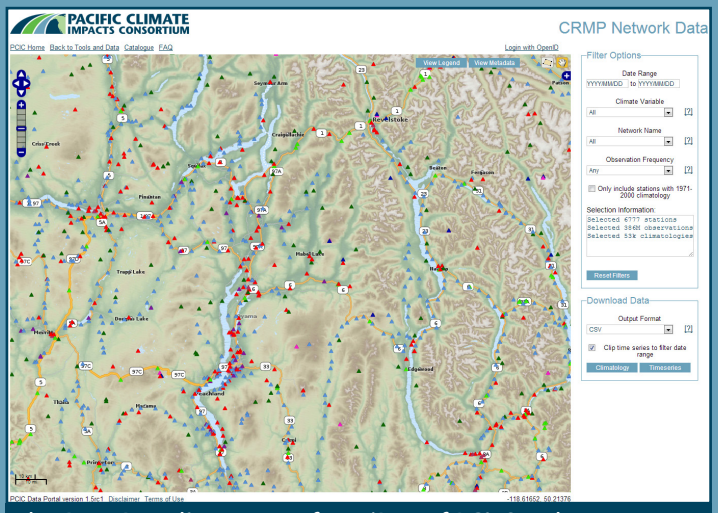
PACIFIC CLIMATE IMPACTS CONSORTIUM
PCIC UPDATE
VOLUME 5, NUMBER 4, FALL 2012

PCDS DATA PORTAL

On October 22nd, PCIC launched its much-anticipated Pacific Climate Data Set (PCDS) portal, making weather observations from over 6000 stations available to the public. This data and the ease of access with which it is being provided will make the portal useful to researchers, engineers, industry, and anyone with a keen interest in the climate of the province or historical weather. The portal provides access to temperature, humidity, precipitation, wind speed and other observational data, collected from 1872 to the present. The image on the right shows the portal's user interface.

Thanks to Environment Canada and British Columbia observing networks that report in real time, the portal will soon be updated in real time as well, so that the latest data will always be available.

PCIC will be housing and redistributing the data, as well as applying quality control to the data and adjustments as needed for the effects of changes in station location, instrument changes, or the influence of poorly calibrated sensors or poor sensor exposure.



The Data Portal's user interface. (Part of BC's Southern Interior Region is shown in this example.)

The data will also help PCIC to develop new high resolu-

(Continued on page 3)

Pacific Climate Impacts Consortium

University House 1
University of Victoria
PO Box 3060 STN CSC
Victoria, BC
Canada V8W 3R4

Telephone: (250) 721-6236
FAX: (250) 721-7217
Email: climate@uvic.ca
http://pacificclimate.org

Francis Zwiers
Director, President and CEO

Faron Anslow
Climatologist

David Bronaugh
Programmer/Analyst

Alex Cannon
Research Climatologist

Cassbreea Dewis
Lead, Planning and Operations

Hailey Eckstrand
GIS Analyst

James Hiebert
Lead, Computational Support

Shelley Ma
Administrative Assistant

Trevor Murdock
Lead, Regional Climate Impacts

Paul Nienaber
Programmer/Analyst

Dave Rodenhuis
Associate Climatologist

Markus Schnorbus
Lead, Hydrologic Impacts

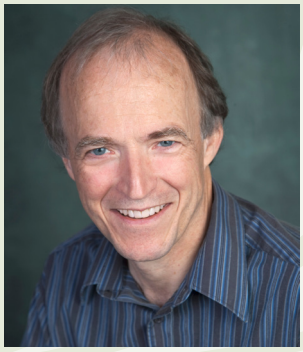
Rajesh Shrestha
Hydrologist

Michael Shumlich
Scientific Information Specialist

Stephen Sobie
RCI Analyst

Basil Veerman
Geospatial Programmer/Analyst

Arelia Werner
Hydrologist



PERSPECTIVE:
MESSAGE FROM THE DIRECTOR

It is with a great deal of pride that we present this newsletter, which contains news of some very satisfying accomplishments in the improvement of our ability to deliver regional climate services to our stakeholders and users.

One of these accomplishments is the implementation of an updated version of Plan2Adapt, which includes an improved mapping capability, and now also features information about the potential impacts of future climate change that is specific to the user's region of interest.

A second major accomplishment is the public launch of a self-serve portal that provides access to the Provincial Climate Data Set (PCDS) on the PCIC website. The launch of the portal is the culmination of more than two years of effort that was made possible through the establishment of a Memorandum of Understanding (MOU) between numerous operators of weather and climate observing networks in the province. The MOU provided the framework under which we could organize data that was housed in numerous places into a single database, and this, combined with the creativity and perseverance of our climatologists and computer scientists, allowed us to produce a powerful, flexible and innovative web tool to access that database. The result provides convenient access to more than 380 million historical weather observations from over 6700 locations across the province, some of which were collected as early as 1872. The capability to provide open and flexible access to the province's weather data resources marks the beginning of what, we hope, will be a continuing series of improvements in this area. Already, we have developed a capability to keep the data portal up-to-date by establishing real-time data feeds into the PCDS from several of the networks operating in the province, and behind the scenes, we are busy expanding the data portal's capabilities so that we will be ready to provide access to new high resolution climate maps and new climate change scenarios that are currently under development.

We hope that you will take advantage of these new capabilities and tools, and look forward to any comments or suggestions that you might want to offer. Please feel free to contact us at any time by sending an email message to climate@uvic.ca.

(Continued from page 1)

tion maps for BC that describe its temperature and precipitation climates in more detail and with greater accuracy than ever before. Those maps will also be made available to the public via the data portal.

To allow PCIC to contact users when changes are made to the data or the workings of the portal, users who download data will be asked to provide email contact information.

The data set and portal arose from a memorandum of understanding between several BC ministries, BC Hydro, Rio-Tinto AlCan and PCIC, that came into effect on the 6th of July, 2010. Additionally, Environment Canada has pledged support for PCIC's role as a central repository for climate data in the province. The Pacific Institute for Climate Solutions contributed funding and consultation in support of the data gathering efforts.

To find out more about the climate observations available in your region, go to:

http://tools.pacificclimate.org/data_portal/pcds_map/

PLAN2ADAPT UPDATE

Plan2Adapt, one of PCIC's web-based tools was born out of an expressed user need for a simple interface between the user and regional climate projections. The 2012 Plan2Adapt update builds on the original objective for balancing simplicity and accurate information on future climate projections.

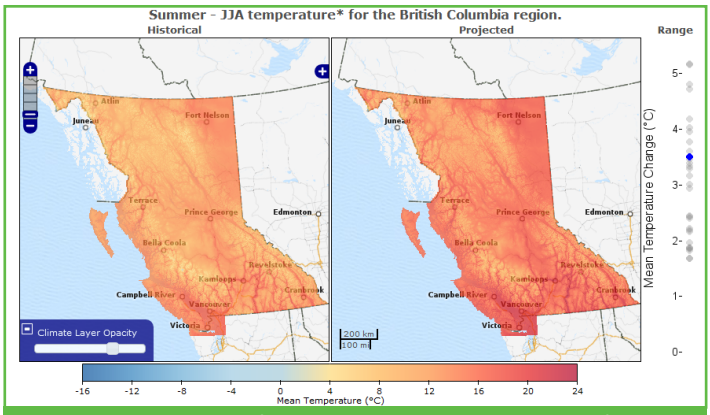
Improved map interface: users can now zoom and pan the map windows (right, top) and overlay layers such as parks. Users can also click on the map to see historical and future projected values of the following climate variables: temperature, precipitation, snowfall, growing-degree days (a variable that indicates the amount of heat energy available for plant growth), heating degree-days (useful for indicating energy demand) and frost-free days (the number of days that the nighttime low stayed above freezing).

Updated regional climate summaries: regions have been updated to their current boundaries, and new region types such as health authority boundaries have been added.

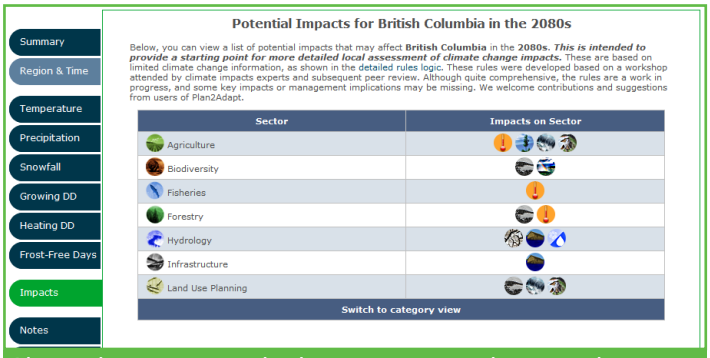
New impacts tab (right, bottom): provides a list of possible impacts for the following sectors: agriculture, biodiversity, fisheries, forestry, hydrology, infrastructure and land use planning has been added. This list of impacts is intended to provide a starting point for more detailed local assessment of climate change impacts and can be used as a guideline to kick-start community planning projects.

The tool is available online, at the address below. If you have any feedback on the new features, please feel free to contact us by sending a message to climate@uvic.ca.

http://pacificclimate.org/tools-and-data/plan2adapt



Plan2Adapt map interface, showing the temperature for June, July and August, for all of British Columbia.

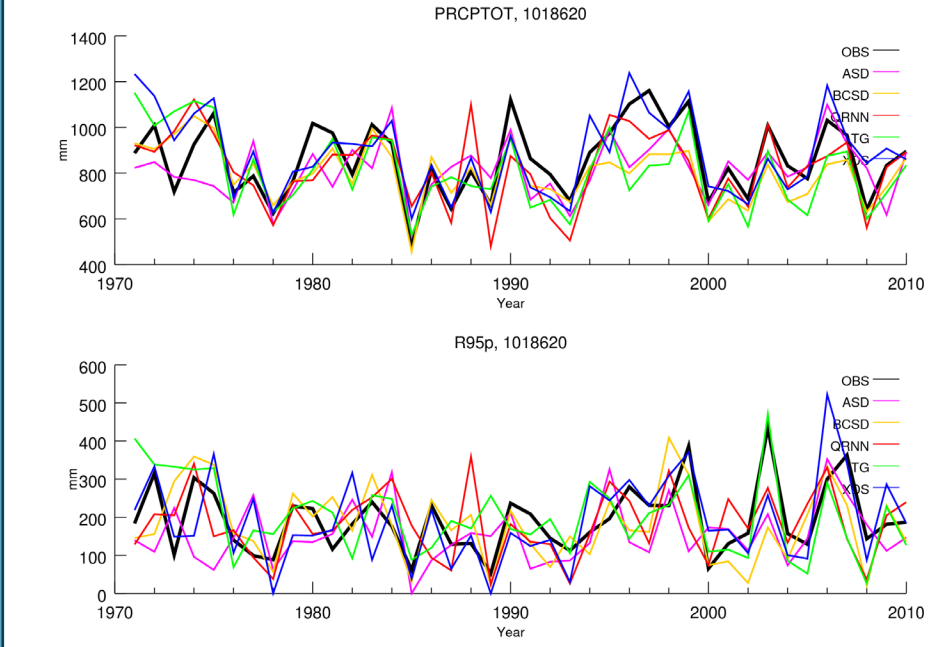


Plan2Adapt impacts tab, showing projected impacts by sector for British Columbia in the 2080s.

DOWNSCALING INTERCOMPARISON PROJECT
SUMMARY REPORT

Three years of research testing a variety of downscaling techniques for their ability to simulate climate extremes in BC is now available in an accessible PCIC Summary Report. PCIC's summary products aim to translate PCIC's in-depth and technical research results into a format that is accessible to users of diverse backgrounds. This downscaling intercomparison project (DIP) evaluated a number of methods that can be used to bring information from global climate models to local and regional scales for BC stakeholders. One of our major findings is that, while most of the techniques show some skill at representing past climate extremes and produced consistent future climates, the two main downscaling techniques used by PCIC showed the best performance. We also found that temperature extremes and annual sums (such as the total amount of precipitation in a given year) were better represented by the downscaling methods than were precipitation extremes and complex, multi-day extreme events (such as the duration of warm spells). The figure on the right shows how closely the individual methods match observations for two precipitation indices.

Our work also showed that, for those downscaling techniques that perform best at reproducing historical observed climate, the largest source of uncertainty in projecting future climate change at fine scales comes from the choice of global climate model that is to be downscaled.



Typical extremes index series for the weather station at the Victoria International Airport. The two variables shown in these time series are total annual precipitation on days when daily precipitation is at least 1 mm (PRCPTOT, upper panel), and total annual precipitation for heavy rainfall events (R95p, lower panel). The black lines show the observational data from weather stations and the coloured lines show the results of the downscaling methods.

The strong performance of the two main downscaling techniques used by PCIC provides confidence in previous PCIC studies. The tests of the various downscaling techniques also provide PCIC—and the broader scientific community—with a better assessment of the abilities of each of these methods and these lessons are reflected in PCIC's new Regional Climate Impacts research plan.

The summary report is available from PCIC's publications library:

http://pacificclimate.org/resources/publications

CLIMDEX CLIMATE EXTREMES DATA AVAILABLE ONLINE

PCIC is proud to announce that climate extremes data from the first stage of the ClimdEX project, on which PCIC is a collaborator, is now available online. The ClimdEX website provides researchers with easy access to datasets of a standard suite of 27 climate extremes, along with uncertainty estimates, trend maps, time series, revision-controlled software and detailed information about the construction of the climate extremes datasets. This allows for greater traceability of methods and easier assessment not only of climate model output, but also the variability and uncertainty of climate extremes.

For its role in the ClimdEX project, PCIC worked in partnership with Environment Canada, independently implementing and validating an existing program used to compute the indices. This added to the scientific community's understanding of the robustness of the indices and allowed the computationally intensive indices to be computed by researchers across the globe.

For more information, see PCIC's ClimdEX page:

http://pacificclimate.org/tools-and-data/climdex

NEW PEER-REVIEWED PUBLICATION RELEASED

In climate change impacts and adaptation research, ensembles of regional and local climate change scenarios are often studied in order to see if their projections of future climate states vary significantly from the present climate. The question then arises as to what is meant by 'significant' when the projections are potentially the result of an ensemble of scenarios from a number of different climate models, that are being driven by several different forcing scenarios.

In a recent paper published in the peer-reviewed journal *Climatic Change*, PCIC director Francis Zwiers and Hans von Storch, director of the Institute for Coastal Research of the Helmholtz Center Geesthacht, set out to analyze this question.

They ask in what contexts the hypothesis testing of climate scenarios is well-posed. They find that it is often difficult to describe the sampling strategy that led to the selection of the ensembles used and therefore suggest that the outcome of experiments should be given in a simple, descriptive manner instead. This approach provides the results of the research, without providing a quantified uncertainty value in circumstance where quantification may not be well defined.

Read the article, *"Testing Ensembles of Climate Change Scenarios for Statistical Significance"* :

http://pacificclimate.org/resources/publications

CLIMATE EXTREMES IN THE COLUMBIA BASIN

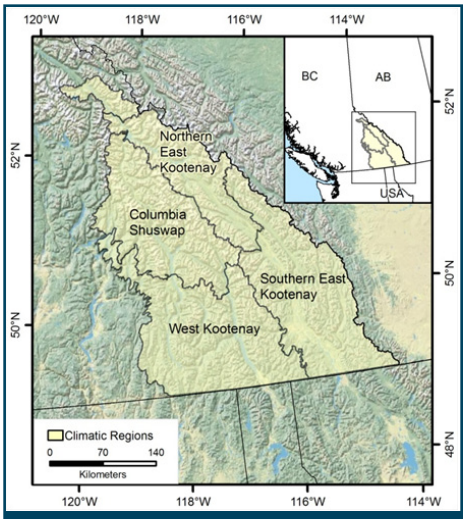
In a recent study on the projected changes to indices of extremes from the output of eight regional climate models in the Columbia Basin (region shown on right), PCIC found that climate projections show considerable warming in the 2050s compared to the 1971-2000 baseline (shown in the figure below) and an increase in the frequency of warm extremes. In addition, the projections show an increase in the frequency and intensity of extreme precipitation events, a decrease in summer precipitation and increases in precipitation for all other seasons. The results for more complicated indices were inconclusive.

This project was undertaken with the support of the Columbia Basin Trust. PCIC has just published the findings of this preliminary investigation in a report titled, "Climate Extremes in the Canadian Columbia Basin: A Preliminary Assessment."

Further work remains to be done, with regional downscaling or bias correction needed to assess more complicated indices and additional regional climate model experiments desired to refine the results of this preliminary assessment.

Read this report in the PCIC publications library:

http://pacificclimate.org/resources/publications



Study area: Canadian Columbia River Basin (light green) and its climatic subregions (Greg Utzig, pers. comm.).

TALKS, LECTURES & AN EXHIBITION

The joint PCIC-PICS fall seminar series started on September 19th, with Dr. Juan Blanco from UBC's Department of Forest Sciences discussing sustainable practices to combine wildfire risk control with local energy production in his talk, "Fire in the woods or fire in the boiler?" Following this, on October 24th, Dr. Dan Moore, from UBC's Department of Geography and Department of Forest Resources Management delivered a talk titled, "Hydrologic response to future climate change: incorporating the effects of changing land cover." The next talk will be delivered by Trevor Williams, from the UVic's Institute for Integrated Energy Systems. His talk is titled, "Modeling the electrical grid, renewable energy and the electric vehicle: what it tells us."

PCIC also delivered several general talks and a guest lecture in September. The guest lecture, "Planning and Decision-Making Using Regional Climate Information" was delivered on September 10th by Trevor Murdock, as part of the "Human Dimensions of Climate Change" HDCC200 course offered by Dr. Bob Gifford, which makes up part of the climate change minor. It follows presentations earlier in the course by PCIC Director Dr. Francis Zwiers on climate modelling, and focuses primarily on the use of regional climate information for adaptation planning and decision-making.

"Climate Change Variability, Projections for BC, and Implications for Growers," an introduction to the concepts of climate variability, trends, and future projections using climate models, was given by Trevor at the 32nd Annual General Meeting of the Forest Nursery Association of British Columbia, in Campbell River on September 26th.

PCIC also delivered a talk, "Projections of Climate Change Extremes in the Canadian Columbia Basin," at the 3rd Annual Pacific Northwest Climate Science Conference, Boise, Idaho on October 1st.

On September 11th, PCIC and the Canadian Centre for Climate Modelling and Analysis hosted a joint seminar featuring Dr. Matt Newman of the University of Colorado and the United States National Oceanic and Atmospheric Administration . The talk was titled, "An empirical benchmark for Pacific Ocean variability and predictability." In the talk, Dr. Newman discussed how multivariate red noise (a random noise signal that varies most strongly at low frequencies) can act as an approximation of observed Pacific sea surface temperature (SST) anomalies on time scales of years to decades.

In June, PCIC hydrologists Markus Schnorbus and Rajesh Shrestha attended the Canada Water Resources Association/Canadian Geophysical Union conference, "Earth, Wind and Water — Elements of Life." While there, they helped to organize a special session on "Hydrologic Impacts of a Changing Climate" and delivered two talks: "Runoff Sensitivity to Climate Change in the Upper Peace River, British Columbia, Canada" and "Evaluating Indicator Hydro-Ecological Variables from a GCM-Driven Hydrologic Model."

As part of the University of Victoria's 50th Anniversary Festival on September 29th, UVic held a campus-wide showcase and open house, celebrating 50 years of excellence. The various faculties, centres, schools, divisions and service providers comprising UVic shared their work with the general public.

PCIC and our sister organization, the Pacific Institute for Climate Solutions co-exhibited at a table in the School of Earth and Ocean Science's open house, answering questions about our research and sharing information about the initiatives that we have developed. Among the initiatives that were showcased by PCIC and PICS were PCIC's Plan2Adapt tool and the PICS Climate Insights 101 short course series.

PCIC CORPORATE REPORT 2011-2012 & PCIC STRATEGIC PLAN 2012-2016

In May, PCIC published its new Strategic Plan for the period of 2012-2016. This plan details both its service objectives and how we will continue to fulfill them. PCIC will continue to deliver information under its service objectives by following a comprehensive approach that recognizes the complex and diverse user-base for climate information. The modes of delivery of this information range from online tools, such as the Data Portal, to user-commissioned reports, such as the report to the Columbia Basin Trust on climate extremes, that contain information that is robust and tailor-made for PCIC's partners and user-base.

In October, PCIC completed its fourth annual Corporate Report, *PCIC Corporate Report 2011-2012*. This report outlines PCIC's projects, reports, seminars and education efforts over the 2011-2012 period, acknowledges the consortium's partners, details PCIC's publications and discusses its operations and finances. The report also shares the perspectives of the consortium's Board of Directors and Program Advisory Committee.

Download these reports from our online publications library:

http://pacificclimate.org/resources/publications

NEW GEOSPATIAL PROGRAMMER / ANALYST

PCIC welcomes Basil Veerman as the new Geospatial Programmer/Analyst. Basil Veerman has joined PCIC in the Computational Support Group to assist staff scientists by providing geospatial programming support, information management, and map development.

Basil's previous experience includes working as the Geomatics Lead for CAREX Canada where he managed the development of web mapping products and assisted project members with geoprocessing tasks. Basil also has a background in a variety of technical support positions and as a freelance web mapping consultant. He has recently graduated from the University of Victoria's Geomatics Program and will be receiving his BSc this fall.

NEW SCIENTIFIC INFORMATION SPECIALIST

PCIC welcomes Michael Shumlich, who has joined PCIC as a Scientific Information Specialist, to work alongside the consortium's scientific and technical staff in developing and implementing high-quality plain language documents aimed at PCIC's users.

Michael has just completed his MSc in Atmospheric Science at UVic. His research there focused on the climate impacts of proposed schemes to offset the warming from human greenhouse gas emissions by injecting sulfate aerosols into the atmosphere. Michael holds a BSc in physics, a diploma in Graphic Design and Marketing and brings several years of experience in design and communications to the PCIC team.

VISITING RESEARCHER

During September, Dr. Markus Donat, a post-doctoral research fellow from the Climate Change Research Centre at the University of New South Wales (UNSW) in Sydney, Australia, spent some time at PCIC, working on the problem of handling missing values for ClimdEX indices. While here, he met with PCIC's David Bronaugh, to discuss PCIC's independent implementation of ClimdEX indices, replacing the old ClimdEX package with the newer PCIC ClimdEX implementation and having the Climate Change Research Centre and UNSW use the PCIC implementation.

While here he also gave a talk titled, "Global observational datasets to monitor changes in extreme temperature and extreme precipitation." In his talk he discussed the HadEX and the GHCNDEX data sets and the comparing of these data sets to reanalysis data.