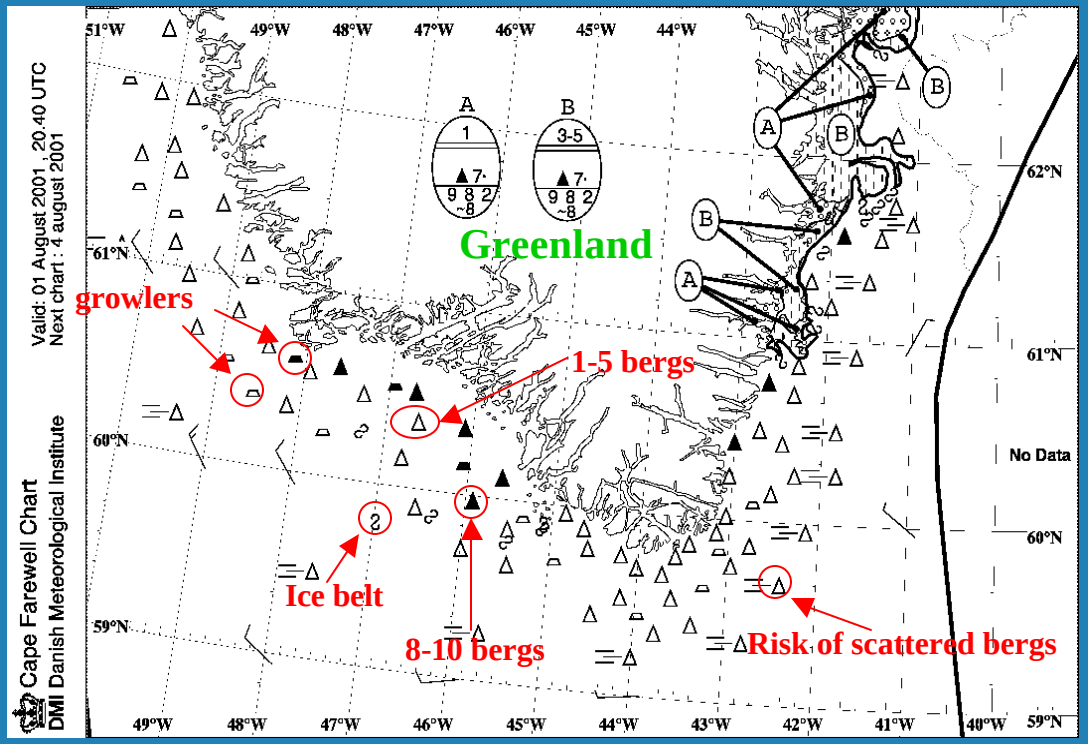
--Regions of remotely-formed ice (including icebergs)

East Greenland Current



August 2001

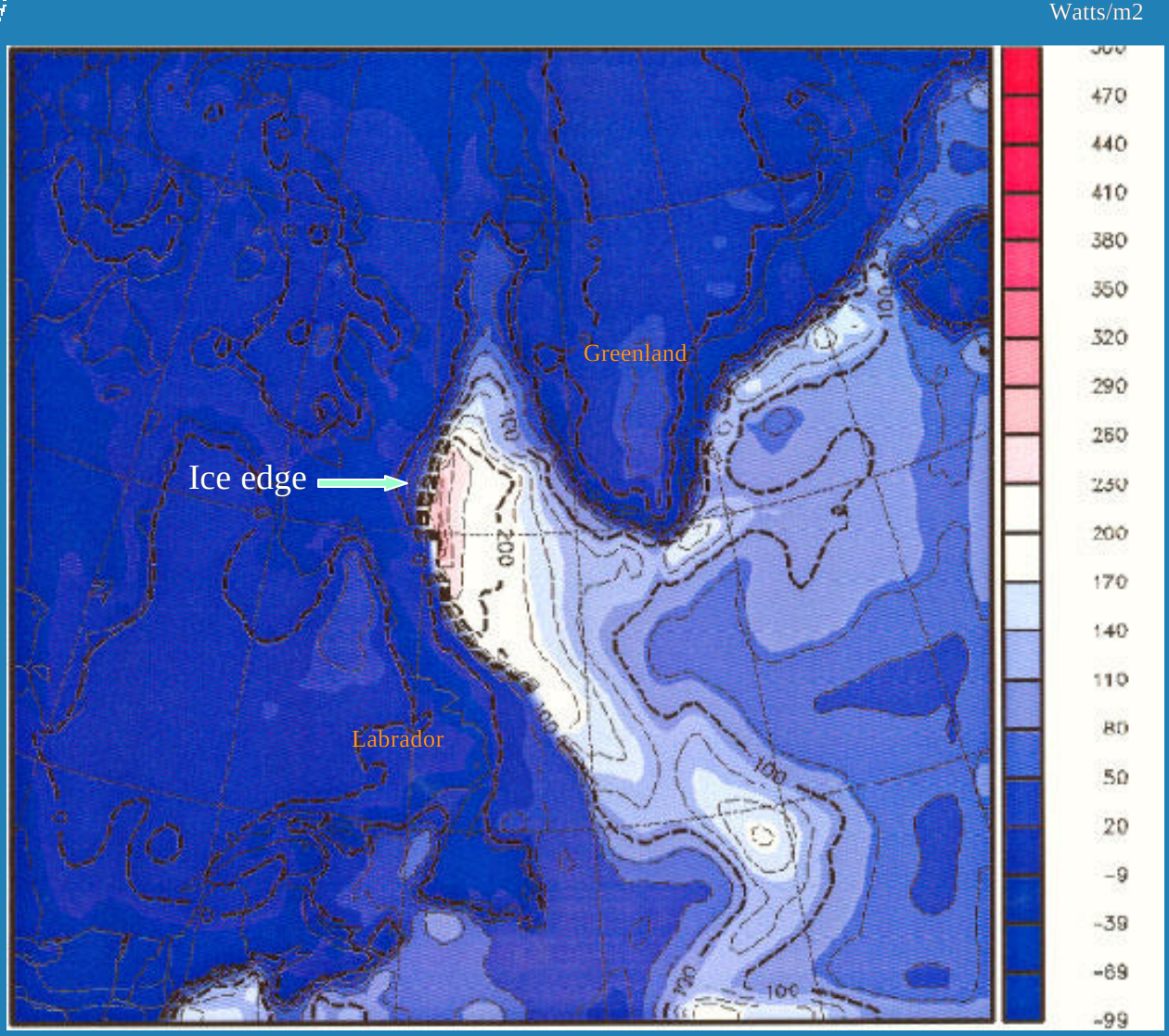
Bergs, Bergy bits, Growlers



August 2001 ice chart from Danish Meteorological Institute

West Greenland Current

Water mass transformation



Winter 1997 heat flux over western Sub-polar North Atlantic

Wintertime weather

Labrador Sea, March 1997

Steaming towards the Labrador Current

Optimizing the platform

CTD launch in winter

Water sampling in spring