



# World Meteorological Organization Pan-Arctic Regional Climate Outlook Forum **SUMMARY REPORT**



**May 15-16, 2018  
Ottawa, Canada**



FINNISH METEOROLOGICAL INSTITUTE



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## 1. Introduction

Climate change in the Arctic is affecting the entire Earth system. Indigenous Peoples and communities, Northerners, industry and wildlife are experiencing significant and direct impacts. For example, temperature increases have led to significant reductions of sea ice, thawing permafrost and coastal erosion. To meet the Arctic adaptation and decision-making needs, substantial progress has been made towards the establishment of an Arctic Regional Climate Centre Network (ArcRCC-Network). The ArcRCC-Network is based on the [World Meteorological Organization \(WMO\) RCC concept](#) with active contributions from all the Arctic Council member countries through a mutually agreed structure consisting of three sub-regional geographical nodes, namely, (i) North America Node, (ii) Northern Europe and Greenland Node and (iii) Eurasia Node. For more information on the ArcRCC please view the link [here](#).

The presence or absence of ice regulates many activities in the Arctic such as transportation, fishing and hunting, tourism, resource extraction, etc. It may be said that the Arctic experiences two main seasons: a long and icy winter of about 9 months and a short and cool summer of about 3 months. Freezing and thawing periods on the fringes of these two seasons are among the most important considerations for many sectors. Bi-annual forums are being planned to meet with users twice per year: a face-to-face meeting in April/May prior to the Arctic summer season, and a virtual meeting in October prior to the Arctic winter season.

## 2. PARCOF-1 Objectives

As part of ArcRCC-Network implementation and ongoing engagement strategy, the inaugural session of the Pan-Arctic Regional Climate Outlook Forum, PARCOF-1, was held in Ottawa, Canada, from 15 to 16 May, 2018, hosted by the Environment and Climate Change Canada (ECCC) and co-sponsored by WMO.

The PARCOF-1 focused on meeting with Arctic Commercial Shipping users and Circumpolar Indigenous organizations (*see Appendix A for the participants list*). The participation of Indigenous peoples who have lived for generations in the Arctic is invaluable to the success of this initiative. Their participation, needs, observations and skills are essential inputs to the ArcRCC-Network. The PARCOF will engage with the Arctic Council Permanent Participants to seek an ongoing dialogue and encourage Indigenous perspectives in a meaningful way.

The PARCOF occurred over 2 days to allow for [presentations](#), break-out discussions and training activities (*see Appendix B for Agenda and Appendix C for break-out questions*). The objectives of the first PARCOF were to:

- Share the current state of climate products available for the Arctic
- Better understand user needs
- Co-produce the output products (i.e. regions, graphics, plain language text)
- Share and get feedback on the new [ArcRCC web site](#).
- Develop a model for engaging with users in future outlook forums

One of the key outcomes of the PARCOF-1 was to produce an integrated [ArcRCC consensus statement for Summer 2018](#) from the network. This consensus statement synthesized the current climatological conditions and forecasts (“outlook”) for temperature, precipitation and sea-ice to highlight potential implications or risks for decision-making by various sectors. This consensus statement was announced through a [WMO press release](#), and launched the official start of the ArcRCC demonstration phase.

### **3. Feedback from Users**

The PARCOF-1 provided the opportunity for the ArcRCC-Network to collaborate in creating climate products for the first time, and to meet network members face-to-face. Working across international boundaries and time zones there were many lessons learned in developing these first demonstration products. However, the ArcRCC-Network members all voiced that they learned a tremendous amount about the relevant Arctic climate information needs and perspectives from the Indigenous and shipping organizations that participated. These users provided feedback that was honest, open, gracious, extremely valued, and will help to shape the products and how they are communicated during the demonstration phase of ArcRCC-Network and beyond. The following sections provide a summary of the feedback received from the users during the break-out groups and in plenary discussions.

#### 3.1 User Needs

- Cruise tourism organizations plan and sell tickets for their voyages up to 2-3 years in advance and therefore could use 2-3 year forecasts. Commercial shippers begin planning 3-6 months in advance and found the seasonal forecasts useful. The shippers noted that they utilized National Climate data to look at trends to support their decision-making and National Weather and Ice information for daily operations and to monitor sea-ice freeze-up and break-up at the week scale.
- The ability for shippers who cross International boundaries to go to one website Pan-Arctic website for all their information needs instead of going to multiple websites would be ideal. Indigenous users noted that higher resolution temporal and spatial scales are needed before they become useful at regional community scales. Community governments may use outlooks to plan resupply 3 months in advance, but hunters would only start planning as early as 3 weeks in advance.
- Communities used meteorological services for weather information, but not climate, they rely on their Indigenous knowledge.
- Indigenous knowledge holders still rely on their knowledge and will draw on additional information to help augment their decisions. They discussed that it is the younger generation who need to rely more on weather and ice information from national services.
- Lakes and rivers are also important for ice road regional travel and shipping, and local travel for hunting, fishing and sources of drinking water.
- Data access is still a challenge. Internet connections and speeds are limited, so products cannot be large file sizes. Ships rely on staff in offices on the land to compress files and e-mail them since they often do not have access the internet.

### 3.2 General Feedback on the Seasonal Outlooks

- Current Pan-Arctic scale is good for climate change monitoring and trends for Arctic science/policy needs, i.e. Arctic Council and United Nations. ArcRCC will provide regular products twice a year (Winter/Summer) to fill some gaps in Arctic Council and IPCC Assessments that are not produced regularly and can become quickly outdated.
- Users found the presentations too scientific and the products difficult to understand especially the skill of the product and probabilities. Expert interpretation is required since some of products can't stand on their own. The products need to be as simple as possible, there is too much information and they are not meteorologists.
- The legends on the Temperature and Precipitation outlooks do not explain the areas of white (no skill).
- Some users thought that training and a manual on the products could be useful but training material needs will vary greatly.
- Other users suggested that many will not have access to training and people will not read or understand user manuals, therefore the products need to be designed so anyone can understand them without training.
- Suggestion were made to develop products for 2 levels of users: general and advanced users
- Need to find ways to bring these products to the community to design them so they are useful and understandable, and exchange information with elders to see where the products and indigenous knowledge is similar. Need to interact with Indigenous knowledge holders in a two-way dialogue so Indigenous knowledge holders can share their knowledge and learn and trust the ArcRCC information.
- Indigenous knowledge is oral-based; not all ArcRCC products need to be visual products. Indigenous users may best utilize a variety of information which may include tables and text summaries.
- Users liked the text descriptions in the sea-ice outlooks which described the different regions and how they identified risks for navigation. This should also be done for communities to show sea-ice travel risk. It could also be done with temperature (risk of forest fires) and precipitation (risks for flooding/drought) products.
- The text could be beneficial for users with low-bandwidth or to communicate over the radio.
- The three categories of below, near and above normal are not specific enough. How much colder or wetter (2-3 degrees Celsius, or 2-3 mm of rain) they would prefer to see numbers.
- As we move forward it would be good to see compare the outlooks with the seasonal summaries
- It would also be good to share seasonal summaries with Indigenous users and discuss key years/seasons in their oral histories.
- Colour coding and legends need to be consistent amongst the products.
- ArcRCC should offer products in both high and low resolutions, and interactive maps.

- Develop interactive maps where the user can zoom in on the products to their region(s) of interest, the current outputs are too small.
- Seasonal products are not as useful for users, and they are very interested in sub-seasonal (monthly, 3-6 week period) scale.

### **3.2.1 Specific Feedback on the Temperature Outlooks**

- Colour scale of red (above normal temperatures) and blue (below normal temperatures) was found to be confusing. As the shades of red got darker, users thought that this meant these areas were warmer or more dangerous when in fact it meant it had a higher probability, and vice versa for the blue shades.
- A separate overlay with the probabilities could help.

### **3.2.2 Specific Feedback on Precipitation Outlooks**

- The outlooks cannot separate out rain from snow. One must assume that in the summer it would be rain and winter it would be snow. Difficult to know in the spring and fall seasons whether precipitation would be rain and/or snow.

### **3.2.3 Specific Feedback on the Sea-Ice Outlooks**

- This outlook showed the percentage of probably of sea-ice concentrations greater than 15% for Sept 2018. Users had difficulty understanding this product after learning how to read the Temperature and Precipitation Outlooks. Would be helpful if there was some consistency between all the Outlooks.
- Users found that the sea-ice outlook graphic for September 2018 was not really useful or intuitive. Graphics were too small to identify their areas of interest. The users found the text describing the different regions and how they identified risks for navigation more user friendly and could be expanded to identify risks for other Arctic climate users.
- All agreed the freeze-up and break-up were the most important times and the single seasonal summary for the summer did not provide them with enough information to understand sea-ice freeze-up and break-up.
- Monthly outlooks starting in January would allow users to monitor the potential evolution of the sea-ice break-up/melt. Starting in August monthly sea-ice outlooks would also be more useful to monitor the potential sea-ice freeze-up.
- Graphics showing the ice edge and concentration would be better for community sea-ice travel and shipping.
- Shippers would like to see products on navigability. Known areas of “go” or “no-go” based on historical data with anomalies highlighting the differences.

### 3.4 Other Near-Real-Time and Forecast Information that users would like

- Communities would like to have access to the information that is available to the pilots that are flying into northern communities. They assume that their information is more real-time than what they have access to from the National Weather Services.
- Information on cloudiness, wind speed and direction, snow depth, waves, storminess, ice pressure, ice ridges, ice thickness, locations of fast ice, lakes and rivers (freeze-up, break-up and thickness), and ocean currents and temperatures were also discussed.
- Changes in the Permafrost active layer for monitoring ice roads, erosion and community infrastructure.
- This information could be provided as data, as some Indigenous users can make their own decisions with the data. However others suggested products which combined some of this information such as wind + precipitation, wind + tides + ice conditions for a variety of users.

### 3.3 Feedback on the Seasonal Summaries

- Users liked the ranking temperature and precipitation graphics and found them fairly easy to understand. Users would like to be able to zoom in on areas of interest.
- These summaries are good for monitoring climate change and understanding larger scale trends for adaptation strategies.
- Also good in preparing for future resource development and environmental assessments.
- Perhaps using 30-years is not as relevant as the last 10 years since there has been so much change.
- Regional local decision-makers would find seasonal summaries on a more regional, local scale more useful
- Seasonal summaries and time series that describe how things are changing, to compare to the previous year(s) would be helpful. For example, the sea-ice broke up 2 weeks early/late, or the sea-ice was thicker/thinner.
- Users would like to see seasonal summaries on changes/trends in snow, fast-ice, locations of multi-year ice, sea-ice freeze-up and break-up, storm statistics (frequency and duration, track, maximum winds), wind direction and velocity, wave climatology and wave height analysis, extreme events, permafrost, lakes and rivers. Russia and the [Global Cryospheric Watch](#) identified some current products/climatology's that are available

## **4. Lessons Learned**

- Products need to be designed from a user's, not a modelling output perspective. Currently the products are not intuitive and access to training may not be equitable or desirable.
- We need to stop referring to the Arctic as a harsh and remote environment. It's a beautiful place where Indigenous peoples have lived for millennia.

- Arctic Indigenous peoples are not only users, but producers of environmental information. Indigenous knowledge can have a significant impact on ground-truthing satellite data and in-situ sensors, climate trends, initializing models and in the development of forecasts. National Meteorological and Ice Services need to look at how to work with Indigenous knowledge producers to co-develop culturally relevant local and regional scale products. Russia, Alaska and Canada gave examples of some forecasts they provide with shipping, offshore and coastal community users in mind.
- National and International organizations separate climate and weather services but users do not, they are interested in all temporal scales from hourly to 2-3 years in advance. Intuitively this makes sense, but bringing this all together will be a challenge for ArcRCC and their partners at National Meteorological and Ice services to bridge the climate and regional/local weather products (see above bullet) and (see *Other information that users would like*).
- To invite and prepare users for the PARCOF takes time and is a shared ArcRCC-Network effort. The users that were invited to the Ottawa PARCOF were contacted 6 months in advance and several telephone and/or face-to face conversations took place to explain: the ArcRCC; the objectives of the PARCOF; their role and in presenting and in the break-out sessions; and to determine their interest and objectives in participating.
- Although the modellers prefer to have the PARCOF in May as the skill of the forecasts improves as you get closer to the summer season, the shipping and Indigenous representatives noted that May is a very busy time for summer operations and Indigenous peoples are out on the land/sea-ice hunting and fishing. Greater user participation would be possible in April.

## 5. Next Steps

The Norwegian Node will be hosting the October virtual forum to present the Winter 2018/19 Arctic Consensus Statement, and review further feedback from the PARCOF-1 users. In preparation for the Winter 2018/19 Consensus Statement the ArcRCC network will begin to utilize the feedback received at the PARCOF-1 to revise products and the website.

Future PARCOFs will be hosted by various ArcRCC network members in other circumpolar countries. The end-user focus of the forums will be discussed amongst the network and will be influenced by where the next forum is held. Arctic Council and Indigenous participants will be invited to all future forums as their needs cut across all sectors. Future PARCOFs may include other Arctic climate users such as (but not limited to):

- Arctic Ecosystems and Wildlife
- Arctic Defence, Marine Safety, Search and Rescue, Regulators, Pollution/Oil Spills
- Arctic Health and Populations
- Natural Resource Development
- Infrastructure: Terrestrial, Marine, Telecommunications
- Arctic Policy/Science



## Appendix A – List of PARCOF Participants

	Name	Title	Organization	E-mail
1	Abderrahmane Yagouti	Canadian Centre for Climate Services	Environment and Climate Change Canada	<a href="mailto:abderrahmane.yagouti@canada.ca">abderrahmane.yagouti@canada.ca</a>
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18	Halldór Björnsson	Atmospheric Research	Icelandic Meteorological Organization	<a href="mailto:halldor@vedur.is">halldor@vedur.is</a>
19	Helge Tangen	ArcRCC Network Coordinator	Norwegian Meteorological Institute	<a href="mailto:helget@met.no">helget@met.no</a>
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21	Johanna Ekman	Project Manager	Finnish Meteorological Institute	<a href="mailto:johanna.ekman@fmi.fi">johanna.ekman@fmi.fi</a>
22	Joanna MacDonald	Climate Change and Health Officer will attend the 2 days	Inuit Circumpolar Council	<a href="mailto:jmacdonald@inuitcircumpolar.com">jmacdonald@inuitcircumpolar.com</a>
23	John Parker	PARCOF lead, NA Node Lead	Meteorological Service of Canada	<a href="mailto:john.parker2@canada.ca">john.parker2@canada.ca</a>
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32	Martin Stendel	Climate Scientist	Danish Meteorological Institute	<a href="mailto:mas@dmi.dk">mas@dmi.dk</a>
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35	Nikolai Kondratov	Associate Professor	Northern (Arctic) Federal University, Arkhangelsk	<a href="mailto:n.kondratov@narfu.ru">n.kondratov@narfu.ru</a>
36	Paul Pestieau	Meteorological Service of Canada	Environment and Climate Change Canada	<a href="mailto:paul.pestieau@canada.ca">paul.pestieau@canada.ca</a>
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39	Rupa Kumar Kolli	Chief, World Climate Applications & Services Division	World Meteorological Organization	<a href="mailto:RKolli@wmo.int">RKolli@wmo.int</a>
40	Shanna Pitter	ArcRCC North American Node Consortium Member	National Oceanic and Atmospheric Administration	<a href="mailto:shanna.pitter@noaa.gov">shanna.pitter@noaa.gov</a>
41	Stefan Kredel	Director expedition shore programs	Silversea Cruises (UK)	<a href="mailto:stefank@silversea.com">stefank@silversea.com</a>
42	Stephanie Meakin	Science Advisor will present and then leave	Inuit Circumpolar Council	<a href="mailto:meakin.steph@gmail.com">meakin.steph@gmail.com</a>
43	Sylvain Deland	Environmental Programs Coordinator	Prediction Services Operations Central	<a href="mailto:sylvain.deland@canada.ca">sylvain.deland@canada.ca</a>
44	Valentina Khan	ArcRCC Eurasian Node Climate Forecasting Representative	Hydro meteorological Research Centre of the Russian Federation	<a href="mailto:valentina_khan2000@yahoo.com">valentina_khan2000@yahoo.com</a>
45	Vasily Smolianitsky	ArcRCC Eurasian Node Lead and Climate Monitoring Representative	Arctic and Antarctic Research Institute	<a href="mailto:vms@aari.ag">vms@aari.ag</a>
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## Appendix B – PARCOF Agenda

<b>Day 1: Tuesday May 15, 2018</b>	
Les Suites Hotel, 130 Besserer Street, Byward Suite (2 <sup>nd</sup> Floor)	
<b>TIME</b>	<b>ITEM</b>
<b>8:30</b>	<b>Registration</b>
<b>Welcome and Overview of Arctic Climate</b>	
<b>9:00</b>	<p><b>Martine Dubuc</b> Associate Deputy Minister Environment and Climate Change Canada</p> <p><b>Robert Kadas</b> Senior Advisor, office of Canada’s Senior Arctic Official to the Arctic Council Global Affairs Canada</p>
<b>9:10</b>	<p><b>David Grimes</b> President World Meteorological Organization Assistant Deputy Minister, Meteorological Service of Canada, Environment and Climate Change Canada</p>
<b>Introducing the Arctic Polar Regional Climate Centre (ArcRCC) &amp; the Pan Arctic Regional Outlook Forum (PARCOF)</b>	
<b>9:30</b>	<p><b>Helge Tangen</b> ArcRCC Network Coordinator, Norwegian Meteorological Institute</p>
<b>9:45</b>	<p><b>John Parker</b> Forum Lead, North American Lead Canadian Ice Service, Meteorological Service of Canada</p>
<b>Hearing from the End Users: 1</b>	
<b>10:00</b>	<p><b>Stephanie Meakin</b> Inuit Circumpolar Council – Canada</p>
<b>10:15</b>	<p><b>Bridget Larocque</b> Arctic Athabaskan Council – Canada</p>
<b>10:30</b>	<b>BREAK</b>
<b>10:45</b>	<p><b>Vera Metcalf</b> Eskimo Whaling Commission – US/Alaska</p>
<b>11:00</b>	<p><b>Alana Faber</b> Arctic Adventures – Canada</p>
<b>ArcRCC Seasonal Temperature and Precipitation Outlook Products</b>	
<b>11:15</b>	<p><b>Marko Marcovic and Bertrand Denis</b> Canadian Centre for Meteorological and Environmental Prediction</p> <ul style="list-style-type: none"> <li>• Showing the new ArcRCC Temperature and Precipitation Outlooks, what they mean and how you can use them</li> <li>• Outlining break-out group objectives and questions</li> </ul>
<b>11:45</b>	<b>LUNCH (on your own)</b>
<b>1:00</b>	T&P Outlook break-out groups (separate rooms)
<b>2:00</b>	Reporting back from T&P break-out groups (Byward Suite)
<b>2:30</b>	<p><b>Paul Pestieau</b> Year of Polar Prediction</p>

<b>2:45</b>	<b>Health Break</b>
<b>ArcRCC Seasonal Sea-Ice Outlook Products</b>	
<b>3:00</b>	<b>Bruno Tremblay<sup>1</sup> and Bertrand Denis<sup>2</sup></b> 1. Department of Atmospheric and Oceanic Sciences, McGill University 2. Canadian Centre for Meteorological and Environmental Prediction <ul style="list-style-type: none"> <li>• Showing the new ArcRCC Sea-ice Outlooks, what they mean and how you can use them</li> <li>• Outlining break-out group objectives and questions</li> </ul>
<b>3:30</b>	Sea-Ice Outlook break-out groups (separate rooms)
<b>4:30</b>	Reporting back from Sea-Ice break-out groups (Byward Suite)
<b>5:00</b>	<b>Wrap up for the day</b>

<b>Day 2: Wednesday May 16, 2018</b>	
<b>TIME</b>	<b>ITEM</b>
<b>Hearing from the End Users: 2</b>	
<b>9:00</b>	<b>Stefan Kredel</b> Silversea Cruises - Europe
<b>9:15</b>	<b>Annika Ogilvie</b> Fednav Shipping - Canada
<b>ArcRCC Website</b>	
<b>9:30</b>	<b>Eivind Støylen</b> Norwegian Meteorological Institute <ul style="list-style-type: none"> <li>• A tour of the website and where you can find the products</li> <li>• Questions and feedback on the website, group discussion</li> </ul>
<b>ArcRCC Seasonal Summary Products</b>	
<b>10:00</b>	<b>Vasily Smolyanitsky<sup>1</sup> and Gabrielle Gascon<sup>2</sup></b> 1. Arctic and Antarctic Research Institute, Russia 2. Prediction Services West, Meteorological Service of Canada <ul style="list-style-type: none"> <li>• Showing the new ArcRCC Seasonal summaries, what they mean and how you can use them</li> <li>• Outlining break-out group objectives and questions</li> </ul>
<b>10:30</b>	<b>BREAK</b>
<b>10:45</b>	Seasonal Summary break-out groups (separate rooms)
<b>11:45</b>	Reporting back from seasonal summary break-out groups (back in Byward Suite)
<b>12:15</b>	<b>LUNCH (On your own)</b>
<b>ArcRCC Summer 2018 Consensus Statement</b>	
<b>1:30</b>	<b>Vasily Smolyanitsky and Bertrand Denis</b> <ul style="list-style-type: none"> <li>• Review of Consensus statement for the Arctic Summer 2018</li> <li>• Questions and feedback on the consensus statement, group discussion</li> </ul>
<b>2:30</b>	<b>BREAK</b>
<b>2:45</b>	Planning for ongoing communications
<b>3:15</b>	Round Table: Ask participants for their impressions of the 1 <sup>st</sup> PARCOF
<b>3:45</b>	Suggestions for future forums with users
<b>4:00</b>	<b>End of Forum</b>

## Appendix C – BREAK-OUT GROUP QUESTIONS

The following questions were provided in advance to share examples of the types of questions that would be asked during the break-out groups.

<b>1. Current use of Monthly/Seasonal Climate information.</b>
a) Do you currently use climate information? b) If so, what type of climate information are you currently using and where do you get that information? c) How do you use that information (operational or climate change adaptation decision-making)?
<b>2. Needs for Monthly/Seasonal Climate information</b>
a) What climate information do you need that you don't currently have access to? b) For what region(s) do you need climate information? c) For what time/period (e.g. week, month, season) is climate information key to you? d) When do you need the information? What lead times are critical to you (e.g. a month or 3 months in advance)? How often does this information need to be updated?
<b>3. Understanding the new ArcRCC Climate products (to be introduced at the PARCOF)</b>
a) Do you have a good understanding of the initial ArcRCC products that were presented? b) Do you have questions about the products, their accuracy and/or limitations? c) Do you think your community/sector will understand and use this information to meet their decision-making needs? d) Could improvements be made to better meet your needs, for example change how the information is presented (e.g. graph, tables, charts, text summary, etc.)? e) Do you need any additional information/training on the products? f) Are there any technical limitations for you in accessing the products?