



# OCEAN SCIENCE POLICY PANEL

CANADIAN SCIENCE POLICY CONFERENCE

NOVEMBER 21, 2013



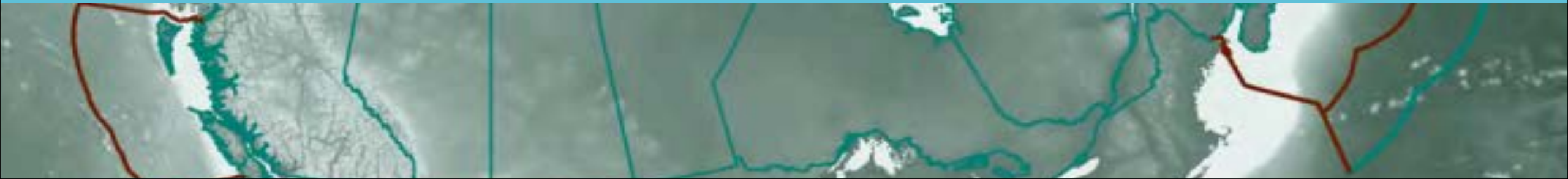
Arctic  
Ocean

# A Three Ocean Nation – World's Longest Coastline





Canada's UN claim equals 20% of current landmass  
Total offshore lands equal to 70% of landmass



# BLUE ECONOMY

\$100B Economic Growth: Arctic Ocean [Lloyd's Of London, 2012]

China's Ocean Economy: 6% GDP [\$438B]

Brazil's Ocean Investment: \$225B Over 5 Yrs

"Natural Capital": \$70T GDP Annually [World Economics Council]

Oceans: 90% Global Trade

Fisheries: \$94B Annually

Aquaculture: \$98B Annually

# OCEAN NETWORKS CANADA

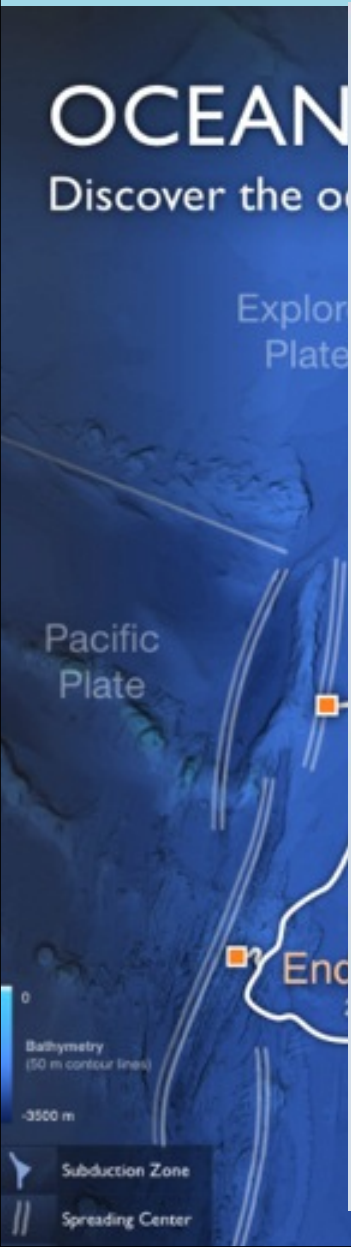
Discover the ocean. Understand the planet.



## Highlights in Ocean Observation

Recent highlights of Canadian and international observation initiatives:

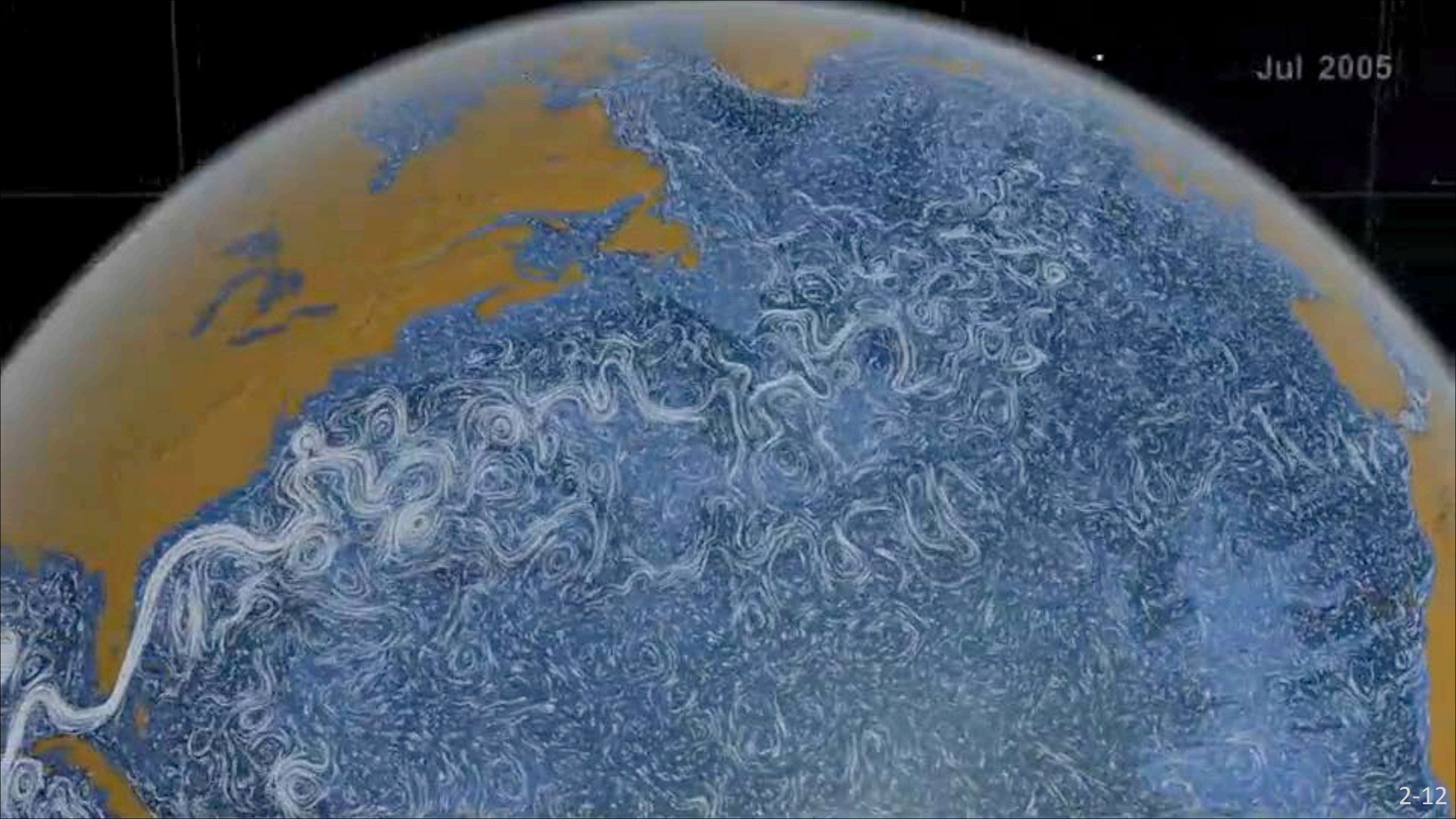
- **Argo** is a global array of more than 3,500 automated floats that transmit data via satellites. The system covers almost the entire global ocean, with the notable exception of the Arctic. Canada is contributing about one-tenth of the active Argo floats and was one of the early developers of the Argo Software System (Argo, n.d.).
- The **Ocean Tracking Network (OTN)**, based at Dalhousie University, collects data on sea animal movements in relation to the physical characteristics of the surrounding ocean. It uses a global network of acoustic receivers to track individual tags attached to a variety of aquatic species (OTN, n.d.).
- The **Census of Marine Life (2000–2010)** used human-operated vehicles (HOVs), ROVs, AUVs, and towed platforms in a concerted effort to establish a baseline of marine biodiversity (Snelgrove, 2010).
- The **Ocean Networks Canada (ONC)** observatory combines the North-East Pacific Undersea Networked Experiments (NEPTUNE) and the Victoria Experimental Network Under the Sea (VENUS) into one of the world's most potent cabled networks (Taylor, 2009).



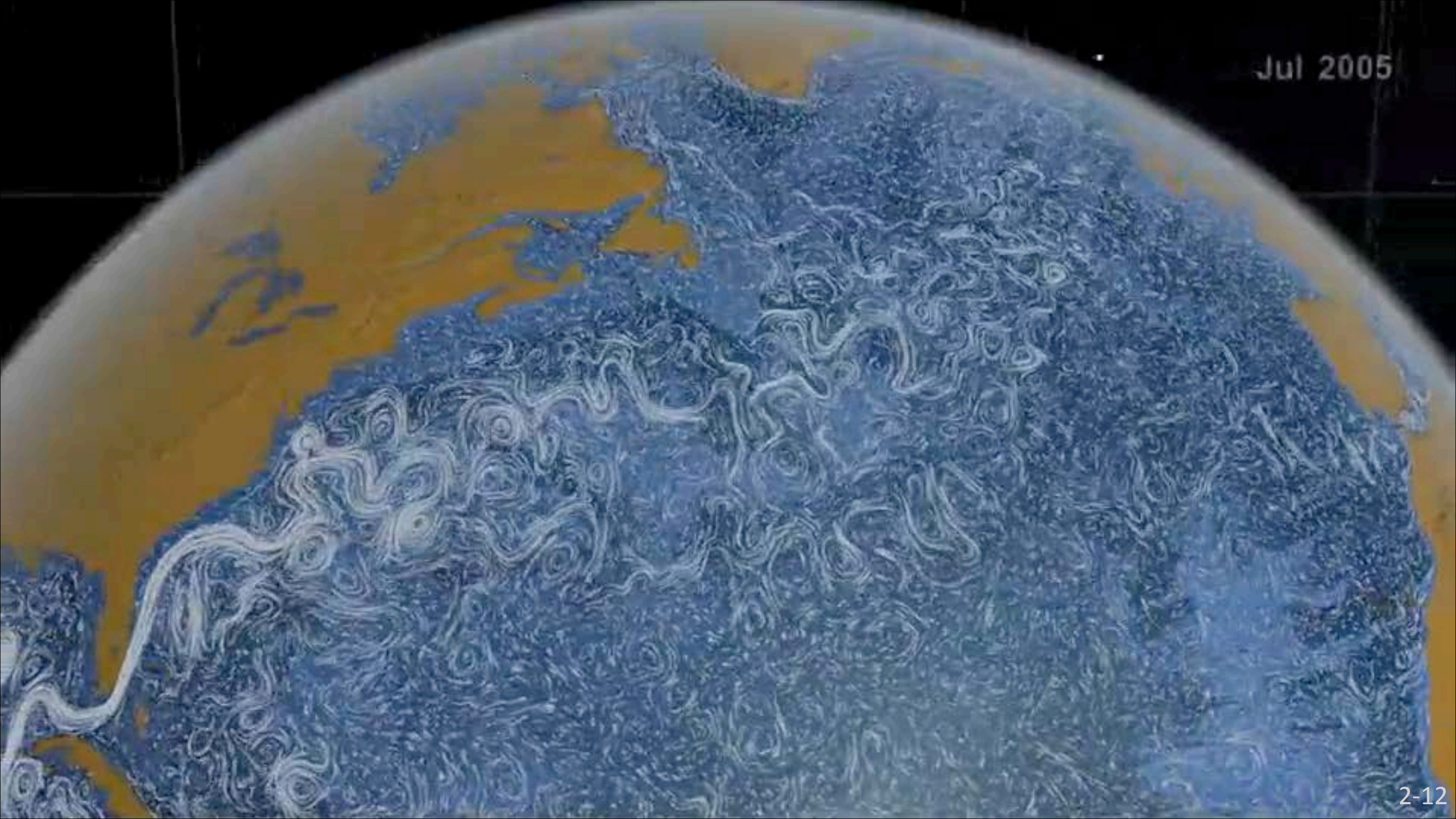




Jul 2005



Jul 2005





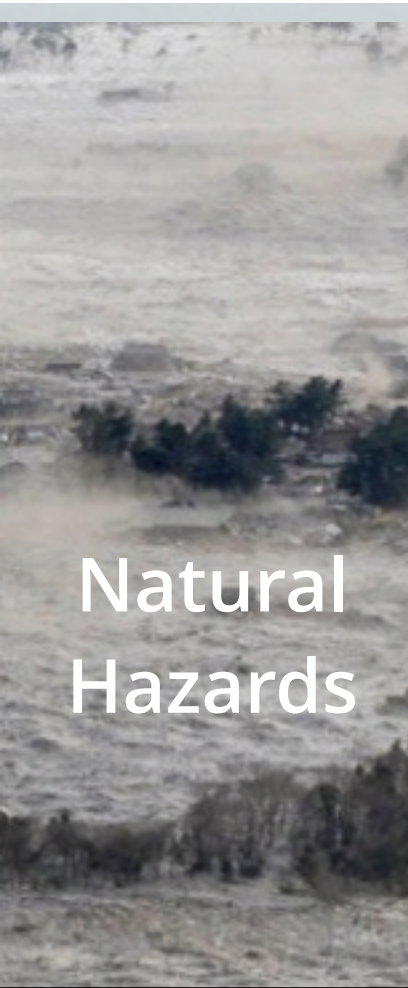
Climate  
Change



Climate  
Change



Natural  
Hazards



Natural  
Hazards

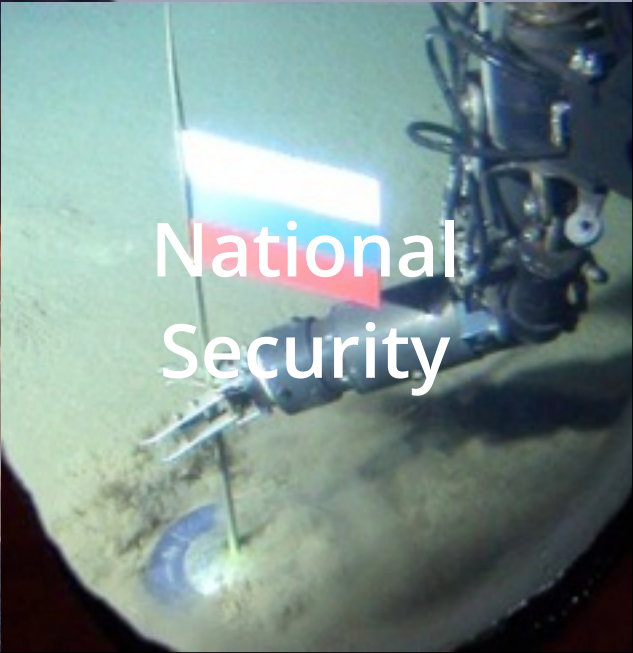
Climate  
Change



Marine  
Shipping









All give rise to a demand for ***ocean science*** that ***informs policy*** for ***good decisions*** about ***ocean use***





◀ FROM AP: Illinois hotel favored by Capone for sale on eBay... just now ▶ Enter email address Get Alerts

# DIRTY BUSINESS

## Criminal Investigation Of BP Oil Spill May Ensnare Executives In Cover-Up



FROM AP: Illinois hotel favored by Capone for sale on eBay... just now

Enter email address

Get Alerts

## Lessons learned:

- science for environmental baselines
- prescriptive regulatory policies failed
- polluter pays clarity needed - still in the courts

An underwater photograph showing sunlight rays filtering through the water surface, creating a dramatic, blue-toned scene. The text is overlaid on the upper portion of the image.

# CANADA & THE BLUE ECONOMY

An underwater scene with sunlight rays filtering through the water, creating a blue and white color palette. The sun is visible at the top left, casting rays across the water.

# CANADA & THE BLUE ECONOMY

Canada's Unique Ocean Science & Commercialization Centres

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Build Upon Proven Science, Expertise & Leadership

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Build Upon Proven Science, Expertise & Leadership

Ocean Science Underpins the Ocean Technology Sector

Our Growth Could Follow Blue Economy Projected Growth



# STRENGTHS & CHALLENGES FOR CANADIAN OCEAN SCIENCES

## Why Oceans? Why now?

1. Crucial time for “Planet Ocean”
2. New technologies for understanding
3. Policy and sustainability challenges

Urgency, interest

Technology

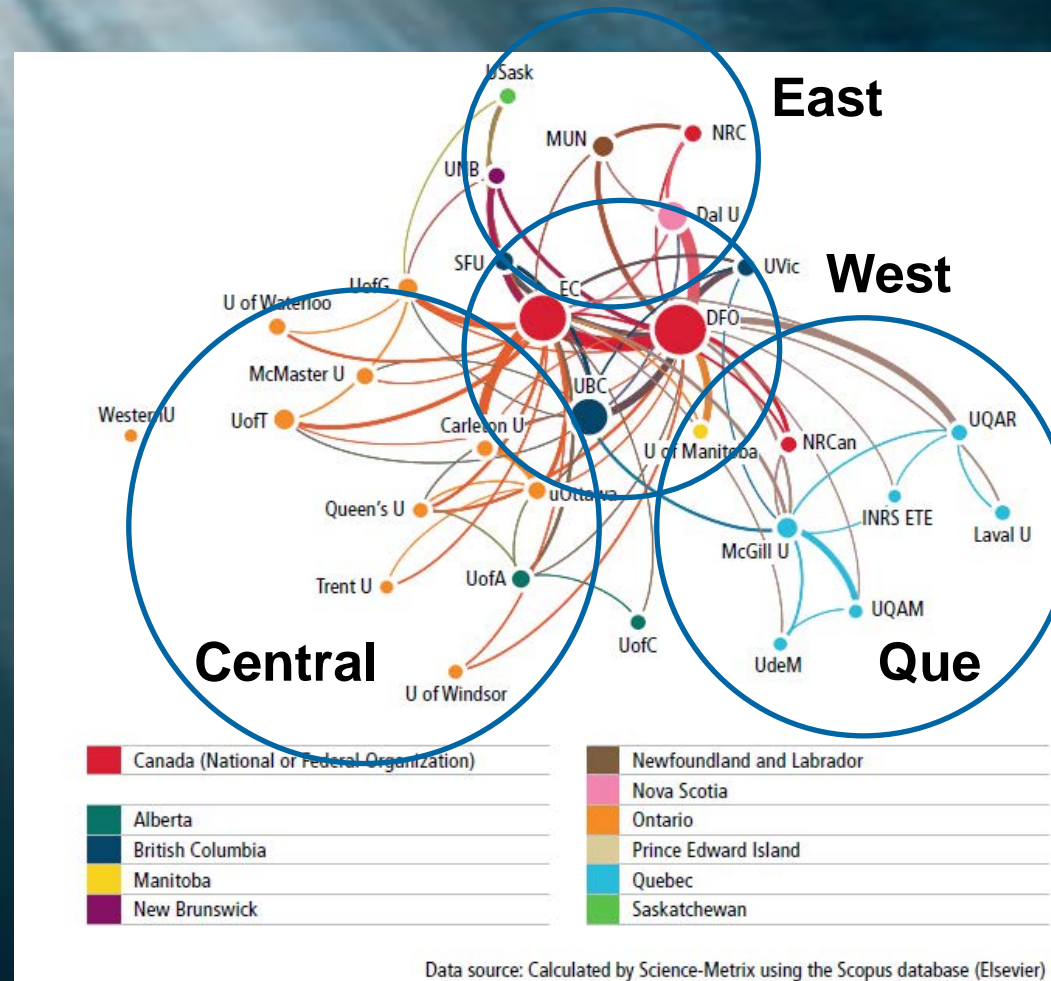
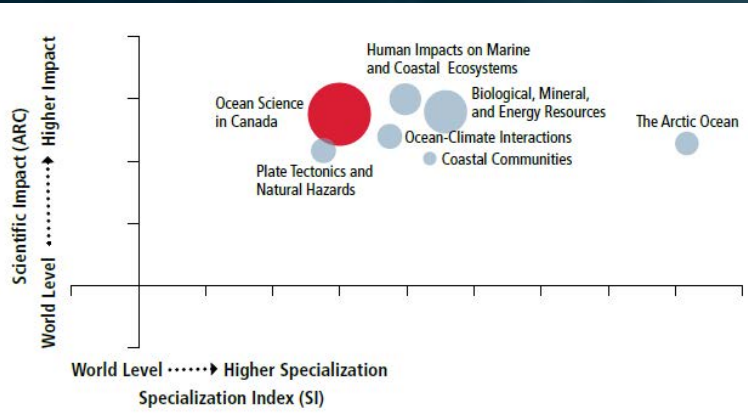
Policy



# STRENGTHS & CHALLENGES FOR CANADIAN OCEAN SCIENCES

## Strengths

- Research reputation (strong, slipping)
- 2° of separation
- Arctic (#2 in oceans)
- Infrastructure



# STRENGTHS & CHALLENGES FOR CANADIAN OCEAN SCIENCES

## Strong Ocean Sciences

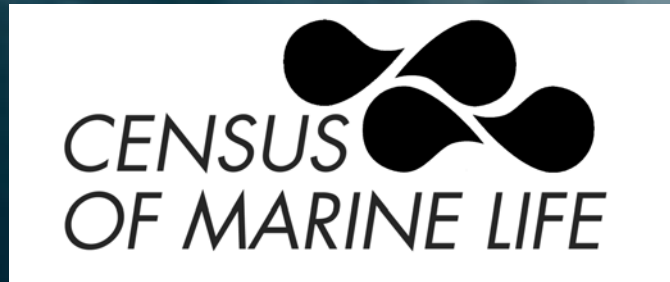
- **ArcticNet**
- **CAISN** (invasive species)
- **CHONe** (biodiversity)
- **Fisheries Capture** (fisheries)
- **Multitrophic Aquaculture** (aquaculture)
- **OTN** (tracking animals)
- **MEOPAR** (hazards)
- **ONC** (enabling technologies)

## The changing scientific landscape...

- Ecosystem-Based Management
- Convention on Biological Diversity
- Law of the Sea
- Oceans Act
- Fisheries Act



# STRENGTHS & CHALLENGES FOR CANADIAN OCEAN SCIENCES



International  
Leadership

*Biodiversity Science  
for Sustainability of  
Canada's Three Oceans*

**CHONE**  
CANADIAN HEALTHY OCEANS NETWORK

The Canadian Healthy Oceans Network is a collaboration of 15 universities and major federal government departments focused on developing scientific guidelines for sustainable ocean usage.

The Network is funded under the Natural Sciences and Engineering Research Council's Strategic Research Networks Program.

Other financial support comes from:

- Fisheries and Oceans Canada
- Province of Newfoundland and Labrador
- Memorial University
- Natural Resources Canada
- Atlantic Reference Centre of the Huntsman Marine Science Centre
- Canadian Museum of Nature

Universities participating in the Network are:

- Memorial University (the lead institution)
- Dalhousie University
- Cape Breton University
- University of Prince Edward Island
- Mount Allison University
- Université du Québec à Rimouski
- Université du Québec à Chicoutimi
- Université Laval
- McGill University
- Guelph University
- University of Waterloo
- University of Alberta
- Simon Fraser University
- University of British Columbia
- University of Victoria

**NSERC**  
**CRSNG**

NSERC Canadian Healthy Oceans Network (CHONE)  
Administrative Centre: Memorial University  
St. John's, Newfoundland A1C6S7  
Network Director: Paul Snelgrove, p.snelgrove@mun.ca

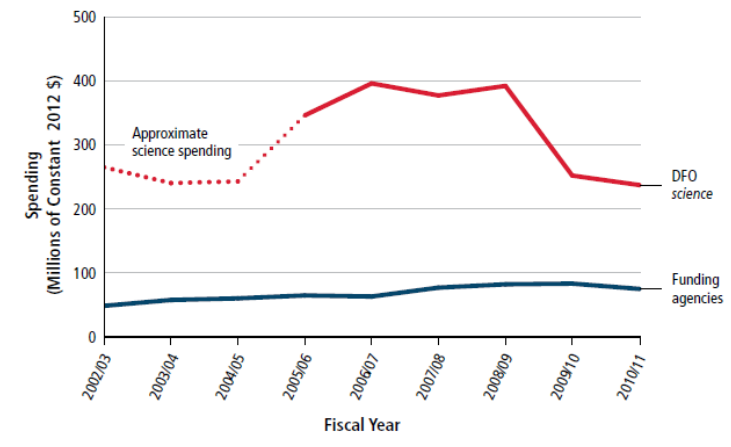
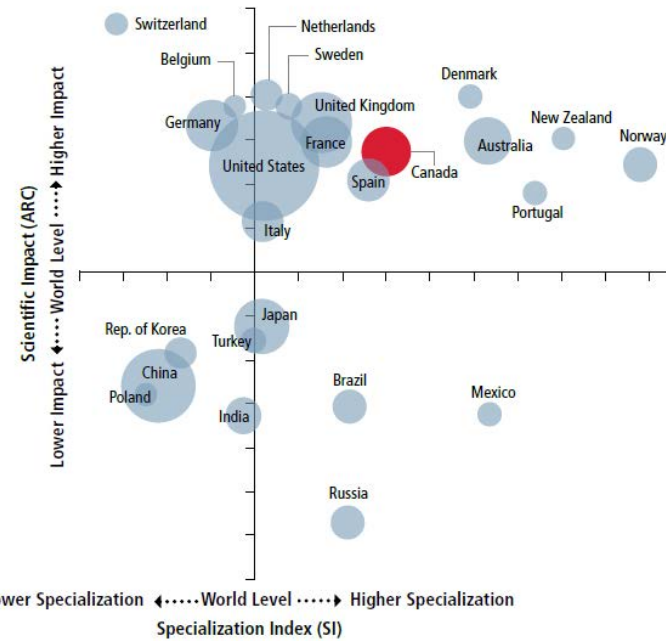
Photo credits: NOAA/V. Junicliffe; ROPOS; E. Kerckhoff; ROPOS; A. Larson; ROPOS/A. Metzger; NOAA/K. Raskoff; NOAA/B. Robm; K. Smith



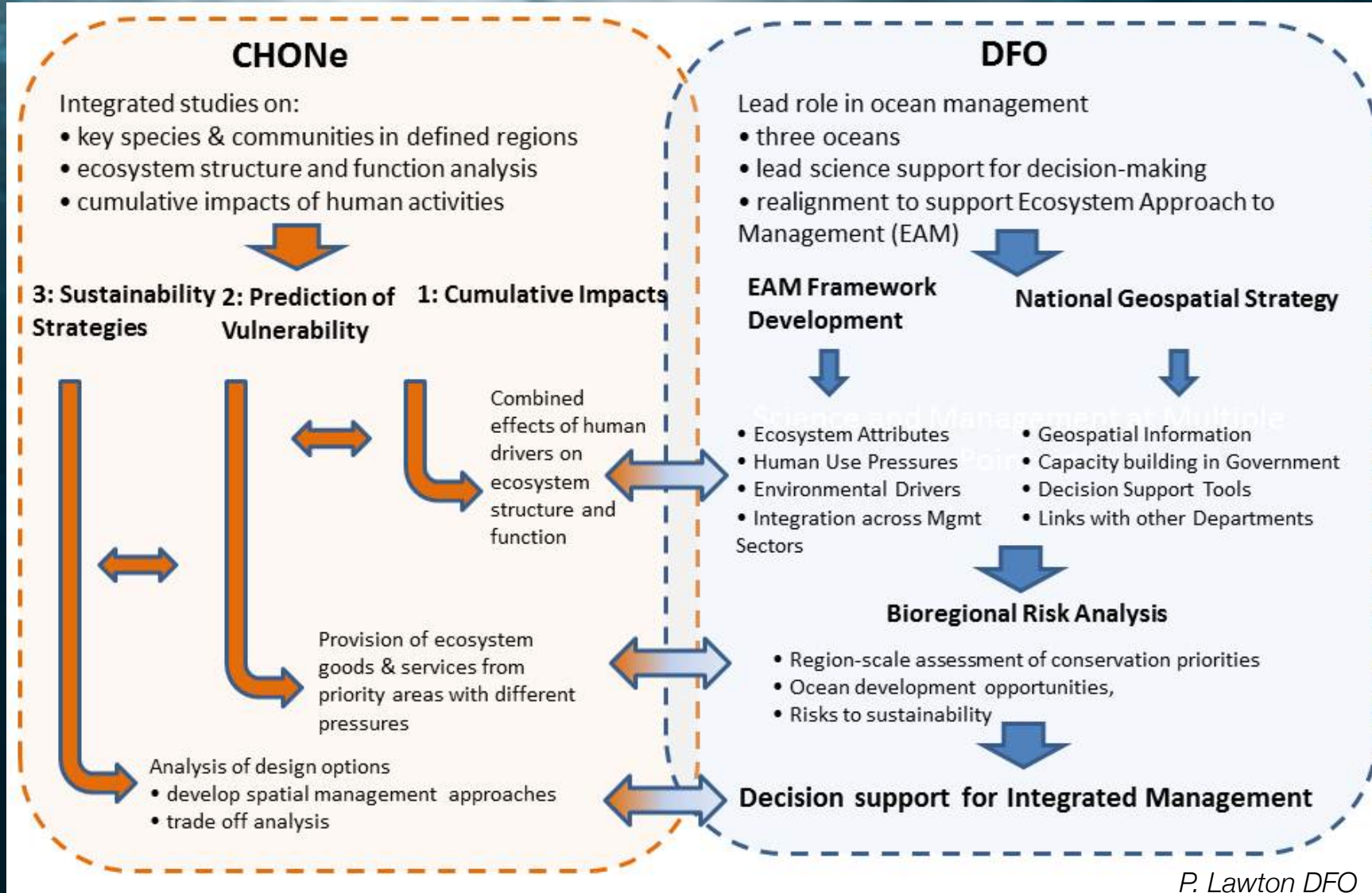
# STRENGTHS & CHALLENGES FOR CANADIAN OCEAN SCIENCES

## Challenges

- Geographic span
- Longest coastline
- Many institutions (HQP info weak)
- Funding allocation
- Different “languages”
- No central body

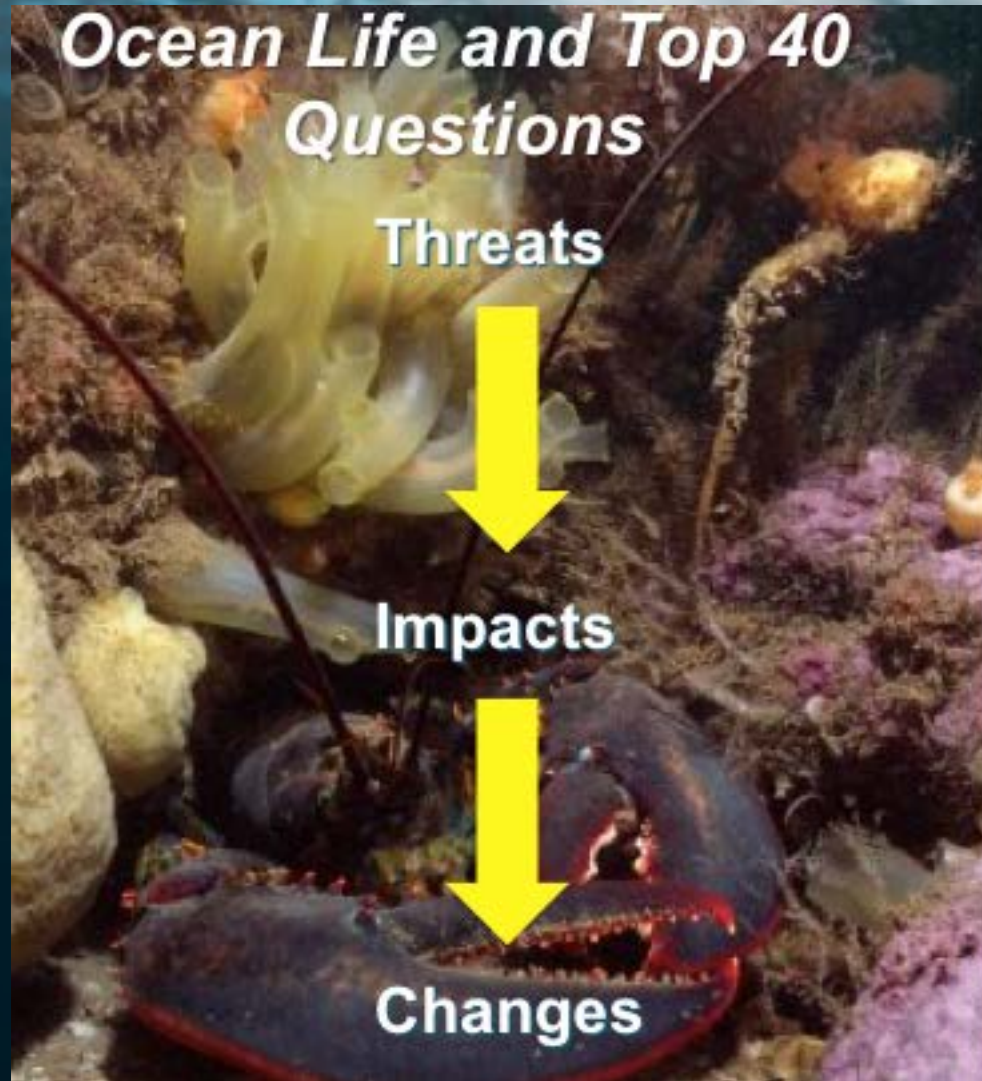


# STRENGTHS & CHALLENGES FOR CANADIAN OCEAN SCIENCES





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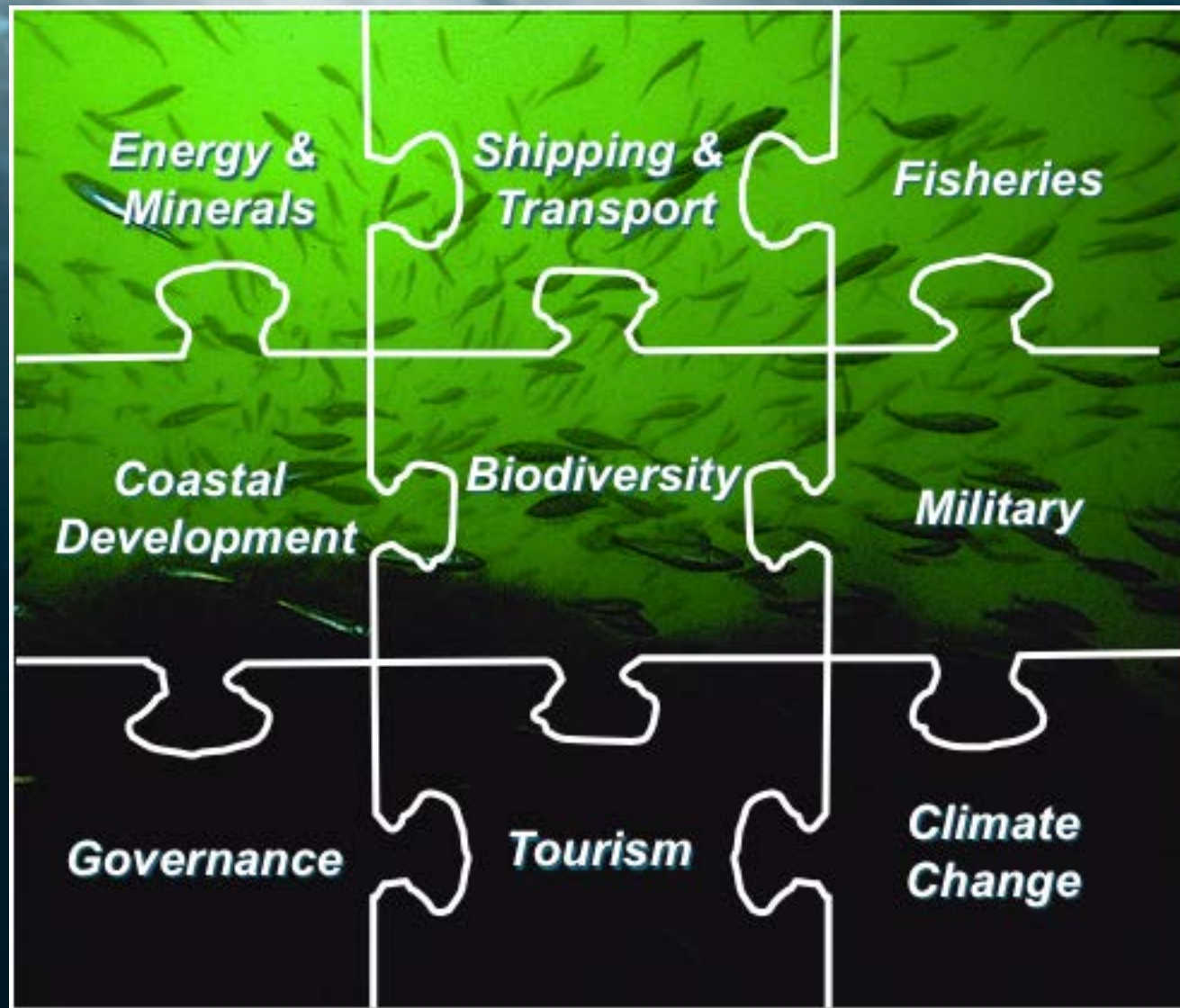


Effects of sea level rise, climate change, acidification, water quality, oil & mineral exploitation, noise, invasive species

Aquaculture, fisheries, biodiversity

Fishing industry, tourism, ocean function,

# STRENGTHS & CHALLENGES FOR CANADIAN OCEAN SCIENCES





## MAIN FINDING #7

*New networks and collaborations are emerging to address some of the challenges faced by the ocean science community, such as those posed by Canada's geography. However, coordination gaps remain.*

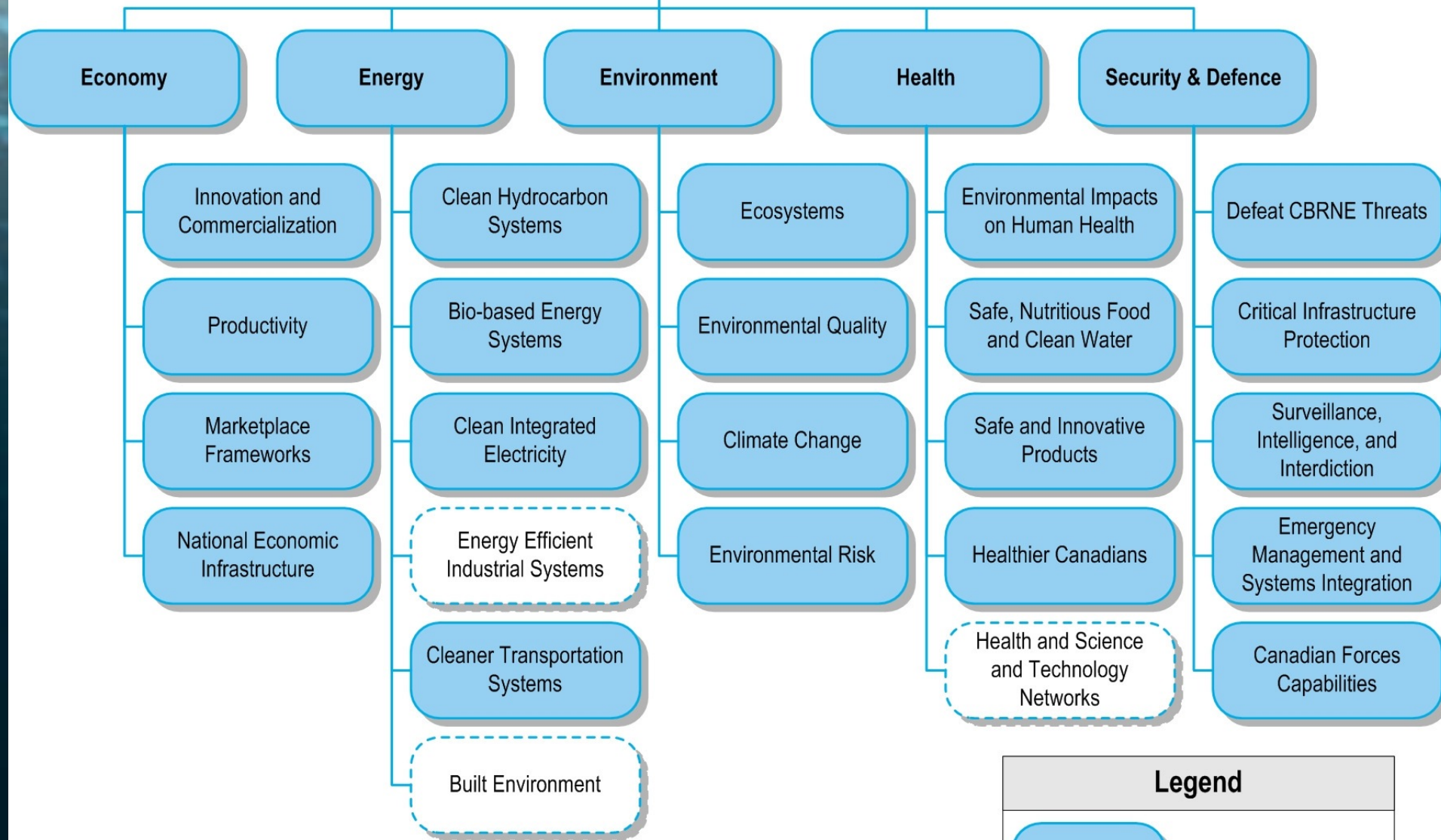
# NETWORKS AND ALIGNMENTS

*New types of funding opportunities, consortia and alignments are changing the way ocean scientists collaborate.*

*The Panel identified several gaps:*

- Vision gap: No overarching national strategy or vision for the entire ocean science community.*
- Coordination gap: Insufficient coordination among regional clusters.*
- Information gap: Insufficient information about ocean science activities and capacities across the country.*

# Oceans Science & the Federal S&T Map



## Legend



Federal Oceans S&T



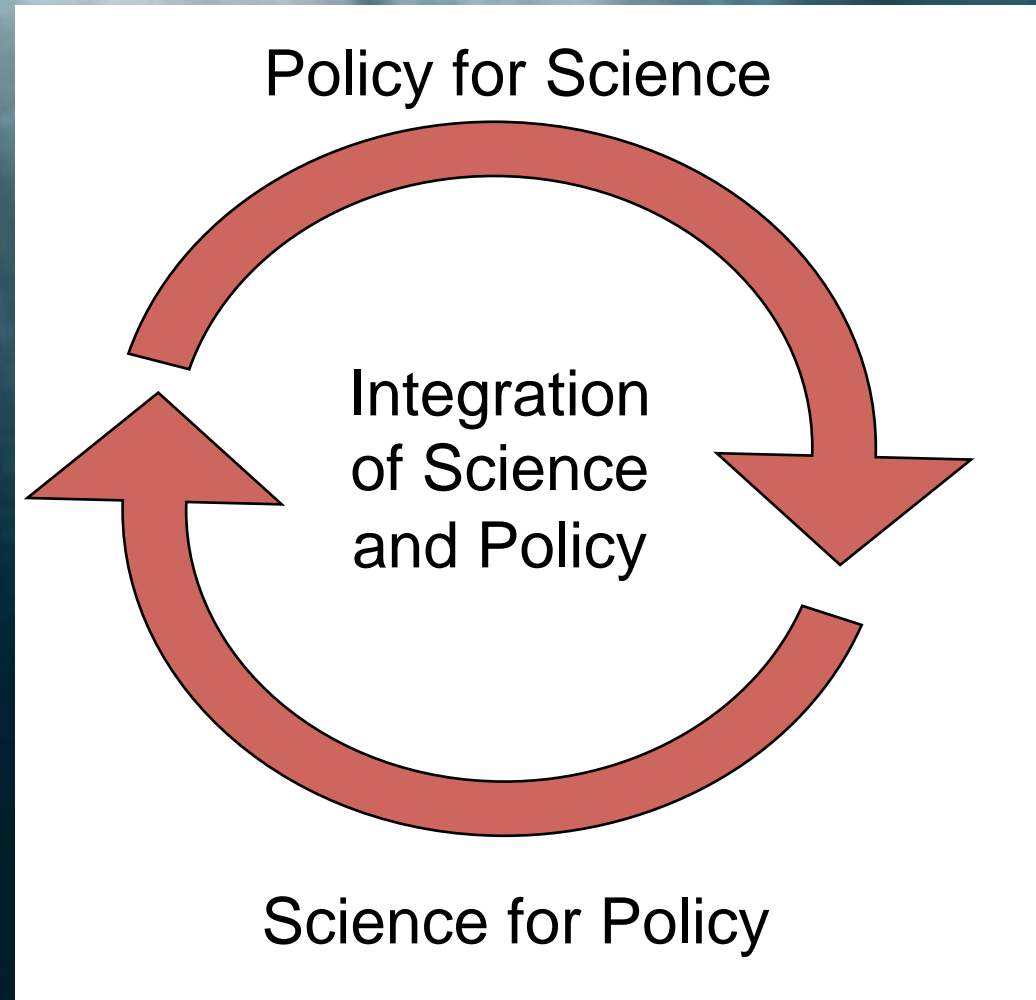
Not Applicable



# A SCIENCE / POLICY ENCOUNTER

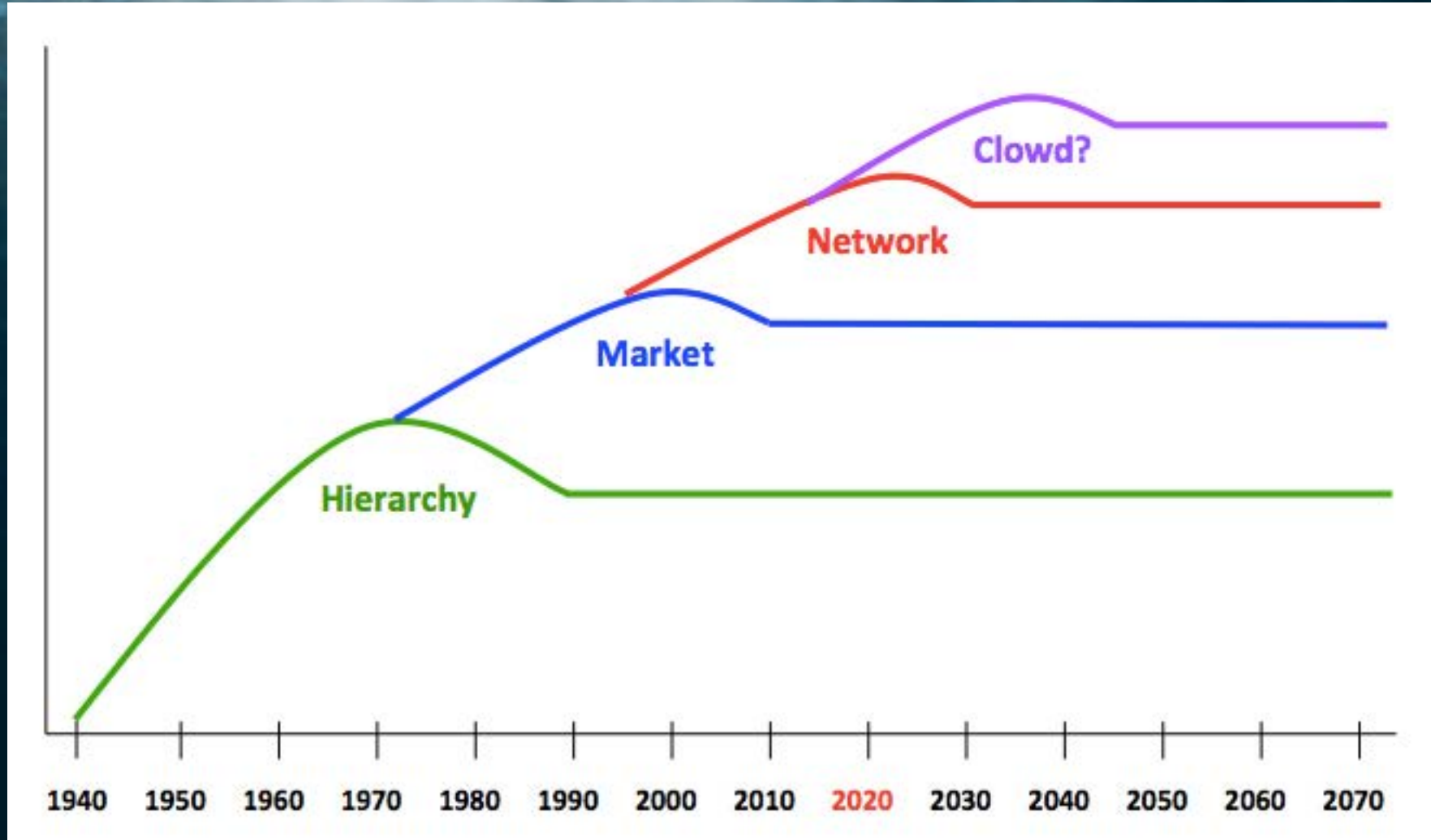
- *A man in a hot-air balloon gets lost and descends to ask for directions. The balloonist hovers over a woman on the ground and asks where he is.*
- *The woman shouts back, “You are at 45 degrees, 25 minutes, 29 seconds north, and 75 degrees, 42 minutes, 20 seconds west. I am standing at 100 metres above sea level, so you must be at about 120 metres.”*
- *The man in the balloon replies, “You must be a **scientist**. I ask you a simple question, you provide me too much information and I’m still lost!”*
- *The woman calls back, “You must be a **policy analyst**. You came out of nowhere with your questions, I give you the most accurate and precise answer I can, you’re still lost, and you blame me!”*

# THE FULL LIFE CYCLE OF SCIENCE POLICY: ...POLICY FOR SCIENCE FOR POLICY FOR SCIENCE FOR POLICY...





# EVOLUTION OF GOVERNMENT SCIENCE



# EVOLUTION OF GOVERNMENT SCIENCE

Version	Form	Operating Mode	Knowledge Access	Investment Focus
GovScience 1.0	Hierarchies	Make	Hire	Human & Physical Capital
GovScience 2.0	Markets	Buy	Procure, Contract	Financial Capital
GovScience 3.0	Networks	Collaborate (formal, partnerships)	Social learning	Social Capital
GovScience 4.0	Cloud?	Collaborate (informal, mass)	Social production	E-Capital: Web 2.0 / Social media

# FINAL CONCLUSION

*Due to its geography and historic capacity, Canada not only has remarkable opportunities in ocean science, but a necessity to seize these opportunities to use and protect the ocean.*

*Addressing the vision, coordination, and information gaps is essential if Canada is to unlock these opportunities.*

*This requires a national effort involving the entire ocean science community as well as its users in government, the private sector, and civil society.*

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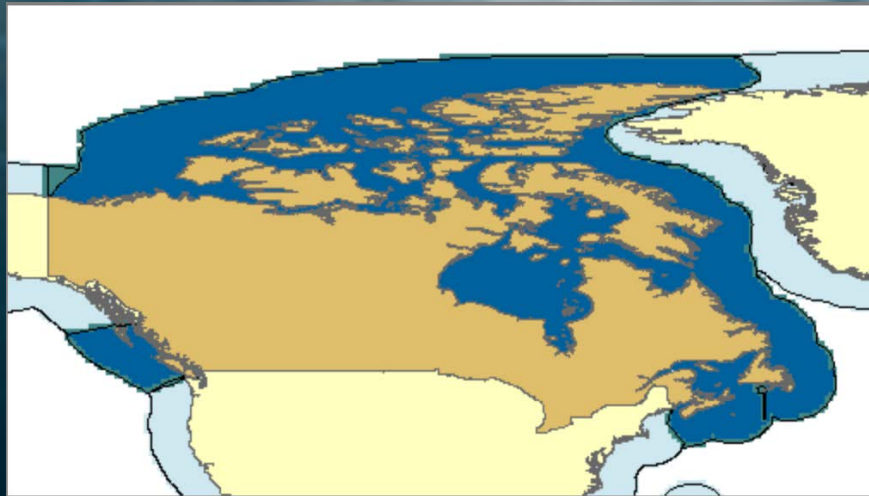
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# WHY IS OCEAN SCIENCE IMPORTANT TO CANADA?

- to inform decisions on its three oceans
- to advance sustainable development



## What's needed?

...research, data sharing, coordination, efficiencies, partnering, and governments must continue to invest in the “knowledge economy”

(see CCA report)

# OCEAN SCIENCE HELPS

- Identify and assess resource potential
- Determine sustainability and consequences of development
- Create and implement smart practices for development
- Determine means to prevent problems and respond

Knowledge gained through **research**. Without it, costs increase.



# US OCEAN POLICY

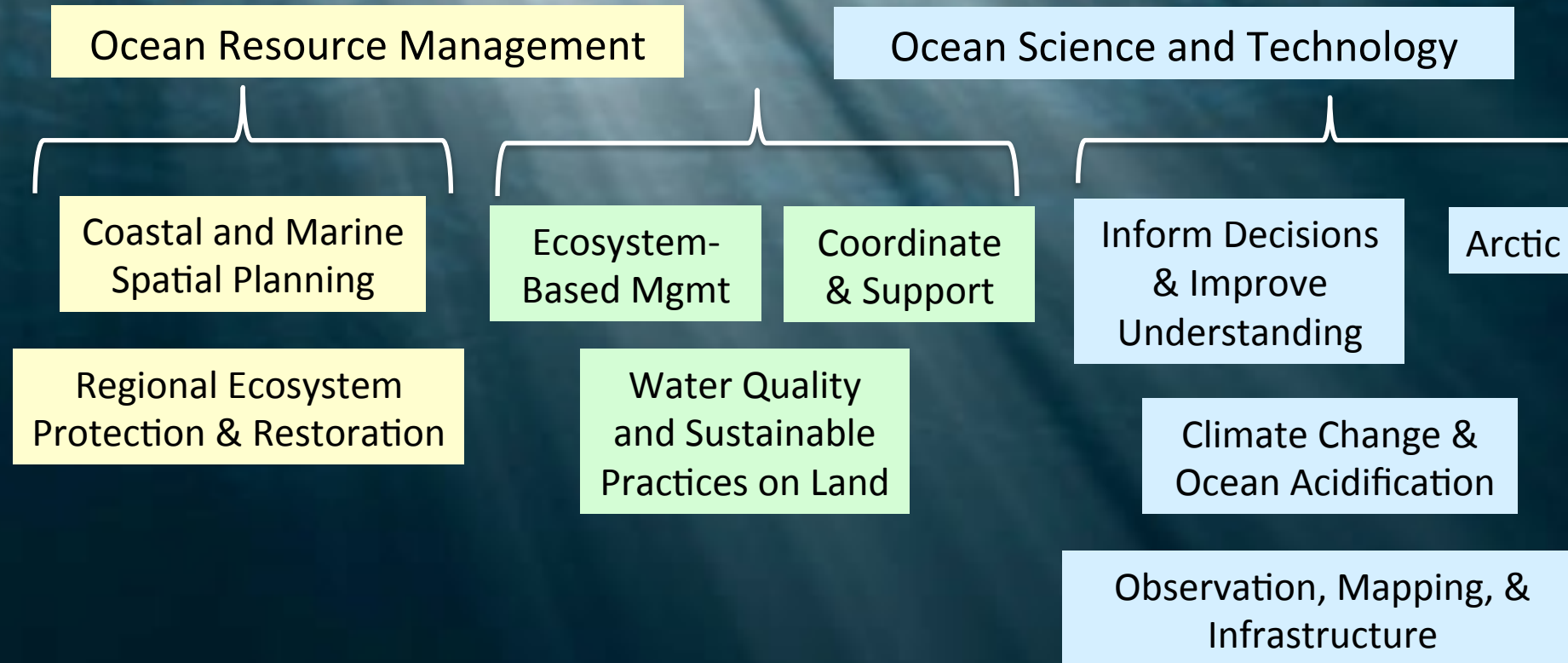
- June 2009 – Obama establishes an Interagency Ocean Policy Task Force
- July 2010 – Obama adopts Task Force recommendations and releases a National Ocean Policy for the ocean, coasts, and Great Lakes
- April 2013 – Implementation Plan released
- [whitehouse.gov/oceans](http://whitehouse.gov/oceans)





# NOP ARCHITECTURE, 9 PRIORITIES, 5 BENEFITS

## National Ocean Council



Societal benefits: Ocean economy, safety and security, coastal and ocean resilience, local choices, and science and information

# BENEFITS OF THE IMPLEMENTATION PLAN

Improves interagency coordination to:

- speed Federal permitting decisions
- better manage the ocean, coastal, and Great Lakes resources that drive so much of our economy
- develop and disseminate sound scientific information that local communities, industries, and decision-makers can use
- collaborate more effectively with State, Tribal, and local partners, marine industries, and other stakeholders.



# US ACADEMIC GOVERNANCE

**Consortium:** nonprofit organization representing over 100 of the leading public and private ocean research and education institutions, aquaria and industry

**Mission:** advance research, education and ocean policy.

**Discovery:** of how the ocean is critical to supporting life

**Understanding:** educate society on the ocean's influence on life

**Action:** influence policy makers to advance ocean science, education, and marine policy



# AN EMERGING ARCTIC



# ECONOMICS...MAJOR DRIVER FOR ARCTIC CHANGE

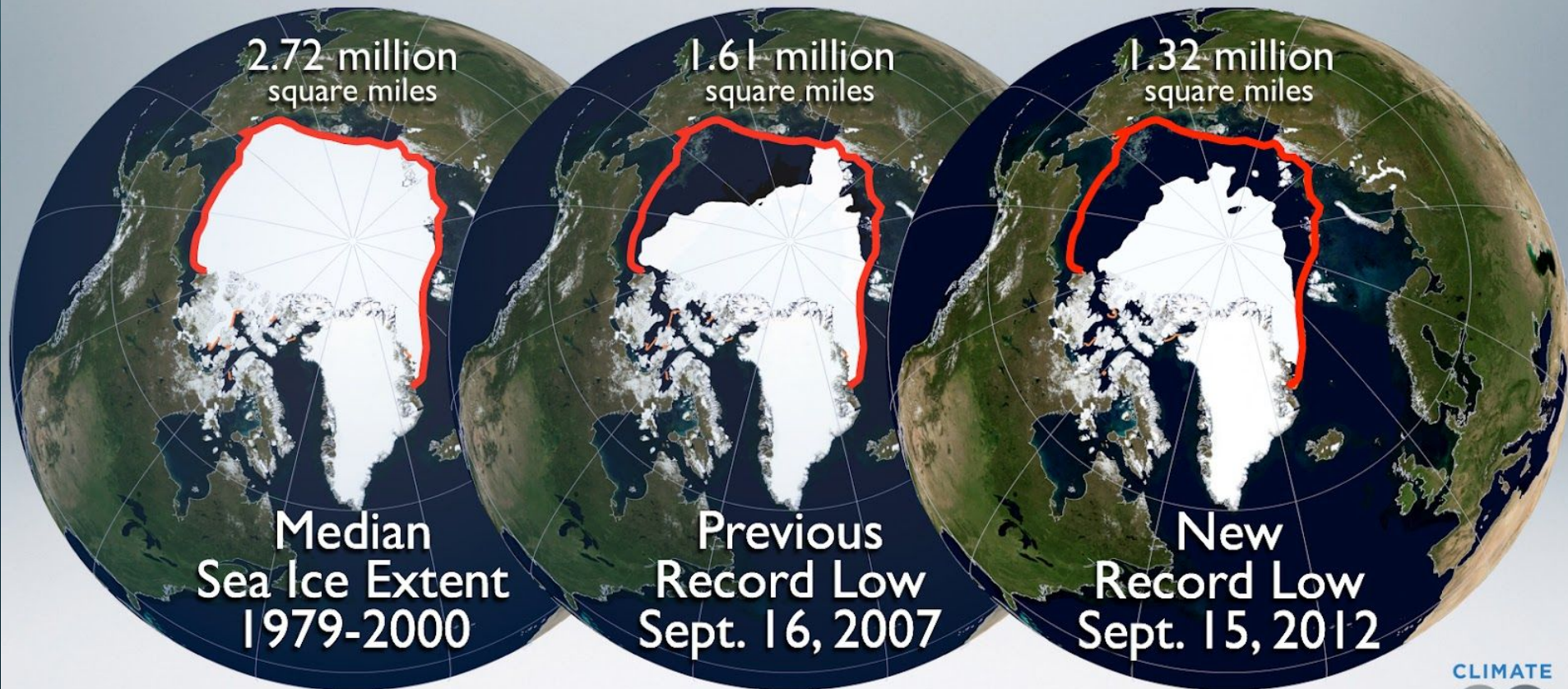
- Increasing global demand for resources



- Arctic region is resource rich and is increasingly accessible due to:
  - Climate change
  - Technological advances



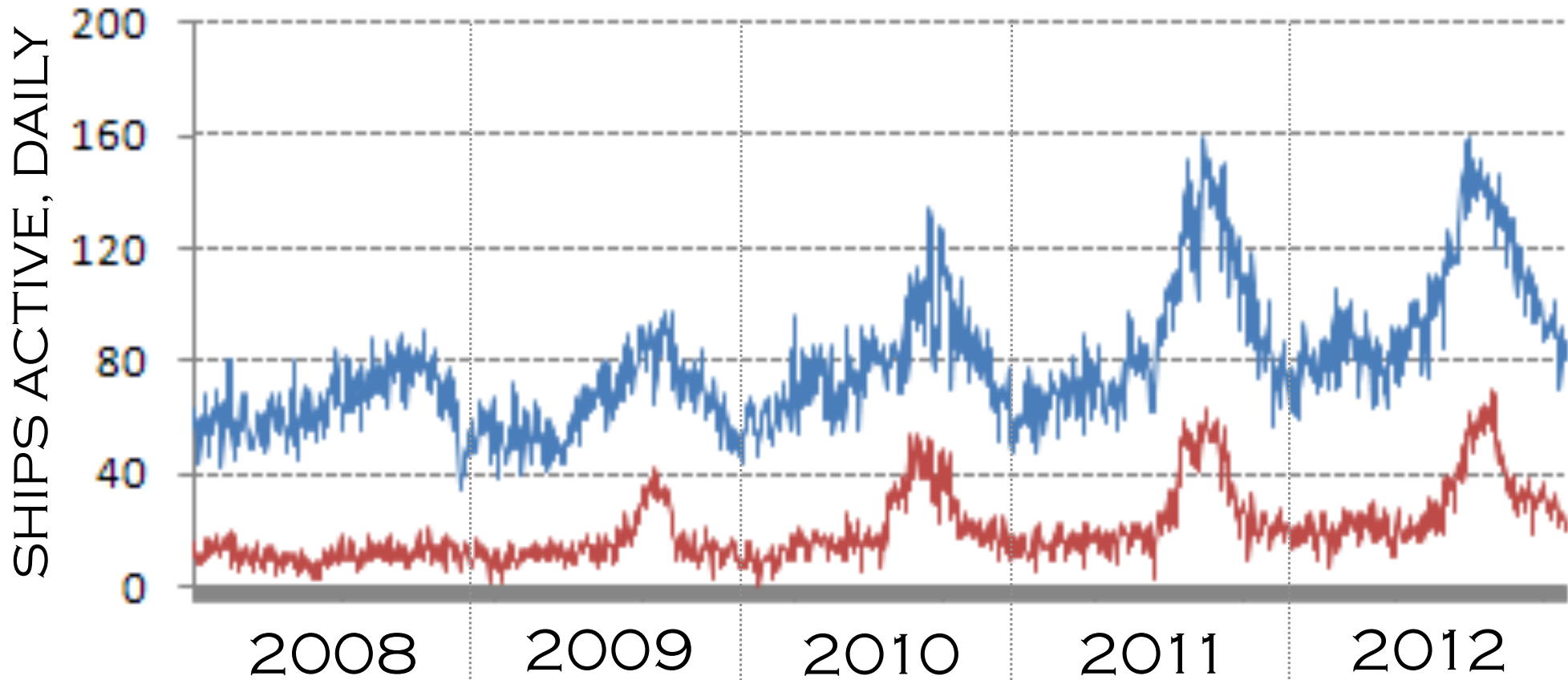
# RECORD LOW ARCTIC SEA ICE



Source: The National Snow and Ice Data Center Sea Ice Index  
Records are for 5 day running averages

# Cargo and Tanker Ships Active in the Arctic

[daily totals, 2008-2012]



Source: US Navy

# US ARCTIC RESEARCH PRIORITIES

- Environmental Change
- Arctic Human Health
- Civil Infrastructure
- Natural Resource Assessment & Earth Science
- Indigenous Languages, Identities, Cultures





# FEDERAL ARCTIC RESEARCH POLICY/PROCESS



Set goals



ARCTIC RESEARCH PLAN:  
FY2013-2017

Executive Office of the President  
National Science and Technology Council

FEBRUARY 2013

Turn goals into  
research plan



White House:  
requests budget

Congress:  
authorizes &  
appropriates

Fed. govt. spends ~\$400M/yr on Arctic research

(Sequestration!)

**THANK YOU**



**THANK YOU**

