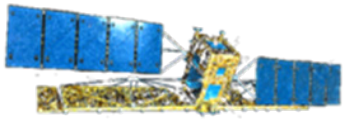
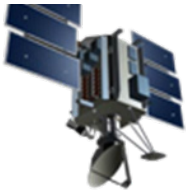
National / Naval Ice Center (NIC)





NOAA Sea Ice Forecasting Workshop
Anchorage, AK
September 19-21, 2011

Christopher Szorc, Senior Ice Analyst/Forecaster

USCG

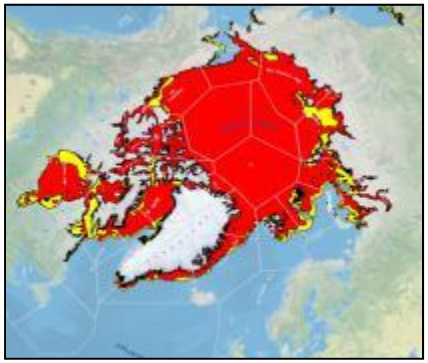
USN

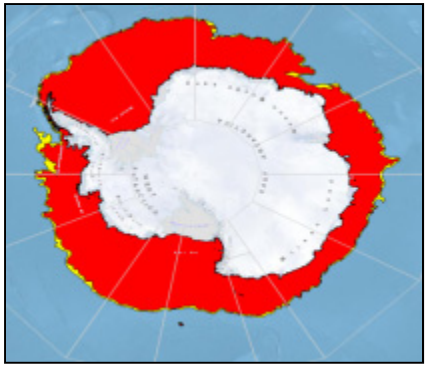
NOAA

NIC Mission

- A multi-agency operational center operated by the United States Navy, National Oceanic and Atmospheric Administration, and United States Coast Guard.
- Located in Suitland, Maryland and employs over 50 military and civilian personnel.
- Over 140 International Customers, including SUBFOR, ONI, NOAA, NWS, NSF, USCG, MSC, and NASA.
- GLOBAL sea ice analysis and forecasting.

NIC Suitland, MD

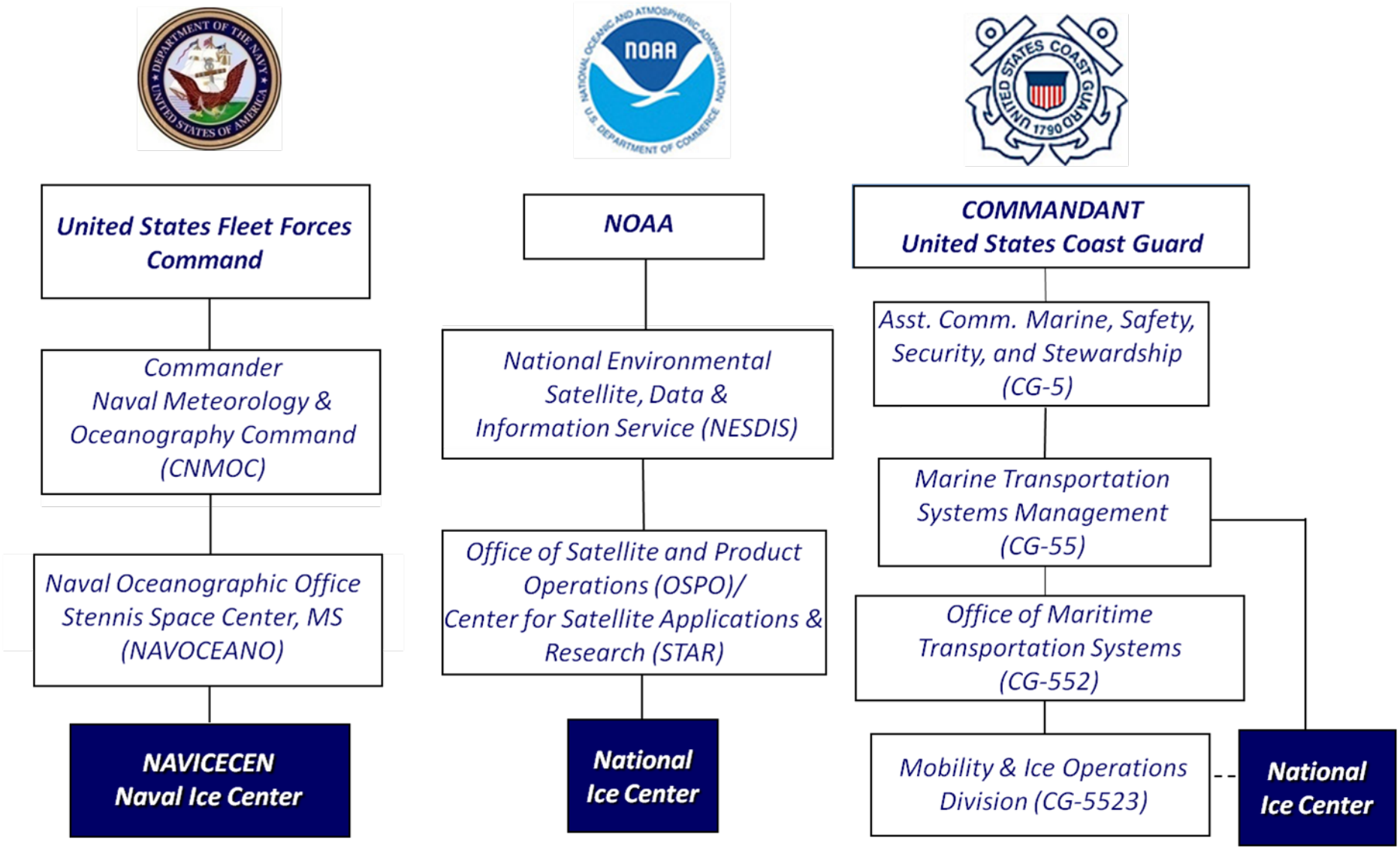




Coverage 20.6 Million Square Miles – Arctic, Antarctic, and Great Lakes

Mission: Provide the highest quality, timely, accurate, and relevant snow and ice products and services to meet the strategic, operational, and tactical requirements of U.S. national interests across a global area of responsibility.

NIC Organization



International Partnerships

- **North American Ice Service (NAIS)**
  - Multi-agency partnership between U. S. National Ice Center, Canadian Ice Service and International Ice Patrol.
  - Mission: Transform individual organizational strengths into a unified source of ice information and meet all marine ice information needs and obligations of the United States and Canadian governments.

- **International Arctic Buoy Program (IABP)**
  - Global participants working together to maintain a network of drifting buoys in the Arctic Ocean to provide real-time operational requirements and research purposes including support to the World Climate Research Program and World Weather Watch.

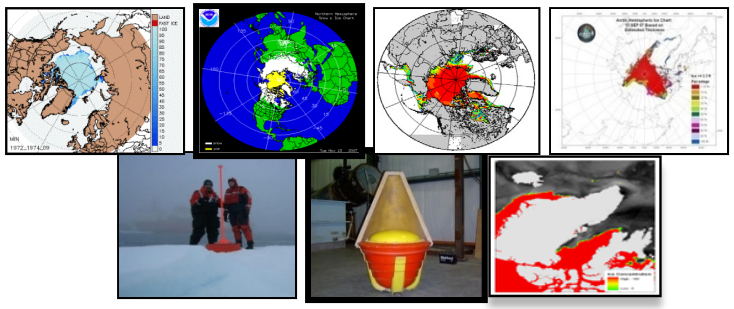
- **International Ice Charting Working Group**
  - Formed in October 1999 to promote cooperation between the world's ice centers on all matters concerning sea ice and icebergs.

Information Technology & Science and Applied Technology

OPERATIONS

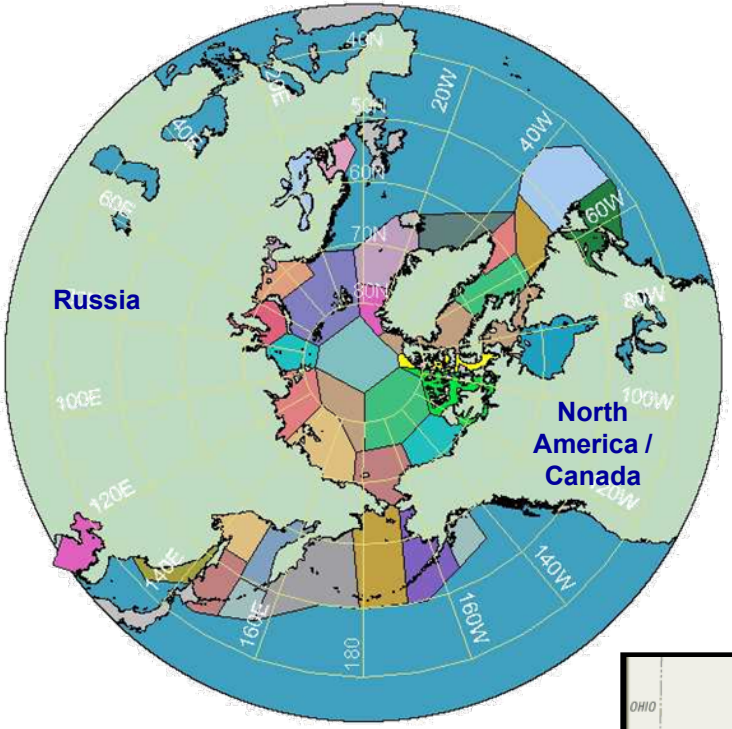
Information Technology
- Enhanced IT Capabilities
- Faster Product Generation
- Faster Data Transfer
- Enhanced Archive for data
- More Reliable Backup Capabilities

Science and Applied Technology
- Sensor Exploitation
- Product Development
- New Technology Exploitation
- Scientific Expertise
- Modeling Validation



Area of Responsibility - 20.6M sq.mi.

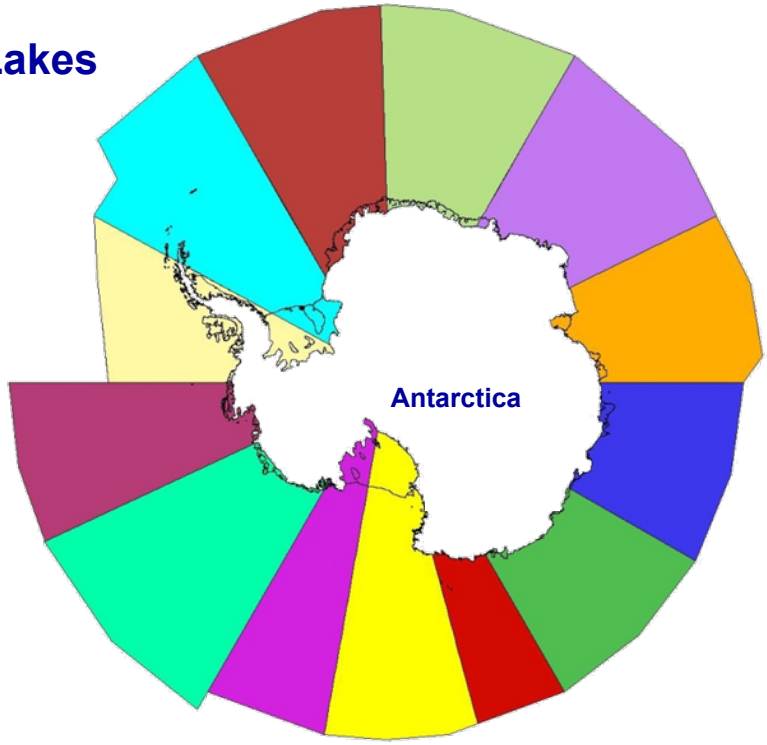
Arctic, Great Lakes, Antarctic



Arctic (including Sea Of Japan, Sea of Okhotsk, and Yellow Sea)

Great Lakes

Chesapeake / Delaware Bays

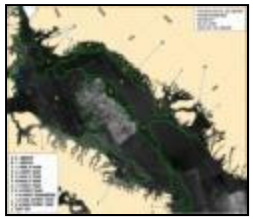


Antarctic

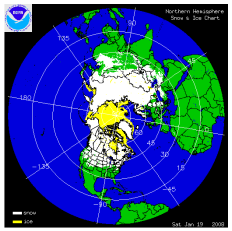
Operations and Product Generation

Human, Derived, Automated, and Reconfigured

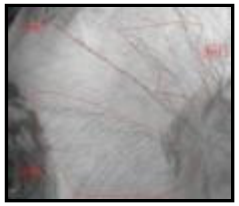
Products (Routine/Special Support)



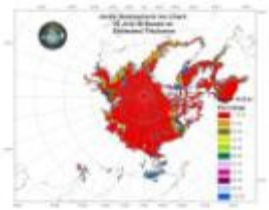
Annotated Images



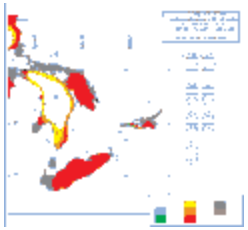
IMS snow and ice maps



Fractures, Leads and Polynas (FLAP)



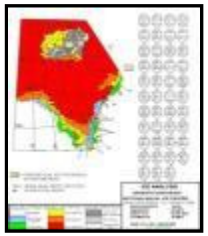
Ice Thickness Estimations



Ice Forecast Outlooks

Expert Ice Analyses, Forecasting, and Quality Control

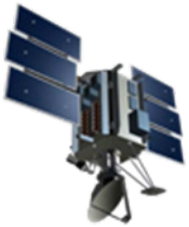
Ingest 100GB Daily



Data Fusion

Derived Data Automation

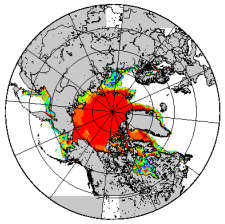
Direct Data Dissemination



Satellite

Air Recon

Surface Observations



Modeling

Bouys

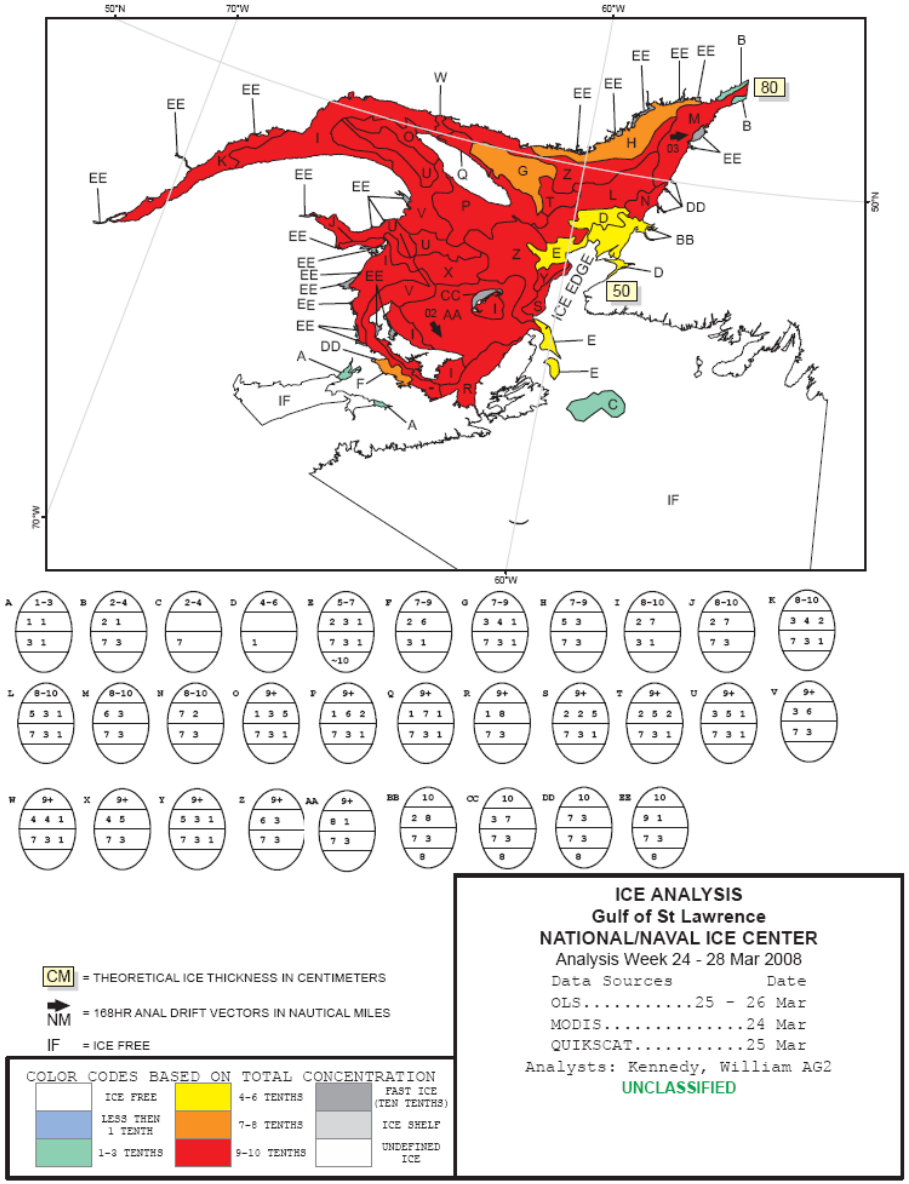
Products

- Weekly Analysis
- Annotated Images
- SPAROS
- FLAPS
- Antarctic Iceberg Database

Weekly Analysis

- Weekly analysis of Arctic, Antarctic, and Great Lakes regions

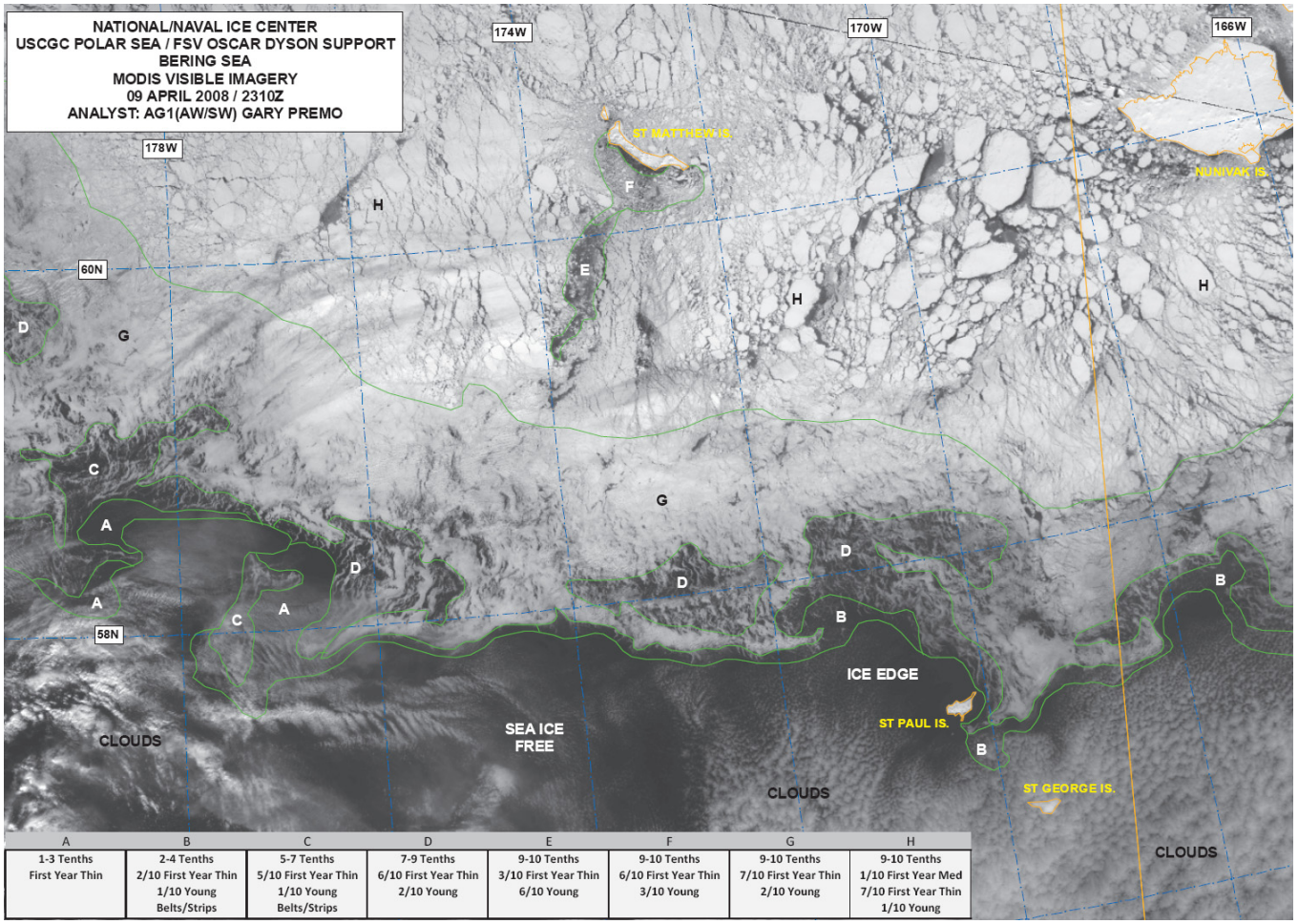
- Hosted on NIC web in .pdf format and also various GIS formats



Annotated Images

-Tailored support produced on request for tactical and scientific support

-Graphic format



A	B	C	D	E	F	G	H
1-3 Tenths First Year Thin	2-4 Tenths 2/10 First Year Thin 1/10 Young Belts/Strips	5-7 Tenths 5/10 First Year Thin 1/10 Young Belts/Strips	7-9 Tenths 6/10 First Year Thin 2/10 Young	9-10 Tenths 3/10 First Year Thin 6/10 Young	9-10 Tenths 6/10 First Year Thin 3/10 Young	9-10 Tenths 7/10 First Year Thin 2/10 Young	9-10 Tenths 1/10 First Year Med 7/10 First Year Thin 1/10 Young

Produced during special evolutions

Special Arctic Oceanographic Synopsis

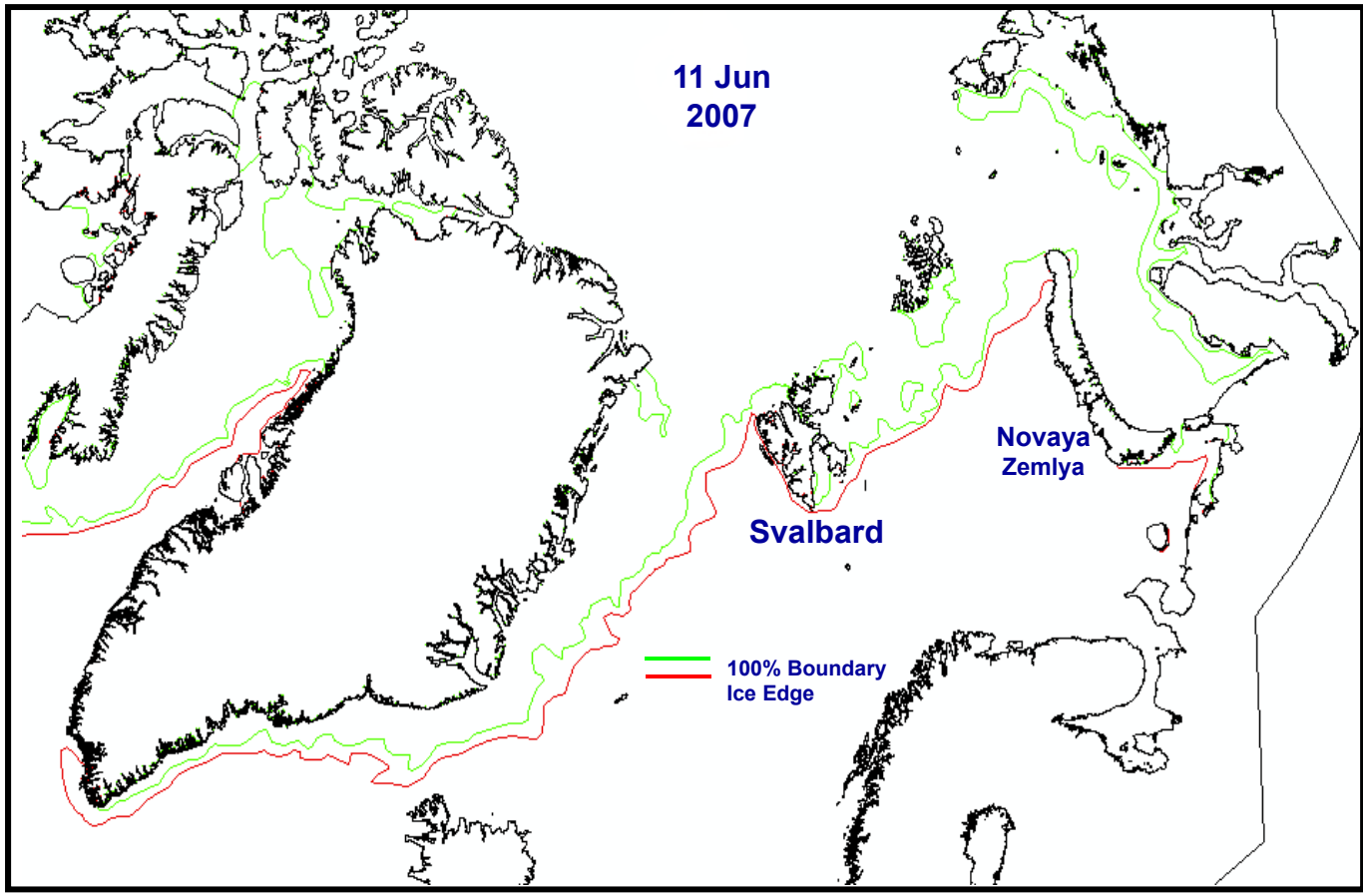
Back

-Daily Ice Edge

-OTH-G message and graphic format

-Produced for Arctic and Antarctic hemispheres

-Disseminated via message traffic to SUBFOR Broadcast



Produced daily for U.S. SUBFOR and various DoD customers

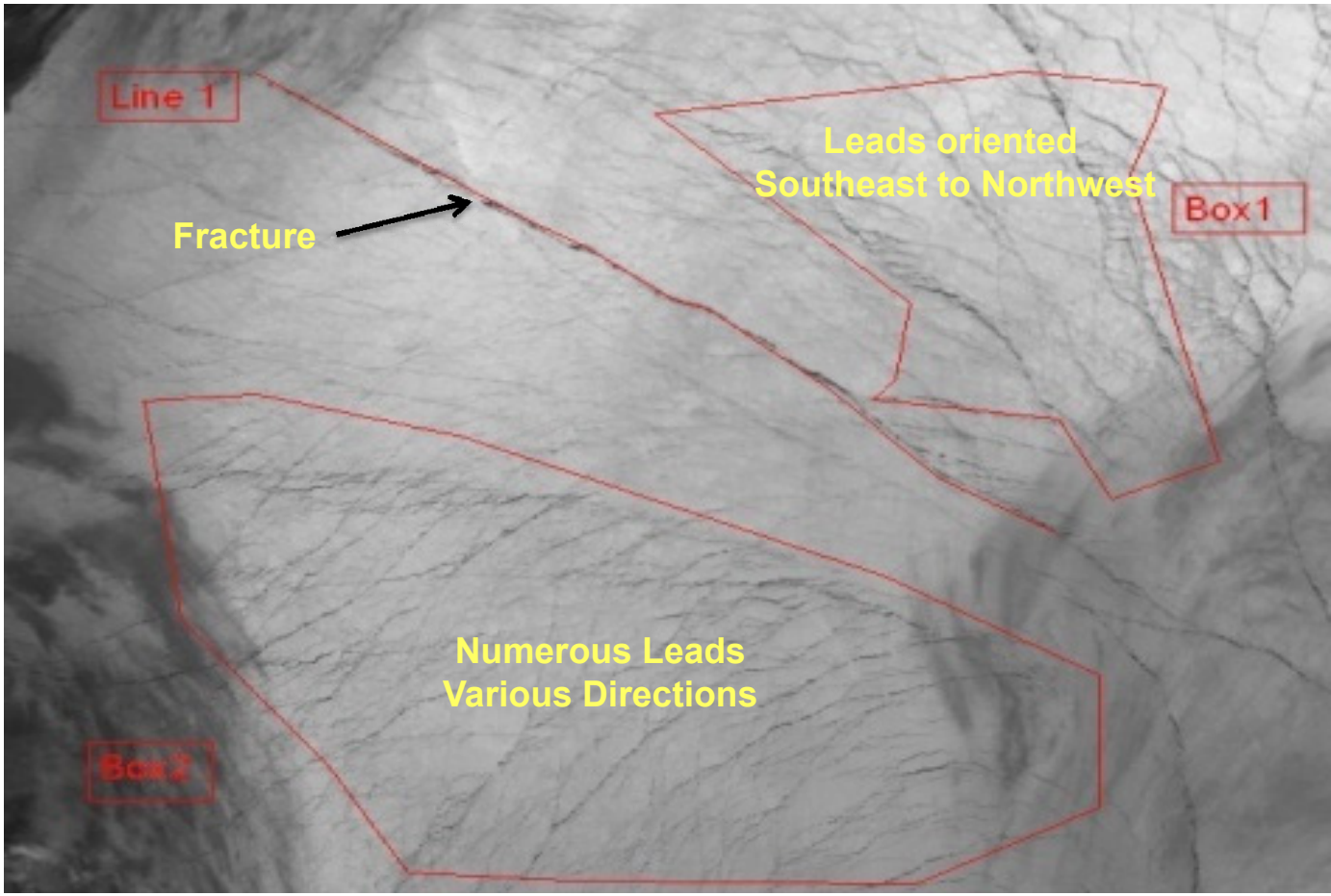
Fracture, Leads and Polynyas

Back

- Typically classified at SECRET level

-Produced in OTH-G message format

-Disseminated via message traffic and SUBFOR broadcast



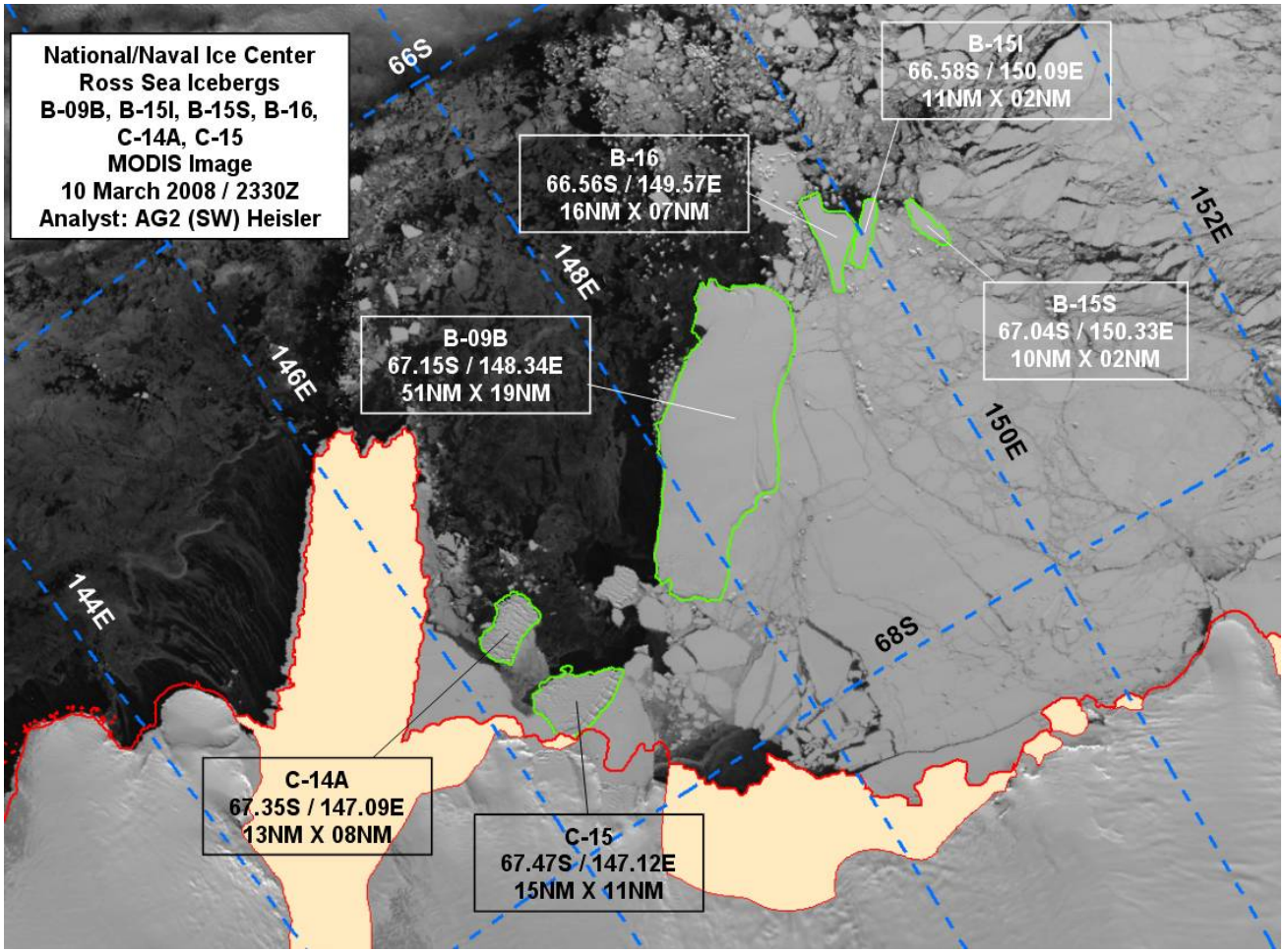
Produced daily during operations for US SUBFOR

Antarctic Iceberg Database

- NIC is responsible for maintaining the database used throughout the world

- Identify and track Icebergs larger than 10NM

- Database of all named Icebergs dates back to 1976



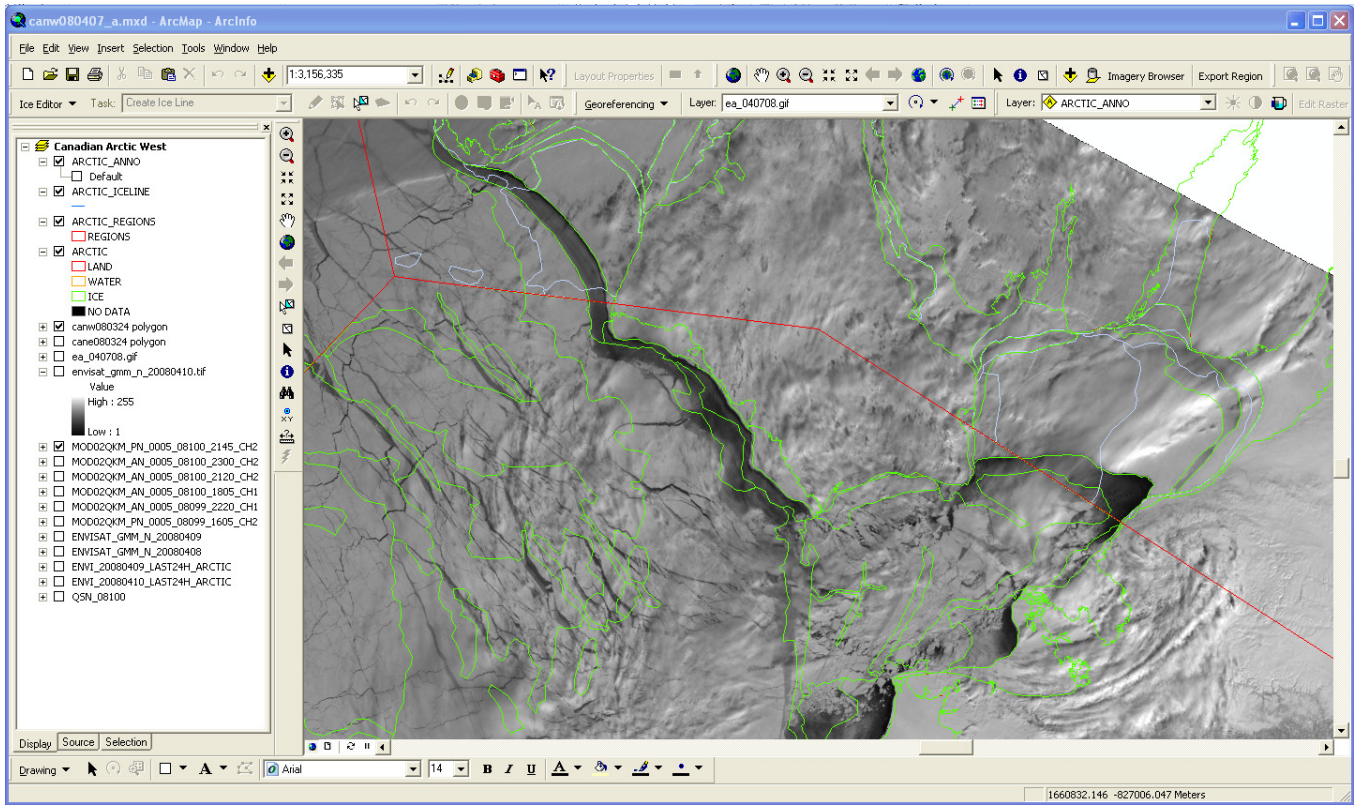
Updated weekly World dissemination

Sea Ice Prediction and Analysis System (SIPAS)

- Customized ESRI ARCMAP software tailored for Sea Ice Analysis

- Enables analysis to be completed under one application suite

- Full digital and graphical capabilities provide customers with the highest quality products



Near Future

- **KML Format – Currently Antarctic Icebergs available in KML to display on Google Earth, plans for Arctic, Antarctic & Great Lakes ice coverage in the works.**

- **Incorporate other Ice Services charts into NIC database, (Canadian region, Baltic Sea) why duplicate work done by other services with better knowledge, resources of local area.**

TODAY'S CHALLENGES

- Minimally manned and resourced to meet current mission requirements.
- As a result, must continuously reprioritize support to meet expanding missions in the Arctic by USCG, Navy, and NOAA.
  - Change in type and number of missions to support (non-ice hardened ships and ice breakers).
  - Expanded forecast needs (7 days, 1-3 months, 1 year, 5-10 years).
  - More complex and detailed ice information: Location, thickness, age, movement.
- Availability of broad-based ice information.

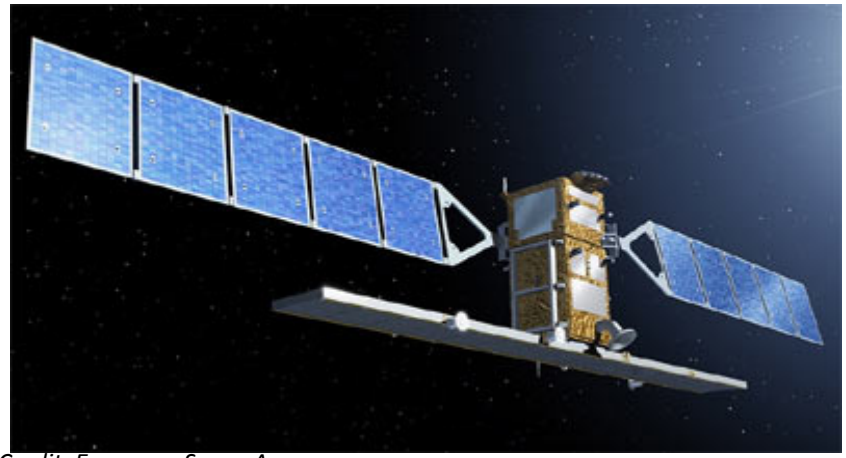
In order for NIC to plan, resource and provide operational support to its customers, those customers must clearly articulate their ice product requirements for current and future missions.

FUTURE MISSION REQUIREMENTS

- Strengthen partnerships and collaboration with other Arctic countries on safety of navigation, science/research, data collection, and charting.
- Increase data resources
  - Real-time availability of all-weather, day and night, high resolution Synthetic Aperture Radar (SAR) imagery is crucial.
  - Seasonal ice buoys; open ocean drifting buoys; hydrographic sensors; potential exploitation and use of UAV/UUVs?
- Improve modeling and forecasting capabilities (OTSR/WEAX)
- More trained ice analysts as demand signal for support in the Arctic increases.
- Increased automation capability where it makes sense.
- Continued access to Ice Reconnaissance data – USCG (International Ice Patrol) and Navy.

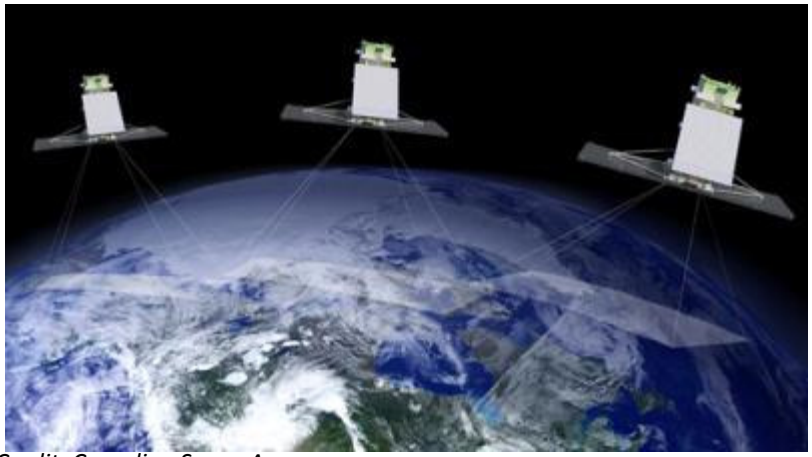
FUTURE SATELLITE SENSORS

SENTINEL-1 (ESA)
LAUNCH PLANNED FOR 2013-2015



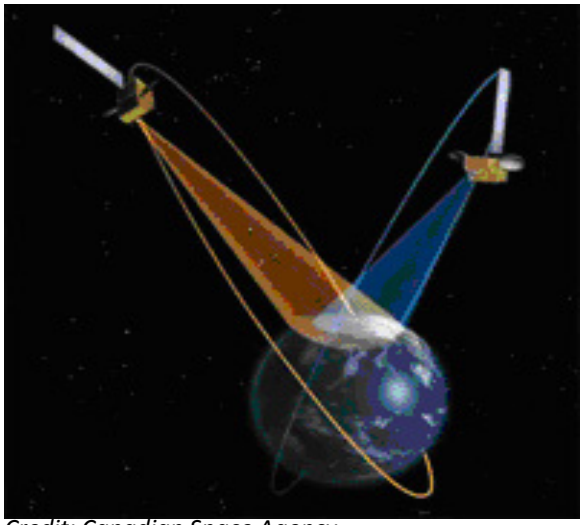
Credit: European Space Agency

RADARSAT CONSTELLATION (CSA)
LAUNCH PLANNED FOR 2014-2015



Credit: Canadian Space Agency

POLAR COMMUNICATION AND WEATHER (CSA)
TENTATIVE LAUNCH PLANNED FOR 2016



Credit: Canadian Space Agency

Questions?