Water temperature of the Nechako River under a changing climate

Richard Arsenault, Eng. PhD.

Research project goal

Evaluate as best as possible the impacts of climate change on water temperatures in the Nechako River, along with the associated uncertainty.

Project objectives

1. Water temperature modelling of the Nechako River is necessary to simulate water temperature variations due to climate change:
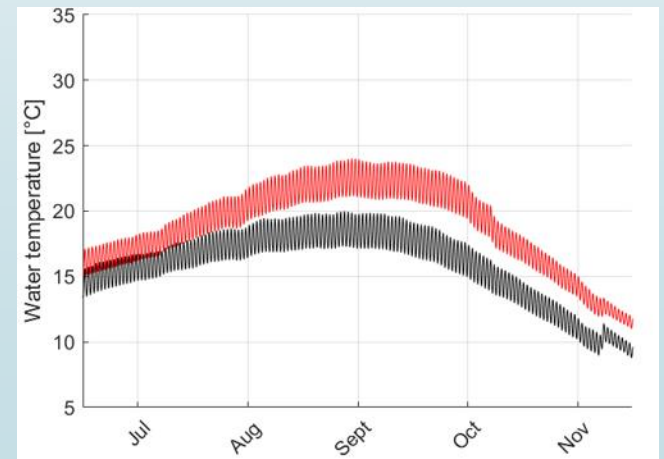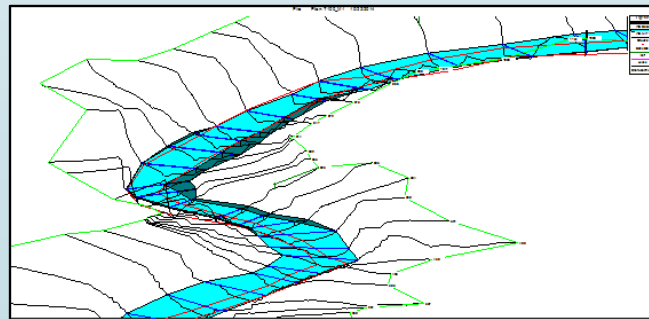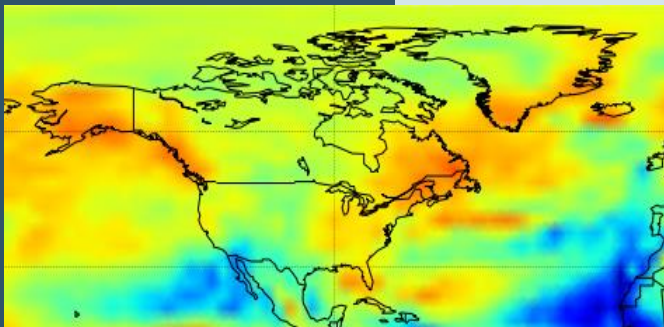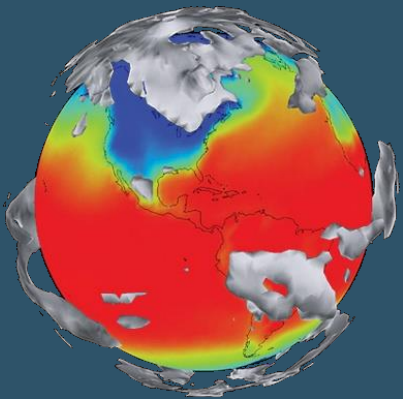
   ➡ Create and parameterize water temperature models for the Nechako.
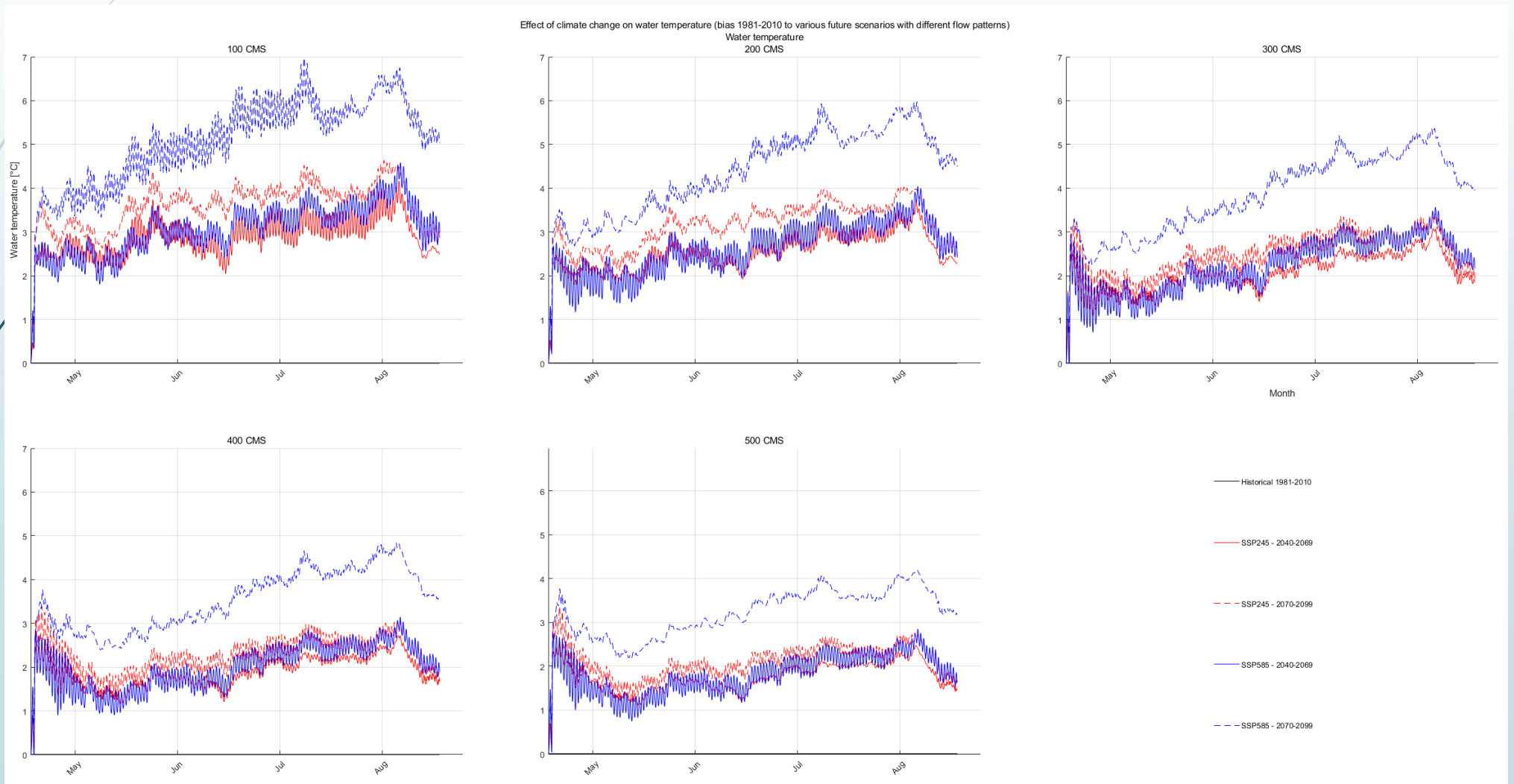

Results of the thermal simulations
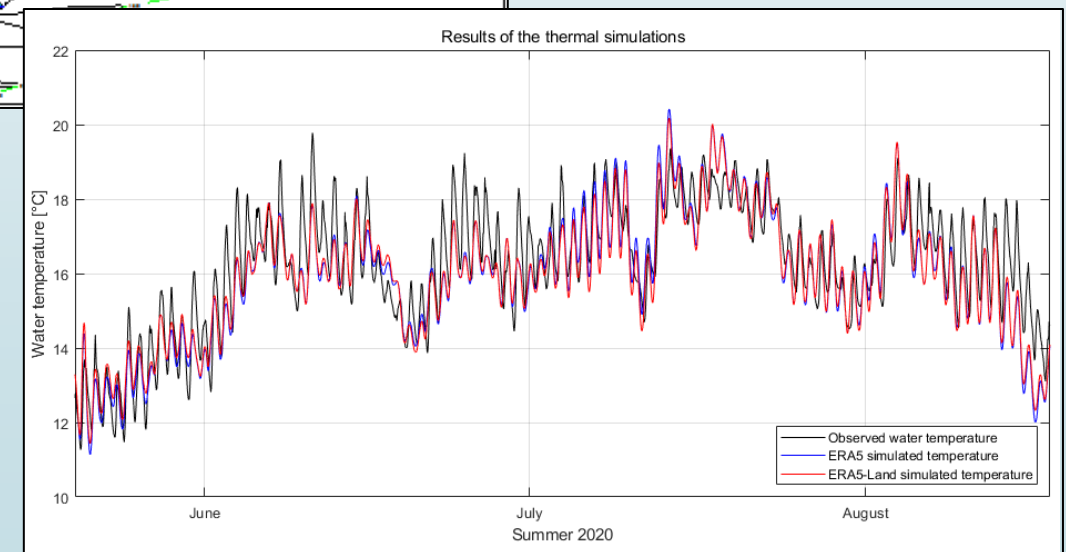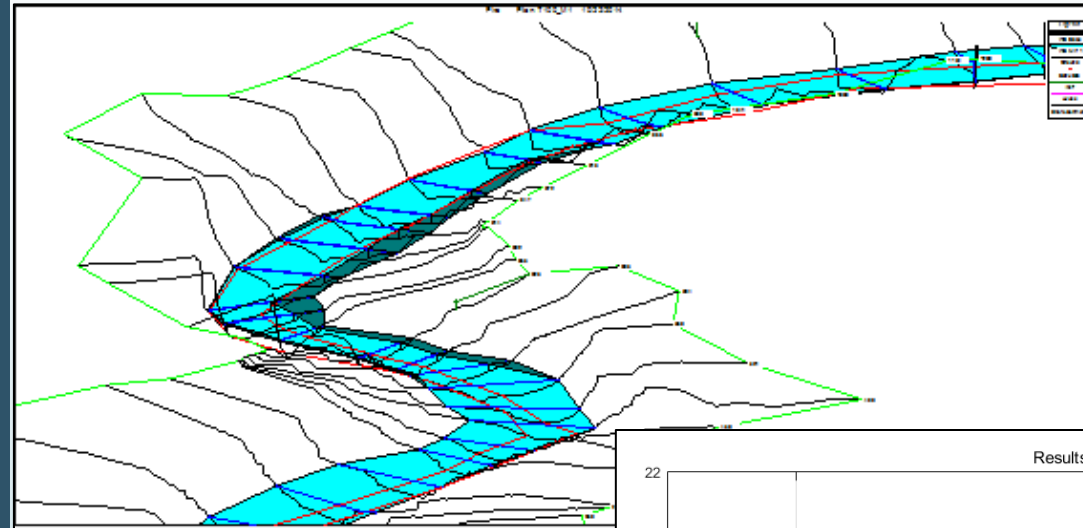
Project objectives

2. Evaluating the impacts of climate change requires understanding the intricacies of climate modelling in order to ensure robust results:

   ➧ Implement state-of-the-art climate model processing techniques to estimate the future climate (and thus future water temperatures).

3. Simulation of the impacts of climate change is rife with uncertainties (What will the future look like? How will mankind's greenhouse gas emissions evolve?):

   ➧ Integrate uncertainty sources in the climate change impacts assessment.

Overview of main results

1. Water temperature will likely increase in the future

Effect of climate change on water temperature (bias 1981-2010 to various future scenarios with different flow patterns)

Overview of main results

2. The uncertainty is rather large, depending on the hypotheses and horizon
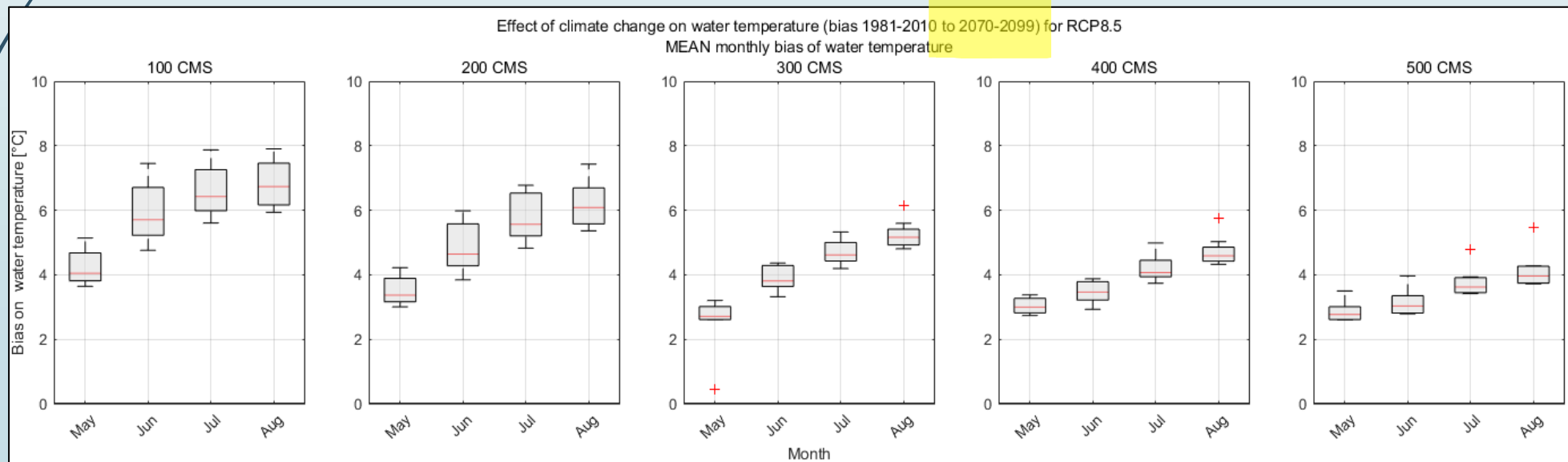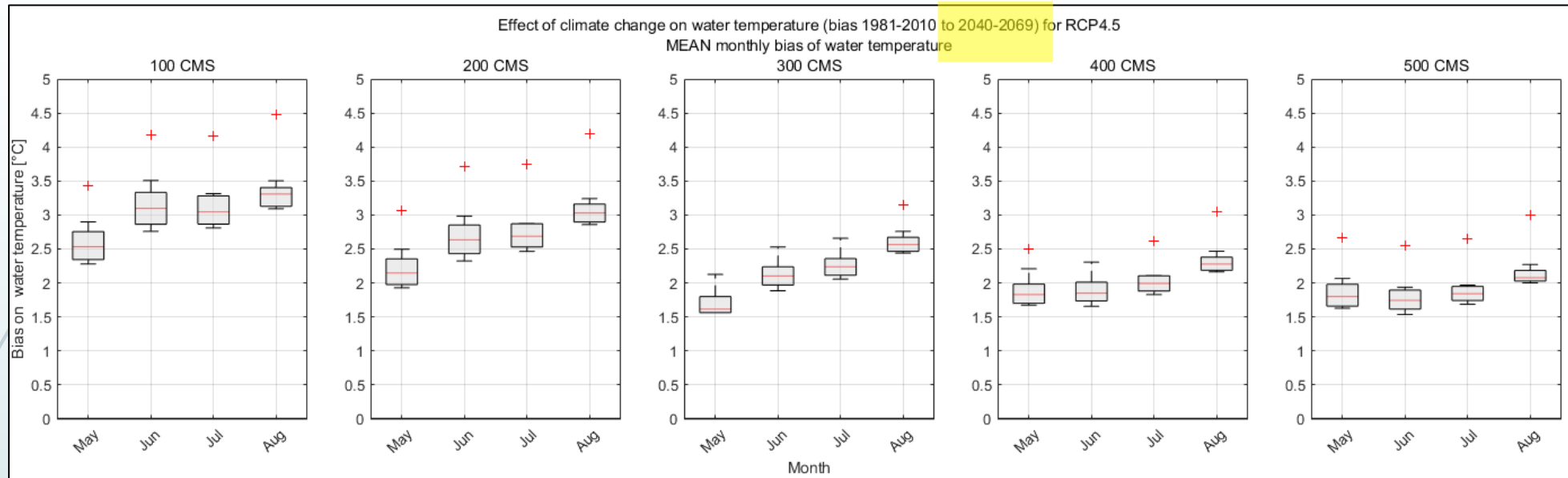
Key findings

Water temperatures will **likely increase** in the future due to climate change.

Increases will depend on the actual climate change, but we can already estimate them to be in the order of **2-3°C compared** to current temperatures if managed inefficiently (constant releases).

Some high-flow releases have no impact on temperature, or actually **increase** average daily temperatures.

Temperature of water released at Skins Lake has little to no bearing on temperatures at Vanderhoof or Finmoore (thermal equilibrium is reached in Cheslatta-Murray lakes)

Next steps

- Evaluating the impacts of changes in water releases on water temperatures

- Including flows from the Stuart River to assess how temperatures will change beyond Finmoore in the Nechako River

- Working - and comparing results – with other groups (Stephen Dery)

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