ANNEX A

STATEMENT OF WORK
TITLE

Study of the Socio-Economic benefits related to improved Communications and Weather Services in the Arctic /North delivered by the Polar Communications and Weather (PCW) Mission

SCOPE

Background

The Arctic is embedded in Canadian history and culture. The geopolitical significance of the region and the implications for Canada have never been greater. In 2010, the Government of Canada (GoC) unveiled an ambitious Northern Strategy and Arctic foreign policy statement articulating how the GoC intends to address new opportunities emerging across the Arctic and North, in part as a result of climate change and the search for new resources. The GoC has expressed a vision for the Arctic as a stable, rules-based region with clearly defined boundaries, dynamic economic growth and trade, vibrant Northern communities and healthy and productive ecosystems.

The Northern Strategy also concerns itself with important challenges - social, economic and environmental in nature – that present in the Arctic. One of the most important pillars for recognizing the potential of Canada’s Arctic is the exercise of our sovereignty over the Far North. A second major focus is promoting economic and social development in which the well-being of the people of the North is as fundamental as is the stewardship of the indigenous natural resources. It is equally noteworthy that the Arctic has profound significance for climate and functioning of ecosystems around the globe. The region is particularly vulnerable and prone to rapid change. As a result, critical environmental, economic and national security issues are emerging many of which have significant impacts for human lives, livelihoods, and coastal communities.

The Arctic perfectly exemplifies the complex interdependence of communities and changing environmental conditions. The breadth and complexity of the cultural, societal, economic and environmental impacts requires a focussed and systematic effort at gathering the science, services and stewardship responsibilities in the Arctic region and calling upon scientific capabilities to increase our ability to address current and future national security and socio-economic development issues. This implies a related need to sharpen the understanding of climate/weather trends, and to support the safety and security needs for fishing, marine mammal protection, transportation, energy, infrastructure and mineral exploration to name a few.

The Polar Communications and Weather Mission

The Canadian Space Agency in collaboration with Environment Canada, the Department of National Defence, Natural Resources Canada and the Communications Research Center (hereinafter referred to as the clients) is examining the potential for a communications and weather services satellite system referred to as the Polar Communications and Weather (PCW) Mission, a Mission which will in its operations, contribute to resolving some of the challenges and at the same time, leverage opportunities in the Arctic. This Mission is currently in Phase A (Concept study) of development with a launch date targeted for 2017. PCW will provide high capacity, continuous communication services throughout the Canadian Arctic as well as meteorological Earth observations leading to improved weather forecasting. In addition, PCW will contribute to the monitoring, understanding and forecasting of space weather in order to reduce its hazardous impacts on space-borne and ground based infrastructure, navigation and human health.

PCW’s high capacity communication services will close the gap over Canada’s high Arctic region where this service is now either unreliable or does not exist. These new Canadian capabilities are particularly important
because of increasing Arctic exploration, the requirement to protect Canada’s vast northern natural resources and for Canadian Sovereignty in times of changing climate, political and economical conditions.

The PCW mission will provide reliable two-way communications capability available 24 hours a day to all of the Canadian north for high data rate (HDR) data and information products. Currently, satellites in geostationary orbits can provide reliable service to areas south of approximately 70 degrees N latitude, but further north availability is unreliable or non-existent and depends on local terrain and other conditions.

Continuous 24/7 meteorological observation of the entire Arctic with high temporal resolution is also proposed for timely weather advisories and more specifically for obtaining information about tropospheric winds which define the atmospheric circulation around the circumpolar domain. The current paucity of knowledge of the tropospheric 3D wind field in the Arctic is a serious gap that cannot be addressed by LEO or GEO satellites, and this information is essential for improving the quality of weather forecasts in the Arctic region and globally.

Summarizing, the objectives of the PCW mission are to:

• Facilitate Canadian operations in the North and support Canadian sovereignty by providing reliable communications services and timely meteorological information for civilian and defence operations.

• Improve weather forecasting, modeling and environmental monitoring by continuous observations of the Arctic, to produce high quality radiometric data that’s currently unavailable or available only with insufficient spatial or temporal resolution.

• Improve monitoring of climate related variables to increase understanding of climate change and improve the capability to model feedback processes associated with it.

• Contribute to the monitoring, understanding and forecasting of space weather, which refers to the continuously changing conditions in the energetic particle and electromagnetic environment in the vicinity of Earth, to reduce its hazardous impacts on space-borne and ground based infrastructure, navigation and human health.

• Enhance the role and visibility of Canada’s contributions to the World Meteorological Organization’s (WMO) World Weather Watch (WWW) and the Global Earth Observing System of Systems (GEOSS)

Purpose of this Study

The proposed study will quantify and delineate the socio economic benefits resulting from the proposed Polar Communications and Weather (PCW) Mission, in terms of the projected improvement in the quality of weather forecasts, including those associated with space weather events, and in terms of the benefits accruing from filling the gap in communications over the Canadian high Arctic region.

The socio-economic benefits analysis will focus on the full complement of payloads characteristic of the PCW Mission, namely, the meteorological aspects, the science (space weather) aspects and communications aspects.

The operational objectives of the meteorological aspects of the PCW mission are to improve the accuracy of short and middle range weather forecasts (public, Canadian Forces, marine, aviation) through an improved characterization of the atmospheric state of the Arctic region. The operations objectives of the communications aspects of the PCW mission are to provide robust high-rate (HDR) and continuous communications services above latitude 72 degrees. This is essential for successful activity in that region, government or private.
The operational objectives of the space weather monitoring provided by the suite of space weather instruments are to provide real-time monitoring of the local (to the satellite) space environment to provide diagnostics of satellite anomalies or communication degradation, in support of the overall PCW mission objectives.

Taken together, these communication capacity and meteorological and space weather improvements are aimed at facilitating future Canadian operations in the Arctic and supporting Canadian sovereignty by providing reliable communications services and meteorological information for civilian and defence operations.

The socio economic benefits analysis will be focused on those services and knowledge aspects that are incremental to what would have been the case in the absence of the PCW Mission. The projections will be relevant for the lifespan of the Mission, at present set at 20 years.

**Content**

This Statement of Work defines the work to be performed in terms of deliverables. It also defines the manner in which the work is to be performed and controlled. The following topics are covered:

- Work Definition and Tasks
- Deliverables
- Schedule Requirements

**Responsibilities**

In this document, the Canadian Space Agency is also referred to as ‘CSA’ or the ‘Agency’.

The Canadian Space Agency is the major client for the work. As such, the CSA has the final authority on all matters concerning the work performed.

The contractor shall perform the study as outlined in the Statement of Work and deliver the end items defined by the Statement of Work.

**Copyright to Crown**

All copyright is vested with the CSA.

The contractor will be required to sign a non-disclosure agreement (NDA) before accessing commercially sensitive information. Refusal to sign the NDA will render the contract null and void.

**APPLICABLE DOCUMENTS**

**General**

The documents listed in the following subsections are applicable to this Statement of Work. Unless otherwise specified, the current revision of the applicable document applies.

In the event that the Contractor has recognized a conflict between requirements and/or conditions stated in the applicable documents, such conflict must be identified to the Canadian Space Agency for clarification.

**CSA Documents**
See Appendix 1
Polar Communications and Weather (PCW) Mission User Requirements Document

Reference Documents

Not applicable

WORK DEFINITION

In order to properly perform the work required, as a minimum, the following activities shall be part of the proposed work;

Kick off meeting

The contractor shall review the proposed work plan, schedule, cost and methodology with CSA prior to initiating the work. The Contractor will submit for CSA approval a detailed approach at the kick off meeting which will be held no later than 2 weeks after contract award.

Literature review

The work to be performed will include a literature review. A copy of the reviewed and referenced literature shall be delivered to the CSA at contract end. The contractor shall use open literature information on similar systems that have been studies by organizations such as NOAA, EUMETSAT, WMO and other relevant researchers/organizations noted for work in the area of socio economic analysis, especially if related to weather services.

Consultations

The contractor will need to consult with key contacts within the Canadian Government namely, Department of National Defence, Environment Canada, National Resources Canada and the Communications Research Centre and The Canadian Space Agency. The contractor will also consult with relevant international organisations. The CSA will provide contact information but the contractor is also encouraged to use its own contacts.

The contractor will use electronic means for consultation as much as possible. The contractor will identify in its offer the consultations that imply travel and the related costs. Comprehensive accounts of all the consultations performed under the contract shall be delivered to the CSA at contract end.

Mid-term review

At midterm of the project, the Contractor shall present the results and key findings of the work, nationally and internationally. Also, the Contractor shall review progress of the work in relation to the agreed upon plan. The review shall cover schedule, cost, scope and objectives. Also, the contractor shall address any issues that require CSA’s attention.

Final review

At final review, the Contractor will present the findings and result of the work. The presentation shall be held at the CSA.
Meetings, Deliverables and Reporting Requirements

Meeting Requirements

All meetings shall be held between the Contractor’s Project Authority (PA) and CSA’s Project Technical Authority and other key CSA personnel at CSA John H Chapman Space Center in St-Hubert. An agenda shall be prepared by the Contractor and submitted to the Project Authority for approval at least five (5) working days prior to the meeting date. Note that key CSA contacts and information will be in St. Hubert, Quebec; key contracts and information within Environment Canada will be in Montreal and the Ottawa-Hull area, key contacts for DND and CRC will be in the Ottawa area. The Contractor shall be responsible for recording the minutes of all meetings and submit them to the CSA’s PA within 10 working days after the meeting.

Table: Meeting Schedule

<table>
<thead>
<tr>
<th>MEETING No.</th>
<th>MEETING</th>
<th>DATE</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kick-off meeting</td>
<td>2 weeks after contract award</td>
<td>CSA</td>
</tr>
<tr>
<td>2</td>
<td>Mid-term review</td>
<td>December 2011</td>
<td>CSA</td>
</tr>
<tr>
<td>3</td>
<td>Final review meeting and presentation</td>
<td>Before March 16, 2012</td>
<td>CSA</td>
</tr>
</tbody>
</table>

Kick Off Meeting

Within two weeks of the award of the contract (or at a date mutually agreeable to the Project Authority and the Contractor) a Kick-Off Meeting shall be held to:

a. Review contract deliverables;
b. Review the requirements of the work and methodology;
c. Review the work schedules;
d. Discuss the expected elements of the gap analysis and the socio economic analysis;
e. Review funding and expect cash flow;
f. Discuss any licensing issues; and
g. Meet the personnel assigned to the work.

All key participants under the contract, including at least one representative from each subcontractor (if applicable), will attend this meeting.

Final Review Meeting

The Final Review Meeting will be held at the date specified in Table X-1. The specific intent of this meeting will be to discuss in detail the findings and results obtained during the performance of the work. The Final Review Meeting is intended to provide an opportunity for the Contractor, and Government representatives to review and discuss in detail:

a. The contents of the socio economic analysis;
b. The Executive Report;
c. Meeting Presentation material;
d. Other items as deemed appropriate.
TASKS

The Statement of Work (SOW) defines the work to be performed in terms of critical tasks in the analysis. The contractor is expected to work in close collaboration with the clients throughout the course of the study. In order to quantify and delineate the socio-economic benefits to be derived from the PCW mission, the Contractor will need to carry out the tasks described below.

TASK 1: Background Documentation of Current Critical Services and Knowledge

The Contractor shall provide a summary report of the critical existing services and applications related to meteorological, space weather, and communications capacity provided in the Arctic region. The focus of this first report, to be referred to as a Background Descriptive Summary, will be related to facilitating future Canadian operations in the Arctic and supporting Canadian sovereignty for civilian and defence operations.

The Contractor will also prepare a second report comprising an analysis of the international space related activities focused on the Arctic region (referred to as the International Environmental Scan). This report will include but is not limited to the major member countries of the Arctic Council namely, Canada, Denmark, Norway, Russia, Iceland, Sweden, Finland and the United States, the major Arctic indigenous communities named to the Council (as of 2010) and space related activities of Observer States, including ESA and the EU.

The outputs from this Task, namely, The Background Descriptive Summary and the International Environmental Scan reports will be submitted to the CSA within 6 weeks of commencing the contract and shall also form part of the final report.

TASK 2: Gap Analysis

Based on the summary of existing services and applications prepared in Task 1, the Contractor will identify the gaps in meteorological services, space weather knowledge and communications provided in the Arctic currently. The contractor will be responsible for developing a strategy and methodology to effectively and efficiently conduct the gap analysis. At a minimum the analysis will address the following core questions:

- What services and applications are needed?
- What are the gaps in services and applications critical to the operational requirements in the Arctic related to civil and defence requirements?
- What are the vulnerabilities and risks that currently exist as a result of these gaps?

The outputs from this task shall include a report that describes the existing critical services and applications delivered in the Arctic in terms of communications and meteorological services together with a full analysis of the expected improvements. This report shall form part of the final report but will be delivered in at least a draft form prior to the completion of Task 3 below.

TASK 3: PCW Mission: Characteristics and Value Added

The contractor will provide a description of the new and/or enhanced suite of services that will be possible as a result of a PCW Mission and in so doing will catalogue the suite of environmental parameters that the PCW mission will measure, related to the meteorological aspects as well as to space weather and communications requirements. In particular the description shall identify the improvements which address the gaps identified in
Task 2. This will include improved weather services, both geographically (i.e. where there are no services now) and in terms of quality (e.g. how a continuous eye-in-the sky will enable better forecasts of ice-edge movements, low cloud and visibilities affecting airports, etc.). The gaps in space weather knowledge and communications services shall also be addressed by the enhanced services provided by the PCW mission. The results shall be expressed both qualitatively and quantitatively including resolution, accuracy and timeliness aspects to the extent possible. This task will be supported by information provided by the clients including any work done so far to identify the expected improvements. At a minimum, the scope of this analysis shall address the following core questions:

- How do the features of the PCW Mission address these gaps and improve upon the existing services?
- How are the information products improved with the high temporal availability of data?

This analysis shall be delivered in report form and shall also form part of the final report.

A preliminary list of the suite of services to be delivered by the PCW Mission is provided in Appendix 1 to this Statement of Work. This list is not exhaustive but shall be viewed as a guide to the Contractor.

**TASK 4: Socio-Economic Benefits**

The Contractor will conduct an analysis of the socio-economic benefits of each service identified in Task 3 as being new or improved. The contractor will review previous reports and documentation provided in references and sought through open literature information on similar systems that have been studied by organizations such as NOAA, EUMETSAT, WMO, and other relevant researchers/organizations noted for work in the area of socio-economic analysis especially if related to weather services. Benefits shall be cast in terms of the following core questions:

- What would be the benefits to the performance of weather forecasting models with new input data?
- What impact is PCW expected to have on our collective knowledge of weather forecasting, space weather and communications in the high Arctic?
- Will such an improved understanding and knowledge have any spill-over into other areas? If so, what are these areas and what is the nature of the benefits?
- What is the value of the improvements in weather forecasting and communication services to the key activity sector or user group?
- What are the concurrent social benefits?
- How can the data derived from the PCW mission contribute to the future economic growth and well-being of Northern communities in the Arctic region?

The contractor shall identify relevant information that can be used with a reasonable measure of confidence to assess the socio-economic benefits of the PCW Mission for Canada. At a minimum, the preliminary assessment of the benefits shall be made for each of the following sectors of activity: Transportation (e.g. air, land, water); Energy production and use, Natural Resource management, and Government operations.

These sectors of activity are provided as the minimal scope for the analysis; the Contractor may identify additional areas to be assessed. The assessment of the socio-economic benefits shall be expressed in quantitative terms to the extent possible. Extrapolations or mathematical models are acceptable where deemed appropriate. In all cases, the contractor shall make any assumptions used in developing estimates clear and transparent to the clients.

The Contractor shall more fully develop the preliminary methodology for determining the socio-economic benefits within these sectors submitted with its bid in response to the Request for Proposal for the contract based on the results of Task 1 – 3 and will provide to the clients for review and approval before implementation. Social impacts to consider might include but are not limited to: Benefits for the general public and northerners especially; Inspiration for the nation and youth by the first-ever space technology able to
continuously observe the North Pole and entire Arctic region; and the Image and reputation of Canada as an international leader of innovative space technology for Arctic monitoring.

**TASK 5: Suggestions for Further Studies**

**The Evaluation Methodology**

Contractor shall provide suggestions for further studies. For each service and benefit area, the contractor shall discuss the shortcomings in the data on which the analysis was based and suggest a methodology to providing firmer estimates. The contractor shall also provide suggestions for evaluation criteria that will be used to assess the performance of the Mission. The results of the analysis within this task shall be presented in report format and shall form part of the Final Report to this study.

**TASK 6: Final Report and Presentation to Clients**

The contractor will document all findings in a Final Report and major findings shall be provided in a PowerPoint format and electronic form for presentation to the clients at the end of the study.

**DELIVERABLES AND REPORTING REQUIREMENTS**

All documents to be delivered to the Canadian Space Agency are described and summarized in a table herein. All documents shall also be provided in electronic form. Acceptable electronic formats are MS Word, MS PowerPoint. Each electronic file shall be named so that it can be easily identified and opened.

**Monthly Progress Reports**

The Contractor shall provide an electronic copy of a monthly progress report to be e-mailed to the Project Manager no later than the 7th of each month. Each report shall discuss the progress of the work and shall include, but not be limited to, the following information:

a. Project status dashboard (Example)

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>STATUS</th>
<th>TREND</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule</td>
<td>Green</td>
<td>Improving</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>Green</td>
<td>Worsening</td>
<td></td>
</tr>
<tr>
<td>Progress</td>
<td>Red</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>Yellow</td>
<td>No change</td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

Green        As planned  
Yellow       Between +/- 5% of plan  
Red          Greater than +/- 5% of plan  

b. Statement indicating whether or not the project is on schedule/cost and, if not, an explanation for any delays and a proposed updated schedule and/or a recovery plan  
c. Brief summary of the technical progress of the work for each work package;  
d. Summary of the proposed work for the following month;  
e. Summary of problems encountered and their impact on the project and the subsequent solutions proposed;
f. Status of the new Intellectual Property (IP)
g. Identification and any new Background Intellectual Property (BIP) expected to be used and/or referenced.

Gap Analysis, Socio-Economic Benefits Analysis Report

The report(s) shall contain all the information required to understand the results and provide the analysis and supporting information to substantiate all key findings and results. The reports will contain, but not be limited to; answers to all questions raised in the SOW together with suggestions for any further studies for each service and benefit area. The Contractor shall discuss the shortcomings in the data on which the analysis was based and suggest a methodology to providing firmer estimates. This will enable a full and accurate evaluation of the work by the Project Manager.

The Contractor shall submit two (2) hard copies and one (1) electronic copy of the results of the Study of the Socio Economic benefits related to improved Communication and Weather Services in the Arctic/North region delivered by the Polar Communications and Weather (PCW) Mission as required by the detailed SOW. Acceptable electronic formats are MS Word. Flattened or protected electronic formats will not be accepted. The Contractor shall indicate the appropriate intellectual property notices in respect to standard acquisition clauses applicable herein.

Executive Report

The Executive Report shall contain a description of the work performed, findings and results achieved under the contract. The Executive Report will be placed in the public domain to promote the transfer and diffusion of knowledge. This report shall not exceed 10 pages. Any information that would constitute a public disclosure of the findings and results concerning the Socio Economic Benefits analysis shall be placed in the Gap Analysis and Socio Economic Benefits Analysis Report.

The contractor shall indicate the appropriate intellectual property notices in respect to standard acquisition clause 4006.

Communication Package

The contractor will produce a communication package summarizing the study results and key findings. The communication package shall contain visual elements, such as renderings, tables and figures that facilitate communication of the study key results and findings. The Contractor shall indicate the appropriate intellectual property notices in respect of standard acquisition clause 4006 in all documents.

Information Disclosure

All documents shall be of a suitable quality capable of being reasonably reproduced using commercial photocopying machines.

All documents submitted to the Canadian Space Agency shall bear the following information on the front cover:

- Contract #
- Contract deliverable requirement list # (CDRL#)
- Document title, number and revision level
- Date
- Contractor’s name
- Copyright to the Crown markings

Table 1: CDRL List
<table>
<thead>
<tr>
<th>CDRL #</th>
<th>DELIVERABLE TITLE</th>
<th>DELIVERY DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monthly progress reports</td>
<td>Monthly</td>
</tr>
<tr>
<td>2</td>
<td>Kick off meeting presentation</td>
<td>5 working days before KoM</td>
</tr>
<tr>
<td>3</td>
<td>Kick off meeting minutes</td>
<td>5 working days after KOM</td>
</tr>
<tr>
<td>4</td>
<td>Task 1 report</td>
<td>6 weeks after contract award</td>
</tr>
<tr>
<td>5</td>
<td>Task 2 &amp; 3 reports</td>
<td>8 weeks after contract award</td>
</tr>
<tr>
<td>6</td>
<td>Task 4 Full Proposed Methodology</td>
<td>10 weeks after contract award</td>
</tr>
<tr>
<td>7</td>
<td>Mid-term review presentation</td>
<td>5 working days before MTR</td>
</tr>
<tr>
<td>8</td>
<td>Mid-term minutes</td>
<td>5 working days after MTR</td>
</tr>
<tr>
<td>9</td>
<td>Final review presentation</td>
<td>5 working days before FR</td>
</tr>
<tr>
<td>10</td>
<td>Executive report</td>
<td>15 working days before FR</td>
</tr>
<tr>
<td>11</td>
<td>Socio Economic Benefits study results</td>
<td>15 working days before FR</td>
</tr>
<tr>
<td>12</td>
<td>Communication Package</td>
<td>15 working days before FR</td>
</tr>
</tbody>
</table>

**Schedule/Lapsed time to complete**

The work is to be completed within 6 – 8 months of awarding of the contract.
### Appendix 1

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Organization</th>
<th>Operational Service Name</th>
<th>Short Description</th>
<th>Level 2 or Higher Products required from PCW to support the service</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. Garand</td>
<td>EC</td>
<td>Operation Meteorology in the North</td>
<td>Basic weather forecast at 6 hours to 10 days (winds, temperature, cloudiness, precipitation) Level 2 Product Resolution (km) Refresh Rate (hour) Priority</td>
<td>Lower Troposphere Clouds (&gt;700 hPa) 5 medium 0.25</td>
<td>Calibrated radiances are fundamental input. Clear mask needed for all surface retrievals.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Middle Troposphere Clouds (400-700 hPa) 5 medium 0.25</td>
<td>High Troposphere Clouds (&lt;400 hPa) 5 medium 0.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Radiances 0.5-2.5 2.5 very high 0.25</td>
<td>Clear-Sky Mask 2.5 very high</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cloud Top Height 2.5 high</td>
<td>Polar Lows/Hurricane Intensity 2.5 0.5 very high 0.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Derived Motion Winds 2.5 0.5 very high 0.25 high</td>
<td>Vertical Moisture Profile 2.5 0.5 very high high</td>
<td></td>
</tr>
<tr>
<td>L. Gaand/Ron Goodson</td>
<td>EC Dorval/EC Edmonton</td>
<td>Enhanced Meteorology in the North</td>
<td>Like basic meteorology with more products to provide better resolution and support more applications resolution (km) Refresh Rate (hour) priority</td>
<td>Cloud Layer Heights 5 medium 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Convective Initiation 5 medium 1</td>
<td>Enhanced &quot;V&quot;/Overshooting Top Detection 5 medium 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total Precipitable Water (Humidity) 5 high</td>
<td>Sea Surface Temperature 5 high</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Albedo of the surface* 5 5 5</td>
<td>Derived Stability Indices 5 5 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Probability of Rainfall 5 5 5</td>
<td>Surface (Skin) Temperature e° 5 5 5</td>
<td></td>
</tr>
<tr>
<td>Rene Servranck, Richard Menard</td>
<td>EC, Dorval</td>
<td>Air Quality Monitoring System Report on aerosol, ashes, volcanic ashes that are a threat to human activities or air traffic resolution (km) Refresh Rate (hour) priority</td>
<td>Aerosol/Smoke Detection Mask (Aerosol, Smoke, Dust) 2.5 0.25 high 0.25 very high</td>
<td>Volcanic Ash: Detection Mask and Height 5 high 0.5 0.5 0.5 0.5 0.5 medium 0.5 1 high</td>
<td>All these variables will be analysed in real time and assimilated in EC environmental prediction model.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aerosol Optical Depth 5 high</td>
<td>SO2 Detection 5 0.5 5 10 0.5 0.5 0.5 0.5 0.5 1 high</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ozone Total Column Amount 5 0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Organization</td>
<td>Function</td>
<td>Fire and Hot Spot Characterization</td>
<td>Flood Standing Water</td>
<td>Note</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>----------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>A. Trischenko</td>
<td>NRCAN, CFS Sault St-M</td>
<td>Fire and Disaster Monitoring</td>
<td>Resolution (km): 2.5</td>
<td>Refresh Rate (hour): 0.5</td>
<td>Forest fire prepared by NRCan. Radiative power defines smoke input into atmosphere.</td>
</tr>
<tr>
<td>Tim Lynham</td>
<td></td>
<td></td>
<td>priority: high</td>
<td>medium</td>
<td></td>
</tr>
<tr>
<td>Mark Bushner</td>
<td>EC, Stat Canada</td>
<td>Environment Monitoring System</td>
<td>Vegetation Index: 1.25</td>
<td>Neve/Ice Cover: 24</td>
<td>See details with meteo product list. Sea and Lake ice is included in ECV.</td>
</tr>
<tr>
<td>Gordon Reichert</td>
<td></td>
<td></td>
<td>Water quality: 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chlorophyll: 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Various climate essential variables (ECV): 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Trischenko, H. Barker</td>
<td>NRCAN, EC Downview</td>
<td>Essential Climate Variable/Climate Change Monitoring</td>
<td>Absorbed Shortwave Radiation: 10</td>
<td>Downward Longwave Radiation: 10</td>
<td>Fluxes are obtained from combining model and observations. Important for climate and model validation. Not required in real time. POW to solve diurnal cycle.</td>
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<td>Surface: 10</td>
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<td>Upward Longwave Radiation: TOA: 10</td>
<td>Downward Shortwave Radiation: TOA: 10</td>
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<td>Surface: 10</td>
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<tr>
<td>Ismael Gultepe</td>
<td>EC, Downview</td>
<td>Nowcasting</td>
<td>IR Imagery: medium</td>
<td>FOG: medium</td>
<td>High resolution movie loops are major nowcasting tool. Visibility, fog vital to aviation.</td>
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<tr>
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<td>Visible Imagery: medium</td>
<td>Visibility: medium</td>
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<table>
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<tr>
<th>TBD</th>
<th>Aircraft Safety</th>
<th>Issuance of aircraft icing threats to support aircraft navigation in the North.</th>
<th>Aircraft Icing Threat</th>
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Obviously important for aviation especially in Arctic. Requires combination with model output.