The Drivers of Arctic Shipping & Marine Operations

ShipArctic 2015: A Joint WMU-IMO-Arctic Council Conference
World Maritime University, Malmo, Sweden ~ 25-27 August 2015
Topics ~ ShipArc Presentation:

- Arctic Perspectives & Global Links
- Changing Arctic Marine Access
  - Current Arctic Marine Use
- Arctic Marine Shipping Assessment (AMSA) ~ Scenarios & Recommendations
  - Summary Points & Challenges
The 21st Century Maritime Arctic

- Rapid & Profound Climate Change
- Globalization ~ Arctic Natural Resources
- Regional & Global Geopolitics
- Indigenous Peoples Challenges
Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle

- 13% Undiscovered Oil
- 30% Undiscovered Natural Gas
- 20% Undiscovered Natural Gas Liquids

New Arctic Resource Discoveries

http://pubs.usgs.gov/fs/2008/3049/
New Arctic Resource Discoveries

Probability of Presence of Undiscovered Oil and/or Gas Fields

Coastal Seas

New Arctic Resource Discoveries
Today’s Maritime Arctic (200 NM Exclusive Economic Zone)

Hypothetical - Future Maritime Arctic (After UNCLOS Article 76)

The ILULISSAT Declaration

- Conference of 5 Coastal States Bordering on the Arctic Ocean (Canada, Denmark & Greenland, Norway, Russia, USA)
  - 27-29 May 2008 ~ Ilulissat, Greenland
  - LOS/UNCLOS Provides ‘Solid Foundation’
  - ‘We therefore see no need to develop a new comprehensive international legal regime to govern the Arctic Ocean.’

Macnab 2000
The ‘New’ Maritime Arctic

Lukoil (Russia) & ConocoPhillips (USA)
Operator ~ Sovcomflot (Russia)
Builder ~ Samsung (Korea)
Technology ~ Finland, Canada & USA
Arctic Linkages to the Global Economic System

- International Fishing (10%)
- Global Marine Tourism Industry
- Hard Minerals ~ Palladium (40%), Nickel (22%), Diamonds (20%), Platinum (15%), Zinc (10%)
- Estimated Arctic Hydrocarbons ~ Undiscovered Natural Gas (30%) & Oil (13%)
- Potential: Rare Earths (25%), Coal & Fresh Water
  - Regional Trade to Northern Communities & Infrastructure Development
The heating is not uniform geographically

Surface T in 2001-2005 vs 1951-80, averaging 0.53°C increase

J. Hansen et al., PNAS 103: 14288-293 (2006)
Arctic Sea Ice Minimum Extents ~
2007 & 2012
Changing Summer Arctic Sea Ice Coverage ~ 1979-2012
Septembers 2006-2015

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

blue lines= common open-water ships
Septembers 2040-2059

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

blue lines= common open-water ships

Today’s Arctic Commercial Marine Use

Mary River
High Grade Iron Ore

Zinc & Coal

World’s Largest Zinc Mine

Hard Minerals

World’s Largest Nickel & Palladium Mine

Nickel & Copper
Today’s Arctic Commercial Marine Use

- Hard Minerals
- Marine Tourism

High Grade Iron Ore??

Zinc & Coal

Nickel & Copper

Map of Arctic Ocean with routes and locations such as Bering Strait, Beaufort Sea, Chukchi Sea, Baffin Bay, and Greenland.
Today’s Arctic Commercial Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries

Arctic Ocean Marine Routes
Arctic Marine Shipping Assessment of the Arctic Council (2005-2006)

- Northern Sea Route
- Northwest Passage
- Key Marine Routes
- Notable Icebreaker Voyages:
  - Arktika, August 1977
  - Sovetskiy Soyuz, August 1991
  - Polar Sea and Louis S. St-Laurent, July and August 1994

Sea Ice, 16 September 2002

Gulf of Alaska

Zinc & Coal

Bering Strait

U.S.A. (Alaska)

Beaufort Sea

McClure Strait

High Grade Iron Ore??

Baffin Bay

Canada

Russian Federation

Greenland

Atlantic Ocean

North Pole

Antarctic Circle

Nunavut

Davis Strait

Greenland Sea

Barents Sea

Furuvik

Kara Gate

Kola

Kara Sea

Laptev Sea

Chukchi Sea

East Siberian Sea

Pechora

Pevek

Pevek

Bye

Sea Ice, 16 September 2002

by Mapping Solutions, Anchorage 2005
for L. Brigham, USARC
Today’s Arctic Commercial Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries
- Oil & Gas
Today’s Arctic Commercial Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries
- Oil & Gas
- Summer Sealift
Today’s Arctic Commercial Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries
- Oil & Gas
- Summer Sealift
- Exploration/Science

Future High Grade Iron Ore Mine ??

Zinc & Coal

Nickel & Copper
Icebreaker Transits to the North Pole & Trans-Arctic Voyages (1977-2014):

- 110 Transits to the North Pole (93 Russia, 7 Sweden, 3 USA, 3 Germany, 3 Canada, 1 Norway)
- Single Non-summer NP Voyage (Sibir Voyage May-June 1987)
- 66 Ship Transits to the NP in 2004-2014

‘Clear Evidence of Central Arctic Ocean Icebreaker Operations’

25 May 1987 ~ North Pole
Soviet Nuclear Icebreaker Sibir
‘A Walk Around the World!’
Global Media Coverage:

- **Chinese Cargo Ship Sets Sail for Arctic Short-cut** (11 August 2013 ~ Financial Times) ~ [Notable: Ob River in Nov/Dec 2012 from Hammerfest to Tabeta, Japan]

- **100 Times to the North Pole**
  (2 August 2013 ~ Barents Observer)

- **Northern Sea Route Slated for Massive Growth; A Seasonal Supplement to the Suez Canal** (4 June 2013 ~ The Moscow Times)
Winter Maritime Traffic
1 January to 31 May 2013
Marine Exchange of Alaska
Summer Maritime Traffic
1 June to 30 November 2013
Marine Exchange of Alaska
Timeless Arctic Marine Transport: Indigenous Use of the Arctic Ocean
Arctic Council ~ Intergovernmental Forum
AMSA Lead Countries for PAME ~ Canada, Finland & USA
AMSA Focus ~ Marine Safety & Marine Environmental Protection
13 Major Workshops & 14 Town Hall Meetings

Key Challenge ~ Many Non-Arctic Stakeholders
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

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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
"Stricken cruise ship off Antarctic evacuated"

M/V Explorer

Chile
Argentina
DRAKE PASSAGE
Falkland Is

PACIFIC OCEAN

SOUTH SHETLAND ISLANDS

100 passengers and 54 crew evacuated from sinking cruise ship

ANTARCTICA

MSNBC - 11/23/07
Scenarios on the Future of Arctic Marine Navigation in 2050

**Arctic Race**
High demand and unstable governance set the stage for an economic ‘rush’ for Arctic wealth and resources.

**Arctic Saga**
High demand and stable governance lead to a healthy rate of development, includes concern for preservation of Arctic ecosystems & cultures.

**Polar Lows**
Low demand and unstable governance bring a murky and under-developed future for the Arctic.

**Polar Preserve**
Low demand & stable governance slow development in the region while introducing an extensive eco-preserve with stringent “no-shipping zones”.

AMSA/GBN Scenarios Workshops ~ April & July 2007
The Future of Arctic Marine Navigation in 2050
Enhancing Arctic Marine Safety

Protecting Arctic People and the Environment

Building the Arctic Marine Infrastructure

AMSA RECOMMENDATIONS (17) ~ THEMES
Enhancing Arctic Marine Safety

Protecting Arctic People and the Environment

Building the Arctic Marine Infrastructure

AMSA RECOMMENDATIONS (17) ~ THEMES

- Arctic State Linkages++
- IMO Measures
- Uniformity of Governance
- Passenger Ship Safety
- SAR Agreement++++

- Infrastructure Deficit
- Arctic Marine Traffic System+
- Environmental +++ Response Capacity
- Hydrographic, Met & Ocean Data

- Indigenous Use+
- Community Engagement++
- Invasive Species
- Eco-Significant Areas++
- Oil Spill Prevention
- Marine Mammal Impacts
- Reducing Air Emissions
AMSA 2009:

• Baseline Assessment

• Arctic Council Policy Document
  ~ Negotiated Text Approved 29 April 2009 ~

• Strategic Guide

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Summary Points & Challenges

• Arctic Natural Resource Development ~ Main Driver
• Greater Marine Access & Potentially Longer Navigation Seasons
  • NSR ~ Seasonal Supplement to the Suez Canal Route ~ Opportunities for Seasonal Trans-Arctic Voyages
• ‘New’ Suez & Panama Canals Add Capacity to Global Routes
  • Four Challenges:
    (1) Defining/Maintaining the Ice Navigation Season Length
    (2) Addressing the Huge Arctic Marine Infrastructure Gap
    (3) Implementing the IMO Polar Code & Uniformity
    (4) Projecting Plausible Ship Traffic Patterns/Trends
The Maritime Arctic of the Future ~ Complexity

Fishing?

Summer 2020?

4-6 Mons.

Summer 2040?

2011 to 2050+

Fishing?

Year-round 2025?

Improving Coastal Access