Nansen and the
Fram Expedition
-1893-1896

The Arctic-A system in transition

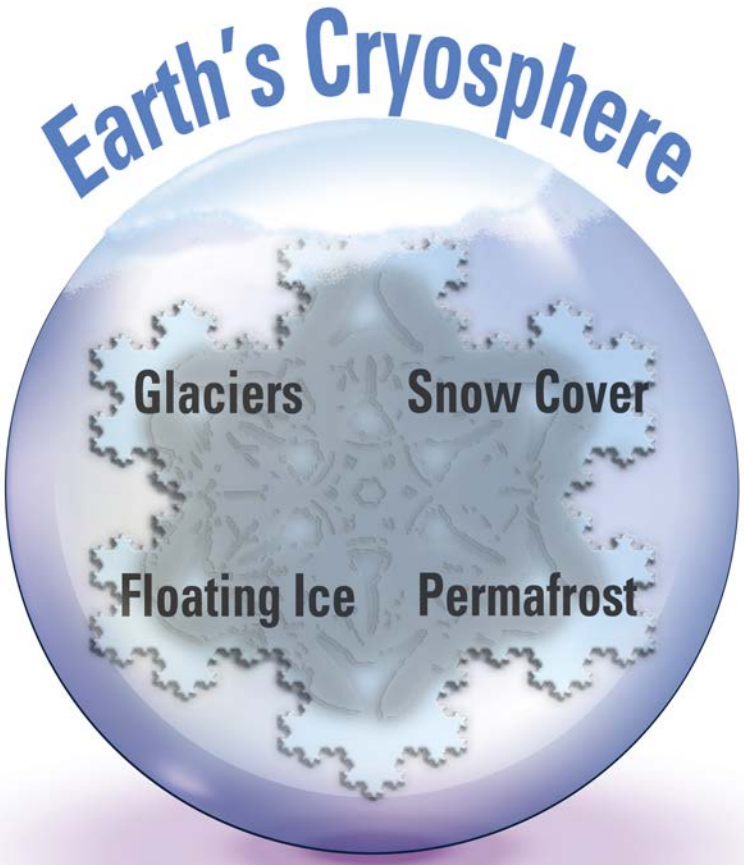
USCG Healy and
Polarstern-N Pole-2015

Jeff Welker
Professor of Arctic Ecology & Biogeochemistry
UArctic Research Chair
University of Alaska Anchorage & University of Oulu, Finland

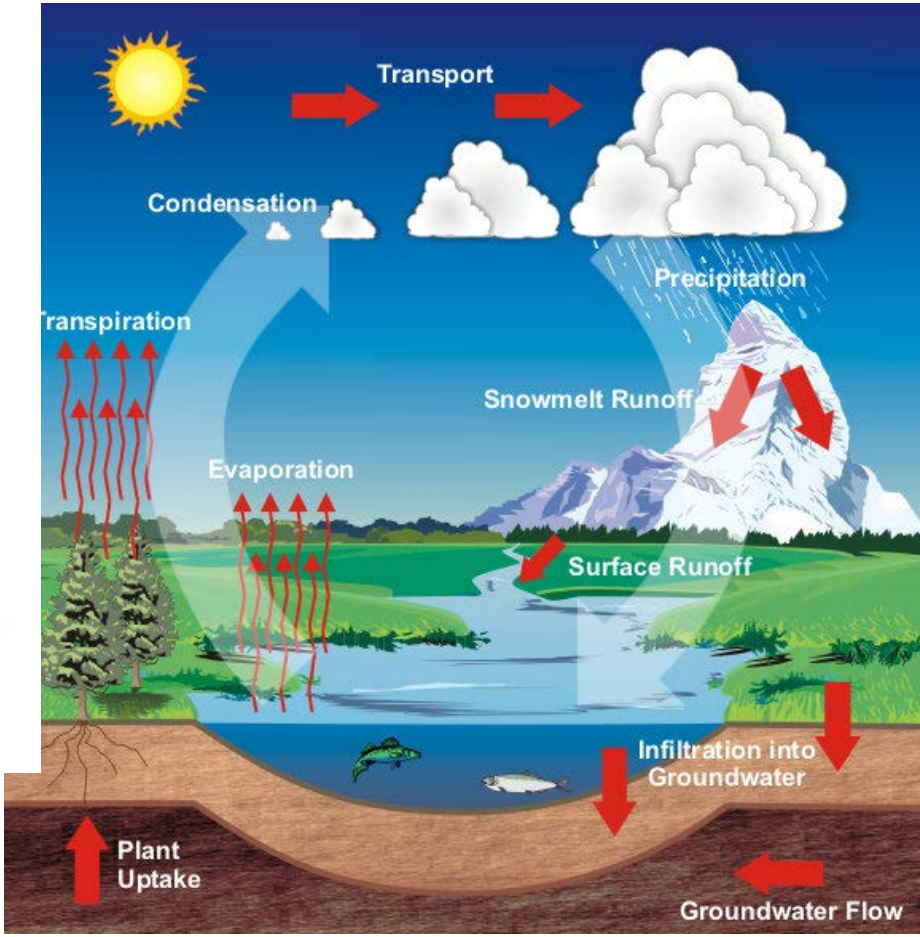
MOSAiC-Multidisciplinary drifting Observatory to Study Arctic Climate-year long

2019-2020

MOSAiC
The International Arctic Drift Expedition

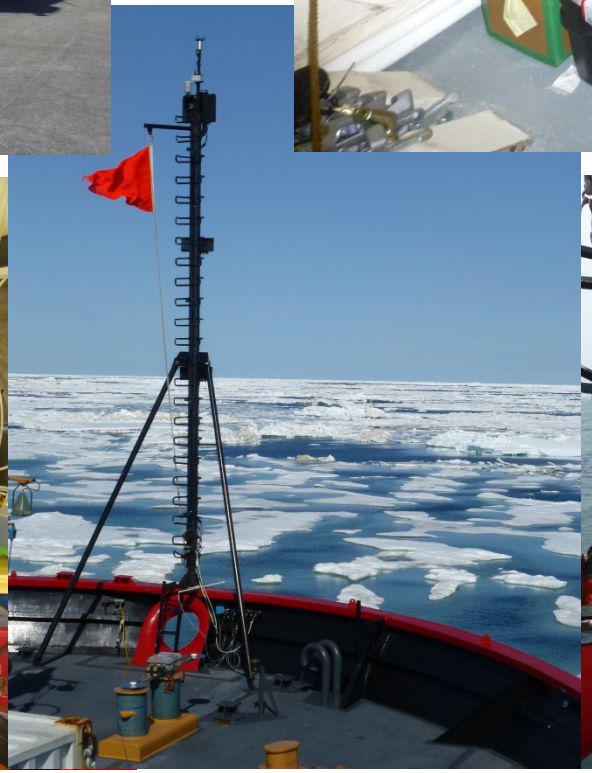


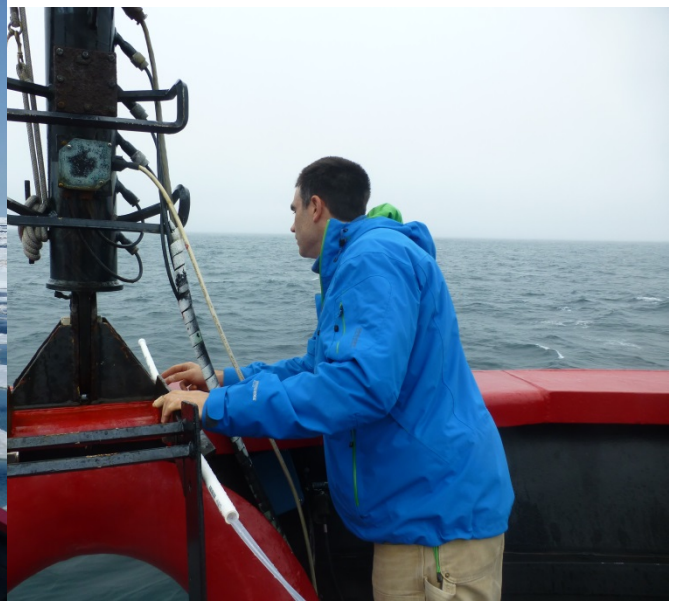
Hydrological Cycle

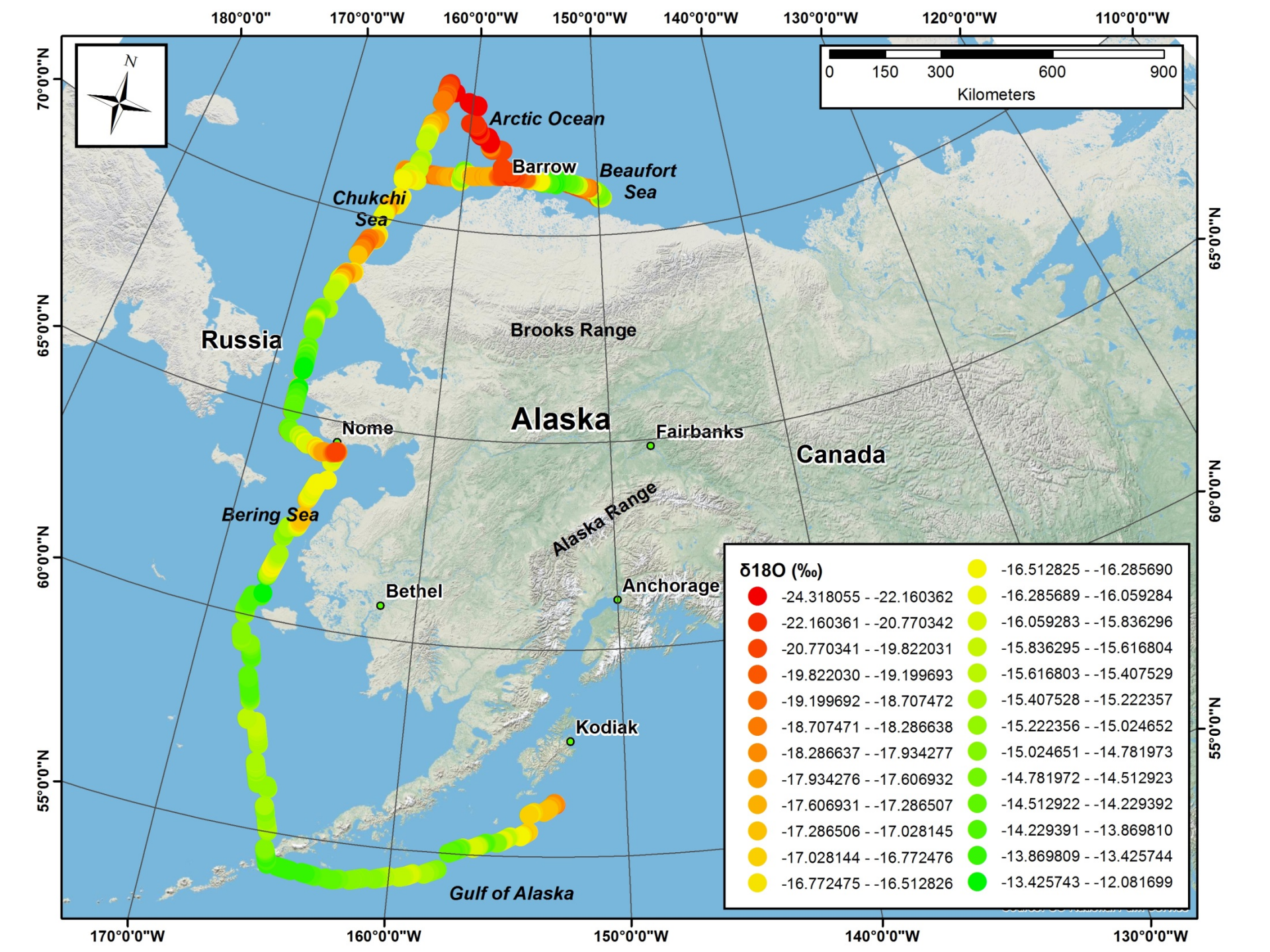


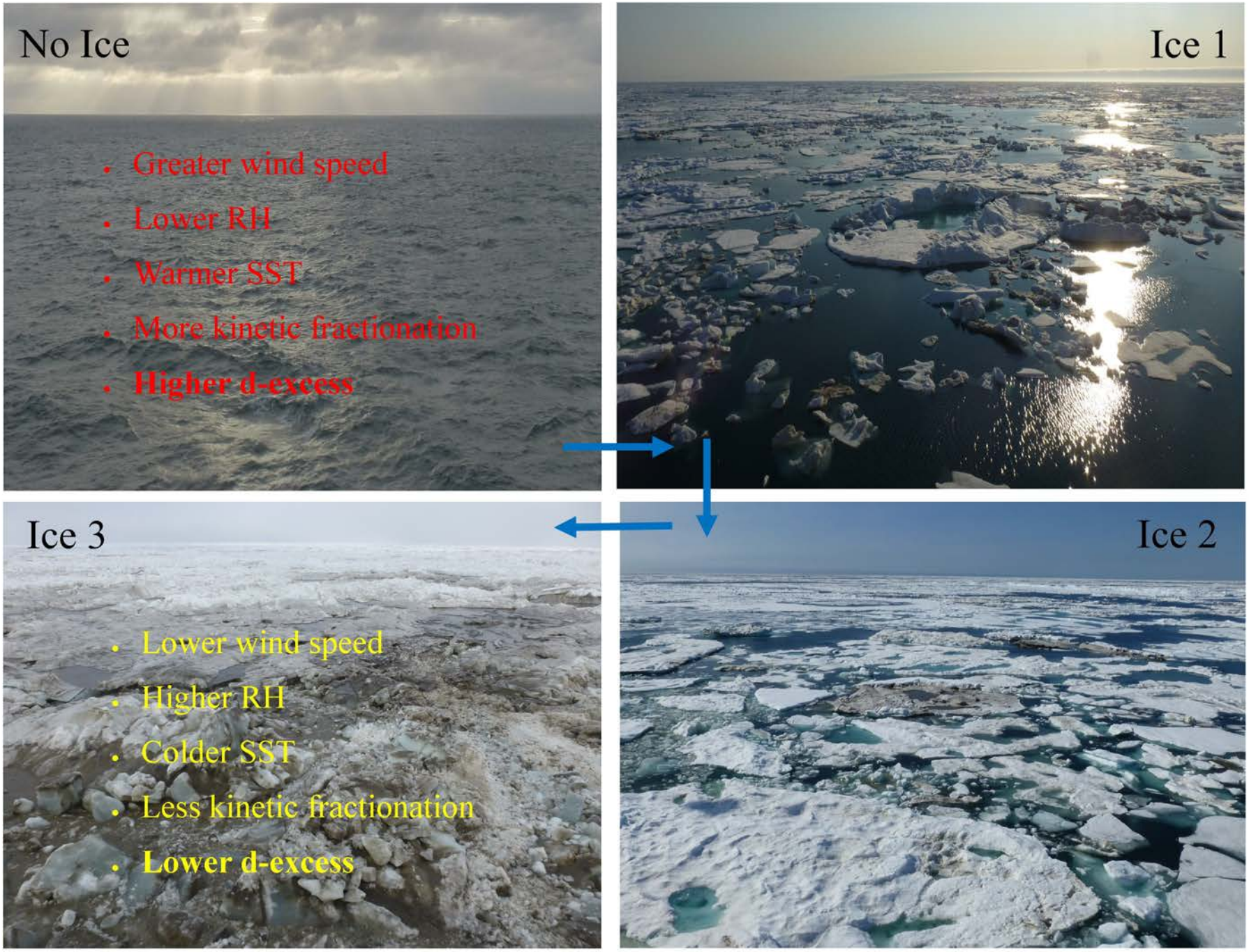
Multiple processes and attributes define the cryosphere and the hydrological cycle are at the core of a changing Arctic

Healy Water Vapor , Seawater CO_2 & CH_4 Isotopic Research






180°0'0"
170°0'0"W
160°0'0"W
150°0'0"W
140°0'0"W
130°0'0"W
120°0'0"W
110°0'0"W
70°0'0"N
65°0'0"N
60°0'0"N
55°0'0"N
N
0
150
300
600
900
Kilometers
Arctic Ocean
Barrow
Beaufort Sea
Chukchi Sea
Russia
Brooks Range
Alaska
Canada
Nome
Fairbanks
Bering Sea
Alaska Range
Bethel
Anchorage
Kodiak
Gulf of Alaska
δ18O (‰)
-24.318055 - -22.160362
-22.160361 - -20.770342
-20.770341 - -19.822031
-19.822030 - -19.199693
-19.199692 - -18.707472
-18.707471 - -18.286638
-18.286637 - -17.934277
-17.934276 - -17.606932
-17.606931 - -17.286507
-17.286506 - -17.028145
-17.028144 - -16.772476
-16.772475 - -16.512826
-16.512825 - -16.285690
-16.285689 - -16.059284
-16.059283 - -15.836296
-15.836295 - -15.616804
-15.616803 - -15.407529
-15.407528 - -15.222357
-15.222356 - -15.024652
-15.024651 - -14.781973
-14.781972 - -14.512923
-14.512922 - -14.229392
-14.229391 - -13.869810
-13.869809 - -13.425744
-13.425743 - -12.081699


No Ice
Greater wind speed
Lower RH
Warmer SST
More kinetic fractionation
Higher d-excess
Ice 1
Ice 2
Ice 3
Lower wind speed
Higher RH
Colder SST
Less kinetic fractionation
Lower d-excess

AGU PUBLICATIONS

Geophysical Research Letters

RESEARCH LETTER
10.1002/2016GL071748

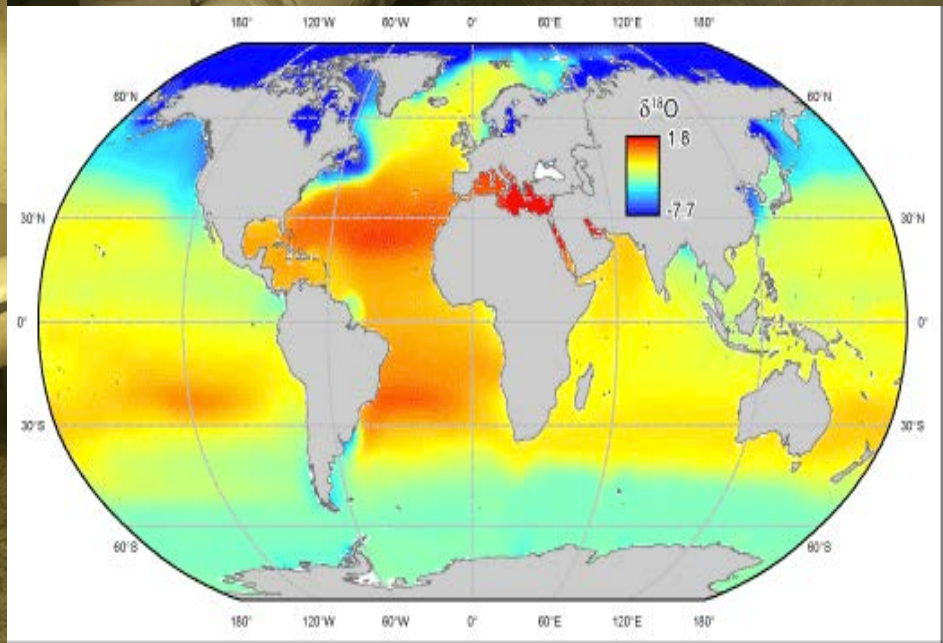
Special Section:
The Arctic: An AGU Joint Special Collection

Influence of sea ice on ocean water vapor isotopes and Greenland ice core records

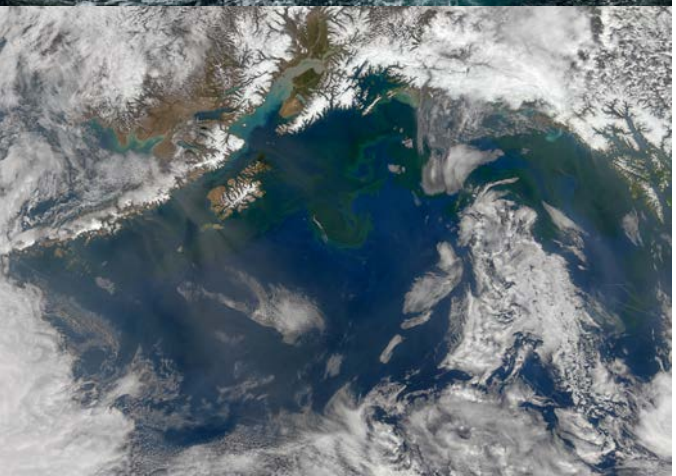
Eric S. Klein[1] and Jeffrey M. Welker[1]

[1]Department of Biological Sciences, University of Alaska Anchorage, Anchorage, Alaska, USA

Healy 1601: In-situ seawater ($^{18}O/^{2}H$) isotope geochemistry

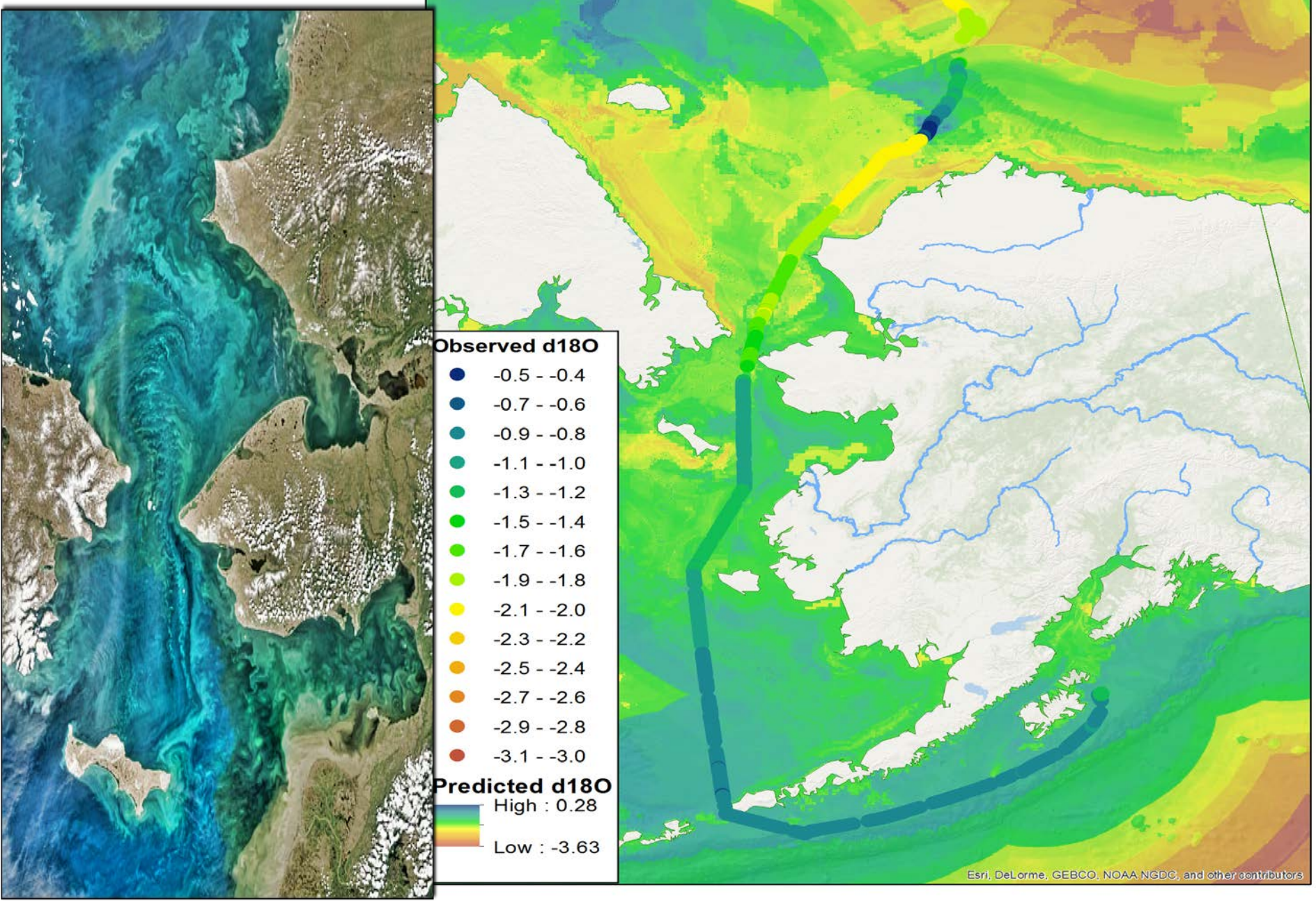


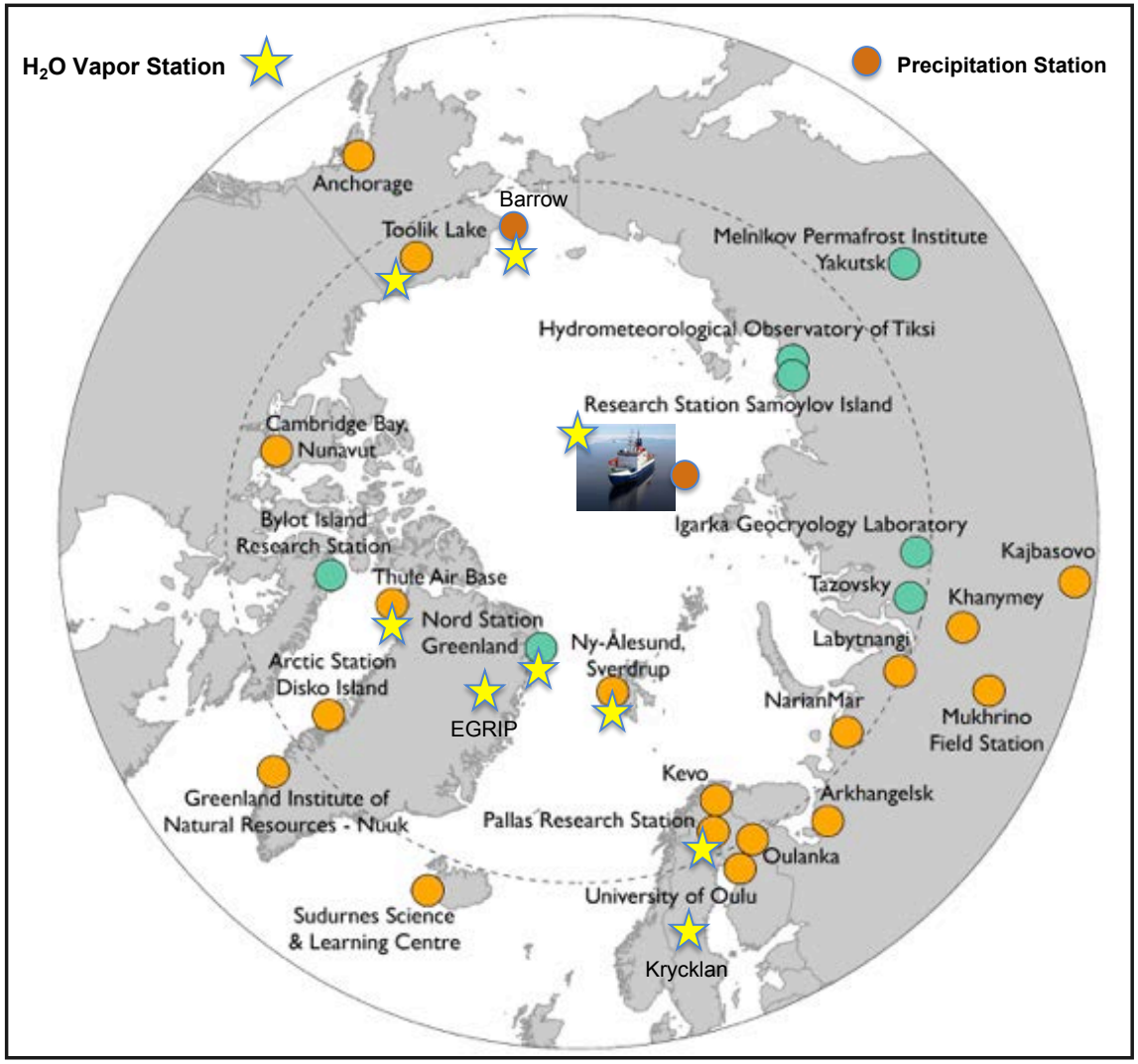
Thanks to Picarro, Dave Fuchucia, STARC & the Healy Captain, XO and and crew




Seawater d18O Isoscape
-0.607
-1.735
-2.863

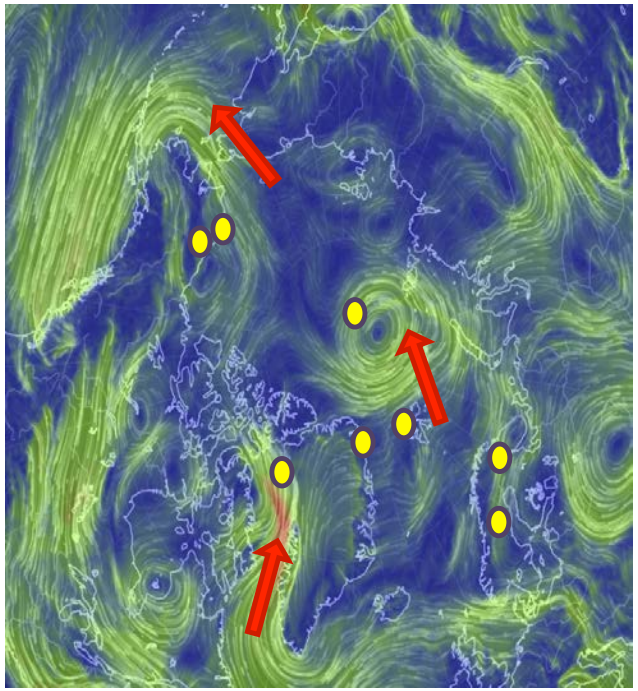
Sea water isotopes



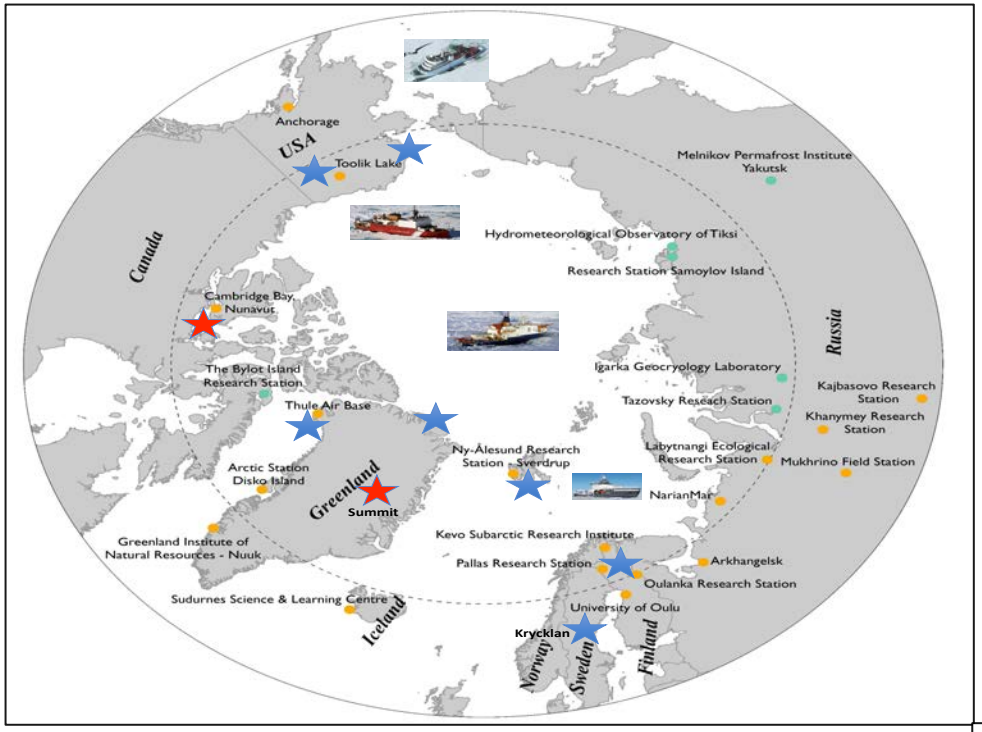


MOSAiC's Arctic Water Isotope Cycle Network- Interactions between sea ice, isotope hydrology and atmospheric processes

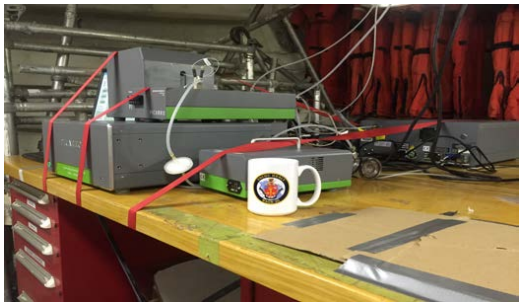
Welker et al.

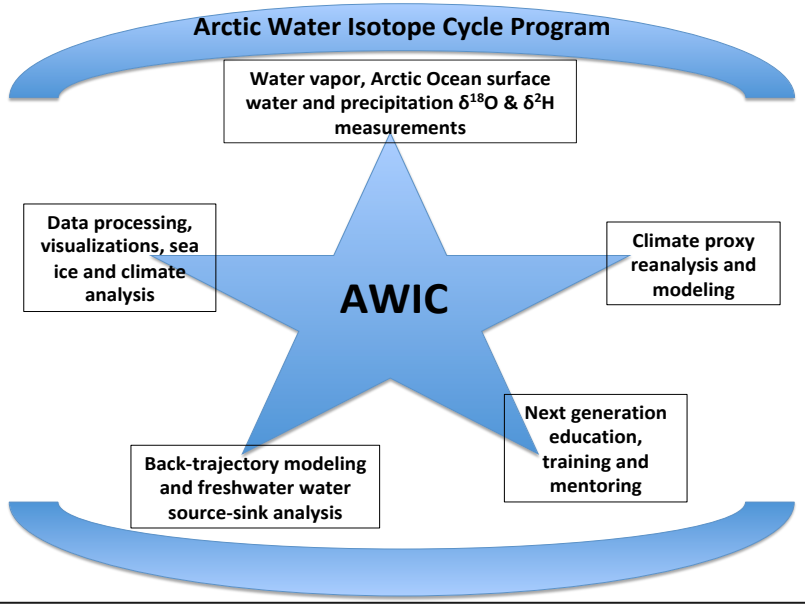


Nov 24



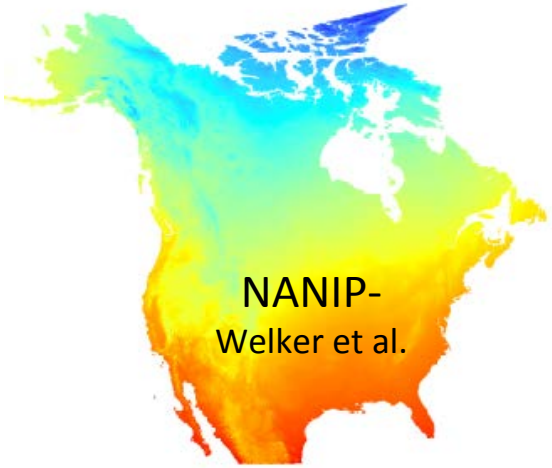
European Research Commission
Advanced Grant Application
J M Welker et al.
Arctic Water Isotope Cycle (AWIC): sea ice and climate controls on moisture transport using a Pan Arctic network of land & icebeaker based isotope ($\delta^{18}O$, $\delta^{2}H$) measurements
5 years, $4 million USD



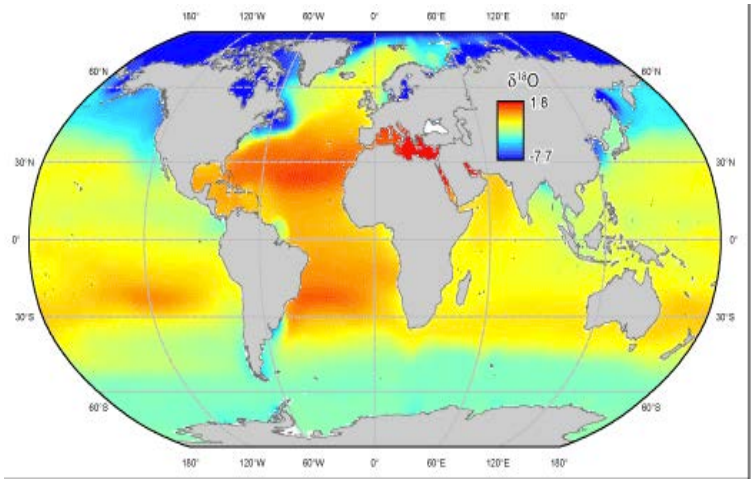


Toolik Lake, AK

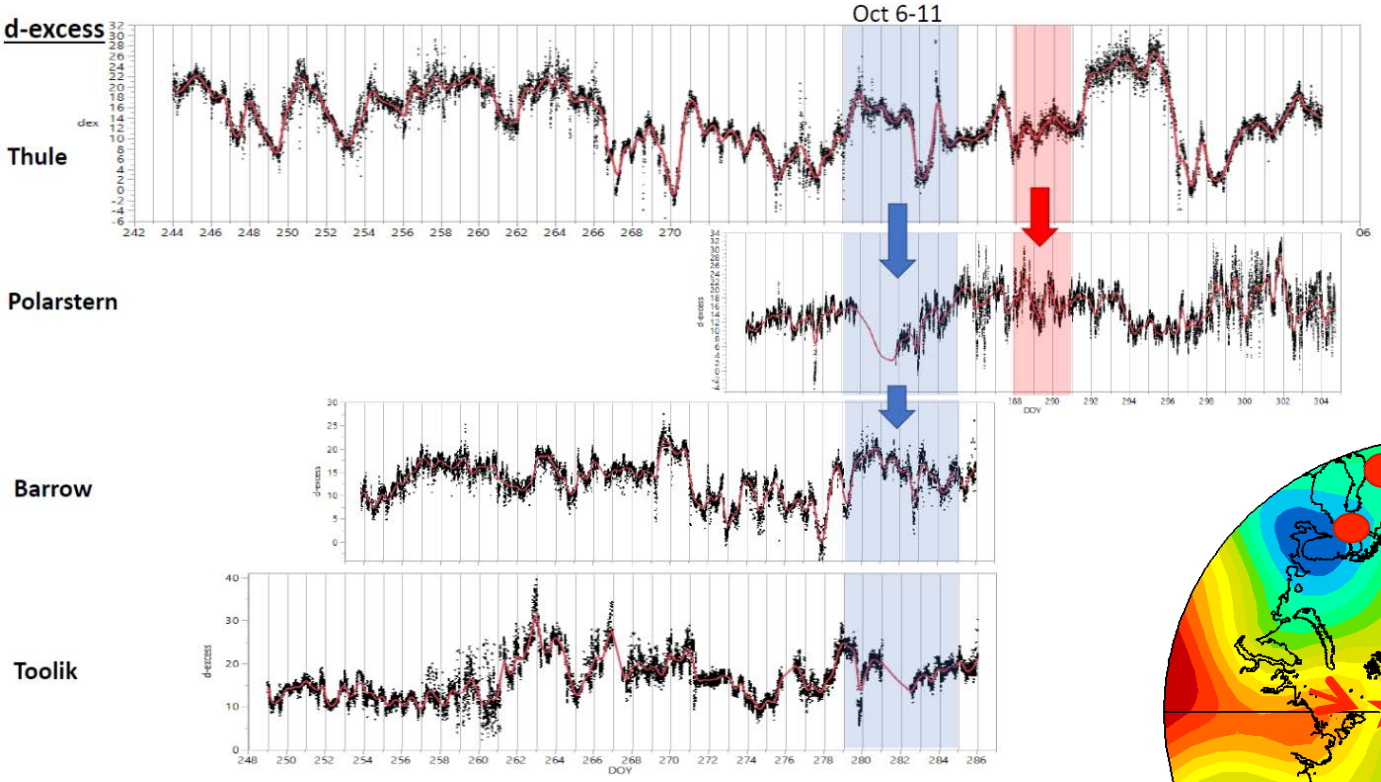
Thule, NW Greenland



NANIP-
Welker et al.



AON
ARCTIC OBSERVING NETWORK



6-11 Oct 2019 daily composited Geopotential Height (850mb)