Appendix I: Task Team Decisions Summary

APPENDIX I: IICWG-XXI – TASK TEAM DECISIONS

Summary

Task Team 1 – ROSE-L
- Continuing through 2021

Task Team 2 – Iceberg Modelling
- Completed – follow-on work in new Task Team 13

Task Team 3 – e-Navigation
- Completed – follow-on work TBD

Task Team 4 – Uncertainty
- Completed – follow-on work in new Task Team 12

Task Team 5 – Ice Analyst/Forecaster Competencies
- Completed at IICWG-XX 2019

Task Team 6 – Regional Climate Centre Contributions
- Completed for Arctic – continuing for Antarctic into 2021

Task Team 7 – Arctic Council Interaction
- Cancelled at IICWG-XX 2020

Task Team 8 – Maritime Training Centre Engagement
- Completed – follow on work continuing under the same task team

Task Team 9 – Value Chain Management
- Completed

Task Team 10 – Data Assimilation and Sea Ice Modelling Group Engagement
- Deferred to 2021

Task Team 11 – Ice Analyst Workshop
- Deferred to 2021

New - Task Team 12 – Uncertainty-2

New - Task Team 13 – Iceberg Model Case Studies

New – Task Team 14 – Southern Ocean Limit Of Known Ice (SOLOKI)

New – Task Team 15 – Iceberg Hazard Product

New – Task Team 16 – Sea Ice Hazard Product

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Task Team 1 – ROSE-L

Task Team Leaders: Wolfgang Dierking / Alvaro Scardilli

Team Members: Dean Flett, John Falkingham, Nick Hughes, Keld Qvistgaard, Sean Helfrich, Mike Hicks, Lisa Lind, Patrick Eriksson, Jan Lieser, Neal Young, Marc de Vos, Constanza Salvó, Amit Mishra, Carla Ramjukadh, Marcello Vichi

Summary of Original Task:

This tasks aims at investigating the advantages of using combinations of C- and L-band images for operational ice charting in support of the advisory group for ESA's HPCM ROSE-L (Radar Observing System for Europe at L-band). For this purpose, ALOS-2 PALSAR-2 L-band images are used and compared to Sentinel-1 and Radarsat-2 C-band data acquired over the same area with the shortest possible time difference. Different ice centers and ice analysts will utilize C- and L- images for producing examples of ice charts.

IICWG-XXI Decision

Continue this task in an extended configuration which directly integrates the services and groups from the Southern Hemisphere.

Alvaro Scardilli added as task team co-lead.

Next steps:

(3) Continuation of support to the ROSE-L Mission Advisory Group of the European Space Agency and the L-C-band synergy project under the lead of the University in Tromsø, with a focus on the Arctic (the task's "NH-branch"). This includes:
   (a) development of strategies to match C- and L-band images for easy comparison and automatic classification
   (b) application of classification algorithms and comparison of results obtained at C-band, L-band, and the combination of both
   (c) production of ice charts based on C- and L-band images separately, and on the combination of both

(4) Planning the interaction between SH groups regarding the use of L-band, C-band and X-band images, and development of a research plan. Steps (a), (b), and (c) are also valid for the "SH-branch" of the task.

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Task Team 2 - Iceberg Model Modernization

Task Team Leader: Mike Hicks

Team Members: Wolfgang Dierking, Dean Flett, Nick Hughes, Philipe Lamontagne, Doug Leonard, Lynn Pogson, Keld Qvistgaard, Andrea Gierisch, Alvaro Scardilli, Gastón Lopez, Hai Tran, Neal Young, Jan Lieser

Summary of Original Task:

- Advance the implementation of iceberg drift and deterioration modeling by sharing an updated version of the NAIS iceberg model in a version control system.
    - COMPLETE – Wiki site established to share and version control model code; model implemented at the Canadian Ice Service, U.S. Naval Research Lab, and Argentine Naval Hydrographic Service
- Evaluate model using global (vice North Atlantic only) environmental forces.
    - COMPLETE – Comparisons of model output using Canadian Meteorological Centre, U.S. Global Ocean Forecast System, and Copernicus and HYCOM inputs
- Convert Fortran version of model code to Python for R&D purposes.
    - COMPLETE – Model code converted to Python by Philippe Lamontagne at the National Research Council of Canada

IICWG-XXI Decision

This task is complete. The task team proposed three areas where follow-on work is needed.

- Document lessons learned through case studies, both in the North and South Atlantic. I presented a few areas where the model just didn't work well with actual iceberg drift, and Gaston did as well. And so I think there are areas that we can coalesce and select a few key case studies. In so doing, I think we will be able to identify areas where the environmental drivers perhaps were not as accurate as they should be. The purpose of it would be to communicate to modelers and others what our problems are and what our gaps are. We also had talked about incorporating model evaluation metrics.
    - Proposed as new Task Team 13 – Iceberg Modelling Case Studies
- Continue to evaluate the Python version of the North American Ice Service iceberg model.
    - Agreed to continue as internal work – not a task team
- Apply model output to enhance existing products or to develop new ones.
    - Addressed in new task teams 14 and 15

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Task Team 3 – e-Navigation

Task Team Leader: Jürgen Holfort

Team Members:

- Mike Hicks, Keld Qvistgaard, John Falkingham, Vasily Smolyanitsky, George Wachira, Jens Peter Weiss Hartmann, Alvaro Scardilli

Summary of Original Task:

- This work is intended to promote and facilitate the presentation of ice chart information on the ECDIS on board of ships. NOT COMPLETE
- A prerequisite is to keep the S411 format up to date, incorporating also new features. - COMPLETE
- Assist the producers of ECDIS so they can easily incorporate the format into their systems. NOT COMPLETE
- Continue making S411 ice charts readily available and develop the ability to produce charts in S411 format at every ice service issuing ice charts. COMPLETE

IICWG-XXI Decision

This task is considered COMPLETE. On-going maintenance to keep the S-411 ice charts available on the Ice Logistics Portal will be done internally at BSH. The team identified two areas where follow-on work is needed:

3. Explore other means, besides ECDIS, of getting relevant ice information onto the bridge of ships and into shore-side planning operations. An important consideration in this endeavour will be integration of ice with weather and wave information – to see how an integrated set of environmental information can be packaged and delivered to vessels.
4. Investigate how forecast sea ice and iceberg model output can be communicated to mariners. Again, integration with other environmental information is important. The notion of risk-based products is also embodied in this concept and careful coordination will be needed to avoid duplication of effort.

Discussion is on-gong about how to take action on these ideas.

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Task Team 4 – Uncertainty

Task Team Leader: Sean Helfrich

Team Members:
Penelope Wagner, Nick Hughes, Angela Chang, Evan Neuwirth, Sofia Montalvo, Florence Fetterer, Anni Montonen, Marcus Huntemann, Bryan Brasher, and Alison Agather

Summary of Original Task:

- Develop mechanisms to quantify the uncertainty in ice charts and convey that information to users – COMPLETE
    - Mechanism is documented in the PowerPoint presentation by Sean Helfrich "*A Proposed Method for Ice Chart Uncertainty Estimations*"
    - In the process, the team developed a standard for transformation of ice charts to NetCDF format to quantify the uncertainty assessment
- Provide a path for utility of ice charts into ice model assimilation – COMPLETE
    - As documented in the a/n presentation
- Communicate confidence metrics for navigators regarding unknowns about ice charting data. – NOT COMPLETE

IICWG-XXI Decision

This task is considered complete. A new task (Task Team 12 – Uncertainty-2) is proposed to follow up this work.

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Task Team 6 – Regional Climate Centre Contributions

Task Team co-Leads: Scott Weese / Jan Lieser

Team Members: Shanna Pitter-Combley, Gilles Langis, Keld Qvistgaard, Nick Hughes, Antti Kangas, Vasily Smolyanitsky, Rick Thoman, Marc de Vos, Alvaro Scardilli, Jan Lieser

Task Objectives:

- Collaboration and review of the sea ice seasonal outlooks up to three times per year (two main releases in the May and October timeframes with an update mid-winter (February).
- Contribute impact statements where relevant
- Contribute to the consensus statement
- Contribute to the evolution of the sea ice component of the Arctic RCC
- Share best practices on heuristic and statistical methods to generate client focused seasonal forecasts
- Share best practices on subjective and objective validation of seasonal outlooks.
- Share client needs for seasonal forecast products
- Ensure coordination with SIPN and SIPN-South on seasonal outlooks
- Encourage attendance of task team members in RCC Climate Forums
    - All of these objectives were achieved

IICWG-XXI Decision:

The Arctic RCC is well-established and the contributions to the seasonal forecasts by Northern Hemisphere ice services is regularized as an on-going operational activity. This task is considered COMPLETE for the Arctic.

The Antarctic RCC is in its formative stages. A concept note for it has been endorsed by the EC-PHORS Management Group. Approval is expected by the WMO Executive Council early in 2021. Until the AntRCC actually gets going, there is little that the IICWG can do. Once it does start up, the IICWG should offer assistance to bring the ice services together to contribute to the products, as was done in the Arctic.

A new Task Team will not be created at this time. Jan Lieser offered to keep a watch on developments in the Antarctic RCC and alert the IICWG when it is things start to happen. A task team my be initiated at that time.

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Task Team 8 – Maritime Training Center Engagement

Task Team Leaders: Keld Qvistgaard / Kristen Serumgard

Team Members: Alejandro de la Maza Dorión, Alexandra Cournoyer, Pascale Bourbannais, Thomas Bøggild, Oleg Folomeev, Tatiana Alekseeva, Bjørn Kay, Chris Hearn, Ynse Janssens, Duke Snider; Jan Carl Nielsen

Summary of Original Task:

Building on the survey of polar navigators, investigating potential/future contributions from ice services to marine training centers, including the use of ice service data in simulators and relevant expertise in various training modules. The task outcomes are:

- List of Marine Training Centers providing Ice Navigation/Polar Waters modules. COMPLETE
- List of identified challenges and potential areas for collaboration. COMPLETE
- List of areas for continued/focused/enhanced collaboration between ice services and marine training centers. COMPLETE
- Present work/findings at IICWG-21, discussion session to address issues among ice services COMPLETE

IICWG-XXI Decision

With the production and presentation of a comprehensive Report to Ice Service Heads, this task is considered complete. The team identified a need to continue the engagement with marine training centres with high level objectives of:

- awareness and promotion
- feedback and interaction

IICWG-XXI decided to continue Task Team 8 into a phase two under Keld Qvistgaard's leadership.

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Task Team 9 – Value Chain Management

Task Team Leads: Caryn Panowicz, Nick Hughes, Søren Olufsen

Team Members:

Task Objectives:

To describe a best practice for managing the full value chain from observation, remote sensed or in-situ, through the scientist, the analyst, and the forecaster to the user. The description should include proposals for adequate feed back loops through the value chain.

The description should propose a new product for the mariners and use this as a demonstration.

IICWG-XXI Decision:

This task is considered COMPLETE. The value chain is documents in the paper "*Best practice for Ice Service Value Chain Management*".

The important conclusion of the task is that someone must take responsibility for the portfolio of ice information products issued within their area of responsibility. The ice services are the natural entities to assert this control and management of the public product portfolio. That includes the responsibility to coordinate with all players in the value chain through formalized procedures. This is not something that the IICWG can do in general. It falls to the individual ice services to undertake this work for their own domains.

As a follow-on action, the ice service heads should report back on their product status at the IICWG-XXII.

Task Team 10 - Sea Ice Modeling and Data Assimilation Group Interaction

Task Team Leader: Lars-Anders Breivik, Dean Flett

Team Members: Thomas Lavergne (MET Norway), Lynn Pogson (Canadian Ice Service)

Task Objectives:

- To reconnect the IICWG with the Sea Ice Modeling and Data Assimilation Group workshop community in order to help in bringing scientific developments into operations.
- To inform the Group of the operational ice services input and perspectives on needs with respect to automated sea ice analysis and prediction.
- To work with the Group to help frame the agendas for future workshop(s) to realize greater benefit to the operational ice services.

IICWG-XXI Decision:

Since the DA Group workshop has been postponed until next year because of the COVID-19 pandemic, this task is continued to 2021.

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Task Team 11 – Ice Analyst Workshop

Task Team Leader: Patrick Eriksson

Team Members:

Task Objectives:

- Organize an Ice Analyst Workshop f or summer 2020 (as recommended by ETSI)

IICWG-XXI Decision:

Since the IA Workshop has been postponed until next year because of the COVID-19 pandemic, this task is continued to 2021.

New Task Team 12 – Uncertainty-2

Task Team co-Leads: Sean Helfrich / Nick Hughes

Team Members: (TBC) Colleen Wilmington (NIC), Helen Beggs (BOM), Angela Chang (CIS), Lars-Anders Breivik (MetNorway), Thomas Lavergne (MetNorway)

Task Objectives:

- Conduct an uncertainty RMSD evaluation of ice concentrations; document the process and the results.
- Establish a high-resolution ice concentrations dataset for ice services to use for their own uncertainty evaluations; and,
- Work with modelers to evaluate the utility of the ice charts RMSD mentioned in item 1) and report the findings.

New Task Team 13 – Iceberg Model Case Studies

Task Team Leads: Mick Hicks

Team Members: Gastón López, Ashok Pandey, Jan Lieser, Neal Young, Hai Tran, Doug Leonard, Alex Hamel, Nick Hughes, Dave Hebert, Julia Crout, Philippe Lamontagne, Marc de Vos

Task Objectives:

- Document lessons learned through case studies, both in the North and South Atlantic, to identify situations where the iceberg model did not work well
- Identify areas where the environmental drivers were not as accurate as they should be.
- Communicate to modelers and others what the model problems are and what the gaps are.
- Investigate model evaluation metrics that could be used to quantify model performance

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New Task Team 14 – Southern Ocean Limit of Known Ice (SOLOKI)

Task Team Lead: Jan Lieser

Team Members: Chris Readinger, Penny Wagner, Alvaro Scardilli, Andrew Fleming

Summary of Task:

Icebergs are a known hazard in the Southern Ocean. Currently there is limited information to support maritime operators regarding the presence of icebergs or their projected movements around Antarctica and sub-polar waters. The SOLOKI project will investigate how better information can be made available for the whole Southern Ocean.

There is a growing need for improved sea ice and iceberg information for the Southern Ocean. The number of vessels in the Southern Ocean is expected to grow which increases the exposure to this hazard. There is also an expectation the risk will increase due to growing numbers of icebergs due to increased melting of the Antarctic ice sheet. The recently approved IMO Polar Code makes it mandatory that all vessels receive accurate and timely information on sea ice and iceberg conditions.

Sea-ice information for the Southern Oceans is provided by a number of national ice and weather centres. Collectively they can be represented by the International Ice Charting Working Group. Pursuing SOLOKI as a collective effort will bring together existing knowledge of ice information for the Southern Ocean, expertise in providing similar information from the northern hemisphere and the opportunity to share resources.

Objectives

The initial concept for SOLOKI is to use a combination of iceberg observations from satellite radar (SAR) imagery and iceberg trajectory forecast models to predict iceberg occurrence. SAR coverage for the Southern Ocean is repeated approximately every 3 - 5 days. Trajectories of detected icebergs forecasted for approximately 5 days will ensure current information during gaps in SAR coverage. Periodic validation will provide an ongoing quality assessment. The SOLOKI product will be made openly available and distributed through existing channels such as the Southern Ocean ice services and web services including Polar View.

We will ensure adequate metrics are recorded to provide numbers of users per month. Regular surveys of selected users and industry organisations (e.g. IAATO, COMNAP) will provide further feedback on adoption and success of SOLOKI.

Critical Success Factors

In addition to establishing the necessary workflow and QA procedures, two key factors are critical.

3. Adequate repeat coverage of accessible satellite SAR imagery for the defined area north of the Southern Ocean sea-ice edge.
4. Operational iceberg trajectory forecasts and associated ocean/atmosphere forcing parameters.

In addition, independent data for validation/QA will be required.

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New Task Team 15 – Iceberg Hazard Product

Task Team Lead: Mike Hicks (initially)

Team Members: Keld Qvistgaard, Nick Hughes, Alejandro de la Maza, Ashok Pandey, David Arthurs, Scott Weese, Richard Hall, Pascale Bourbonnais

Summary of Task:

Develop the prototype IIP iceberg density product into an operational product standardized across ice services.

Mike is to assemble a team to further develop this task with defined objectives and milestones.

New Task Team 16 – Sea Ice Hazard Product

Task Team Leads: Scott Weese / Kevin Berberich

Team Members: Keld Qvistgaard, Nick Hughes, Jürgen Holfort, Ashok Pandey, David Arthurs, Richard Hall, Pascale Bourbonnais

Summary of Task:

Develop a sea ice hazard prototype product in consultation with mariners. The product will incorporate model forecast output so the hazard can be characterized in time. Eventually, a product standard must be developed so the product can be replicated across many ice services.

Scott and Kevin are to assemble a team to further develop this task with defined objectives and milestones.