



# WHOI--Ice-Ocean Interaction

Marine Arctic 2020  
Intersection of Science, Education, Policy and  
Environment

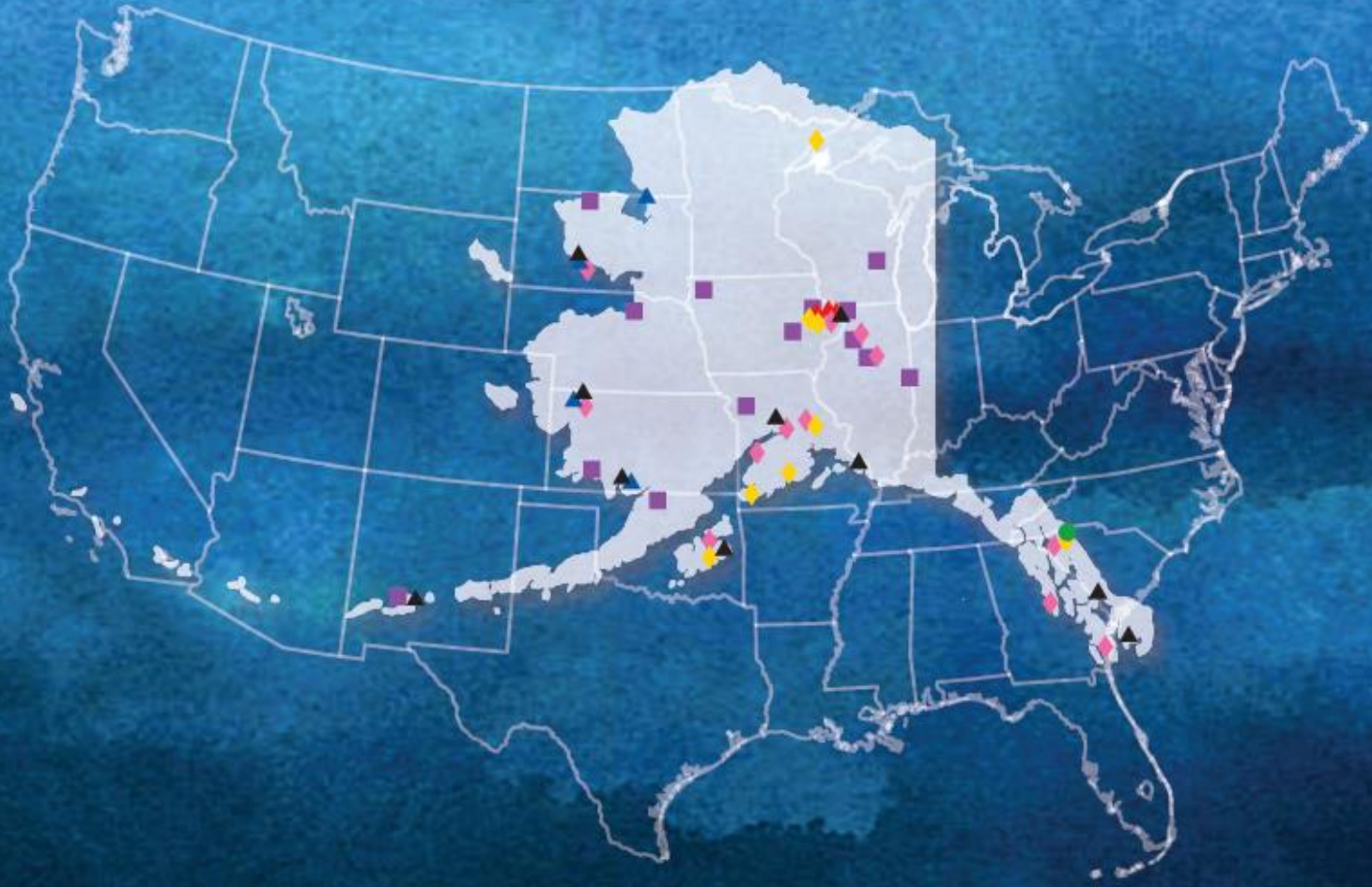
**Michael Castellini**

UAF Graduate School  
and  
Center for Arctic Policy Studies



March 3, 2016





10/2011





**High probability:**

**Most of us here accept climate change**

**Many experts in the room**

**Ask you to switch your perspectives:**

**You are NOT marine scientists**

**Public who ask you questions**

**Public policy, values and decision making**

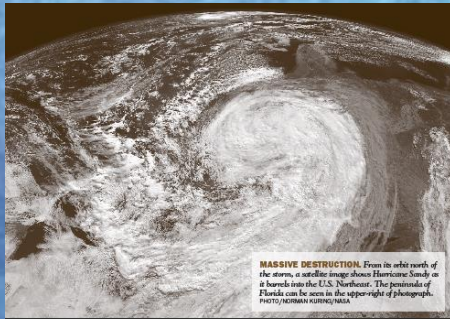
**There are two**

**The Great Ho**



Photo: Bill McCormick





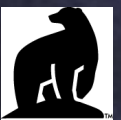
**MASSIVE DESTRUCTION.** From its orbit north of the storm, a satellite image shows Hurricane Sandy as it barrels into the U.S. Northeast. The peninsula of Florida can be seen in the upper-right of photograph. (AP/Wide World Photos)

Climate Change  
and Extreme Weather

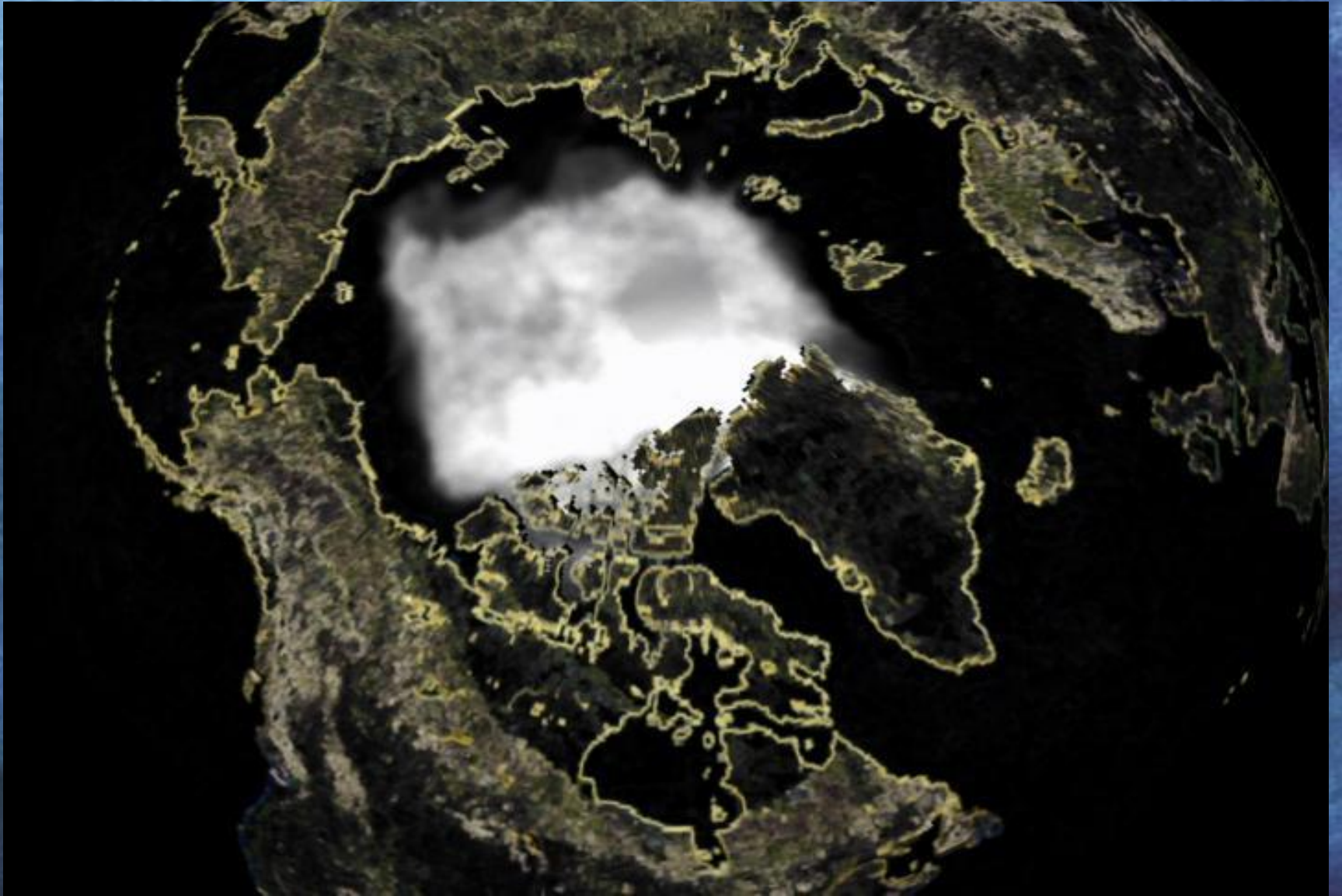
When middle school and high school students ask about climate change:

What do you tell them?

1. Why it is important to them... Hard sell in Atlanta
2. They heard that Climate Change is “just a model”
3. The climate is always changing... no big deal
4. Problem is too big... can't do anything about it







*since 1917* 6

# The Northern Arctic....Ice...water...land

Triple point where ice, people and land meet





Ice directly impacts human access to marine mammals



since 1917







# Arctic Ocean

Who "owns" it ?  
Who shares it?  
What are the resources?

Multiple nation border  
4 million people  
World shipping  
World trade  
Pollution  
Access



# The known issues:

Changes in Arctic sea ice

Increased human marine impact / traffic

Increased economic drivers / resources

Ocean acidification

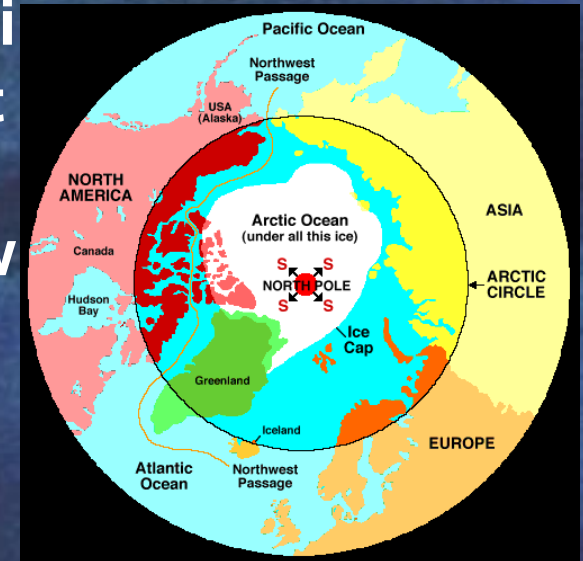
Social impacts on Arctic populations

Changes in fisheries

Permafrost / ocean interaction

Public information / perception

What are the opportunities and what are the risks?



*since 1917*

# How balance exploration, economics, environmental / social impact and risk in a new Arctic?

What is the role of marine science research in this equation?  
What are the roles of education, policy and value decisions?  
How can we predict the future?



*since 1917*



Transfer of issues from other oceans apply to the Arctic

Fishing

Shipping

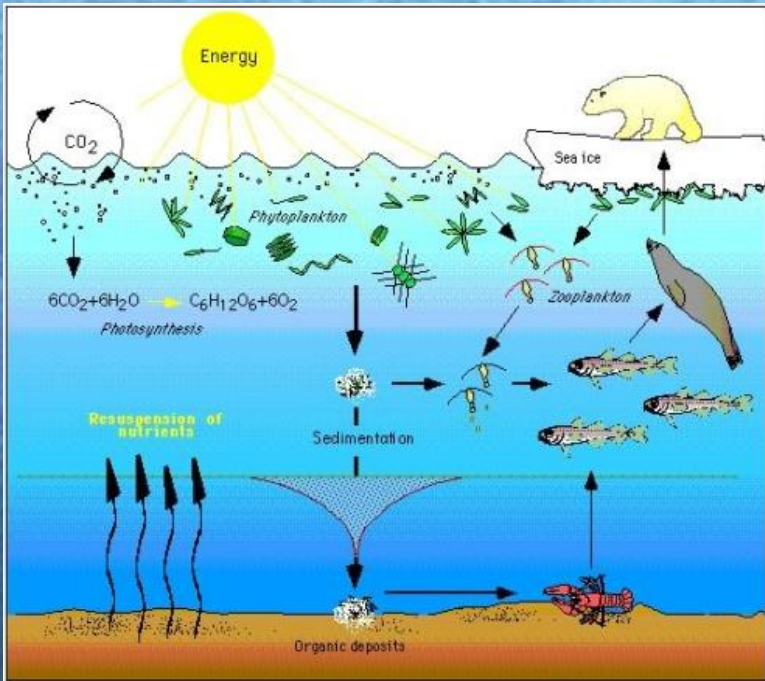
Tourism

Mining

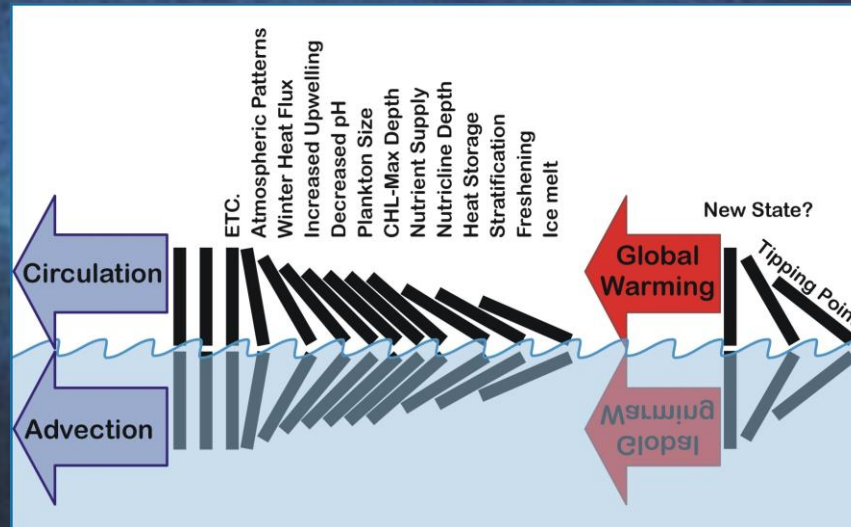
Bio-prospecting







Drawn by Christopher Krembs



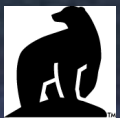


# The risks:

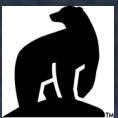
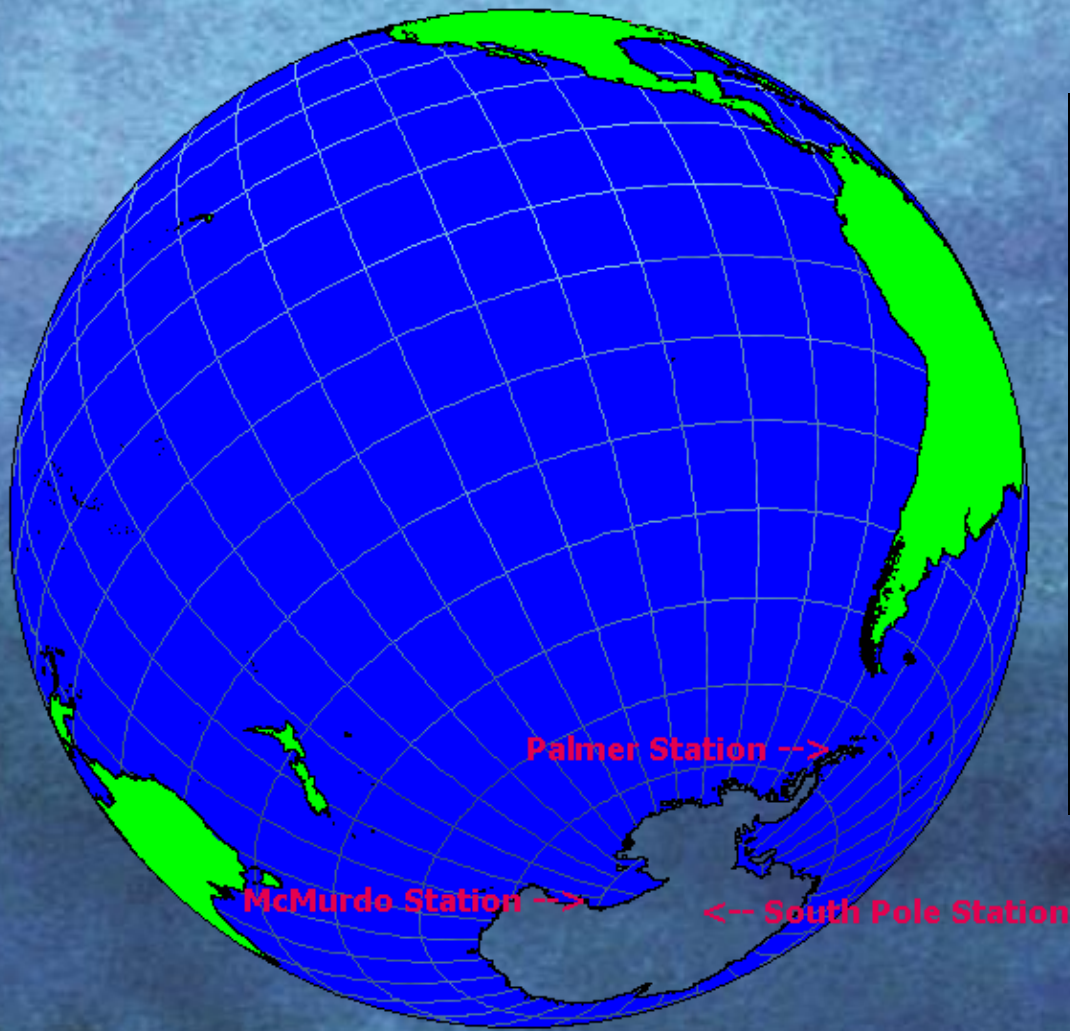
**Public apathy to polar regions**  
**Ineffective approach (academic)**  
**Too little, too late**  
**Data not coordinated, managed**



**There  
are two  
polar  
regions  
on Earth**









# People live in the north...

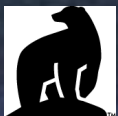


... but not in the south...

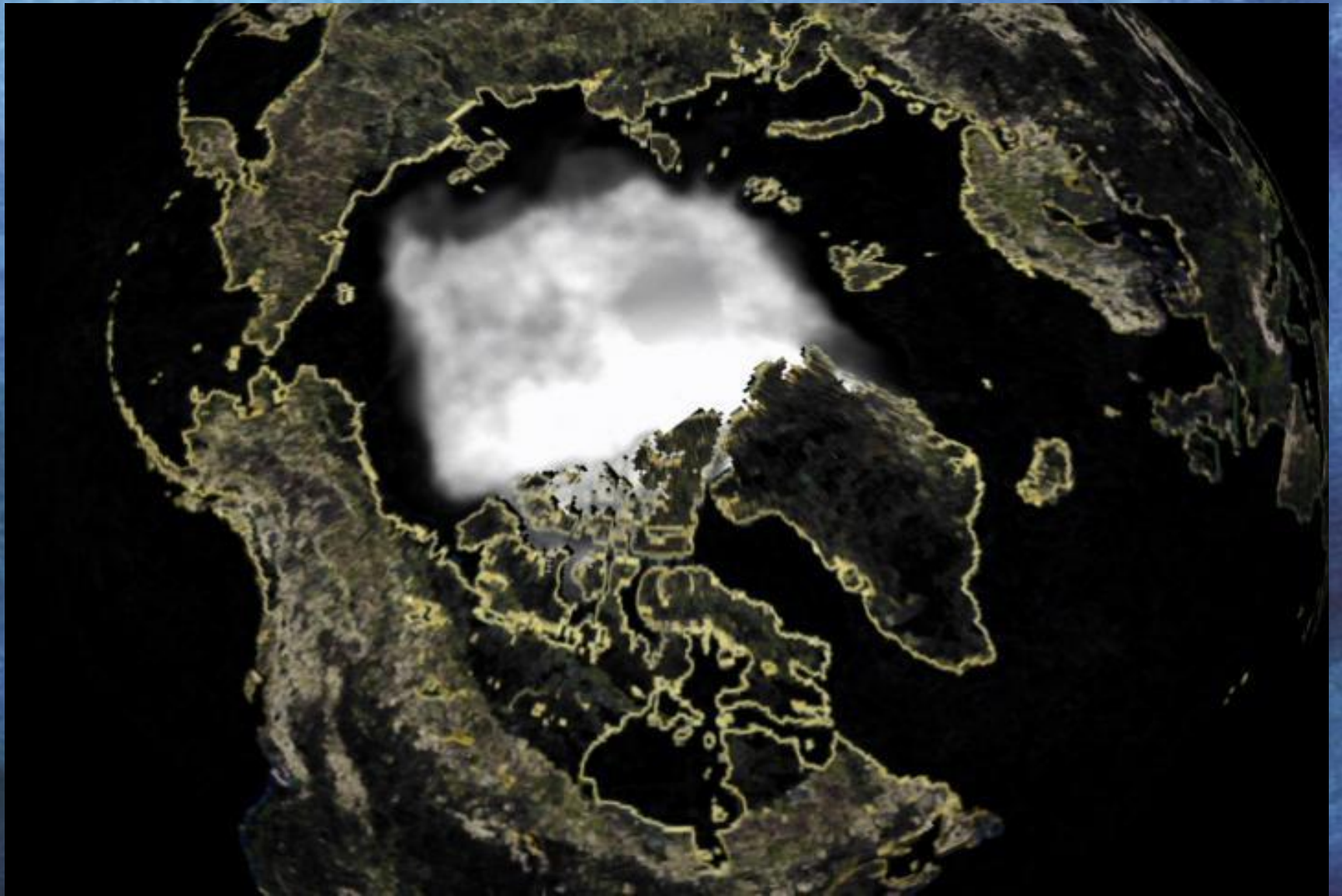








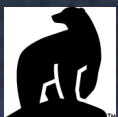




*since 1917*

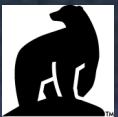


# Alaska Indigenous Language Groups













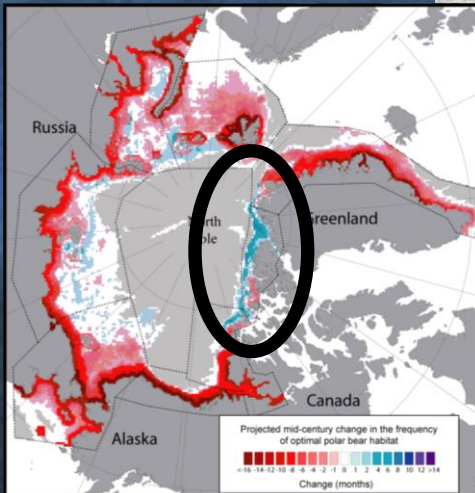
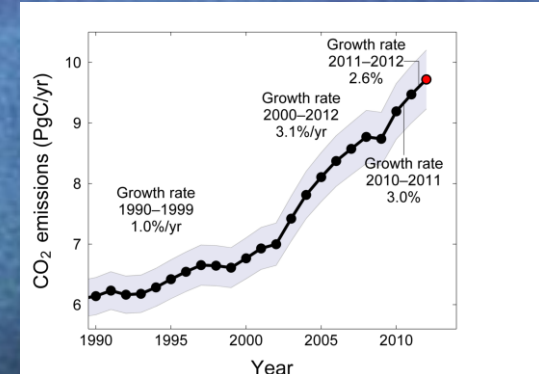
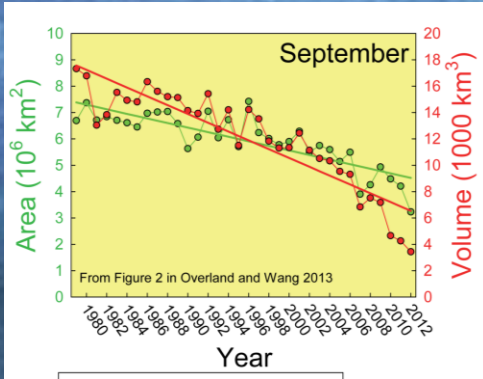






# George Durner

## Will the diminishing Arctic ice be a dead end for Polar Bears?



Will polar bears be a “Sea Winner” or a “Sea Loser”?

- Perhaps the answer to that question depends on





Lori Quakenbush

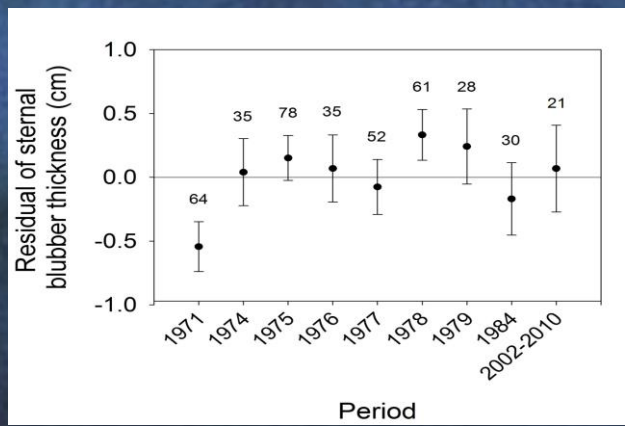
# Are Ice Seals Arctic Winners or Losers?



L Horstmann, SFOS



## Blubber thickness (body condition)



No losers right now

They may surprise us in ability to deal with future ice conditions.



# It's not my problem

“Arctic is far away, dark, cold and nobody lives there anyway”



Coastal erosion in Shishmaref

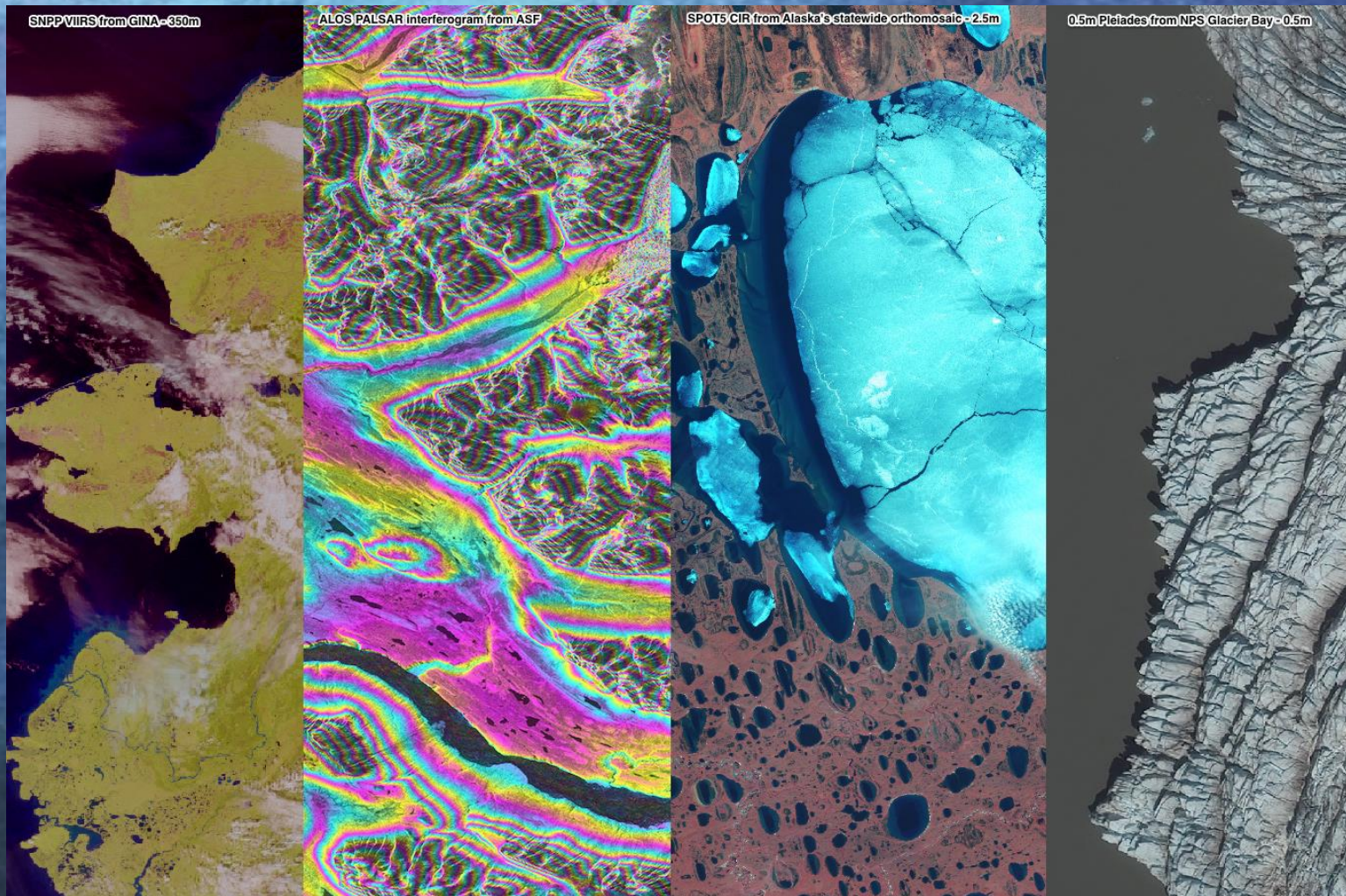


The Arctic is so extensive... .how can you work there?



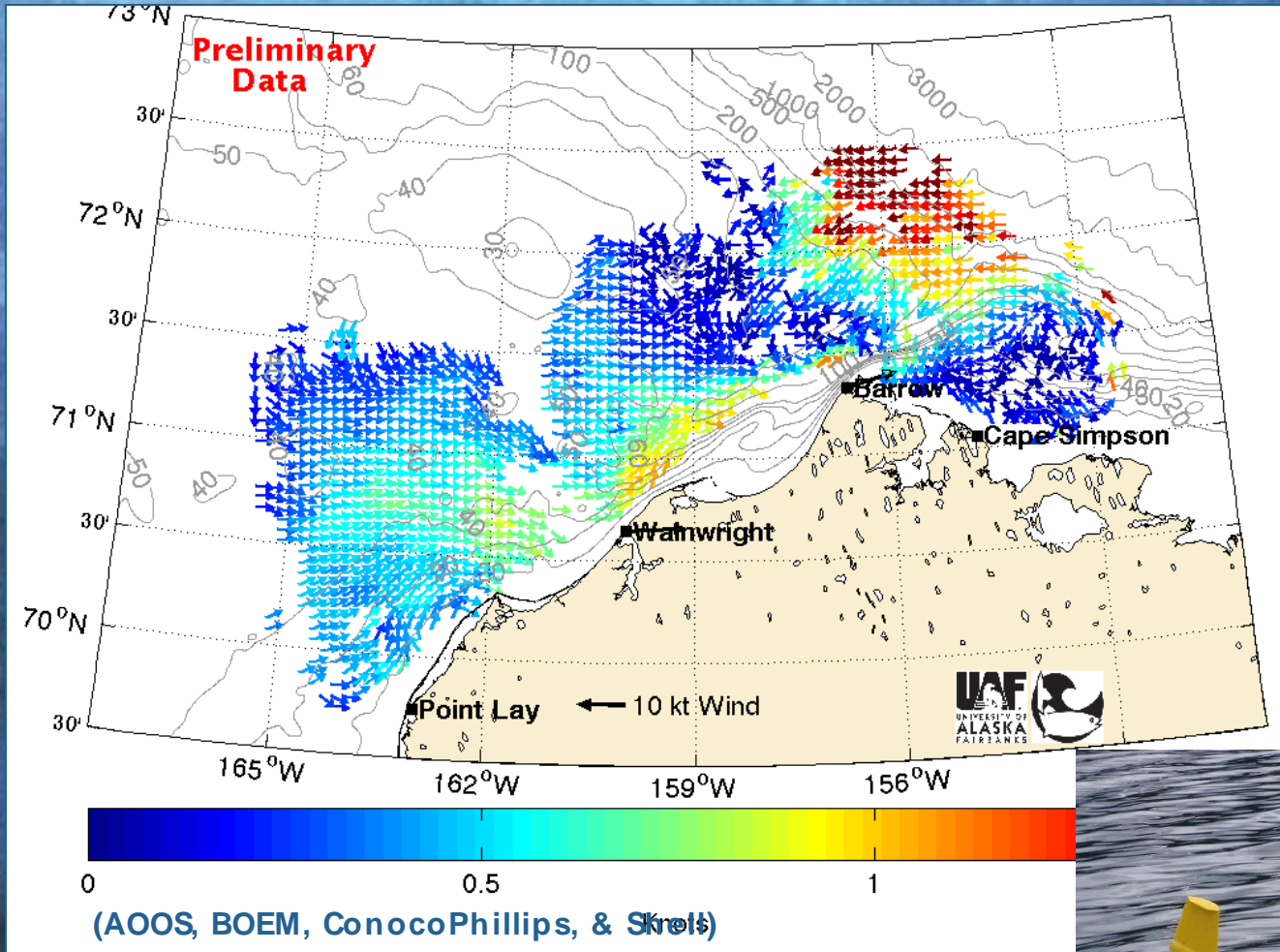


# Satellite Remote Sensing

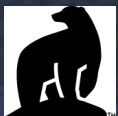




# Shore-based High Frequency Radars (150 km range, ice-free seasons):



Autonomous UW vehicles





# Sea Ice Survey - Barrow





LAND



SEA



SPACE



AIR



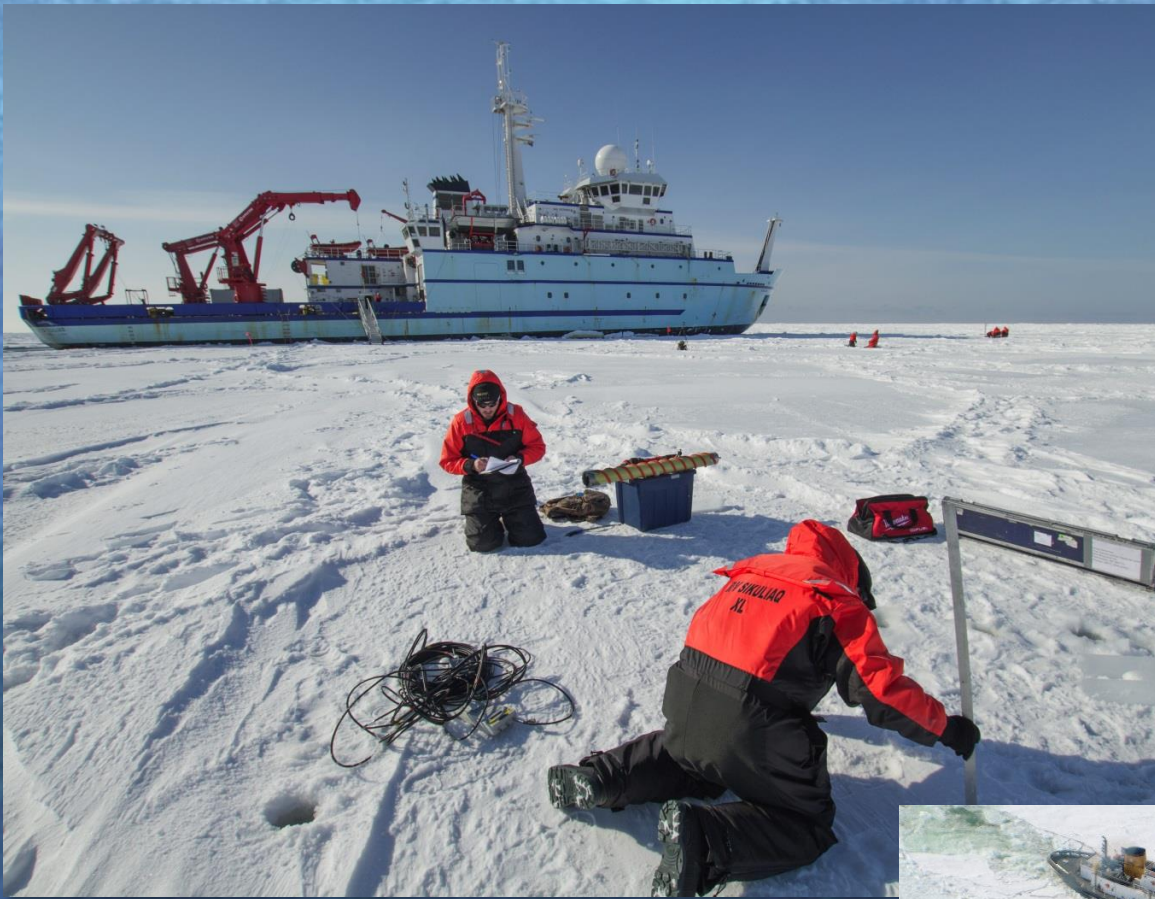














# The Great Hoax

**“Scientists are in this for: (fill in)**

**Fame, fortune, promotion, tenure  
desire to control economy, etc**

**Hoax lectures and events...very  
informative**

Did you know that coastal flooding of Micronesia or Western Alaska is “not important because those regions don’t contribute significantly to the world economy”





# Climate change is a hoax

Worldwide conspiracy by  
scientists

“I don’t *believe* in climate  
change”

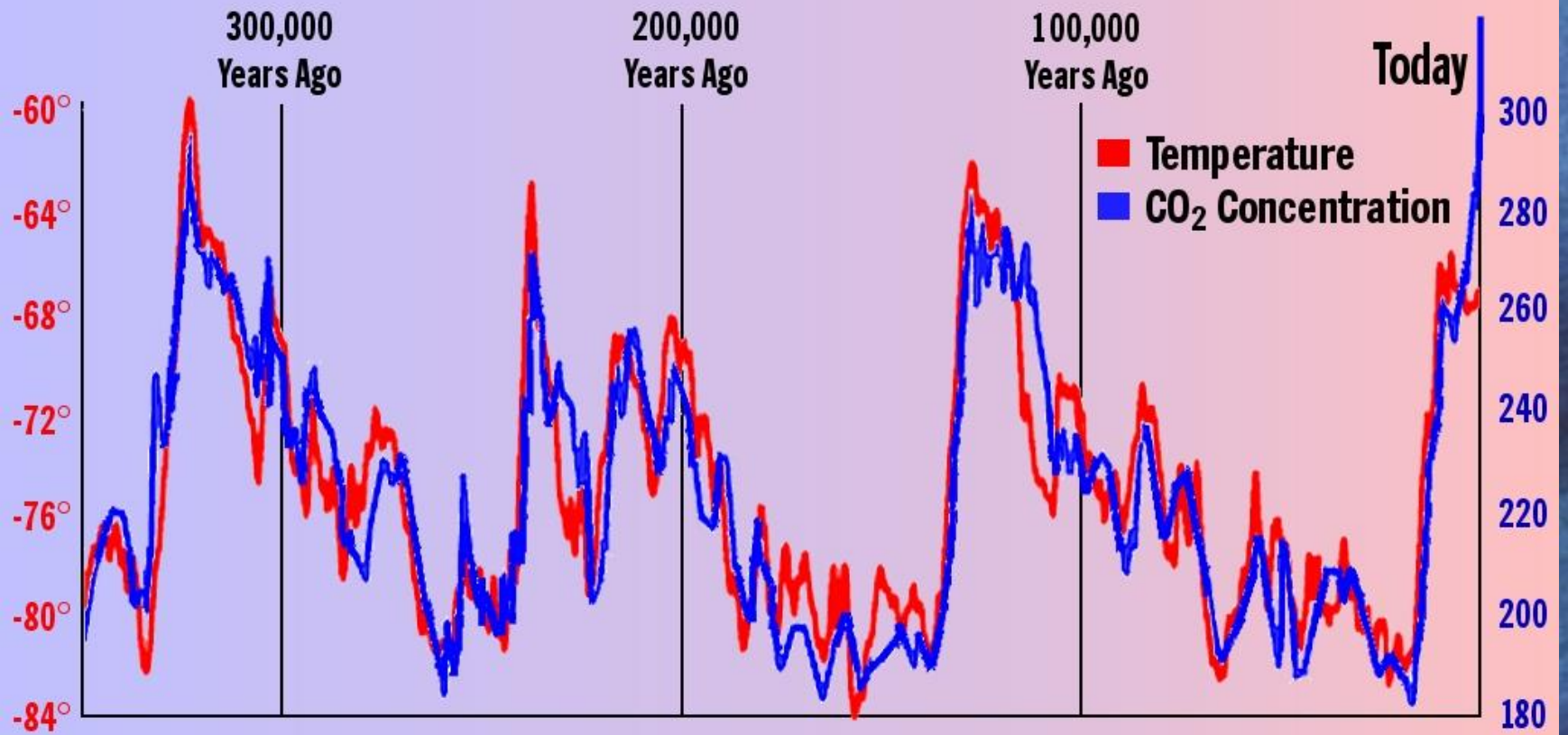
“Being hot is better than  
reezing”



It's all just a model...and the earth always changes...







Temperature in Antarctica in °F

Carbon Dioxide Concentration in PPM

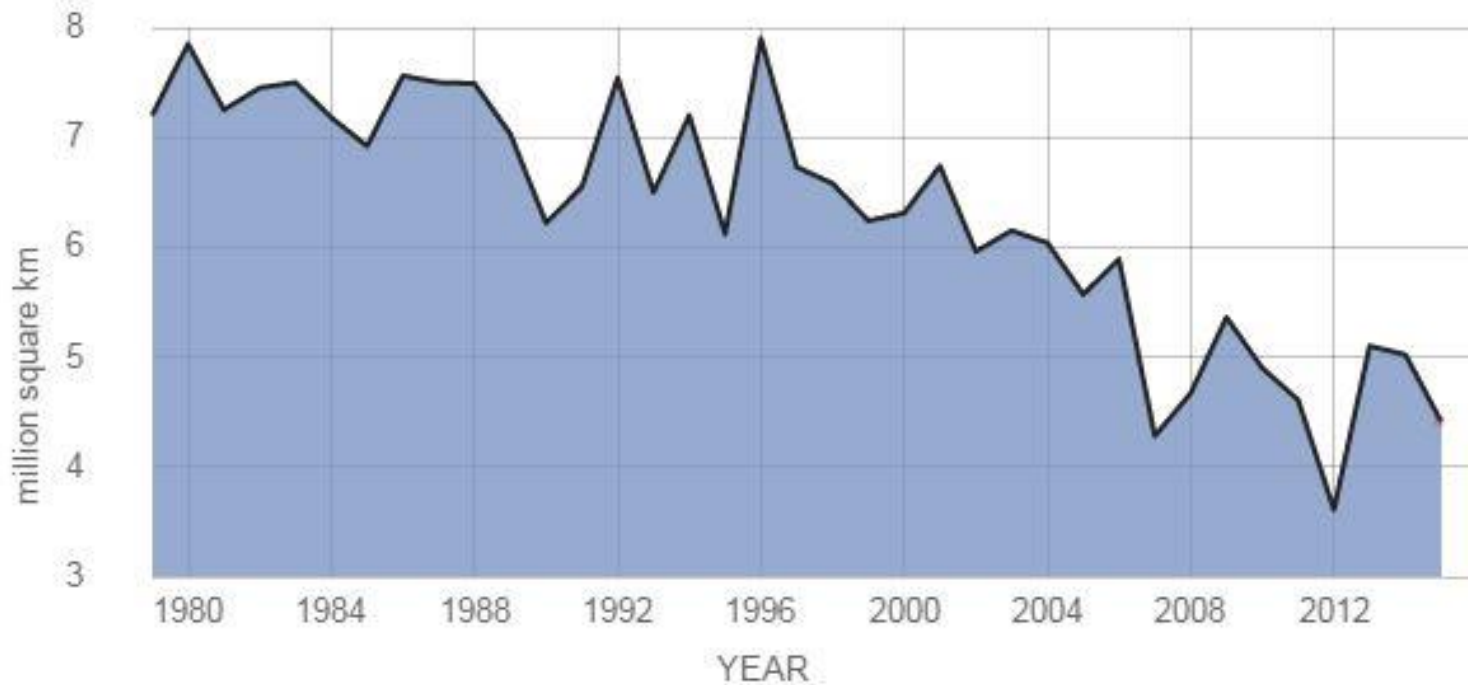


## AVERAGE SEPTEMBER EXTENT

Data source: Satellite observations. Credit: [NSIDC](#)

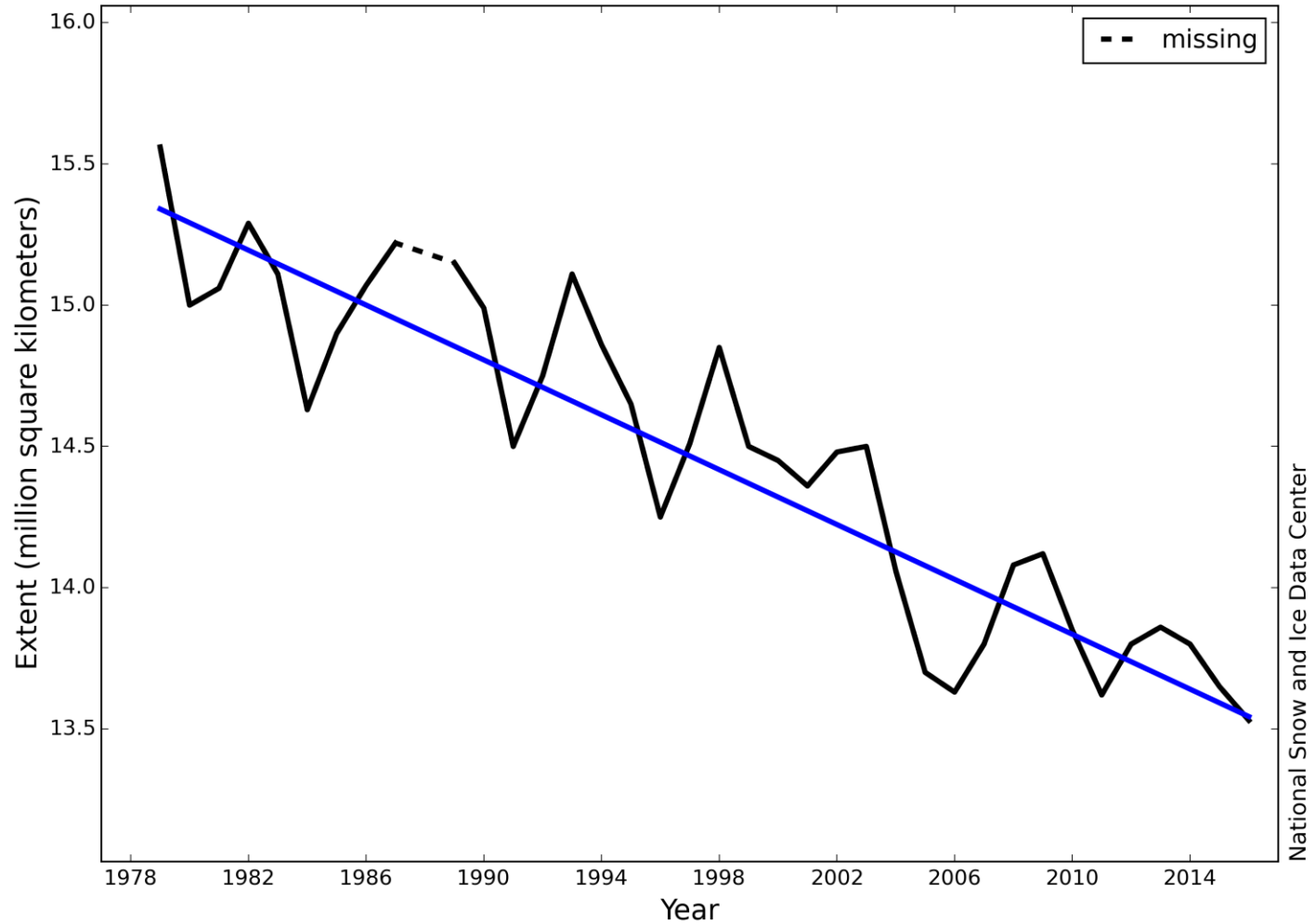
RATE OF CHANGE

↓ **13.4**  
percent per decade

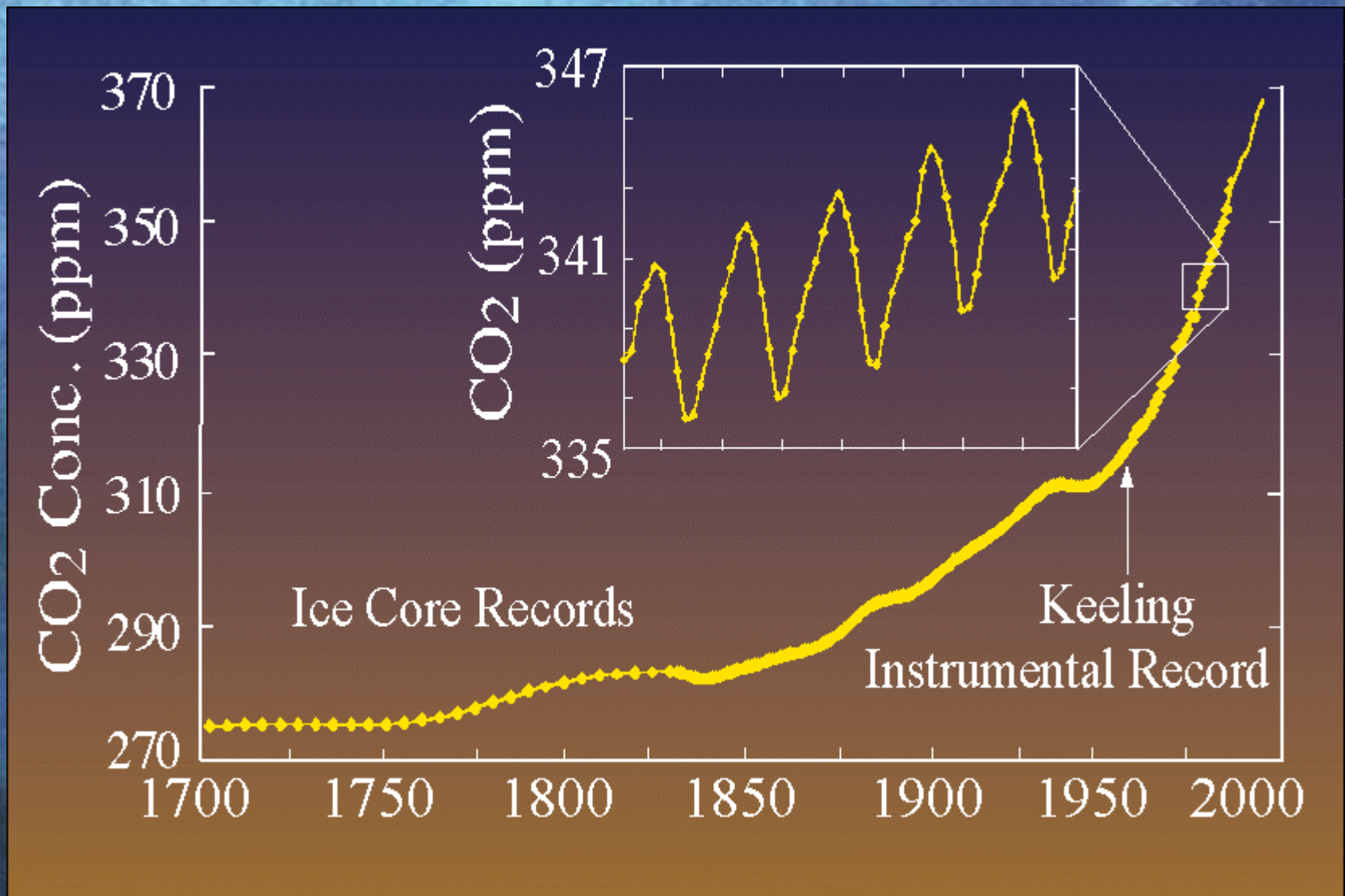




# Average Monthly Arctic Sea Ice Extent January 1979 - 2016

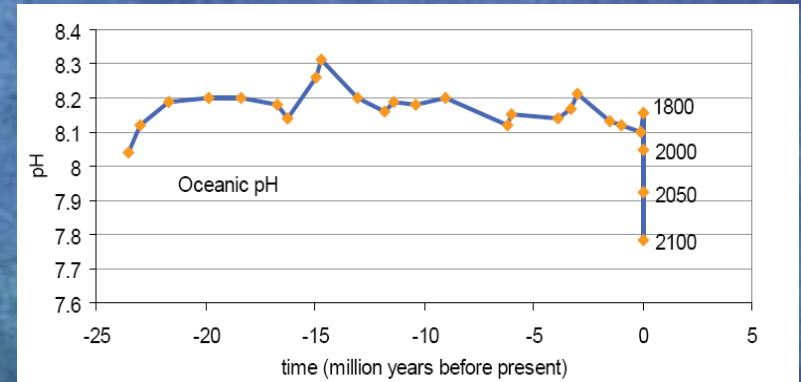
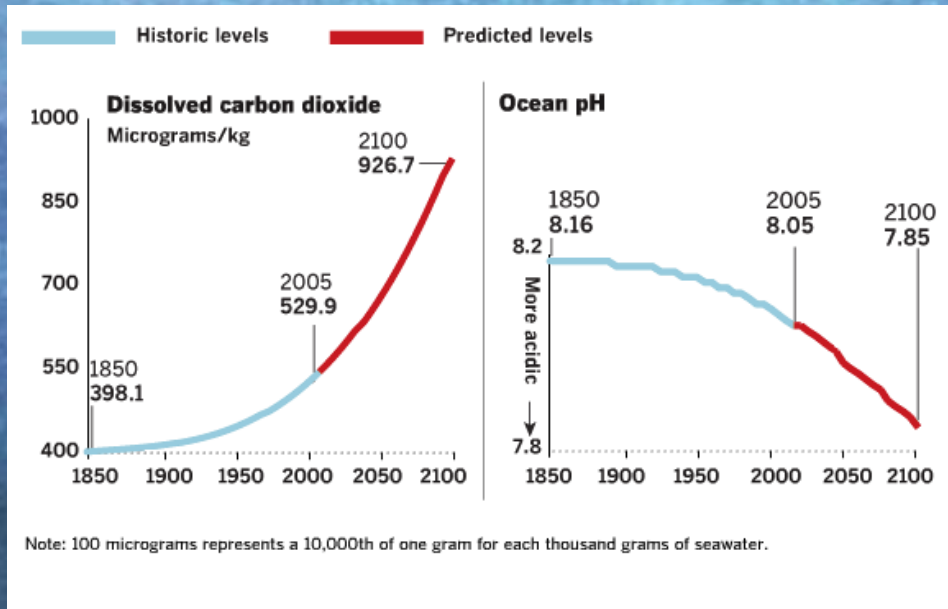






Atmospheric carbon dioxide concentration over the last 50 yr





## We Know Enough to Act

- We **KNOW** that a major catastrophic event is coming
- We **KNOW** how to prevent it
- We **CANNOT PREDICT** exact costs, casualties and damages
- But... uncertainties are **NOT** an excuse for inaction

Images courtesy R. Hopcroft and J.



**The Hoax cycles back around to:**

**These are just models**

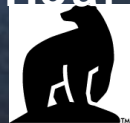
**Change is always happening**

**Climate change is not human induced**

**Data are false, plot, etc**

*“... we're still supposed to believe the models... models they picked because they supported their political interests, not because they represented good science.”*

Sept 19, 2013. Heartland Institute, Joseph Bast



*since 1917*

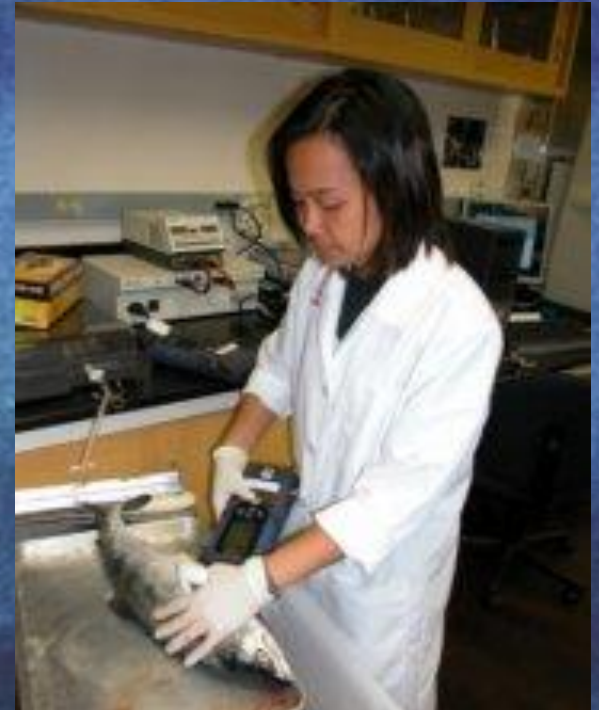


**What can I do?**  
**The questions are too big**  
**I am not a scientist ... .**



© 2013 Macmillan Publishers Limited. All rights reserved









**POLAR**  
**PLANET PALOOZA!**







**One World**

**One Ocean**

**One Health**

**NOAA**







**R/V**  
***Sikuliaq:***



- Owned by NSF, operated by UAF
- Home port in Seward, Alaska
- Global Class ocean research vessel for seasonally-ice covered oceans (1m)



**What can I do?**





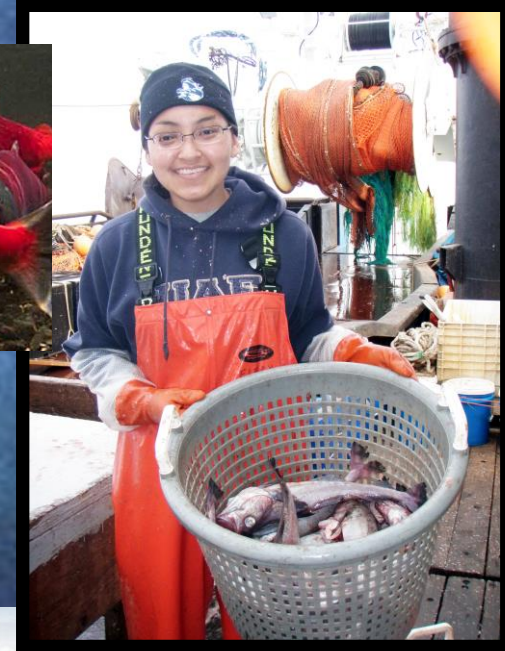
Val Hilde: MMC/NSF





# Marine life in Alaska.....

Abundant  
Diverse  
Connected





# European Scale and Perspective



Alaska at scale with Central Europe  
[special thanks to GIS wizard N. Walker]  
<https://ayankeeinprague.wordpress.com/author/shipbright/page/6/>

- **Alaska: Total population 735,601 (2014 – <http://www.labor.alaska.gov/research/pop/popest.htm> )**
- **Alaska Native Population ~ 135,026 ([labor.alaska.gov/research/pop/present/apr242008.pdf](http://labor.alaska.gov/research/pop/present/apr242008.pdf) - 109k - 2011-09-29)**
- **Prague: population ~ 1.2 million alone**
- **Combined populations of Czech Republic, Poland, Slovakia, Hungary, Austria, Croatia, and Italy: ~ 137.8 Million**