Regional climate impacts assessments in southwestern British Columbia
using high-resolution statistical downscaling
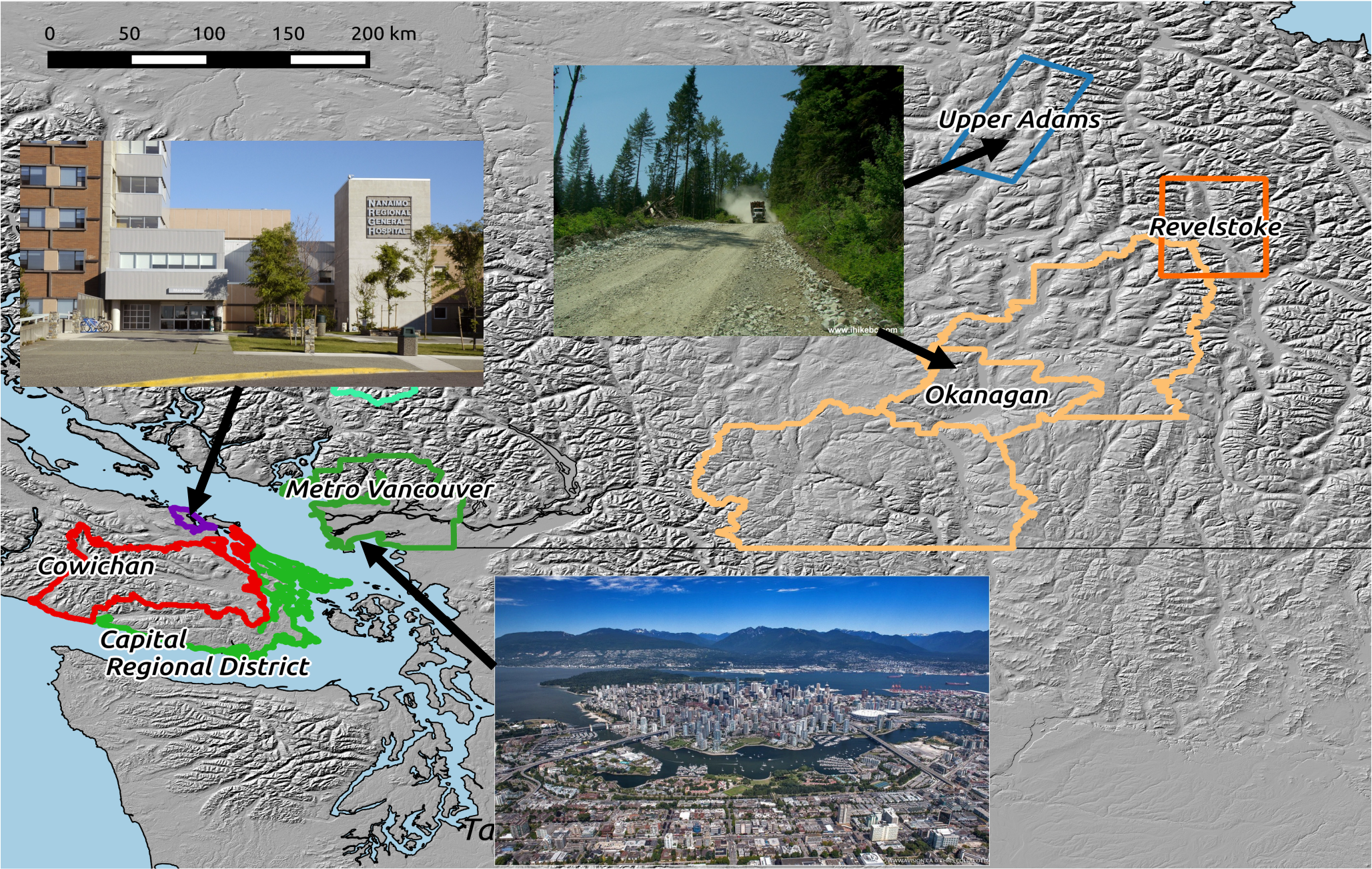
Trevor Murdock, Pacific Climate Impacts Consortium
Stephen Sobie, Pacific Climate Impacts Consortium

University of Victoria

PACIFIC CLIMATE
IMPACTS CONSORTIUM

Regional Climate Assessments

Upper Adams

Revelstoke

Okanagan

Metro Vancouver

Cowichan

Capital Regional District

Statistically downscaled climate projections

- Ensemble of 12 GCMs
- Downscaled to 1/12° (~10km)
- Bias corrected constructed analogues with quantile mapping (BCCAQ)
- Distribution, sequencing from BCCI
- Spatial covariance from BCCA
- Available in NetCDF format from PCIC data portal
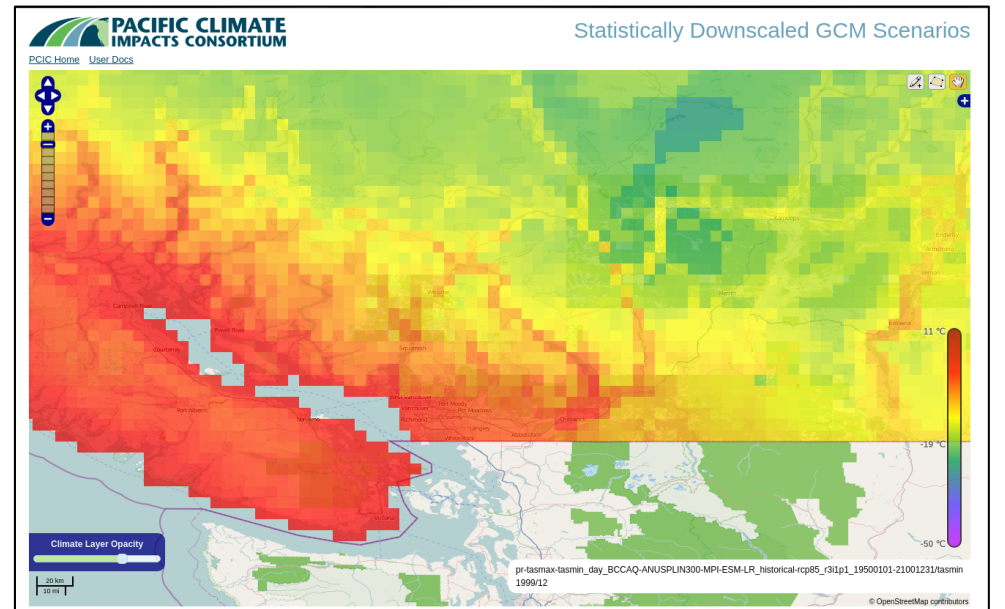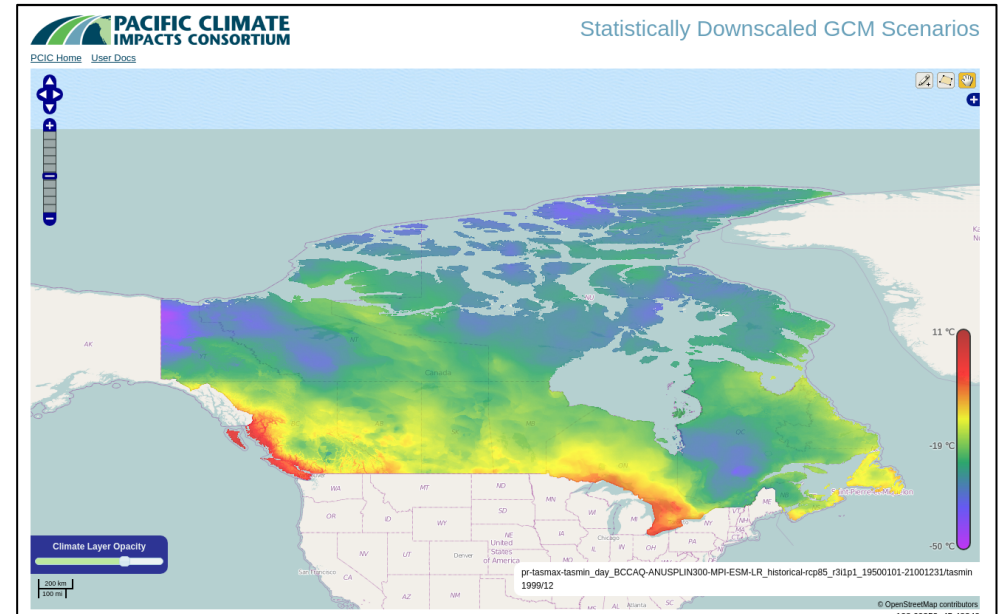
High-resolution bias correction

- PRISM: Parameter-Elevation Regression on Independent Slopes Model (PCIC/OSU)
- 30-arcsec (800 m) resolution
- PCIC Provincial Climate Dataset
- Multiple government and industry station networks
- Monthly Climatologies 1971-2000, 1981-2010
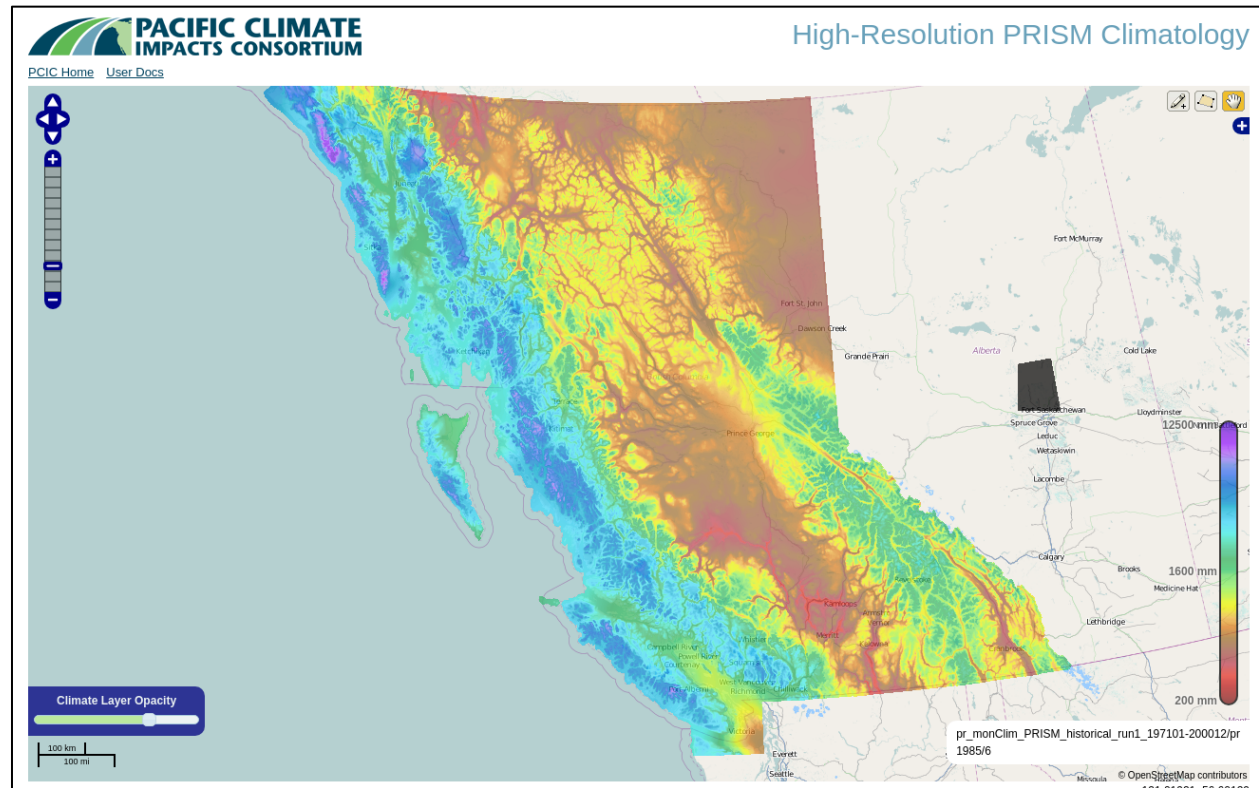
Downscaling + bias correction

Lower Mainland
Summer Days Anomalies
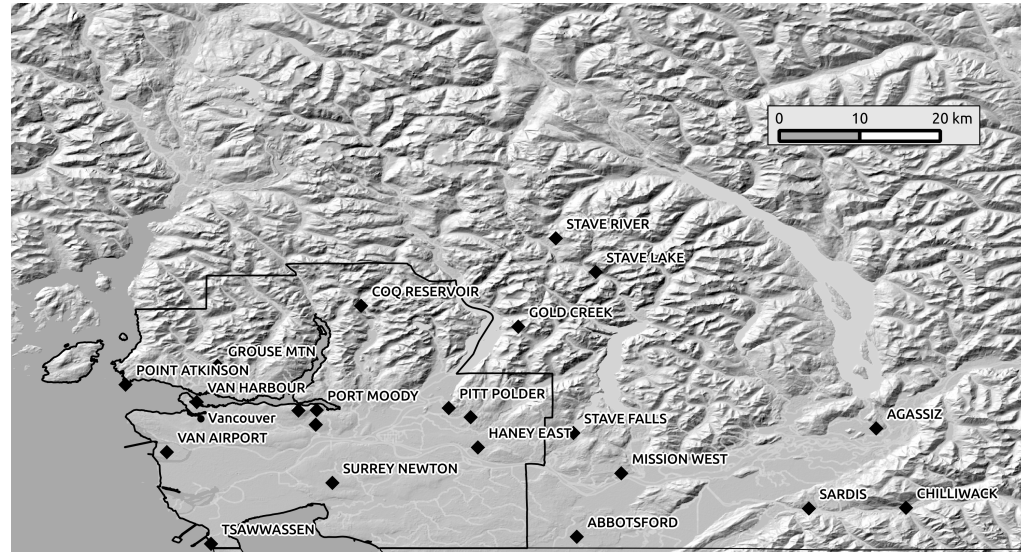**CMIP5 Ensemble RCP85 (2041-2070)**
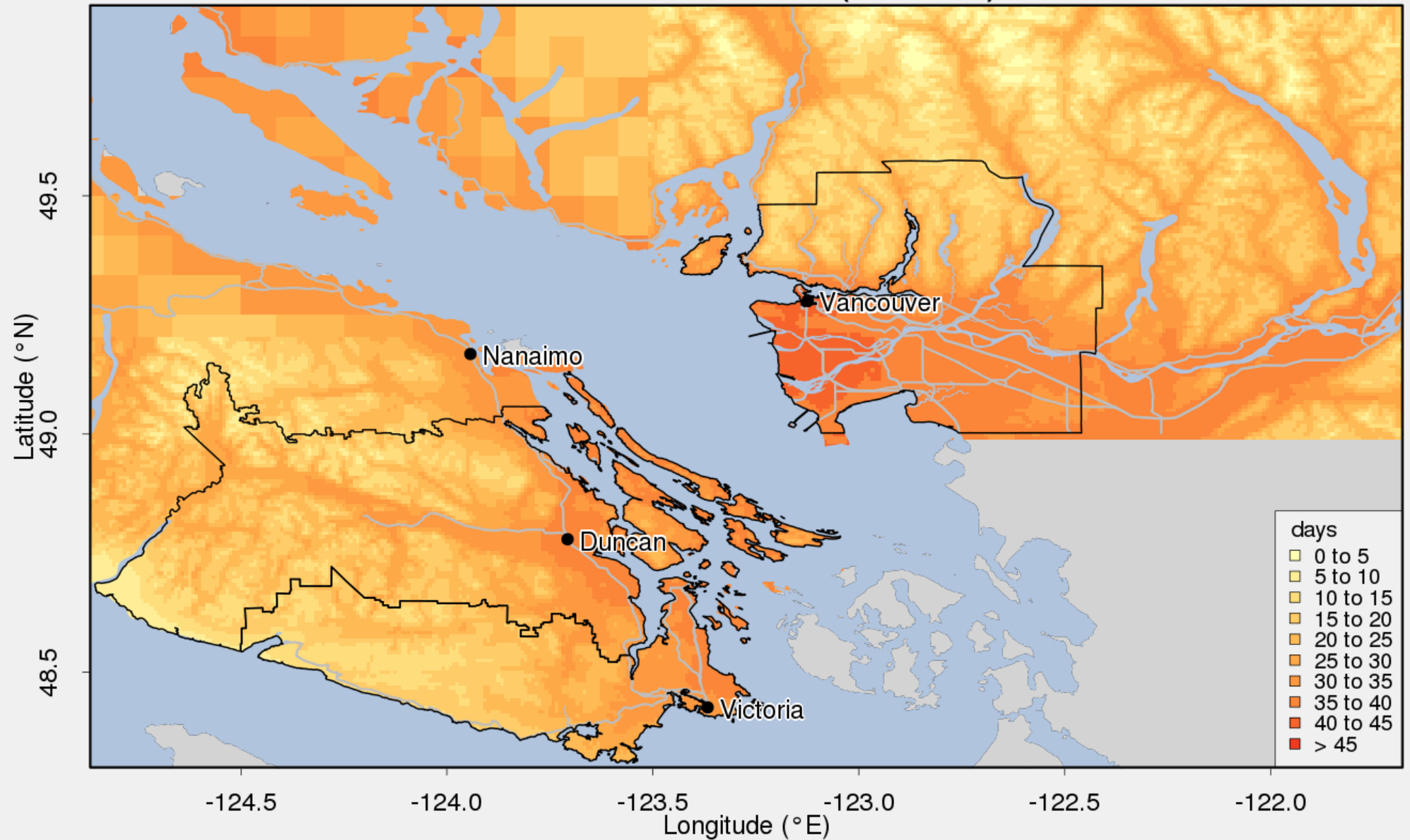
Does bias-correction add value?
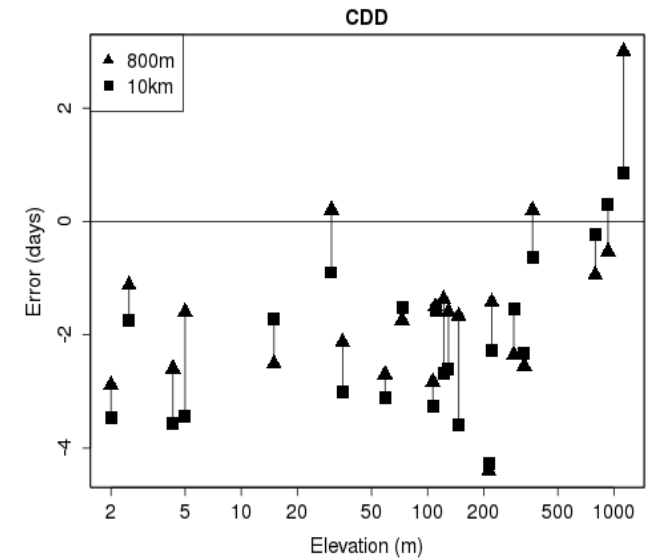
Stations compared to
- NCEP-driven BCCAQ (10 km)
- PRISM (800 m)
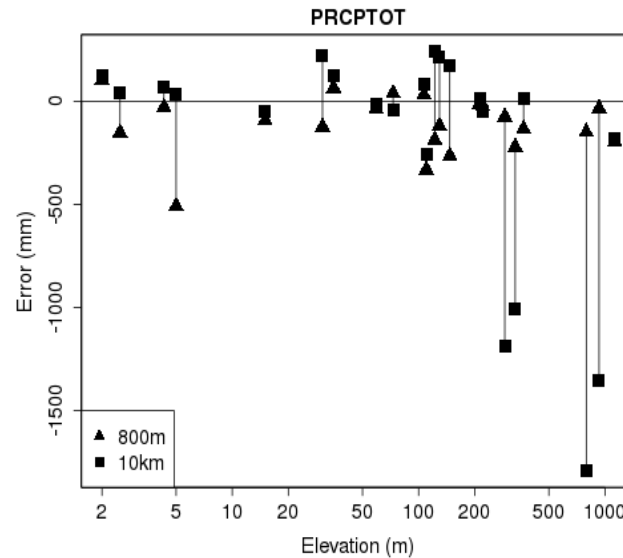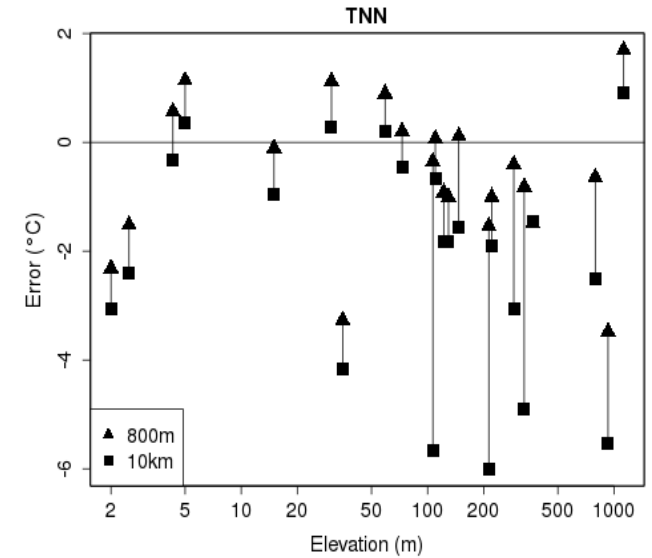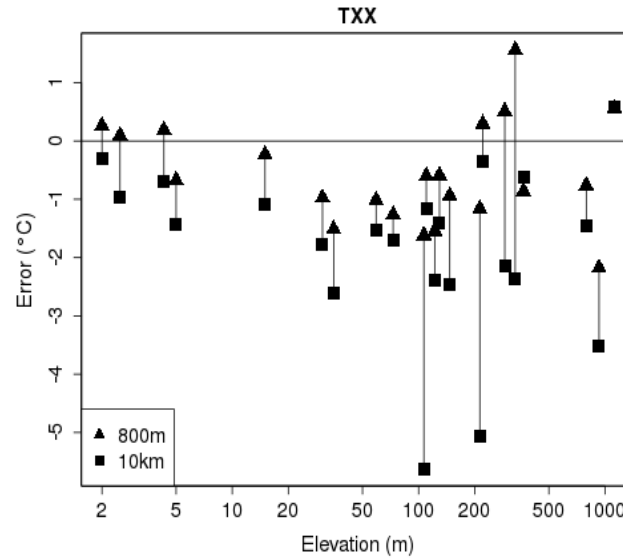
Bias-corrected using 1971-2000
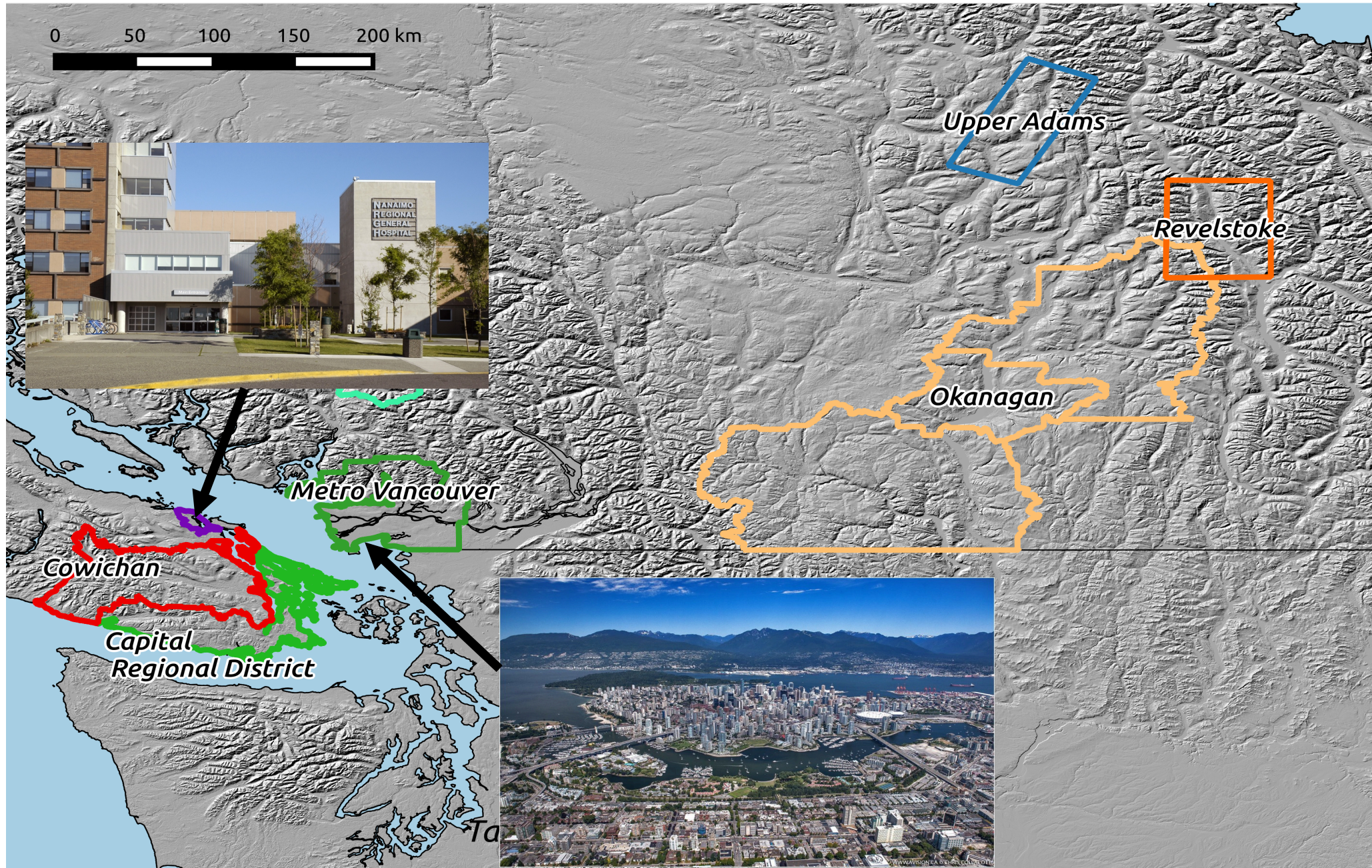
Validated using 1950-1970 and 2000-2010

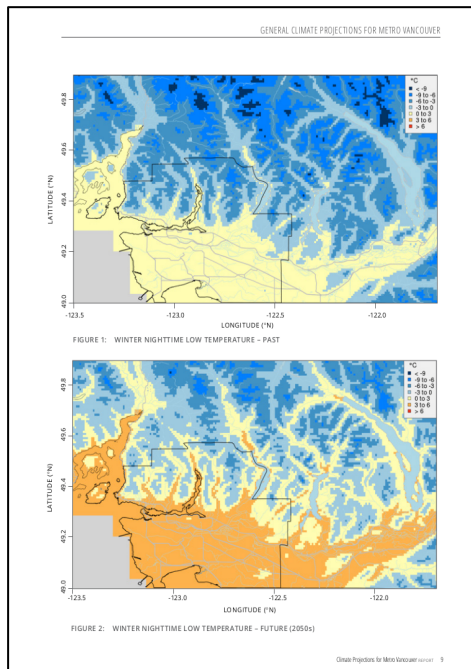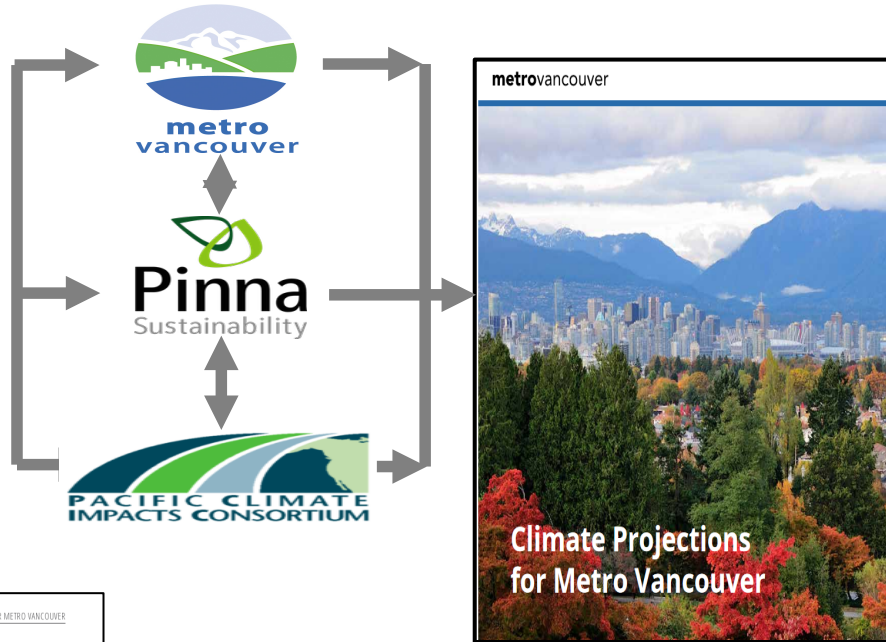# Validation of bias-correction

- Moderate improvement at low elevations

- Greatest improvement at high elevation

- Some exceptions

Regional Climate Assessments

Metro Vancouver

- Drinking Water
- Storm Water
- Urban Forestry
- Building Design
- Sewage

By the 2050s Vancouver will have
WARMER WINTERS
58% decrease in snowpack
Learn more: vancouver.ca/climateadaptation

By the 2050s Vancouver will have
WARMER SPRINGS
72% decrease in frost days
mountain snow melts earlier
Learn more: vancouver.ca/climateadaptation

By the 2050s Vancouver will have
WETTER AUTUMNS
21% more rain on the wettest days
a higher flood risk
Learn more: vancouver.ca/climateadaptation

By the 2050s Vancouver will have
HOTTER DRIER SUMMERS
more frequent heat waves
increased health risks to vulnerable people
Learn more: vancouver.ca/climateadaptation

Water Supply and Demand

The majority of the region's drinking water comes from mountain reservoirs fed by rainfall and snowmelt. An increase in daytime high and nighttime low temperatures will cause more precipitation to fall as rain in the winter months. Rather than winter precipitation falling as snow to build a strong snowpack, winter rains and warmer temperatures will erode the winter snowpack and have a negative effect on the depth and duration of the snowpack into the spring and summer months.

Monthly precipitation projections also indicate drier summers that could extend later into the year. At current levels of water use in our region, warmer annual temperatures and longer dry spells over the summer months, combined with reductions in snowpack, could put strain on the existing water supply during times of the year when temperatures are high and water is in greatest demand.

Despite water conservation efforts, water demand is anticipated to increase to meet the needs of a growing population. Warmer summer temperatures and extended droughts could intensify these trends, potentially leading to increased water demand for outdoor water use and recreational activities.

Increases in the magnitude of extreme rainfall events may increase the possibility of landslides in our region's mountain areas, which could introduce additional turbidity into drinking water reservoirs.

Three Reports Three Approaches

Metro Vancouver

- Internally driven → Water and sanitation department

Capital Region

- Internal, cross departmental process → CRD services & municipal governments
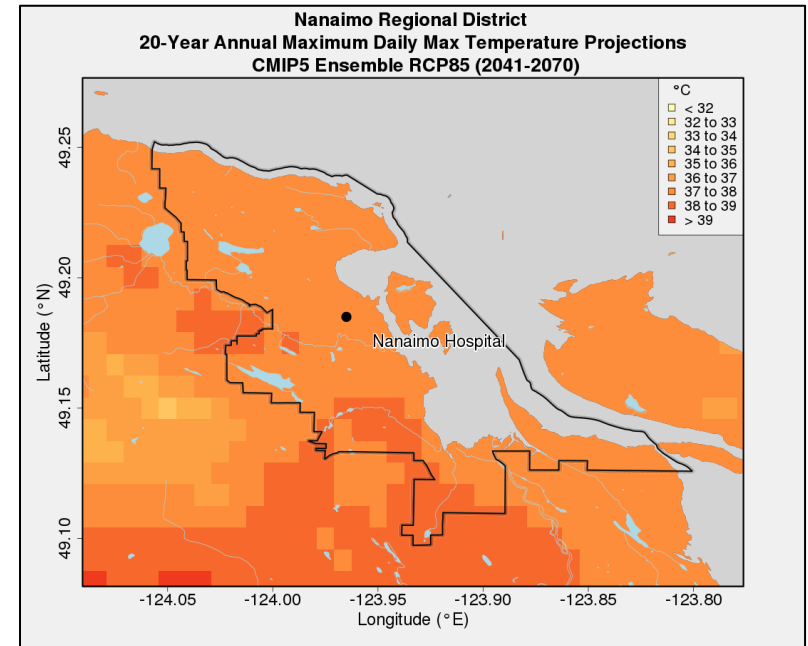

Cowichan Valley

- Community driven process → Regional, municipal & community leaders

Nanaimo Hospital

- Engineering and Design
- Updated Building Code Parameters
- Heating, Cooling, Humidity planning changes

Nanaimo Regional District
20-Year Annual Maximum Daily Max Temperature Projections
CMIP5 Ensemble RCP85 (2041-2070)

Indicator	Definition	Unit	BCBC/ ASHRAE	Past	2050s	Change
Warm month	Warm Month Design Wet Bulb Temp 97.5% (BCBC)	°C	19	20.3	23.6	3.3
Cooling Dry Bulb 99.6%	Peak daily design temperature used for sizing cooling systems (ASHRAE) – similar to BCBC Warm Month Design Temperature 97.5%	°C	26.8	29.8	33.4	3.6
5-Year Return Period Daily Max Temperature	1-in-5 year hot day (ASHRAE)	°C	32.2	32.2	36.0	3.8
CDD(18.3)	Cooling degree days	Degree-Days	10	53	244	191
HDD(18C)	Heating degree days	Degree-Days	3000	2984	2166	-818

Summary

- BCCAQ+PRISM – adds real value beyond better looking maps

- Biggest improvements at high elevation, precipitation

- Helps inform co-produced, iterative reports & adaptation projects

Questions?

Media & lessons learned

The Province — FEBRUARY 26, 2017

MIKE SMYTH: Key to housing crunch lies in density, Liberals believe Page 6

CANUCKS: It's the end of an era, but the fu...

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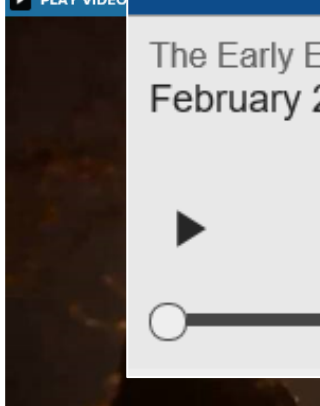
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POLICY | 03/01/17

Will global warming turn Vancouver into San Diego? Not so much

Pacific Institute for Climate Solutions
Knowledge. Insight. Action.

Climate change is set to give Vancouver balmy, southern California-style weather by 2050, with warmer summers and longer growing seasons—at least according to reports by regional media outlets this past week. This idyllic picture was accompanied by warnings of wildfires and torrential rains.

However these stories give audiences an impression that is simultaneously too rosy a picture while exaggerating the dangers.

Monthly bias @ validation sites