Welcome
Sea Ice Prediction Network – Phase 2 (SIPN2) Webinar Series
“Understanding Stakeholder Information Needs for Sea-Ice Forecasting”
28 April 2020

Presenters:

Hajo Eicken
International Arctic Research Center Director

Joseph Little
Economics Program Director, Univ. of Alaska Fairbanks School of Management

Zeke Baker
Postdoctoral Research Associate, University of Oklahoma and National Weather Service-Alaska

Marta Terrado
Science Communication Specialist, Barcelona Supercomputing Center

Background photo by Ute Kaden
When you entered the meeting via Zoom, your video was switched off and your audio was muted by the Host.

Please keep your microphone muted to help prevent disruptions and background noise.

Your Zoom controls (chat, etc.) can be found by hovering your mouse over the bottom of your Zoom window.

We recommend you use the chat feature that lets you chat with individuals or the whole group.

Background photo by Ute Kaden
Guidelines for Asking Questions

Questions will be addressed during the question and answer session following the presentations.

Joining by Zoom: type your questions into the chat window at any time. I will read them aloud during the Q & A.

Joining by YouTube Livestream: type your questions in the “live chat” window. A facilitator will share your questions with me to read aloud.

Joining by Phone: you will need to raise your hand by pressing *9 — and unmute yourself by pressing *6 to ask your question aloud.

For technical support, contact Kuba Grzeda via Chat or email, kuba@arcus.org.
Speaker Introductions

“Understanding Stakeholder Information Needs for Sea-Ice Forecasting”
28 April 2020

Hajo Eicken
International Arctic Research Center Director

Joseph Little
Economics Program Director,
Univ. of Alaska Fairbanks
School of Management

Zeke Baker
Postdoctoral Research Associate, University of Oklahoma and National Weather Service-Alaska

Marta Terrado
Science Communication Specialist, Barcelona Supercomputing Center

Background photo by Ute Kaden
Regional ice information product user needs

**Input and engagement includes:**
- National Weather Service AK Region, Don Moore, Decision Support Lead
- Alaska Arctic Observatory & Knowledge Hub (arctic-aok.org) – Bering Strait to Barter Island
- Sea Ice for Walrus Outlook (SIWO) – Bering Straits (www.arcus.org/siwo)
- Ikaagvik Sikukun – Kotzebue Sound (www.ikaagviksikukun.org)

→ Co-production approaches

**Ice uses & operations in coastal areas**

- **Ice users**
  1. Local communities
  2. Oil and gas developers
  3. Marine mammals
  4. Fish and marine biota
  5. Shipping companies
  6. Tourists

- **Examples of ice use**
  1. Short-term ice trails
  2. Opportunistic travel
  3. Permanent ice road
  4. Staging of equipment
  5. Navigating through ice

**Parameters impacting ice use**
1. Stability
2. Roughness
3. Surface conditions
4. Fractures
5. Ice extent

**Dammann et al.**
*ARCTIC 71:59-, 2018*

**Little, Terrado**
Regional ice information product user needs

- **Ice uses & ice hazards**
  - Presence of ice restricts maritime access & represents operational hazard → Ice concentration & quality
  - Use of (landfast) ice as a platform → Seasonal cycle, ice quality

- **Key ice information user groups (e.g.)**
  - Coastal communities: Indigenous ice uses; access & transport pathways
  - Fishing/crabbing industry: Ice hazards
  - Resource extraction industry: Access & use of ice as platform

---

Ice uses & operations in coastal areas

Ice users:
1. Local communities
2. Oil and gas developers
3. Marine mammals
4. Fish and marining biota
5. Shipping companies
6. Tourists

Examples of ice use:
1. Short-term ice trails
2. Opportunistic travel
3. Permanent ice road
4. Staging of equipment
5. Navigating through ice

Parameters impacting ice use:
1. Stability
2. Roughness
3. Surface conditions
4. Fractures
5. Ice extent

---

SIPN2 Webinar: Understanding Stakeholder Information Needs for Sea-Ice Forecasting – Introduction (Hajo Eicken)
Regional ice information product user needs

- **Prediction needs**
  - Prediction needs are driven by planning & decision-making context – use of information needs to be clearly understood
  - **Predictand variables**: Ice extent & quality, seasonal cycle & key events
  - **Spatial scale**: community-scale (<50 km), regional (100s km), pan-Arctic
  - **Timescale**: hours-days → hazards, weeks-months → access & ice use
  - **Predictive skill & uncertainty**: Determined by tolerable economic/risk factors
Regional ice information product user needs

- **Prediction needs**
  - Prediction needs are driven by planning & decision-making context – use of information needs to be clearly understood
  - Predictand variables: Ice extent & quality, seasonal cycle & key events
  - Spatial scale: community-scale (<50 km), regional (100s km), pan-Arctic
  - Timescale: hours-days → hazards, weeks-months → access & ice use
  - Predictive skill & uncertainty: Determined by tolerable economic/risk factors
Evaluating Stakeholder Preferences for Seasonal Scale Sea Ice Prediction: Early Insights from a Field Survey

April 28, 2020
Acknowledgements

• Thank You
  • Alaska Bering Sea Crabbers
  • Jamie Goen
  • Jake Jacobsen
  • SIPN2
  • ARCUS
  • National Science Foundation
  And others!
Introduction: Bering Sea Crabbers and Sub-Seasonal Sea Ice Forecasts

- Overview
  - Stakeholder Engagement with Bering Sea Crabbers

- Survey Content
  - Experience with Sea Ice
  - Early Views on 1-Month Forecast

- Early Insights
  - Utility in Operations
  - Attributes: Where, When

- Challenges
  - Pandemic
  - Small Sample
• Bering Sea crab fishery commercially important
  • Bering Sea crab harvests comprise 23% of ex-vessel value of all commercially harvested fish in the Bering Sea Aleutian Island Region (approx. $220 million 2015/2016 season, McDowell 2017)
  • Between 75-100 Crab Boats in Bering

• Timing of crab season (Oct. 15-May 15)
  • Currently use short term sea ice forecasts from NWS
  • Need for seasonal scale forecast undefined

• Engage crab fishery stakeholders using online survey

Source: Alaska Department of Fish and Game
Supporting Bering Sea Crabbers with Seasonal Sea Ice Forecasts

- Areas of Survey Focus
  - Background
  - Experience and Operations Near Sea Ice
    - Proximity
    - Past Negative Events
  - Timing of forecasts
    - Priority months for seasonal forecast (Jan.-May)
  - Use in Operations
    - Safety
  - Location
    - Forecast information for preferred fishing locations
Challenges and Limitations

• Surveying during this time has been challenging
• **Treat as a focus group** being used to inform further research
  • 13 total respondents with mixed item non-response
  • 10 respondents answered 80% or more of the questions
• Opportunity for future engagement when things settle down
Respondent Background

• 13 Respondents
  • 12 crab boats
  • 1 cod boat

• Experience
  • 30 Years on average (16 years to 40+ years) operating in Bering Sea

• Primary Crab Species Fished
  • Snow Crab
  • Red King Crab

• All Respondents Report Checking NWS Sea Ice Forecast at Least Every Other Day.
  • Six individuals reported checking more than once per day
Past (Negative) Experience with Sea Ice

- Top three reported negative experiences resulting from sea ice (Since 2005)
  - Lost Gear
    - Lost crab pots are expensive ($1,000 empty)
  - Days Lost Fishing
    - Can’t access preferred locations
  - Vessel Damage
- 4 Respondents willing to operate in open drift with small floe, 3 respondents operate in open drift with large floe
- No respondent indicated working in pack ice.
Is Fishing Better Near the Ice Edge?

7 Responses:
- 6 Yes
- 1 No

When asked **how close** to the ice edge they were willing to deploy fixed gear (8 responses)

- Average of 20 miles
- Minimum of 0 miles (depending on wind direction)
- Maximum of 60 miles
Respondent Insights: Current Impact of Sea Ice on Overall Operations

“It is nice to know where the ice pack is, what direction it is moving and how fast. If we know what the ice is doing we can make educated planning for deliveries, if we can leave our pots near the ice or move them farther away from the ice pack”

“Last few years ice was not an issue but this year it moved us off good fishing grounds”

“Having to relocate gear before delivering”

“We have stayed away from ice edge fish for several years. Ice has not been present in our traditional fishing grounds”
Respondent Insight: What Operations Aspects Affected by Longer Run Forecast

• Respondents were asked with operations would most benefit from availability of 1-month forecast

• Options included
  • Safety
  • Route Planning Navigation
  • Resupply
  • Fuel Purchases
  • others

• 6 respondents indicated that a 1-month forecast would enhance safety
Also.....

- Choice of Fishing Location
  - Productive fishing and presence of ice
  - Definition: CPUE-Catch Per Unit of Effort

- Timing of Delivery
  - Access to St. Paul
Exercise:
Respondents could indicate three locations where they would like to have a sea ice forecast 1-Month in Advance.
Respondent Insight: 1-Month Forecast Affect on Fishing Location Choice

“It could give a very rough idea of where we might be able to fish in the future, but I assume would not be very accurate.”

“Would help in deciding how much gear to put out on the fishing grounds during a season”

“It would make a big difference”
### Respondent Rankings for Ice Attribute Information and Month for Forecast

<table>
<thead>
<tr>
<th>Ice Attribute Information</th>
<th>Forecast Month Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Based on average rank</td>
<td>• Based on Average Rank</td>
</tr>
<tr>
<td>1. Location</td>
<td>1. January</td>
</tr>
<tr>
<td>2. Extent</td>
<td>2. February</td>
</tr>
<tr>
<td>3. Direction</td>
<td>3. April</td>
</tr>
<tr>
<td>4. Concentration</td>
<td>4. March</td>
</tr>
<tr>
<td>5. Stage</td>
<td>5. May</td>
</tr>
</tbody>
</table>
Closing Comments

• Survey is a work in progress
  • Will continue through May

• Respondents expressed interest in longer run sea ice forecasts
  • Location, Extent, Direction

• Useful
  • Safety
  • Fishing location

• Future steps
  • How to convey forecast info to stakeholder
  • Evaluate use of forecast by sub-set of ships
Thank You

• Please contact me if you have questions/comments
• Joe Little: jmlittle2@alaska.edu
Anticipatory Culture in the Bering Sea

Marine and Sea Ice Information in Sociological Perspective
Research question

What is the value of marine weather information to decisions and livelihood made in the Bering Sea in the face of social and environmental change?
Social context of weather information production and use in Alaska

- Scientific innovation
- Increase in use of private weather services
- Rise in internet access and digital technology use
- Changing experiences and expectations of weather, given climate change
- A shift in the National Weather Service towards ‘impact-based decision support services’ (IDSS).
Anticipatory Culture

**Anticipatory culture** comprises the practical and symbolic ways through which actors answers the questions, “what’s next?” and “now what?”

**Temporal dissonance:** the challenges and negotiations that derive from new or uncertain answers to these two basic questions.

Tavory and Eliasoph 2013; Jasanoff and Kim 2015; Hulme 2017; Mische 2014; Anderssen 2018; Daipha 2015; Fine 2007; Pietruska 2016; Hall 2016; Beckert 2016; Coleman and Tutton 2017; Livingstone 2015; Anderson 2010; Adam 1998; Hall 2016; Baker et al. 2018; Elliot 2018
Methods and Data

• Research Sites:
  • Unalaska (Aleutian Islands)
  • Saint Paul (Pribilof Islands)
  • Nome (*On Hold)
  • NWS Alaska

• 36 semi-structured interviews
• Observation, outreach, and shadowing
• Materials transcribed, coded, and analysis (in progress) using qualitative data analysis
1. Climate and livelihood: Temporal dissonance on a generational timescale

- Historical context matters for how people consider environmental change
- Sea ice as a metric of Bering Sea health and environmental insecurity
2. “Everything seems unpredictable”: Unanticipated seasonality

- A declining sense of seasonal patterns
- Economic uncertainty because of overlapping seasonal-scale changes
- Dissonance opens the door to exposure to weather risk
- Divergent responses to changing ice conditions among mariners
3. Weather, Risky Decisions, and the Information Environment
Shaping Anticipatory Culture?

• Prediction of a geophysical state is different than a shared anticipation of the future.

• Gaining practical cognition of users’ situation
  • The capacity to “think like a user” orients weather forecast practices to perceived event impacts

• Knowledge of user situations allows meteorologists to tailor Warnings and Advisories based on meteorological thresholds but also decision-relevant impact thresholds
  • “Ground truth” may be geographically and culturally unequal

• Human interaction matters
  • Faces, names, and relationships embody credibility, trust, and expertise that predictive information cannot provide.

• New products must be mindful of the complex informational environment, which can both enhance and complicate shared anticipations of the future.
Thank you!

Zeke Baker, zbaker@ou.edu
Inspiring the sea ice forecasting community to co-produce knowledge

Marta Terrado and Dragana Bojović
IN A NUTSHELL

Develop enhanced predictive capacity for weather and climate in the Arctic and beyond and determine the influence of Arctic climate change on Northern Hemisphere mid-latitudes, for the benefit of policy makers, businesses and society.
KNOWLEDGE CO-PRODUCTION

Multiple Interfaces for User Engagement and Informing Decisions

- Bespoke services
- More intense interaction
- Highly iterative
- Directly usable data
- One-to-one contact
- In-depth understanding

- Multi-way communications
- Build trust
- Co-learning
- Co-producing
- Capacity-building
- Regular interaction

- One-stop shop window
- Up-to-date
- Wide range of products
- Easy to use
- User-guided design
- Intuitive

Adapted from
Aim
• Comprehensive overview
• Advice and feedback to the project
• Help shaping data into relevant information and services

Challenges
• Find stakeholders/ Gender balance
• Equal contribution
• Sectoral & geographical coverage (bias)
• Over-generalisation
• Meetings: online vs face-to-face (relevant conferences, project GA...)
• User participation in kind vs project partners
• Need to report results back

USER GROUP

10 qualified representatives from:
• Scientific community and international organisations
• Public and private sector
• Society, including local and indigenous communities
EACH STAKEHOLDER IS UNIQUE

• Different backgrounds
• Different types of decisions
• Different information needs

There is no ‘one solution that fits all’ (even within the same sector)
STAKEHOLDERS MAKE DECISIONS UNDER DIFFERENT CONTEXTS

Immediate/ day-to-day decisions
   ‘Survival’
   Almost real-time tools documenting ice conditions

Long-term regulatory and planning decisions
   Climate change adaptation policies
   Projections for the end of the century

Short- and mid-term operational/management decisions
   Optimization of navigation costs
   Sea ice predictions for next weeks and months
CASE STUDIES

Particular **EXTREME** events of the past Arctic weather and climate with an **IMPACT** on specific aspects of the society or the economy of Arctic regions and beyond (identified by stakeholders)

- **Communicate** how project outputs are useful for different stakeholders (moving from models or data to decision-making)
- **Collaborate with stakeholders** by integrating their knowledge and experience (co-production)
- **Showcase the utility of weather, climate and sea ice predictions** (i.e., how this information would have been useful if available in the moment of the event)
- Compare the impact of the decisions taken **with and without the use of predictions**
- Identify **research gaps**
CASE STUDY: Winter cold spell impact on the energy market

Energy Transition
The Global Energiewende

France can’t meet its own power demand

by Craig Morris
26 June 2017

As expected, France was heavily dependent on power imports during the first cold spell of this winter. Yet, most of the country’s reactors are back online. The US is now also investigating 17 reactors with parts from France that could also be defective. Craig Morris has the details.
CASE STUDY: Winter cold spell impact on the energy market

- Suggests that a high reduction of Arctic sea ice has favoured a record-breaking low precipitation and wind speed over parts of western Europe.

- Contributes to understand the linkages between the Arctic and mid-latitudes.

- Once better understood, future forecasts of extremely low sea ice extent (that also relate with forecasts of electricity demand and supply) could be potentially valuable for adaptation and for assessing risk for the European energy systems.
WHAT CAN THE SEA ICE FORECASTING COMMUNITY LEARN?

- Frame research in the right way to **provide solutions** to real-world challenges
- Provide information that answers the **needs of stakeholders** (timely, in adequate format, etc.)
- Develop **skills to communicate** scientific results to people beyond academia

Taking our knowledge to society: The case studies

The case studies focus on **extreme events of Arctic weather and climate** on different time scales, and their **impact on a specific aspect of society or daily life** in the Arctic and beyond. **Severe Weather Europe** has a good collection and documentation of unusual weather events in Europe. Visit the APPLICATE website for examples of case studies done by the project so far.

- Renewable energy
- Health in the Arctic
- Safety/Insurance issues in the Arctic
- Biodiversity and conservation
- Local infrastructure

“Having to explain my work to someone else helped me to have a clearer idea of what I was doing and why and see how this work could also be useful for society”
Thank you!

marta.terrado@bsc.es
stakeholders@applicate.eu

Blog Polar Prediction Matters: https://blogs.helmholtz.de/polarpredictionmatters/

The projects participating in this presentation have received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement n° 727862 (APPLICATE) and n° 776787 (S2S4E)
<table>
<thead>
<tr>
<th>Participant</th>
<th>Organisation</th>
<th>Areas of expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ian Laing, Executive Director</td>
<td>Institute of the North, Alaska, USA</td>
<td>Economic and resource development, policy, responsible land management</td>
</tr>
<tr>
<td>Veronica Slager, Director</td>
<td>North Star Group, Alaska, USA</td>
<td>Social performance, community engagement, sustainable development</td>
</tr>
<tr>
<td>Cindy Dickson, Executive Director</td>
<td>Arctic Athabaskan Council, Canada</td>
<td>Indigenous and local communities, Arctic Policies through Arctic Council</td>
</tr>
<tr>
<td>Justin Kim, Director</td>
<td>Korean Maritime Institute (KMI), Korea</td>
<td>Maritime affairs, Research and Policy</td>
</tr>
<tr>
<td>Michael Kingston, Director</td>
<td>Michael Kingston Associates, UK</td>
<td>Insurance, legal affairs, IMO Polar Code, Arctic Council PAME Arctic Marine Best Practice Forum</td>
</tr>
<tr>
<td>Anders Oskal, Director</td>
<td>International Centre for Reindeer Husbandry, Norway</td>
<td>Reindeer herder, reindeer herding international cooperation</td>
</tr>
<tr>
<td>Mikhail Pogodaev, Deputy Minister</td>
<td>Sakha Republic Government, Russia</td>
<td>Regional cooperation in the North, Reindeer husbandry, indigenous and northern communities</td>
</tr>
<tr>
<td>Mead Treadwell, President</td>
<td>Treadwell Development, Alaska, USA</td>
<td>Arctic Investors, policy shaper</td>
</tr>
<tr>
<td>Dr. Zhang Beichen / Cheng Wenfang</td>
<td>Polar Research Institute of China (PRIC)</td>
<td>Research (research stations and vessels), international science cooperation</td>
</tr>
<tr>
<td>John Wardman, Science Specialist</td>
<td>AXA XL, UK</td>
<td>Insurance</td>
</tr>
</tbody>
</table>
Guidelines for Asking Questions

Questions will be addressed during the question and answer session following the presentations.

**Joining by Zoom:** type your questions into the chat window at any time. I will read them aloud.

**Joining by YouTube Livestream:** type your questions in the “live chat” window. A facilitator will share your questions with me to read aloud.

**Joining by Phone:** you will need to raise your hand by pressing *9 — and unmute yourself by pressing *6 to ask your question aloud.

*For technical support, contact Kuba Grzeda via Chat or email, kuba@arcus.org.*
Regional ice information product user needs

- **Key user identified priorities**
  - Information (ice chart & ice forecast) related to use of coastal ocean/ice during freeze-up period
  - Slush ice vs. sheet ice during freeze-up
  - Coastal ice berms
  - Landfast ice thickness
  - Ice stability & trafficability

- **Potential observation/prediction variables**
  - Mixed layer supercooling
  - Surface wind stress (slush vs sheet ice)
  - Wave height
  - Onshore component of ice convergence
  - ...
Thank You!

Today’s presentation will be archived at: arcus.org/sipn/meetings/webinars.

We will notify the community when it is available.
We welcome your feedback!

Please help us improve the SIPN2 Webinar Series by taking our short seminar evaluation survey at:

https://www.surveymonkey.com/r/SIPN2

• This link is available in the chat window.

• This link will also be included in the follow-up email you will receive once the seminar video recording has been posted online.