

Key Issues and Challenges for Future Use of the Northern Sea Route

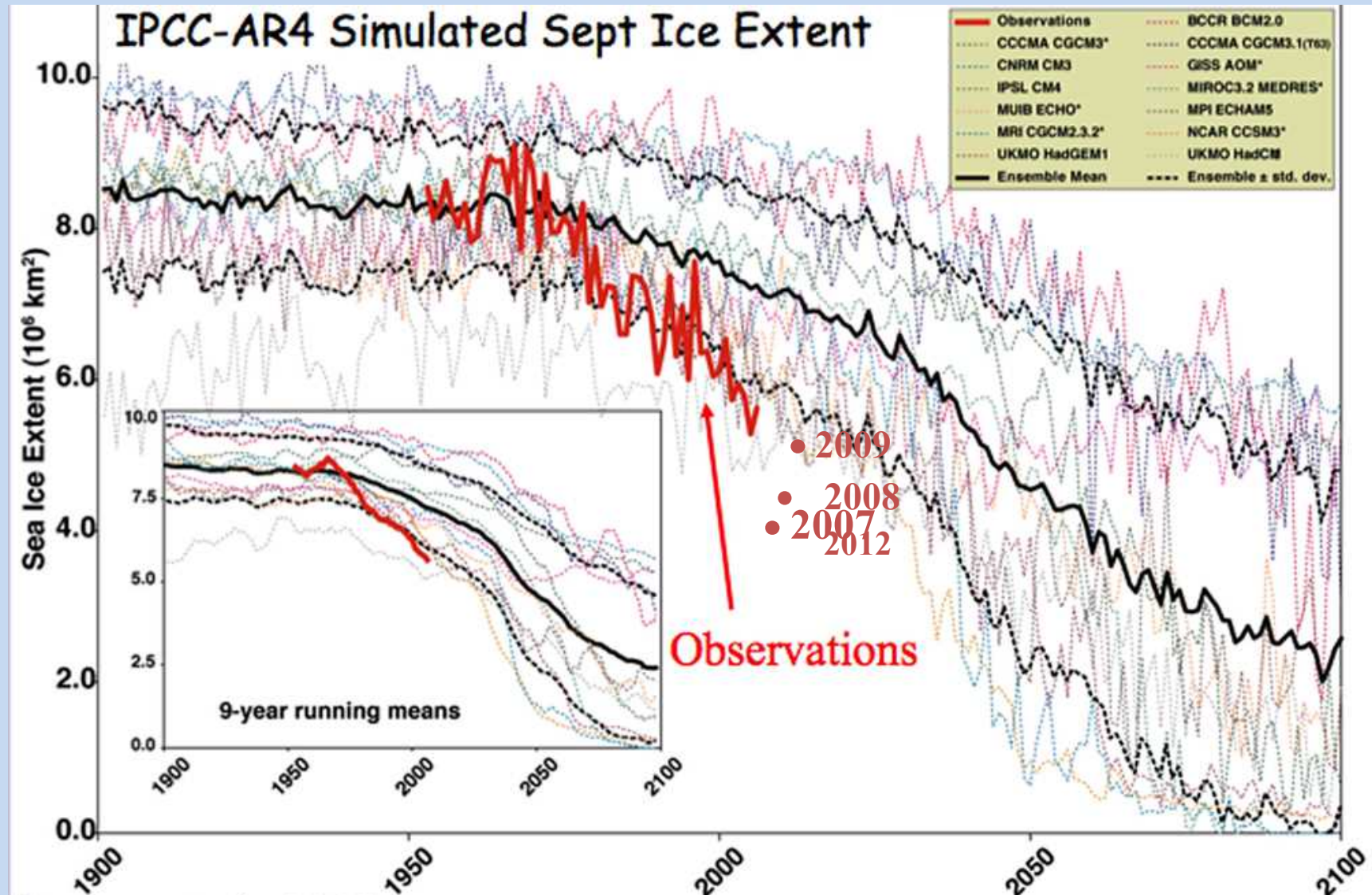
- **Rapid Climate Change**
- **Globalization ~ Arctic Natural Resources**
- **Regional & Global Geopolitics**
- **Protection of Arctic Peoples & the Environment**

International Seminar on Sustainable Use of the NSR
Sasakawa Peace Foundation ~ Tokyo ~ 4 February 2016
Lawson W. Brigham, PhD ~ University of Alaska Fairbanks

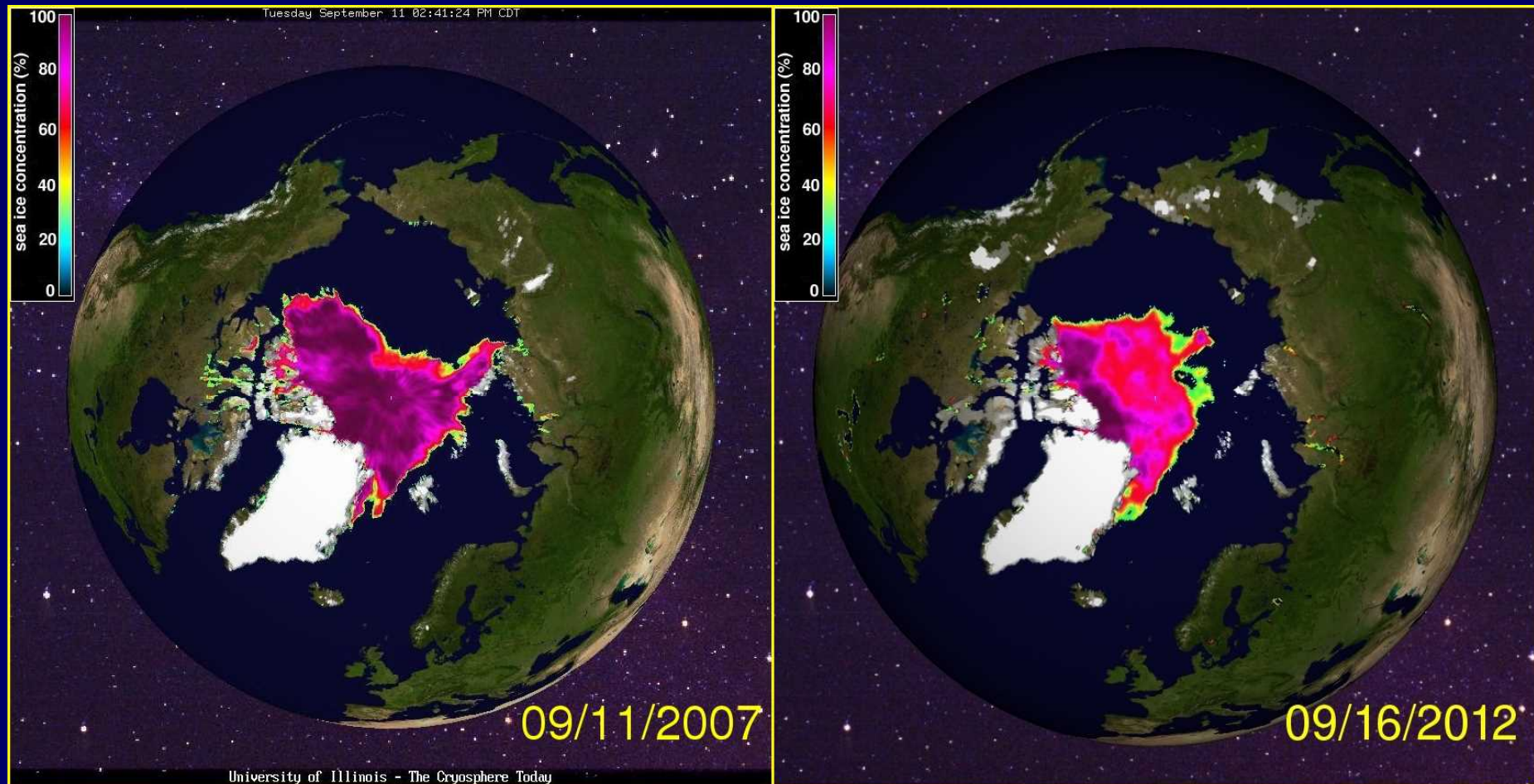
NSR Presentation Topics:

- **Changing Marine Access**
- **Length of the Navigation Season**
- **Key Driver of Arctic Shipping**
- **Independently Operated Icebreaking Carriers**
 - **IMO Polar Code Implementation**
 - **NSR Icebreaker Fleet**
- **Icebreaker Needs of the U.S. & Japan**

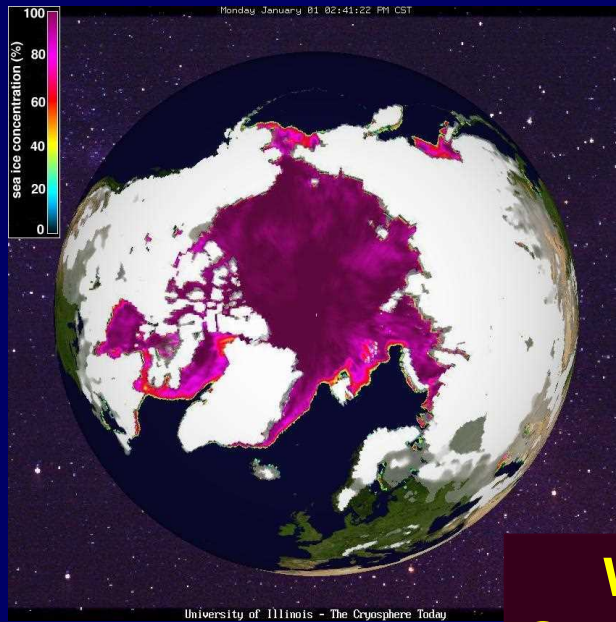
Present Sea Ice Retreat ~ Outside the Range of Model Projections



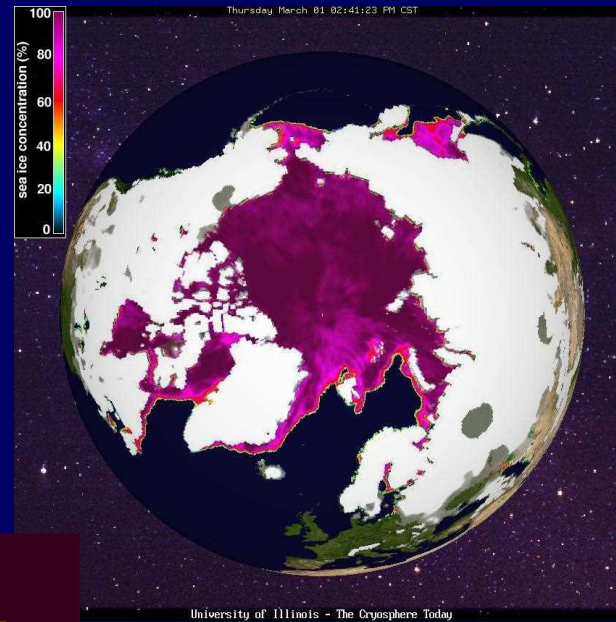
Arctic Sea Ice Minimum Extents ~ 2007 & 2012



1 January

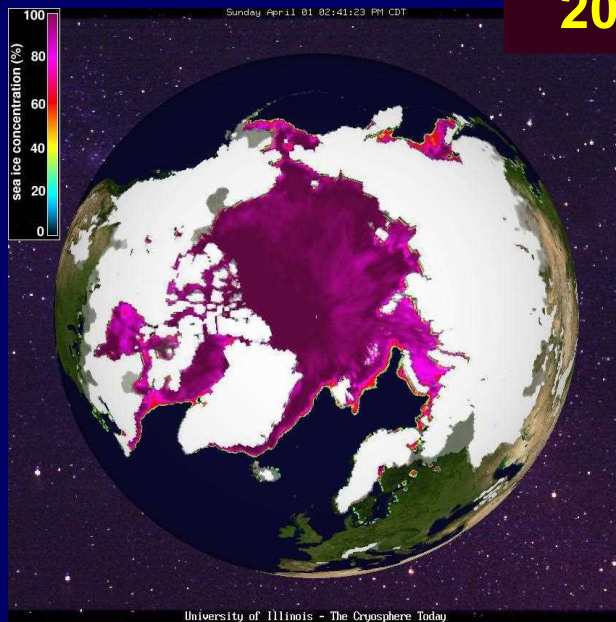


1 March

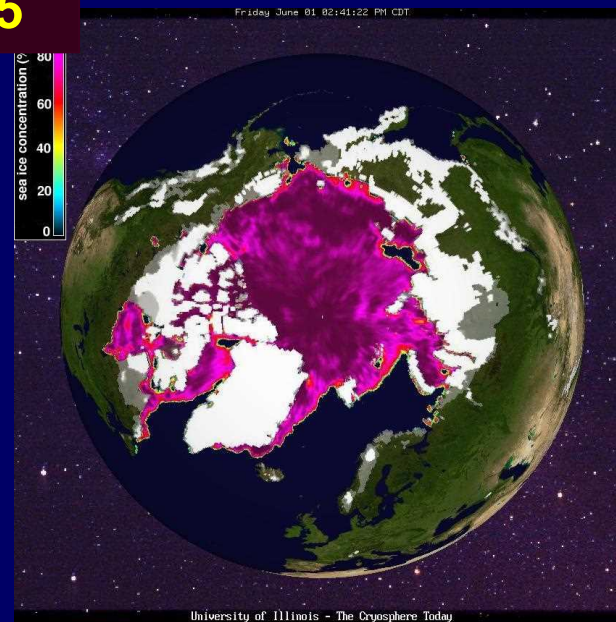


**Winter &
Spring Months
2014 & 2015**

1 April



1 June



Septembers
2006-2015

red lines=
Polar Class 6
(e.g. commercial
icebreaking ships)

blue lines=
common open-
water ships

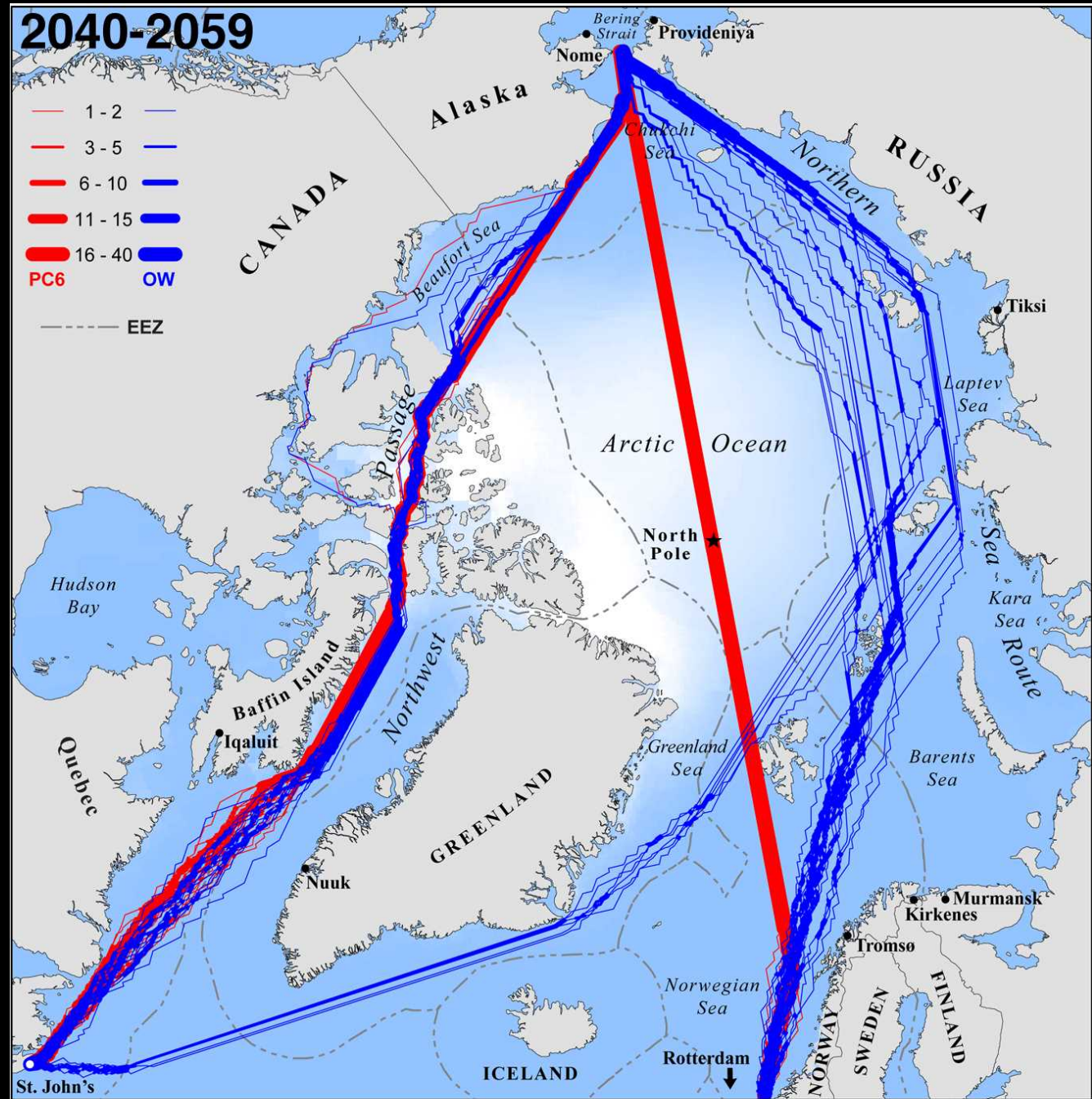


Septembers
2040-2059

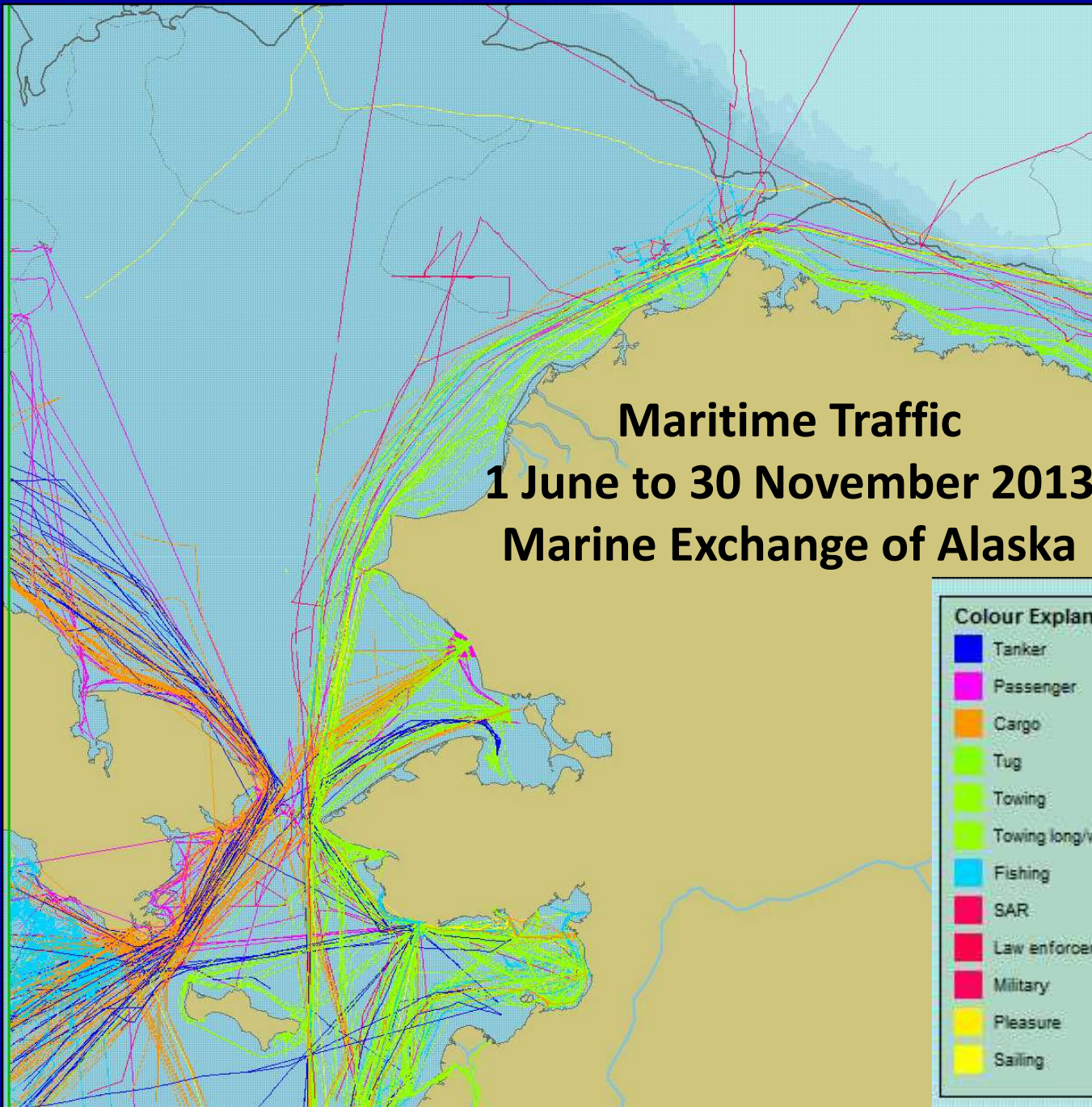
red lines=
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*(“New Trans-Arctic
shipping routes
navigable by
midcentury”, L.C.
Smith and S.R.
Stephenson, PNAS,
2013)*



**Maritime Traffic
1 June to 30 November 2013
Marine Exchange of Alaska**



Colour Explanation (SHIP_TYPE)

- Tanker
- Passenger
- Cargo
- Tug
- Towing
- Towing long/wide
- Fishing
- SAR
- Law enforcement
- Military
- Pleasure
- Sailing

A map of Alaska and the surrounding waters, including the Gulf of Alaska, Bering Sea, and Chukchi Sea. The landmasses are colored in a light tan or yellowish-brown, while the water is a light blue. A green rectangular boundary is drawn around the central and southern parts of the map, encompassing the Gulf of Alaska and the Bering Sea. The text is centered over the Gulf of Alaska.

Maritime Traffic
1 Jan to 31 May 2013
Marine Exchange of Alaska

(I) Length of the Navigation Season Along the NSR:

- **Year-round on the Western NSR Since 1978-79 to Dudinka on the Yenisey River**
 - **Eastern NSR ~ How many months with icebreaker escort? What length of season is the MOT trying to attain?**

Arctic Ministers' Approval 29 April 2009 ~
Negotiated Recommendations & Text

Arctic Council
Arctic Marine Shipping
Assessment 2009 Report



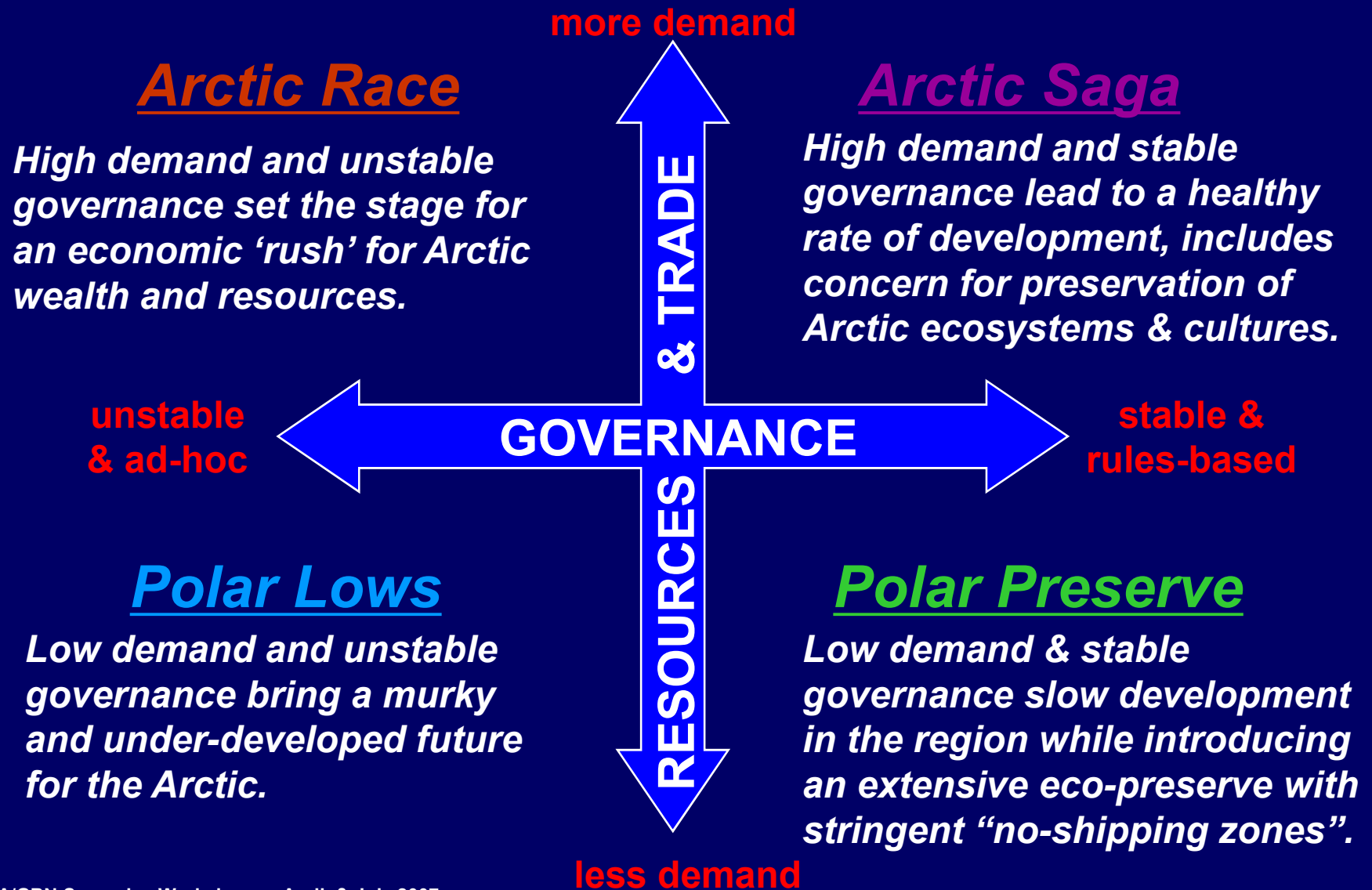
Table of Contents

- Executive Summary with Recommendations
- Arctic Marine Geography Climate & Sea Ice
- History
- Governance
- Current Use/Database
- Scenarios to 2020 & 2050
- Human Dimensions
- Environmental Impacts
- Infrastructure

AMSA Key Uncertainties for Future Arctic Marine Transportation

- Stable legal climate
- Radical change in global trade dynamics
- Climate change is more disruptive sooner
 - Safety of other routes
- Socio-economic impact of global weather changes
- Oil prices (55-60 to 100-150 USD?)***
- Major Arctic shipping disasters***
 - Limited windows of operation (economics)
 - Rapid climate change
 - Maritime insurance industry
- China, Japan & Korea become Arctic maritime nations
 - Transit fees
- Conflict between indigenous & commercial use
 - Arctic maritime enforcement
- Escalation of Arctic maritime disputes
 - Shift to nuclear energy***
 - New resource discovery
 - World trade patterns
- Catastrophic loss or change in Suez or Panama Canals
 - Global agreements on construction rules and standards

Scenarios on the Future of Arctic Marine Navigation in 2050



(II) Key Driver of Arctic Shipping:

Arctic Natural Resource Development

(Nearly All Traffic is Destinalional)

**Arctic Sea Ice Retreat: Provides Greater Marine Access
& Potentially Longer Seasons of Navigation**

(Winter/Spring/Autumn Ice Cover Remains: 9 months)

**(Trans-Arctic Shipping Seasonal & Supplementary to global
trade routes)**



(III) Independently Operated Icebreaking Carriers on the NSR:

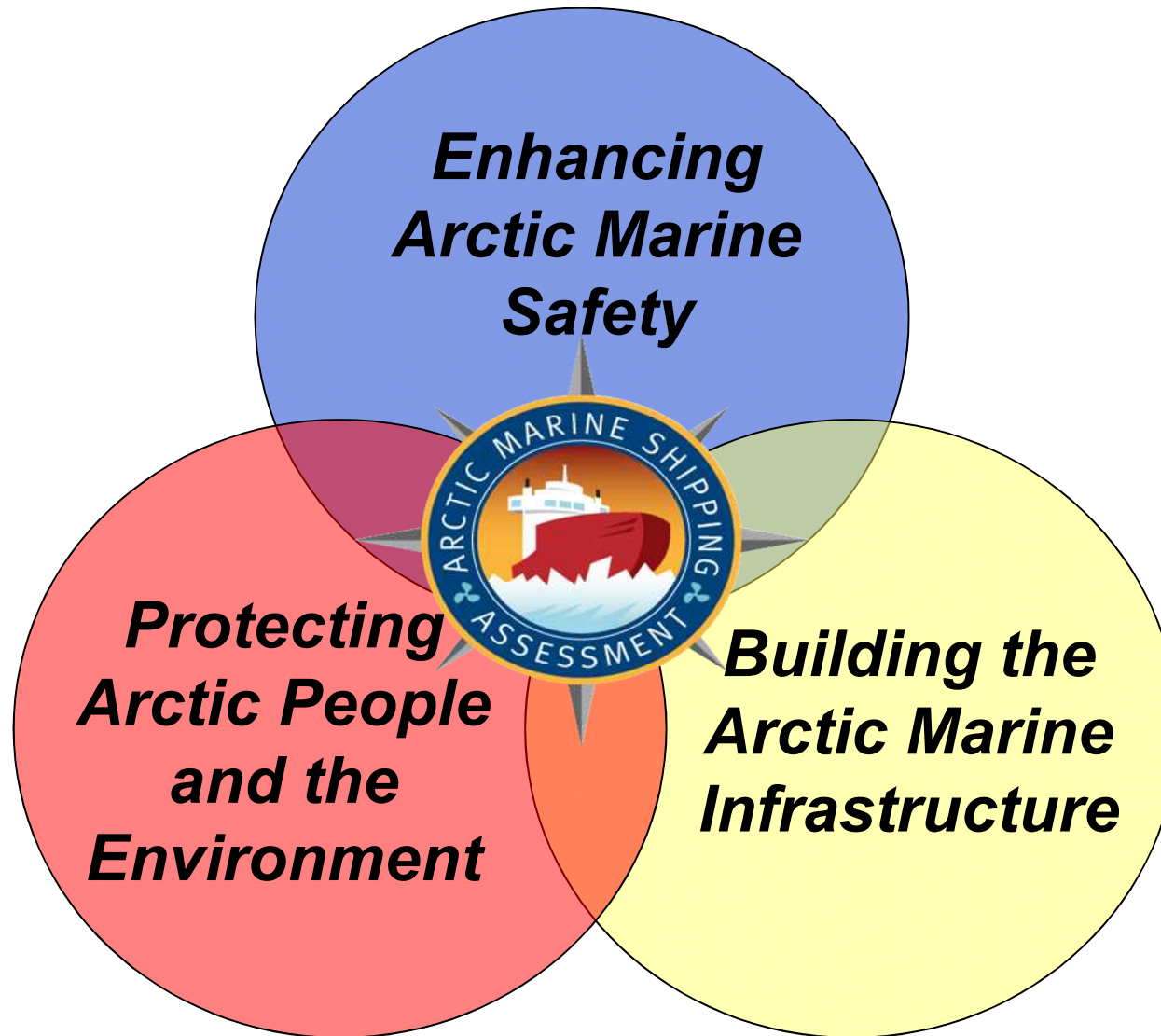
- **Trend in international shipping**
- **Favored by many cargo owners**
 - **Flexible, but costly ships**
- **Icebreaker backup & rescue capacity**
- **Length of the 'Ice Navigation Season'**
- **Alternative: Convoy or Individual Ship Escort by Icebreaker**

(IV) Implementation of the IMO Polar Code

Amendments to SOLAS and MARPOL (1 Jan 2017)

Commercial Carriers & Passenger Ships (500 tons or more)

- **Polar Ship's Structural & Equipment Standards (IASC Ice Classes: PC1/ PC7)**
 - **Marine Safety and Lifesaving Equipment**
 - **Training & Experience of Polar Mariners (STCW)**
- **Polar Ship Certificate (Issued by Flag State; Ship Classes A,B,C)**
 - **Polar Waters Operations Manual (Ship Specific)**
 - **Environmental Rules ~ MARPOL Annexes:**
 - **Annex I ~ Oil & Oily Mixtures (No Discharge)**
 - **Annex II ~ Noxious Liquid Substances (No Discharge)**
 - **Annex IV ~ Sewage**
 - **Annex V ~ Food Waste/Garbage**



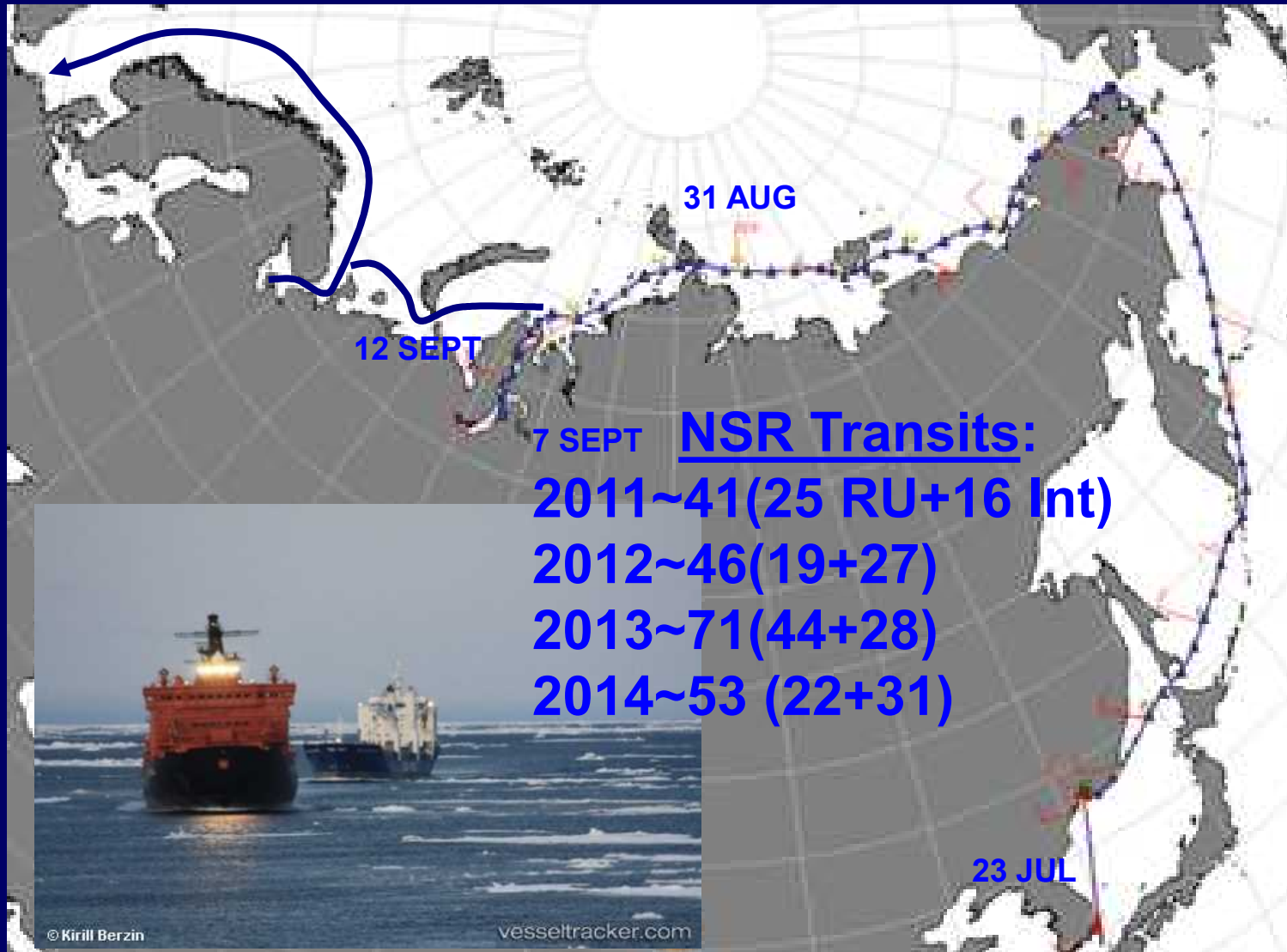
AMSA RECOMMENDATIONS (17) ~ THEMES

(V) NSR Icebreaker Fleet:

- **Composition of Nuclear & Non-nuclear**
- **Correlation with Length of the Ice Navigation Season
~ Integrated Policy for Development of the NSR?**
- **Other Requirements for Icebreaker Support
(Russian Navy, government agencies, research)**
 - **Instruments for the State : Subsidy Issues**
- **Financing Challenges ~ How many new icebreakers?**

(VI) USA & Japanese Icebreakers:

- **USA ~ 2017 Budget ~ Initial Funding for New Construction Polar Icebreakers to be Operated by the USCG; Uses: US effective naval presence, research, law enforcement, response, Arctic & Antarctic operations, & ice navigation training.**
 - **Japan ~ Needs: International Collaborative Research; ice navigation training, maritime presence.**



Uncertainty ~ Summer Northern Sea Route Voyages Linking Arctic Russia & Northern Europe to the Pacific