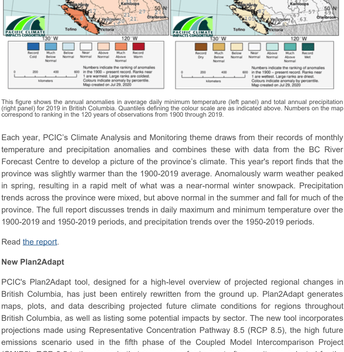
PCIC UPDATE August 2020

PROJECT AND RESEARCH UPDATES

2019 in BC, in Climatological Context



This figure shows the annual anomalies in average daily minimum temperature (left panel) and total annual precipitation (right panel) for 2019 in British Columbia. Quantiles defining the colour scale are as indicated above. Numbers on the map correspond to ranking in the 120 years of observations from 1900 through 2019.

Each year, PCIC's Climate Analysis and Monitoring theme draws from their records of monthly temperature and precipitation anomalies and combines these with data from the BC River Forecast Centre to develop a picture of the province's climate. This year's report finds that the province was slightly warmer than the 1900-2019 average. Anomalously warm weather peaked in spring, resulting in a rapid melt of what was a near-normal winter snowpack. Precipitation trends across the province were mixed, but above normal in the summer and fall for much of the province. The full report discusses trends in daily maximum and minimum temperature over the 1900-2019 and 1950-2019 periods, and precipitation trends over the 1950-2019 periods.

Read the report.

New Plan2Adapt

PCIC's Plan2Adapt tool, designed for a high-level overview of projected regional changes in British Columbia, has just been entirely rewritten from the ground up. Plan2Adapt generates maps, plots, and data describing projected future climate conditions for regions throughout British Columbia, as well as listing some potential impacts by sector. The new tool incorporates projections made using Representative Concentration Pathway 8.5 (RCP 8.5), the high future emissions scenario used in the fifth phase of the Coupled Model Intercomparison Project (CMIP5). RCP 8.5 is the scenario that our users refer to most often, so it was selected for the update to our more user-friendly online tool.

The tool sources its information from the PCIC Climate Explorer (PCEx) and thus will be able to draw from new sources of input data, such as CMIP6, when it becomes available, so that its projections will always reflect the most recent projections available. The updated tool is written with contemporary user interface software and its input data is generated with repeatable software processes, so that new data can be easily and quickly incorporated.

Visit Plan2Adapt.ca.

Survey on Future Climate Data and Information Needs in the Building Sector

PCIC is part of a collaboration, along with the Canadian Centre for Climate Services (CCCS), Ouranos, and the Computer Research Institute of Montréal (CRIM), involved in the ClimateData.ca data portal. Climatedata.ca provides practical climate data and information, and is developing sector specific modules. A new module will be designed for the ClimateData.ca portal to help the buildings sector in Canada access relevant climate data and information to inform the design, siting, operation, etc. of buildings. To help inform the content development of this module we would like to invite users in our network who are part of the buildings sector to fill out a survey (linked below). This survey is meant to help ensure the module is practical for potential users, and has been designed and administered by Institute for Catastrophic Loss Reduction (ICLR) on behalf of the collaborative. It should take roughly 10 minutes to complete.

Fill out the survey.

STAFF PROFILE: DR CHARLES CURRY

Dr. Charles Curry is a Senior Research Associate at PCIC with a background in astrophysics, and Earth system and regional climate modelling. He currently leads a small team of researchers at PCIC engaged in a multidisciplinary project to produce updated climatic design data for engineering and infrastructure design in Canada. This work, supported by the National Research Council of Canada and in collaboration with Environment and Climate Change Canada, will contribute to the development of updated guidance to the engineering community for infrastructure design that takes recent climate observations and projected climate change into account.

Charles made the transition to climate research after beginning his career as an astrophysicist. He describes his time in that field as stimulating, but somewhat unsatisfying after a time. "While I could write papers applying physical reasoning and theoretical models to far-away objects in space, it was rare to have a specific prediction of the model directly confronted by observations," he begins. "Once I realized that my background in fluid dynamics was also well-suited to the study of atmospheres and oceans, I made the leap to climate science and never looked back. Atmospheric science, in particular, provides a vast amount of available data that constrains the types of models one can apply, while still requiring those models to be physically, chemically and mathematically sophisticated."

Charles finds the potential broad societal impacts of his current work to be deeply rewarding and meaningful. "Our team's work on climatic design values leverages a great deal of the data and expertise amassed at both PCIC and Environment and Climate Change Canada over recent decades. Moreover, with future editions of the National Building Code tasked with providing guidance on changes to design values under the influence of climate change, this work takes on a new urgency and importance."

The building code work also spurred a number of interesting side projects for future research. For example, in the course of providing updated information on extreme snow loads, Charles developed and applied an improved method of converting observed snow depth to the equivalent snow load that can be used over the wide range of snowscapes found across Canada. The use of a large ensemble of regional climate model simulations in the project also led to the foundational question: How many simulations are needed for a robust description of a given climate variable? These questions and others have implications for climate research that have yet to be fully explored.

JUNE WAS FULL OF WEBINARS

PCIC participated in a series of webinars and presentations throughout June. These included two with the Agriculture Climate Data series for BC (ACARN): one on June 11th titled, *A Deep Dive Into Weather Station Data, Historical & Streamflow Data*. And one on June 24th, titled, *Climate Modelling Analysis Tools*. PCIC also participated in two seminars with FPInnovations, as part of the *Accounting for Climate Change Impacts in the Design of Resource Road Stream Crossings* serie. The first of these, titled, *Updates and Developments in Climate Change Tools for B.C. + Case Study from the Southern Interior*, was held on June 18th and the second, titled, *From Snowmelt to Streamflow: Data Portals for Future Hydrologic Conditions + Discussion: Climate Change Tools Needs for Crossings Design*, took place on June 25th. For more information on each talk, use the links above to see the talk's page on our site.

The ACARN talks are available, here.

The PFInnovations talks can be viewed, here.

PCIC researchers also presented their work at the 54th annual Congress of the Canadian Meteorological and Oceanographic Society, the largest society of atmospheric and ocean scientists in Canada. This year's Congress was online, owing to the ongoing coronavirus pandemic. The talks from PCIC researchers were delivered on June 4th and 15th. PCIC Director Francis Zwiers delivered the first talk, on June 4th, titled, *Extremes in Future Climate* (recording and presentation available, here, at the bottom of the page). The first of the presentations on June 15th was also given by Dr. Zwiers and was titled, *Long period return-level estimates of extreme precipitation*. This was followed by a presentation by PCIC Regional Climate Impacts Analyst Stephen Sobie, titled, *Future precipitation caused landslide hazard in British Columbia*. The final presentation was given by PCIC Senior Research Associate Charles curry, who presented on, *A new methodology for estimating historical snow loads for infrastructure design in Canada*. For more information about each CMOS presentation, use the links above to view their abstracts.

PCIC STAFF NEWS

Late this spring, PCIC said a fond farewell to Research Associate Dr. Yanping He. Yanping's work focused on developing statistical models that link surface maximum winds with power outages in coastal BC. We wish her all of the best in her future endeavours!

PEER-REVIEWED PUBLICATIONS

Alam, M.S., et al., 2020: Using Statistical and Dynamical Downscaling to Assess Climate Change Impacts on Mine Reclamation Cover Water Balances. *Mine Water Environ.*, doi:10.1007/s10230-020-00695-6.

Alam, M.S., L. Barbour and M. Huang, 2020: Characterizing uncertainty in the hydraulic parameters of oil sands mine reclamation covers and its influence on water balance predictions. Hydrol. *Earth Syst. Sci.*, **24**, 735–759, doi:10.5194/hess-24-735-2020.

Brubacher, J., D.M. Allen, S.J. Déry, M.W. Parkes, B. Chhetri, S. Mak, **S. Sobie** and T.K. Takaro, 2020: Associations of five food- and water-borne diseases with ecological zone, land use and aquifer type in a hanging climate. *Science of The Total Environment*, **728**, 138808, doi:0.1016/j.scitotenv.2020.138808.

Ben Alaya, M.A., **F.W. Zwiers** and X. Zhang, 2020: An evaluation of block-maximum based estimation of very long return period precipitation extremes with a large ensemble climate simulation. *Journal of Climate*, **33**, 16, 6957–6970, doi:10.1175/JCLI-D-19-0011.1.

Melaku, N.D., J. Wang and T.W. Meshesha, 2020: Improving hydrologic model to predict the effect of snowpack and soil temperature on carbon dioxide emission in the cold region peatlands. *Journal of Hydrology*, **587**, 124939, doi:10.1016/j.jhydrol.2020.124939.

Meshesha, T.W., J. Wang and **N.D. Melaku**, 2020: Modelling spatiotemporal patterns of water quality and its impacts on aquatic ecosystem in the cold climate region of Alberta, Canada. *Journal of Hydrology*, **587**, 124952, doi:10.1016/j.jhydrol.2020.124952.

Saunois, M. (**Charles Curry** is a coauthor) et al. 2020: The Global Methane Budget 2000-2017. *Earth System Science Data*, **12**, 1561–1623, doi:10.5194/essd-12-1561-2020.

Sobie, S.R., 2020: Future changes in precipitation-caused landslide frequency in British Columbia. *Climatic Change* (Accepted).

Sun, Q., **F.W. Zwiers**, X. Zhang and G. Li, 2020: A comparison of intra-annual and long-term trend scaling of extreme precipitation with temperature in a large-ensemble regional climate simulation. Accepted, *Journal of Climate*.

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