

CLIMATE ANALYSIS AND MONITORING MEETING REPORT



**PACIFIC CLIMATE
IMPACTS CONSORTIUM**

INTRODUCTION

On Thursday, October 10th, the Pacific Climate Impacts Consortium (PCIC) held its first of three meetings focused on the themes of the Consortium. These meetings are intended to both introduce some of the latest work of the themes as well as to gather feedback from users of the themes' work regarding modifications of planned work, or directions for future activities. Each theme lead undertakes a bi-annual research planning process which defines concrete work targets for the coming two years and a broader direction for three years following. The input gathered from users can help define what should be added (or subtracted) from these research plans. The recent meeting focused on the Climate Analysis and Monitoring (CAM) theme which is tasked with defining the recent past and present climate evolution of British Columbia.

ATTENDEES

The attendees of the CAM theme's meeting were selected to fulfill two purposes. First, they were chosen based on their potential to benefit from the activities of CAM and the possibility that they weren't already familiar with that part of PCIC. Second, it was hoped that invitees would be able to understand and provide critical feedback to the work presented at the meeting. An invitee list was composed of private contractors/consultants, employees of Environment Canada, members of BC government responsible for the collection of weather observations, and members of BC's Climate Action Secretariat. Data sharing partners from BC Hydro also provided valuable feedback. The composition of the meeting is shown in Figure 1. Roughly one-quarter of the attendees were internal to PCIC. Almost half were from government (which includes Environment Canada and BC Provincial) but are split between CAM users and data providers to CAM. About 30% of attendees were in primary research or private consultants/contractors.

PCIC HELD ITS FIRST OF THREE MEETINGS FOCUSED ON THE CONSORTIUM'S THEMES ON OCTOBER 10TH, TO SHARE ITS WORK WITH USERS AND GATHER INPUT TO INFORM PCIC'S RESEARCH PLANS

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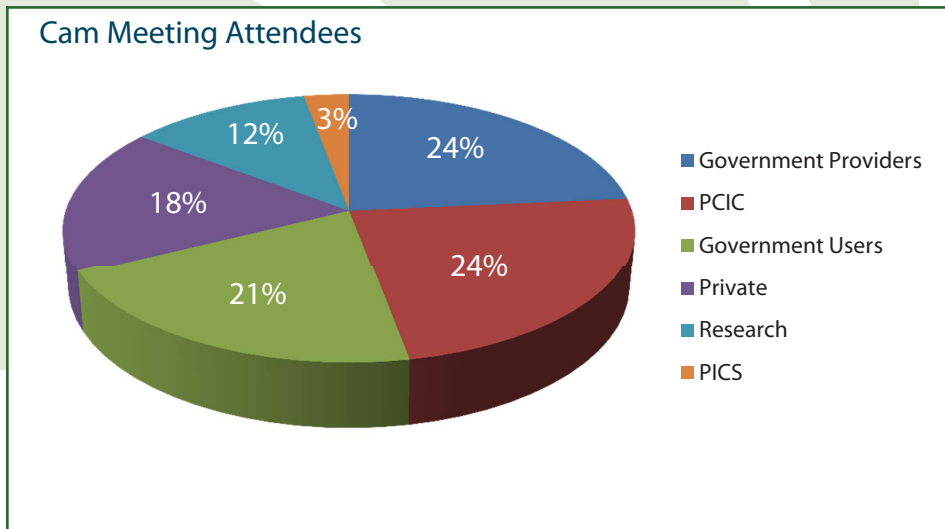


Figure 1: CAM Meeting attendees.

*THE PRESENTERS DISCUSSED
THE CLIMATE RELATED
MONITORING PROGRAMME,
NEW, HIGH-RESOLUTION
PRISM CLIMATE MAPS, HOW
PCIC SERVES UP LARGE
AMOUNTS OF CLIMATE DATA
AS WELL AS PLANS FOR THE
FUTURE*

WHAT WAS PRESENTED?

The format of the meeting was seminar style, with four presentations and a substantial amount of time after each presentation for questions and answers. The day was summarized through a discussion panel intended to focus the issues raised in the Q and A periods into tangible goals or issues for CAM to address. The meeting was structured to work from the data foundation provided by the Climate Related Monitoring Program (CRMP) headed up by Ted Weick, Unit Head of Air and Climate for the Water and Air Monitoring Section, BC Ministry of Environment, through to the presentation and delivery of products by PCIC. The morning talk was given by Ted Weick who gave an overview of the CRMP and described what some of the challenges are. Ted's talk generated a lot of discussion about the consequences of streamlining networks, which implies a possible reduction of the number of observation stations in the province. Questions about metadata were also asked and this was to become one of the major themes of the meeting.

The second presentation was given by Faron Anslow, Climatologist for PCIC, who presented the new PRISM climate maps, the process of creating them, and some of the issues associated with creating a high-resolution climatology for BC. This presentation stimulated questions about how such maps can be validated, how they will compare with PRISM maps in the adjacent US states, and what some of the future applications of PRISM might be. Faron emphasized a need for characterizing the uncertainty in the maps as well.

James Hiebert, the lead of the Computational Support theme of PCIC, presented the new data portal designed to disseminate large arrays of climate data, such as the PRISM data, as well as the existing station data portal. His talk focused on demonstrations of the portals through realistic scenario examples. The audience appeared to appreciate the training in the use of the portals that this provided and seemed happy with the ease with which the data could be accessed and viewed. Audience questions and comments focused on legal issues of disseminating data, tracking and updating portal users, and whether the portal represented a replacement for ClimateWNA.

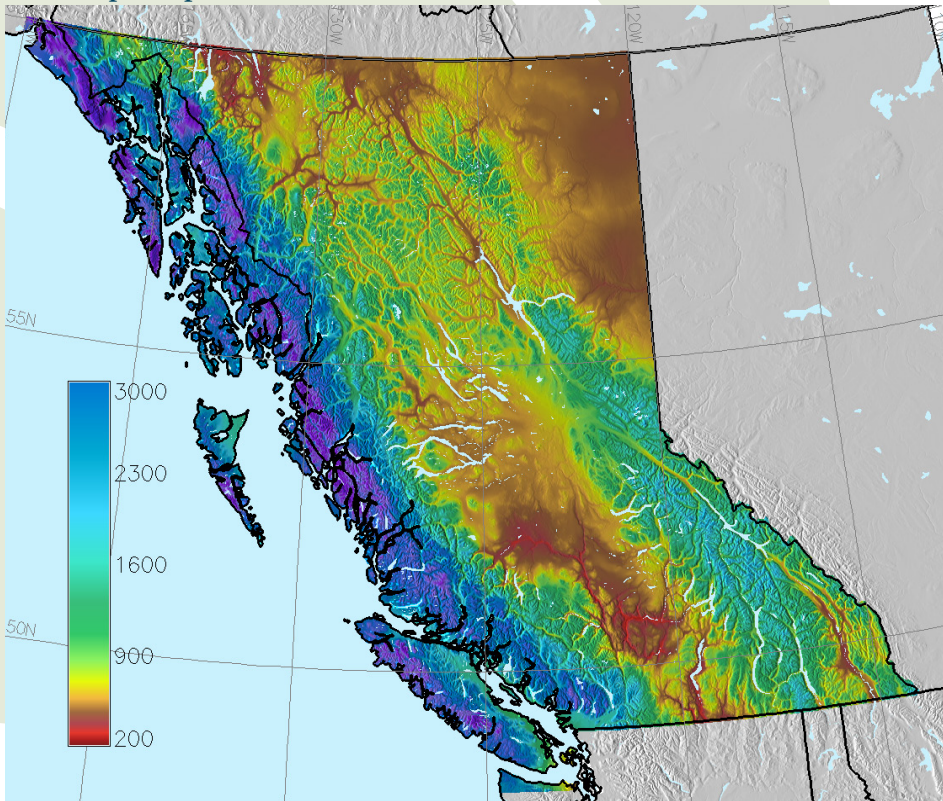
The final presentation covered some of the other work that CAM has been engaged in and plans for the future. This mainly included issuance of seasonal climate anomaly maps, production of historical trend analyses for BC, and a brief roadmap for where CAM is headed in the near future. Here the emphasis is on work that will enhance the utility of PRISM including uncertainty analysis, work on the latest climate normal period, development of monthly time-series maps with PRISM, and expansion of the seasonal climate review activities. This talk was followed by a panel discussion which was intended to focus on whether the current and future CAM activities are of use and what may be added to make the activities more useful to users. The major themes that arose were that users were looking for better metadata describing the data available on the portal or at least some guidance on what the different networks' data was best used for. Extremes were another common theme, with requests for framing the anomaly maps in terms of historical variability and expansion of the Intensity - Duration - Frequency (IDF) products created by Environment Canada. A request was

made to provide seasonal forecast of precipitation or at least some statistical guidance on what to expect a season or two ahead. Participants were also curious about other sources of data such as that collected by industry for short- and long-term projects and often as part of a mandate to provide environmental impacts statements. Other potential data sources discussed included the applications of remotely sensed data.

NEW PRODUCTS

The most important highlights of the CAM meeting were the unveiling of two complementary products resulting from work by the CAM theme and PCIC's Computational Support team. On the CAM side, the theme announced the availability of new, high-resolution maps of monthly and annual climate normals for British Columbia and southeast Alaska created using the PRISM climate mapping technology. This is one of the major culminating products of a three-year project working with the PRISM climate group to define the climate of BC over the 1971-2000 normal period at a spatial resolution of 30 arc-seconds (roughly 800 meters).

To distribute these maps and other large arrays of climate data, PCIC has developed a spatial data portal that will become operational in the coming months. This portal allows users to interactively select datasets, regions, and temporal periods of interest for download in one of two data formats.



A little more than a year ago, PCIC had made station-based data available via a similar web-based tool. The new tool maintains the clean style and functionality of the original. The portal will be the primary access point for the raw PRISM data for BC. This data portal isn't yet available for public release, but the station data portal may be found here:

<http://www.pacificclimate.org/tools-and-data/pcds-portal>

PCIC HAS DEVELOPED A SPATIAL DATA PORTAL TO SERVE UP CLIMATE MAPS AND LARGE ARRAYS OF CLIMATE DATA

Figure 2: Example of PRISM precipitation data.

Also presented at the meeting were the ongoing availability and production of monthly and seasonal climate anomaly maps for BC, Yukon, and Alberta. CAM has been creating these maps at monthly intervals, two weeks after the last day of the preceding month or season. They are available through a web page designed to present the maps a season at a time. Interested users may find these at:

<http://www.pacificclimate.org/tools-and-data/seasonal-climate/>

SUGGESTED AREAS FOR DEVELOPMENT AND THE WAY FORWARD

There were many good suggestions and directions that arose from this meeting. Overall, the CAM theme lead found the meeting extremely useful for defining priorities and to help in framing what is to come in subsequent years. The most common suggestions among participants and which aligned with the CAM theme's mandate are listed below.

- ▶ Define the quality of PRISM maps
 - ▷ Validation of the PRISM maps
 - ▷ Perform uncertainty analysis and deliver estimates of map uncertainty
 - ▷ Where possible, reconcile cross-domain discontinuities
- ▶ Improve metadata delivery for the data on the data portal
 - ▷ Make an initial effort to provide “Network Information Sheets” to accompany data downloaded from each network.
 - ▷ Make the existing metadata easily accessible to the user
- ▶ Incorporate Extremes
 - ▷ Reconfigure the seasonal climate maps to reflect anomalies in terms of variability
 - ▷ Consider constructing additional IDF curves for BC to supplement those available from Environment Canada
- ▶ Miscellaneous CAM Product Improvements
 - ▷ Improve readability of seasonal anomaly maps
 - ▷ Look ahead to developing online analysis tools
 - ▷ Expand seasonal analysis to include atmospheric circulation anomalies.

Many of these suggestions fit into the existing research plan for the CAM theme and where they don't, priorities can be rearranged to meet these needs. Based on the agreement among attendees, each suggestion seemed to have wide support among users. Some ideas that arose from the discussions were potentially valuable but lay outside of what the CAM theme has resources to undertake.

Taken as a whole, the meeting served to reinforce the need for the analysis of extremes in the province. PCIC already has provided such analysis within the context of future climate scenarios from climate model output. So, having a historical framework for those extremes will help to pin down

the magnitude of change and possibly indicate areas where climate models exhibit poor performance over the historical period. Users were interested in good metadata on data that they obtain from PCIC. And, there is a need to support the PRISM maps with documentation and analysis that indicate the uncertainty and reliability of those products.

Finally, PCIC would like to thank those who took the time out of their schedules to participate in the meeting and for their help in defining the direction of the CAM theme. From PCIC's perspective, the session was highly productive.

Participant List, CAM Meeting
The Inn at Laurel Point, Victoria, BC — October 10th, 2013,

Last Name	First Name	Organization	Position
Anslow	Faron	Pacific Climate Impacts Consortium	Climatologist
Barnes	Jim	BC Ministry of Transportation and Infrastructure	Manager, Corporate Initiatives
Campbell	David	BC Ministry of Forests, Lands and Natural Resource Operations	Section Head, River Forecast Centre
Cannon	Alex	Pacific Climate Impacts Consortium	Research Climatologist
Dewis	Cassbreea	Pacific Climate Impacts Consortium	Lead, Planning and Operations
Ellis	Erica	Kerr Wood Leidal	Fluvial Geomorphologist
Foord	Vanessa	BC Ministry of Forests, Lands, and Natural Resources Operations	Research Climatologist
Fraser	Jenny	BC Ministry of Environment	Adaptation Specialist, Climate Action Secretariat
Gagne	Marie-Eve	CCCMa	NSERC Visiting Fellow
Hember	Robbie	Natural Resources Canada	Postdoctoral Fellow
Hiebert	James	Pacific Climate Impacts Consortium	Lead, Computational Support
Larock	Michael	Association of BC Forest Professionals	Director of Professional Practice and Forest Stewardship
Lewis	Ted	Rescan Environmental Services	Hydrologist
Miller	Kate	Cowichan Valley Regional District	Manager, Environmental Initiatives
Murdock	Trevor	Pacific Climate Impacts Consortium	Lead, Regional Climate Impacts
Nielson	Denise	Agriculture and Agri-Food Canada	Research Scientist
Nyland	Dirk	BC Ministry of Transportation and Infrastructure	Chief Engineer
O'keefe	Sarah	BC Ministry of Environment	Acting Senior Climate Change Policy Advisor
Pitt	Lawrence	Pacific Institute for Climate Solutions	Associate Director
Pouliotte	Jennifer	Climate Change Adaptation, BC Ministry of Environment	Senior Policy Analyst
Schnorbus	Markus	Pacific Climate Impacts Consortium	Lead, Hydrologic Impacts
Shumlich	Michael	Pacific Climate Impacts Consortium	Scientific Information Specialist
Smiley	Bruce	BC Hydro	Manager, Generation and Hydrometric Information
Smith	Stephanie	BC Hydro	Manager, Hydrology & Technical Services
Spittlehouse	David	BC Ministry of Forests, Lands and Natural Resource Operations	Climatologist, Competitiveness and Innovation Branch
Tam	Stephanie	Sustainable Agriculture Management, Ministry of Agriculture	Water Management Engineer
van der Gulik	Ted	BC Ministry of Agriculture	Senior Engineer
Walker	Simon	BC Ministry of Transportation and Infrastructure	Avalanche & Maintenance Weather Specialist
Watts	Martin	FORCOMP Forestry Consulting Ltd.	President
Weick	Ted	BC Ministry of Environment	Unit Head - Air and Climate
Wong	Pat	Atmospheric Monitoring Section, Pacific and Yukon Region	Manager
Zwiers	Francis	Pacific Climate Impacts Consortium	Director

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