PACIFIC CLIMATE IMPACTS CONSORTIUM

PCIC UPDATE JUNE 2019

PROJECT AND RESEARCH UPDATES

Climate Report for Vancouver Coastal Health

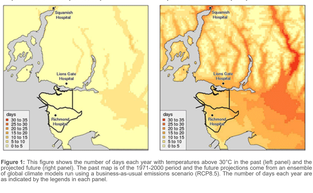

Figure 1: This figure shows the number of days each year with temperatures above 30°C in the past (left panel) and the projected future (right panel). The past map is of the 1971-2000 period and the future projections come from an ensemble of global climate models run using a business-as-usual emissions scenario (RCP8.5). The number of days each year are as indicated by the legends in each panel.

Vancouver Coastal Health (VCH) delivers healthcare services to nearly a quarter of BC's population, through 13 hospitals in Metro Vancouver and the Coast Garibaldi area on BC's coast, just north of Vancouver. Changes to BC's climate are affecting VCH and the communities it serves, with changes in temperature, precipitation and extreme weather events. In order to help address climate risk and enable VCH to assess the resilience of its major infrastructure projects, VCH partnered with PCIC and Pinna Sustainability to co-develop a report on the region VCH serves. The report, titled Moving Towards Climate Resilient Health Facilities for Vancouver Coastal Health, discusses projected changes in the region's climate and potential resilience-building strategies. The projections in the report show that there may be a dramatic increase in the number of days above 30°C (see Figure 1). Projections also show that the Lions Gate Hospital will see an increase in nights with minimum temperatures above 20°C. Based on precipitation projections, VCH experts expressed concern that storm intensity and overland flood risks may increase, and that there may be increased stress on water availability for drinking, reprocessing equipment, washing, dialysis and bathing. Projections indicate an overall shift in energy requirements with heating needs decreasing and cooling needs increasing. One of the primary challenges facing patients and staff in facilities designed for the climate of the past will be maintaining a comfortable indoor temperature and air quality. The report also discusses some of the actions that can be taken today to increase climate resilience. These include developing a climate lens for construction and redevelopment projects that considers climate projections for 2050 at a minimum, optimizing equipment today to meet the demands of 2020 climate projections, conducting resilience planning, and monitoring progress in increasing resilience.

PCIC is currently engaged in several projects to help increase climate resiliency in BC's health sector. In addition to VCH, PCIC has partnered with Island Health, Fraser Health and Interior Health. Earlier work that PCIC has done in the health sector includes a recently published case study for Island Health regarding construction and renovation projects at the Nanaimo Regional General Hospital.

Read the report, *Moving Towards Climate Resilient Health Facilities for Vancouver Coastal Health*, now.

Regional Assessment for Northeastern BC

Northeastern BC is home to about 70,000 residents, and projected changes to the region's climate suggest that it will warm across all seasons and experience greater precipitation year round on average. By the 2080s, projections using an RCP8.5 business-as-usual emissions scenario suggest that the region may have a climate that is quite different than today's, particularly in terms of temperature. In order to aid planning that takes the changing climate into account, the Northeast Climate Risk Network and PCIC partnered to co-produce a regional assessment. Because the co-production development method focuses on the needs and experience of regional stakeholders, it ensures that the resulting work incorporates regional knowledge and is suited to user needs. This assessment, funded by the Fraser Basin Council, brings together hydrological analysis and regional climate impacts for broad general use, with PCIC providing guidance, projections and review. The report will be used by municipalities in the region to inform risk management and decision making practices in preparation for future climate change and will be available through PCIC's Publications Library upon release. As part of the ongoing dialogue related to work on this report, there was a regional workshop in on June 11th and a free public talk in the evening of June 10th in Chetwynd that discussed the changes that the region can expect to see in coming decades.

Watch the talk delivered in Chetwynd on CHET-TV.

(Note: the talk is part of a 90-minute segment of community TV programming, of which the talk itself is the first hour.)

PCIC Co-Produced Report on the Cowichan Valley Featured in the Media

One of the first reports that PCIC co-produced with regional stakeholders has recently been featured in the media. The Times Colonist published an op-ed by Parker Jefferson, the co-chair of the Cowichan Stewardship Roundtable,that discusses, in part, how the 2017 document, Climate Projections for the Cowichan Valley Regional District, has been used to inform planning for the Cowichan River. Climate projections found in the report aided in the development of the Cowichan Water Use Plan, which includes a call to rebuild a weir on the Cowichan River to increase water storage.
For more information, read the Times Colonist article and the report, Climate Projections for the Cowichan Valley Regional District.

STAFF PROFILE: WHITNEY HUANG

Dr. Whitney Huang is a post-doctoral researcher jointly hosted by PCIC and Professor Adam Monahan of the UVic School of Earth and Ocean Sciences, with support for the position being provided by the Canadian Statistical Sciences Institute and the Statistical and Applied Mathematical Sciences Institute (SAMSI). Prior to joining PCIC and UVic, he completed a one-year post-doc at SAMSI at the University of North Carolina, Chapel Hill after receiving his PhD in Statistics from Purdue University.

Whitney's work focuses on developing statistical models and methods to work with spatial and spatio-temporal data, with a particular focus on extremes, such as 100-year storms. Asked about his choice to work in climate statistics, Whitney says, "I naturally became interested in working on climate applications because of the richness of space-time datasets, and the great concern of climate/weather extreme events." Climate statistics is, by its nature, interdisciplinary work, drawing together findings from a large number of disciplines. Commenting on this, Whitney says, "One thing I find interesting about working with people across different disciplines on climate extremes is that people from different research areas tend to have very different focuses." He continues, "my goal is to develop a coherent statistical framework that not only utilizes the available data as efficiently as possible, but also leverages physical knowledge for estimating extremes of geophysical processes."

Whitney's current work at PCIC is focused on modelling concurrent wind and precipitation extremes. He begins by pointing out that "such compound extreme events can have a large impact on building structure and hence require a careful analysis in order to provide useful guidance for building codes." Whitney explains that one important aspect of such extreme events is event simultaneity, that is, when two or more climate variables reach their high values at the same time and place. "It is critical to incorporate the timing information of extremes," Whitney explains. His work is focused on developing a new framework for the analysis of compound extremes while accounting for event simultaneity, which he notes is lacking for most of the existing statistical methods. This work involves using a large regional climate model ensemble to both assess these methods and to facilitate improved non-stationary modelling for concurrent wind and precipitation extremes.

PACIFIC CLIMATE SEMINAR SERIES

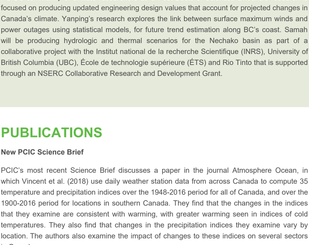

Figure 2: This figure shows Dr. William Hsieh giving his lecture on April 10th.

Before breaking for the summer semester, the Pacific Climate Seminar series wrapped up with a talk on April 10th titled, *Applying machine learning methods to the environmental sciences—opportunities and pitfalls* delivered by Dr. William Hsieh.

More information on Dr. Hsieh's talk can be found, here.

The Pacific Climate Seminar Series will resume this fall. Details for fall talks will be released on PCIC's website and through our mailing list.

PCIC STAFF NEWS

Over the last few months PCIC has been happy to welcome Drs. Dhouha Ouali and Yanping He to research staff positions, and Dr. Samah Larabi as a Post-doctoral Scientist in Hydrology. Dhouha and Yanping continue their work at PCIC as Research Associates, and Samah joins PCIC's community of affiliate researchers as a Post-Doctoral Scientist. Dhouha's research is focused on producing updated engineering design values that account for projected changes in Canada's climate. Yanping's research explores the link between surface maximum winds and power outages using statistical models, for future trend estimation along BC's coast. Samah will be producing hydrologic and thermal scenarios for the Nechako basin as part of a collaborative project with the Institut national de la recherche Scientifique (INRS), University of British Columbia (UBC), École de technologie supérieure (ETS) and Rio Tinto that is supported through an NSERC Collaborative Research and Development Grant.

PUBLICATIONS

New PCIC Science Brief

PCIC's most recent Science Brief discusses a paper in the journal Atmosphere Ocean, in which Vincent et al. (2018) use daily weather station data from across Canada to compute 35 temperature and precipitation indices over the 1948-2016 period for all of Canada, and over the 1900-2016 period for locations in southern Canada. They find that the changes in the indices that they examine are consistent with warming, with greater warming seen in indices of cold temperatures. They also find that changes in the precipitation indices they examine vary by location. The authors also examine the impact of changes to these indices on several sectors in Canada.

Read the new Science Brief.

PEER-REVIEWED PUBLICATIONS

He, Y., N. McFarlane and A. H. Monahan, 2019: A New TKE based Parameterization of Atmospheric Turbulence in the Canadian Global and Regional Climate Models. *Journal of Advances in Modeling Earth Systems*, **11**, 5, doi:10.1029/2018MS001532.

Sillmann, J., C. Weum Stjern, G. Myhre, B. Samset, Ø. Hodnebrog, O. Boucher, P. Forster, A. Kirkevåg, J.F. Lamarque, D. Olivié, D. Shindell, A. Voulgarakis, **F. Zwiers**, T. Andrews, G. Faluvegi, M. Kasoar, T. Richardson, T. Takemura, and V. Kharin, 2019: Extreme wet and dry conditions affected differently by greenhouse gases and aerosols. *Accepted, npj Climate and Atmospheric Science*.

Li, C., **F. Zwiers**, X. Zhang, G. Chen, J. Lu, G. Li, J. Norris, **Y. Tan**, Y. Sun and M. Liu, 2019: Larger increases in more extreme local precipitation events as climate warms. *Geophysical Research Letters*, Accepted, Early Online View, doi:10.1029/2019GL082908.

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