Sea Ice Products and Services

USN    USCG    NOAA

CDR Kelly Taylor
Commanding Officer

LCDR Robert Atkinson
Executive Officer

Mr. Sean Helfrich
(Acting) Deputy Director
Mission
The U.S. National Ice Center (NIC) is a tri-agency partnership of the United States Navy (USN), the National Oceanic and Atmospheric Administration (NOAA), and the United States Coast Guard (USCG) providing global ice and snow analysis and short term forecasting services for the maximum benefit of the United States government.

Vision
To be the U.S. government’s authority on global sea ice and snow analysis and forecasting.

Goals
- Goal 1. Develop Capabilities
- Goal 2. Transition Science and Technology
- Goal 3. Strengthen Partnerships
- Goal 4. Professional Excellence
• 1976: Common requirements between Navy and NOAA resulted in the formation of the Navy/NOAA Joint Ice Center (JIC).

• 1995: USCG joined, JIC became the U.S. National/Naval Ice Center (NIC/NAVICE).

• NIC responsibilities established via Annex V under the MOA between DOC and DON.
  – Participating authorities
    • Navy: 10 U.S.C. § 5013.

• The NIC Executive Steering Committee consists of a representative from each organization (Navy, NOAA, USCG).
• Daily Sea Ice Edge Analysis and Forecast
• Daily Sea Ice Concentration Analysis and Forecast
• Daily Iceberg location (Arctic/Antarctic)
• Fractures, Leads, and Polynyas (FLAP) Analysis and Forecast
• CONUS Ice Analysis: Great Lakes and Chesapeake and Delaware Bays
• Climatological Outlooks
• Global Snow and Ice Monitoring
• Daily Imagery Analysis
• On-scene Ice Analyst
NIC & National Strategy

Navy, NOAA, Coast Guard

- Improve Awareness
- Broaden Partnerships
- Strengthen Foundational Science
Domestic Partnerships

• National Snow and Ice Data Center
  – Archives NIC data
  – Co-generates the Multi-sensor Analyzed Sea Ice Extent (MASIE) with NIC

• NASA – Goddard & Jet Propulsion Lab
  – Algorithm testing and development
  – NIC identified as early adopter for NASA SMAP mission

• Office of Naval Research
  – Programs to enhance understanding of ice
  – Provide analyzed imagery to support research efforts

• Naval Research Labs
  – Evaluate the utility of new USN models
  – Partner on projects for model development

• Bureau of Ocean Energy Management
  – Partner on projects for improved sea-ice forecasting

• Rutgers University Global Snow Lab
  – Climate Data Record (CDR) using NIC Blended Snow

• University of Washington – APL
  – Coordination for IABP (funding and deployment)
International Partnerships

- **North American Ice Service (NAIS)**
  - Multi-agency partnership between U.S. National Ice Center (NIC), Canadian Ice Service (CIS), and U.S.C.G. International Ice Patrol (IIP)

- **International Arctic Buoy Program (IABP)**
  - Global participants working together to maintain a network of drifting buoys in the Arctic Ocean

- **International Ice Charting Working Group (IICWG)**
  - Promotes cooperation between the world’s ice centers on all matters concerning sea ice and icebergs

- **WMO Expert Team on Sea Ice (ETSI)**
  - Formal coordination of sea ice activities on the level of WMO/IOC that provides technical direction to the WMO Secretariat

- **WMO Global Cryosphere Watch – SnowWatch**
  - Promotes cooperation between the world’s snow observing nations
SHARED RESOURCES
- Imagery Savings est > $1.6m/yr
- Man Hour Savings (NIC) est > $ 50k/yr
- Local Expertise
- Flexibility to pursue new products
- Support Joint Missions
- Contingency for Critical Products
Chile was the first Southern Hemisphere country to host the IICWG annual meeting in 2014.

In October 2014, Brazil was the first of the South American countries to send personnel for ice Analyst training at NIC.

NIC, AARI and NMI are collaborating in Antarctic Analysis Harmonization.

<table>
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<th>SHARED RESOURCES</th>
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<td>Sea Ice Analysis GIS Files</td>
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<td>Local Expertise</td>
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<td>Ice Reports</td>
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UNCLASSIFIED

UNCLASSIFIED
Product Generation

Arctic Maritime Domain Awareness

Satellites +

Buoys  Models  Aircraft  Webcam

Radar  Ship Obs  Surface Obs  International Partners

Geographic Information System

Interpretive
Snow and Sea
Ice Analysis and
Sea Ice Forecasting

Meteorology

Semi-automation

Subject Matter Expertise

UNCLASSIFIED
Integration with Models

Models provide forecast guidance and NIC analysts incorporate real time data to produce interpretive analysis.
Arctic Cap Nowcast Forecast System

Surface Winds
Mean Sea Level Pressure
Surface Air Temperature
Sea Surface Temperature
Sea Ice Fraction
Sea Ice Thickness
Ice Drift
Lead Area Opening Rate
Sea Surface Salinity
Compressive Strength of Sea Ice
ACNFS derived product use at NIC

**Change detection from ACNFS**

- Produce 1-7 day difference fields
- Difference layers more precise and uniform

- Can be difficult to mentally interpolate small differences
- Less prone to interpretation errors

Model showing *recession or melt* in sea ice fraction over the next 48hrs

Model showing *advancement or growth* in sea ice fraction over the next 48hrs

ACNFS 48-hr Sea Ice Fraction Change \([t_{48}-t_{00}]\)

ACNFS 48-hr Sea Surface Temperature Change \([t_{48}-t_{00}]\)

Forecasted Warmer Waters

Forecasted Cooler Waters
Mission Support - ICEX 2016 Preparation

U.S. Naval Ice Center
ICEX16 (Exercise)
23 March 2015

Ice Camp Selection
RADARSAT ...............0252Z 23 Mar 2015

- Red: = 24 Feb Posit
- Green: = 23 Mar Posit
- Blue: = 48Hr Fcst Posit

Barrow
Deadhouse

Position Forecast

1800Z 24 Mar 15

#1 NW 7nm 72.40N 147.41W
#2 NW 8nm 72.12N 146.16W
#3 NW 11nm 71.40N 145.49W
#4 NW 9nm 72.06N 149.26W
#5 NW 12nm 73.13N 145.54W
#6 NW 10nm 72.59N 143.13W
#1 72.35N 147.20W approx 132nm from Deadhouse approx size: 9x7nm Breaking Apart
#2 72.07N 145.53W approx 114nm from Deadhouse approx size: 8x12nm Breaking Apart
#3 71.36N 145.185W approx 95nm from Deadhouse approx size: 14x10nm Breaking Apart
#4 71.56N 149.15W approx 97nm from Deadhouse approx size: 14x10nm Breaking Apart
#5 73.13N 145.55W approx 174nm from Deadhouse approx size: 14x10nm
#6 72.58N 143.14W approx 180nm from Deadhouse approx size: 14x10nm
Mission Support - ICEX 2016 Preparation

U.S. Naval Ice Center
ICEX16 (Exercise)
31 March 2016
Ice Camp Selection

RADARSAT ..........................0224Z 31 Mar 2015
RADARSAT ..........................0253Z 30 Mar 2015

- = 24 Feb Posit
- = 31 Mar Posit
- = 12hr Fcst Posit

20 Nautical Miles

12 Hour Forecast Ice Drift
1800Z 31 March

#1 NW 3nm 72.38N 149.46W
#2 NW 3nm 72.13N 148.12W
#3 W 5nm 71.37N 147.06W
#4 WNW 4nm 72.07N 151.37W
#5 NW 8nm 73.17N 148.21W
#6 NW 5nm 72.58N 145.37W

Deadhourse

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Questions