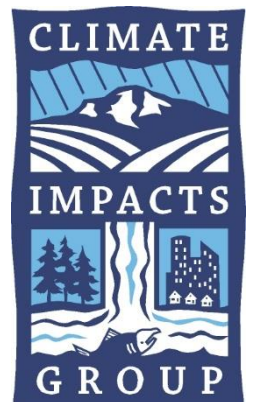


Changing Streamflow in Icicle, Peshastin, and Mission Creek, and the seven Alpine Lakes

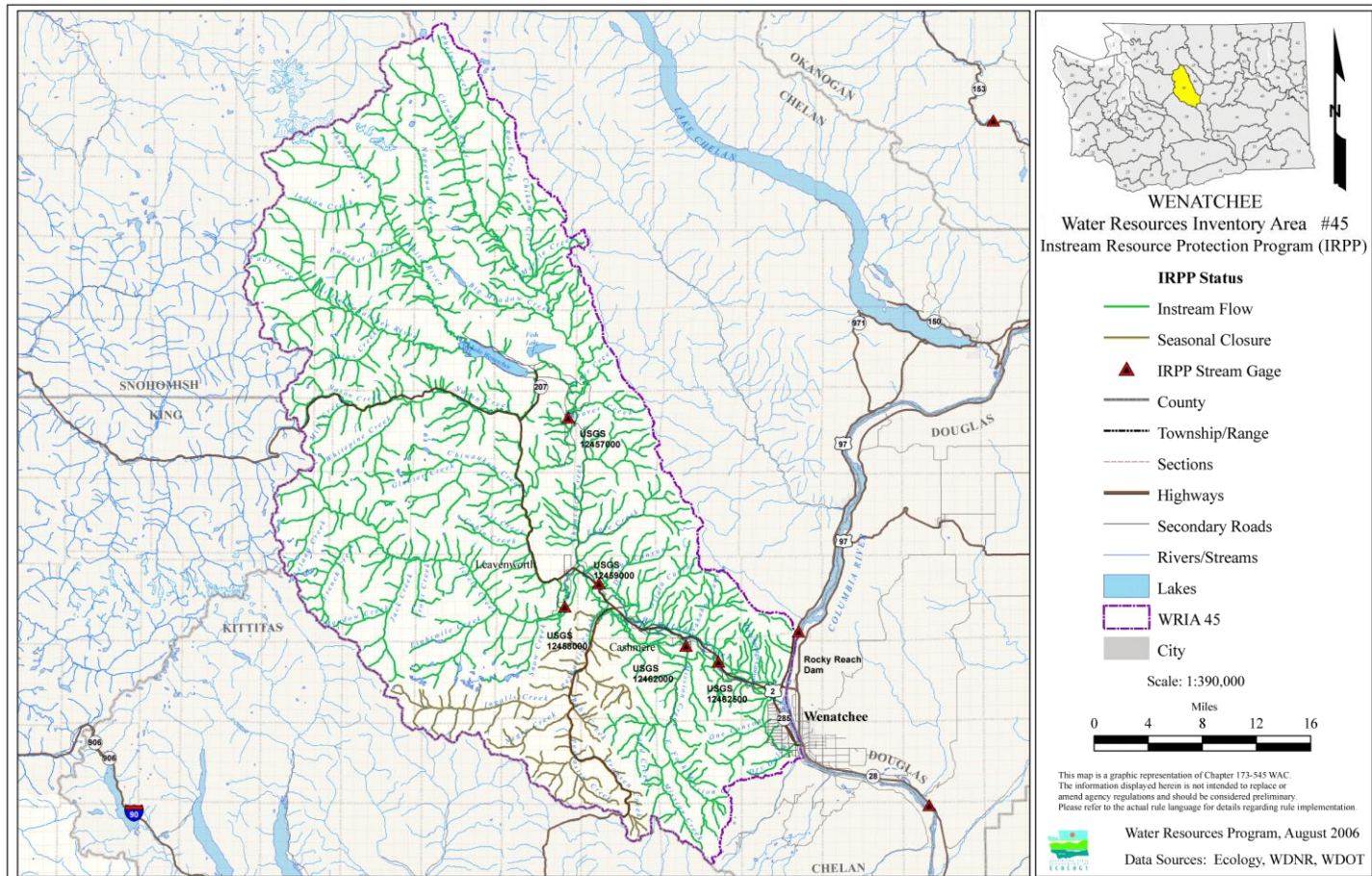
Guillaume Mauger

Climate Impacts Group
University of Washington



Purpose of this project:

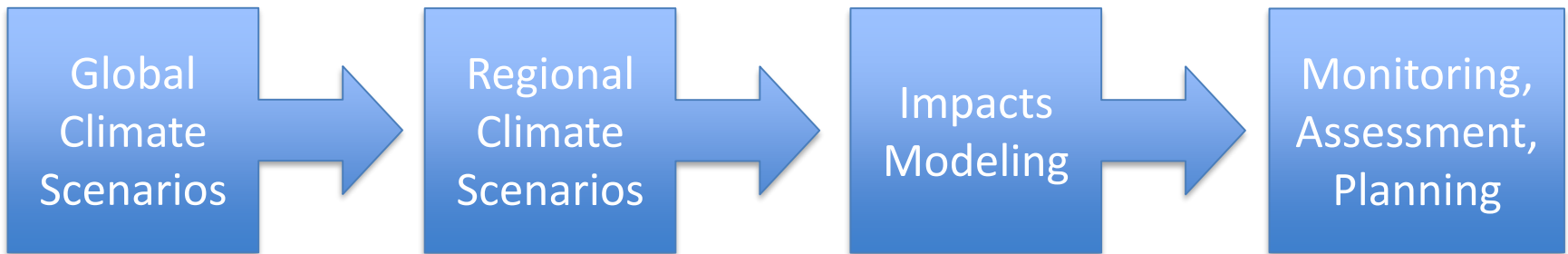
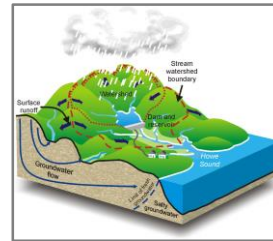
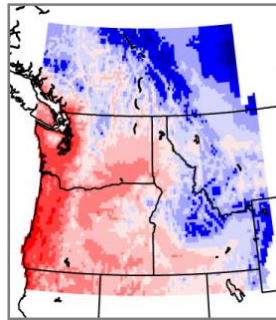
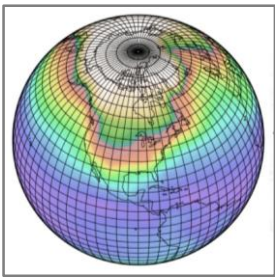
Develop estimated changes in streamflow using off-the-shelf hydrologic change datasets.



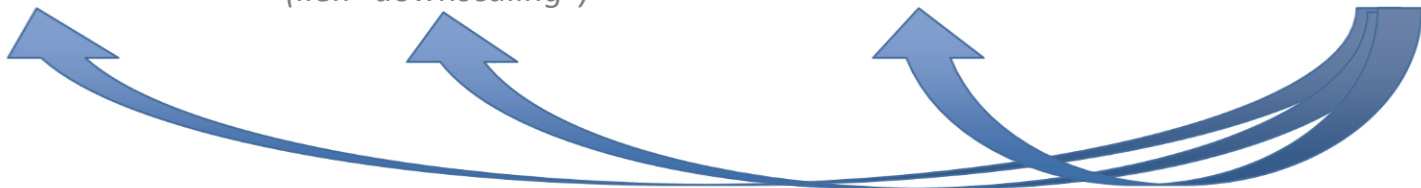
Datasets

MACA	Newer approach: Multivariate Adaptive Constructed Analogs (U-Idaho)
bcMACA	Modified version of MACA (UW)
WSU	Used in Columbia River Forecast. Same methods as MACA (WSU)
HB2860	Older approach: Bias Correction and Spatial Disaggregation (BCSD) method (UW)
bcWRF	Regional Climate Model simulations using the Weather Research and Forecasting (WRF) model (UW)

Quantifying Climate Impacts



(i.e.: "downscaling")



Summary:

1

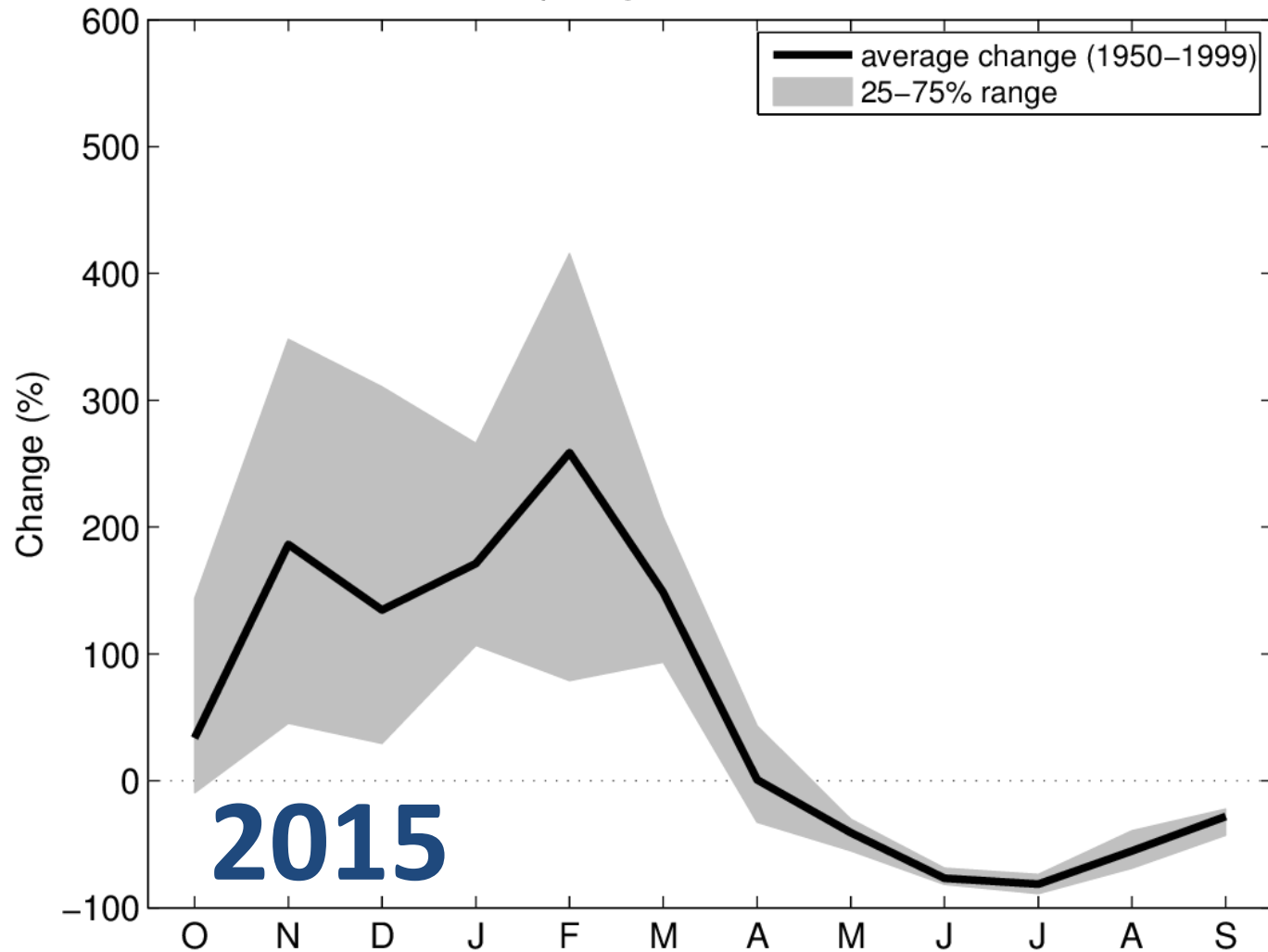
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3

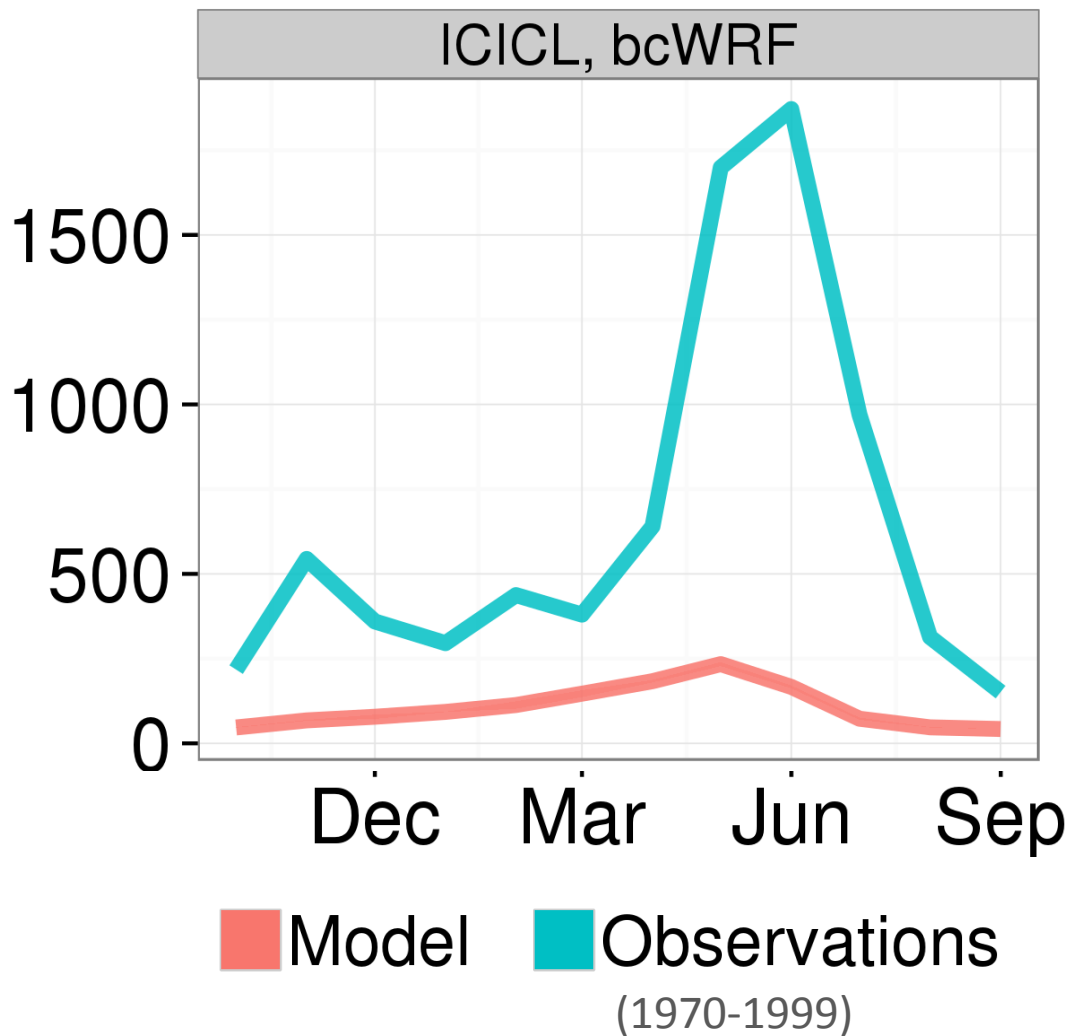
	Greenhouse Gas Scenario			Climate Models		Downscaling		Years		
	Low	Moderate	High	New (CMIP5)	Old (CMIP3)	Statistical	Dynamical	2030s	2050s	2080s
MACA	✓	?	✓	✓	?	✓	?	✓	✓	✓
bcMACA	✓	?	✓	✓	?	✓	?	✓	✓	✓
WSU	✓	?	✓	✓	?	✓	?	✓	?	?
HB2860	?	✓	?	?	✓	✓	?	✓	✓	✓
bcWRF	?	✓	?	?	✓	?	✓	✓	✓	?

4

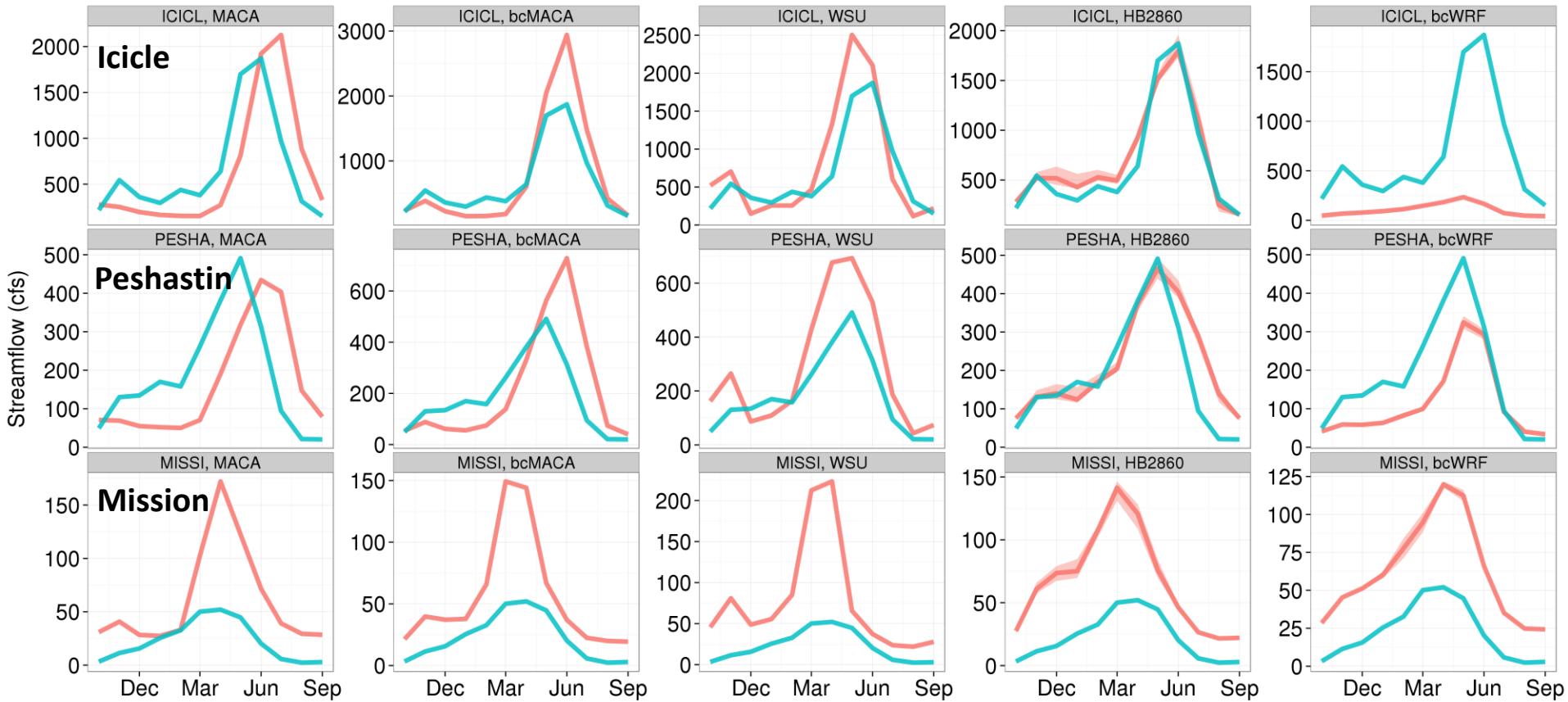
2015 vs. 1950-1999



Comparison with Obs: Icicle

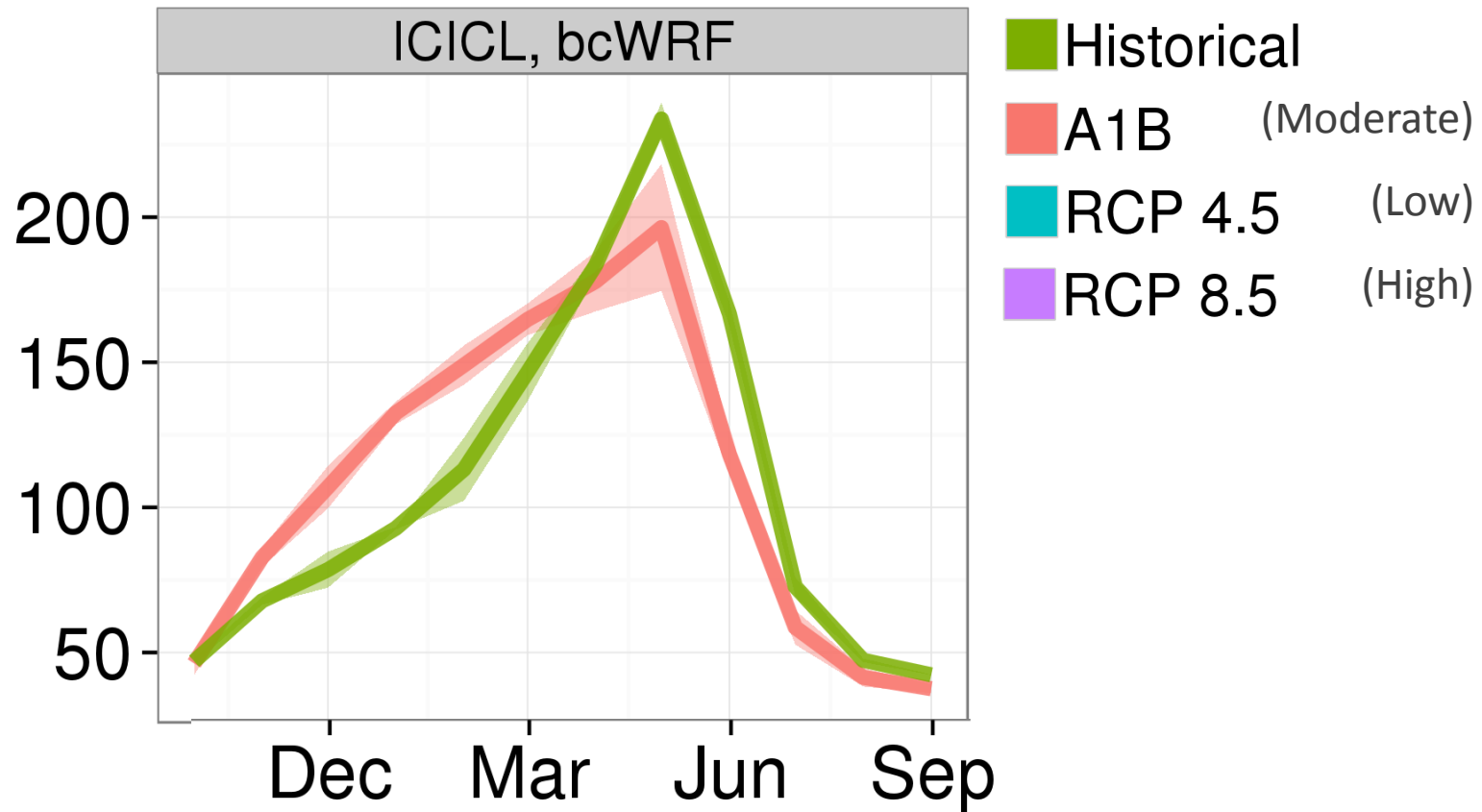


Comparison with Obs: Creeks



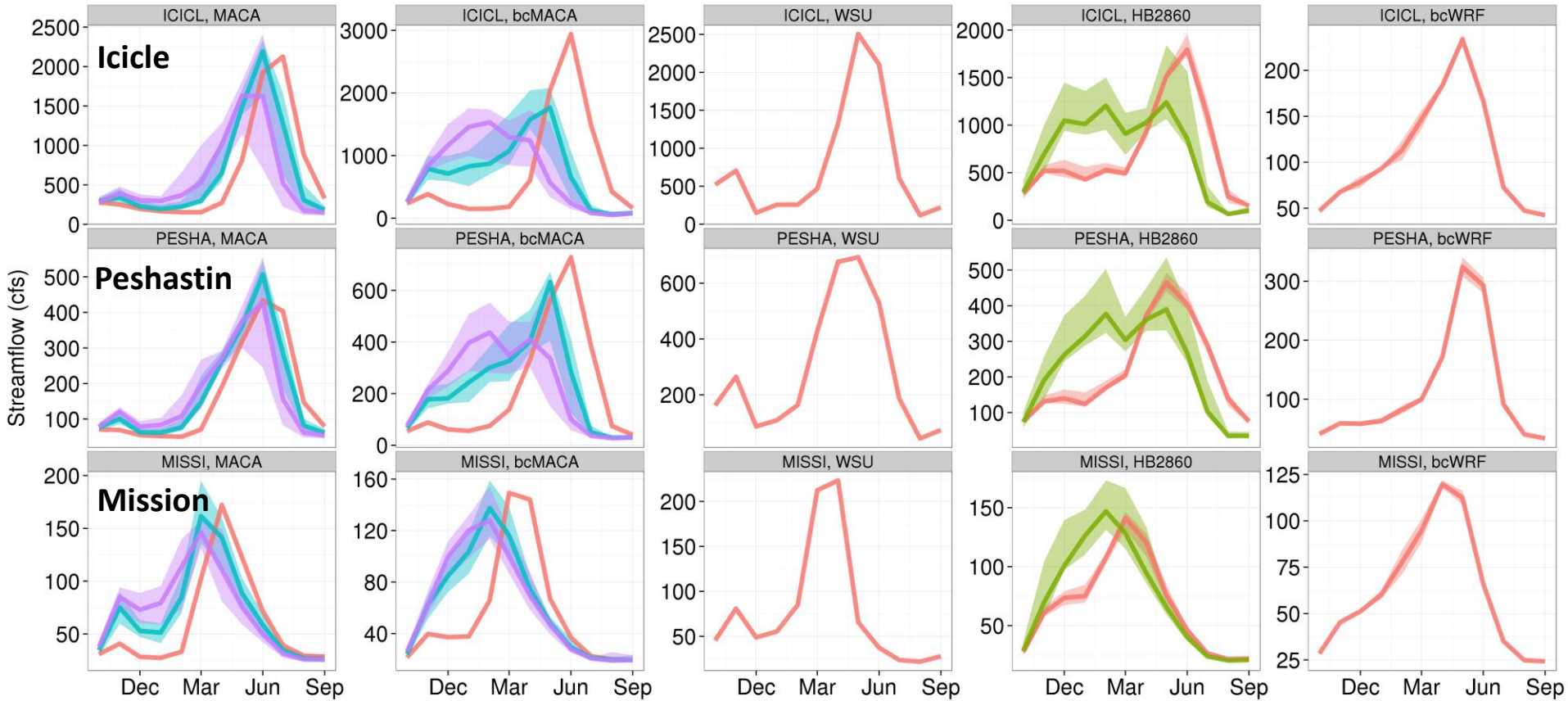
■ Model ■ Observations

Projections: Icicle



2030s

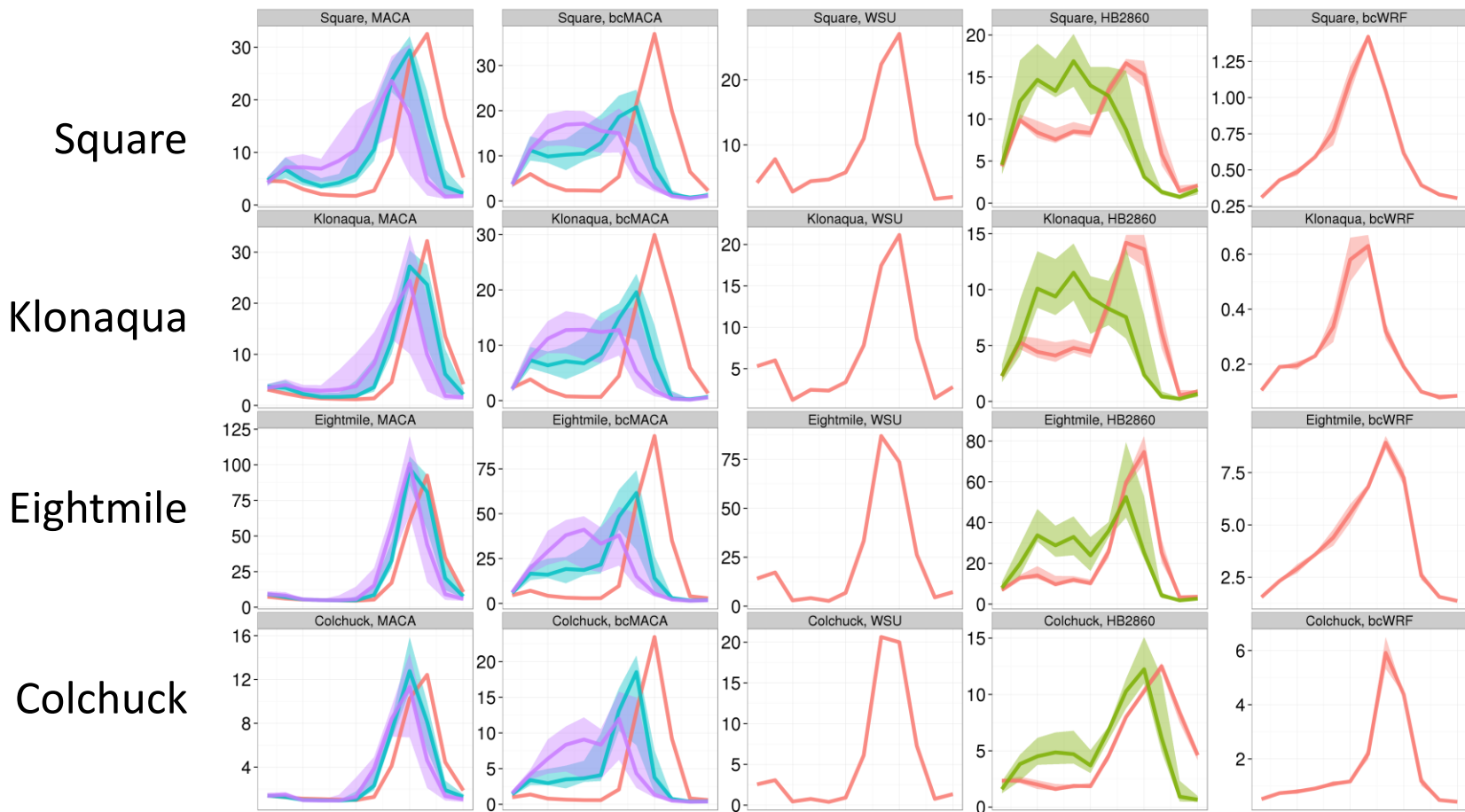
Projections: Creeks



Historical A1B RCP 4.5 RCP 8.5

2080s

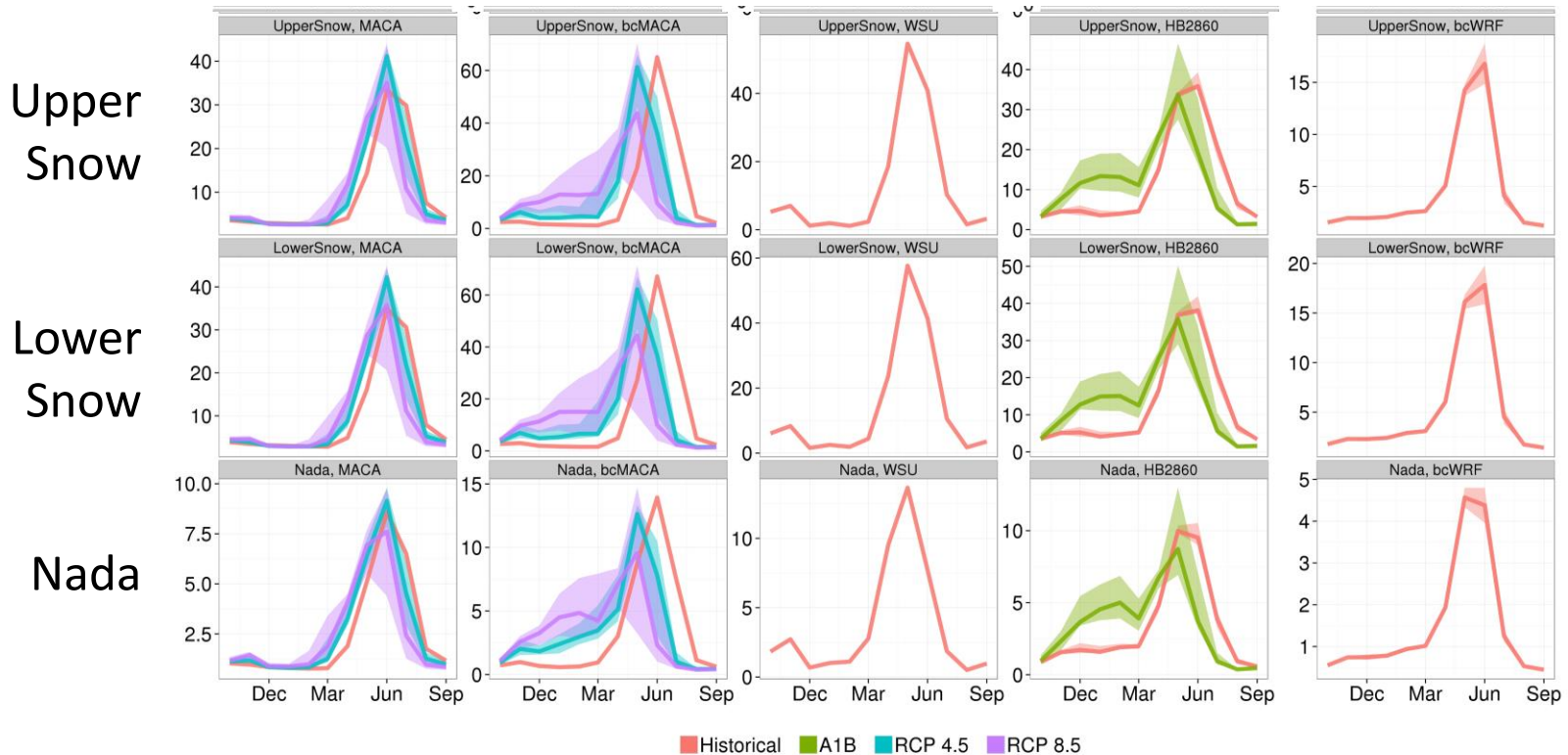
Projections: Lakes



■ Historical
 ■ A1B
 ■ RCP 4.5
 ■ RCP 8.5

2080s

Projections: Upper Snow, Lower Snow, Nada



■ Historical
 ■ A1B
 ■ RCP 4.5
 ■ RCP 8.5

2080s

Robert Norheim - Profile

Download Workbook

Percent Change | Monthly Streamflow

Streamflow Site
Icicle Creek

Decade
 2030s
 2050s
 2080s

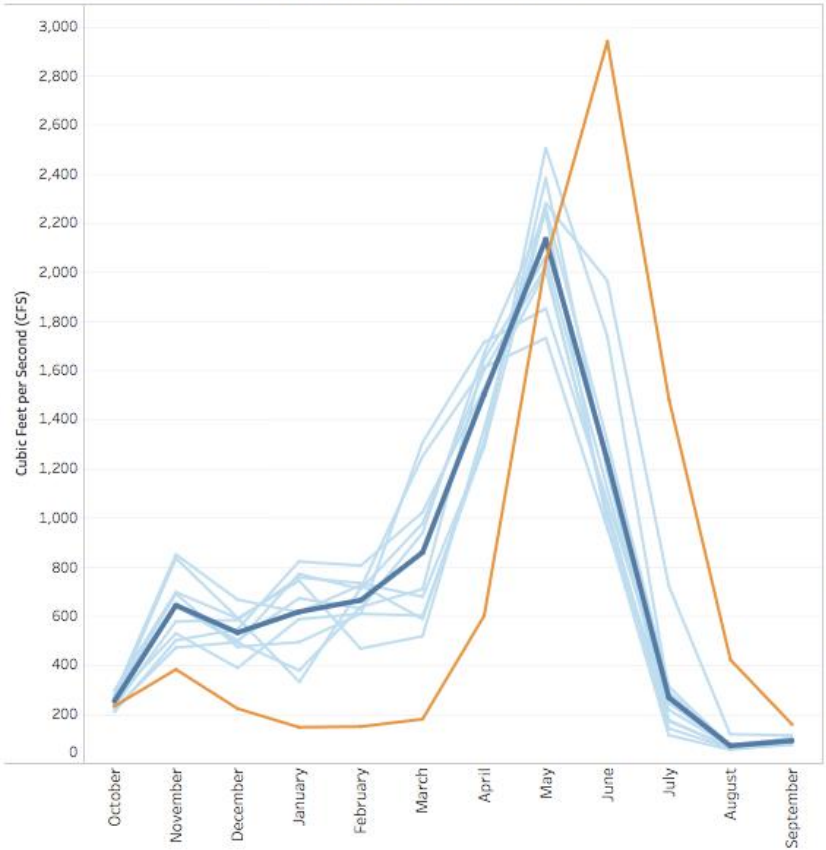
Dataset
 bcMACA
 bcWRF
 HB2060
 MACA
 WSU

Greenhouse Gas Scenario
 Low (rcp4.5)
 High (rcp8.5)

Historical streamflow
 Predicted streamflow:
 Ensemble average
 GCM instance



Monthly Flows for Icicle Creek, 2050s



Description of Datasets

MACA -- Multivariate Adaptive Constructed Analogs (<http://maca.northwestknowledge.net>, Abatzoglou and Brown, 2012). A statistically downscaled dataset, based on the latest global climate model projections (CMIP5). Projections extend from 1950-2099 and include both a low and a high greenhouse gas scenario (RCP 4.5 and 8.5, respectively).

bcMACA -- An adjusted version of the MACA dataset in which average monthly temperature and precipitation is adjusted to match the estimates derived from the observationally-based PRISM dataset (<http://www.prism.oregonstate.edu>, Daly et al. 2008). Projections are based on the same models and scenarios as MACA.

WSU -- A new set of hydrologic projections based on the MACA downscaled climate dataset (<http://www.ecy.wa.gov/programs/awrcwp/2016Forecast>, Hall et al. 2016). Projections are based on the same models and scenarios as MACA, but only extend from 1979-2011 and 2018-2050, meaning that future changes are only available for the 2030s.

HB2060 -- Statistically downscaled projections using the Bias Correction and Spatial Disaggregation (BCSD) method (<http://warm.atmos.washington.edu/2060/>, Hamlet et al. 2013). Projections are based on the previous set of global climate model projections (CMIP3). Projections extend from 1950-2099 and are based on a middle-of-the-road greenhouse gas scenario (A1B).

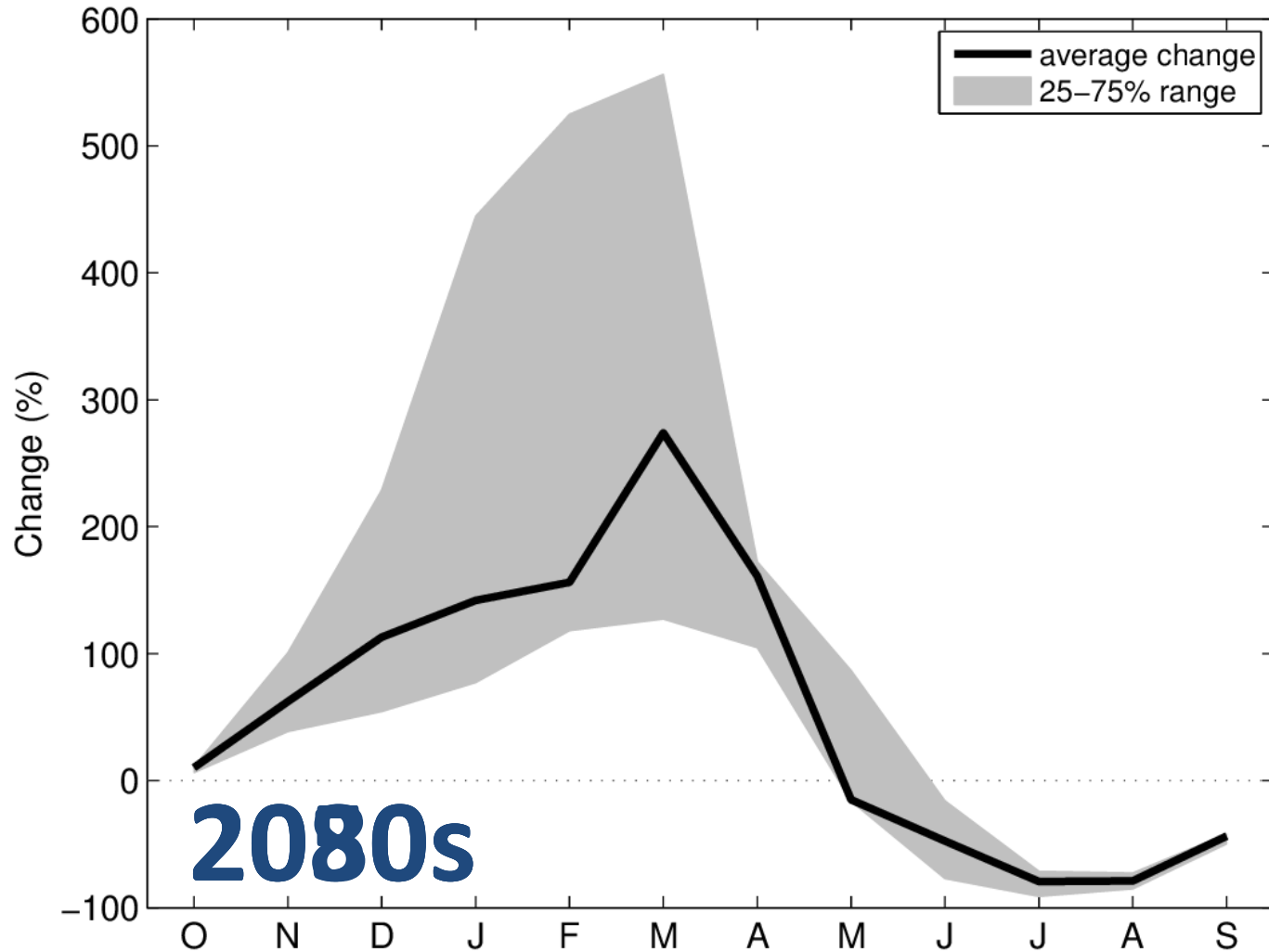
bcWRF -- Regional Climate Model simulations using the Weather Research and Forecasting (WRF) mesoscale model (Salathé et al. 2010). Projections extend from 1970-2069, meaning that future changes are not available for the 2080s. Projections stem from two models obtained from the previous set of global climate models (CMIP3) and are based on a middle-of-the-road greenhouse gas scenario (A1B).

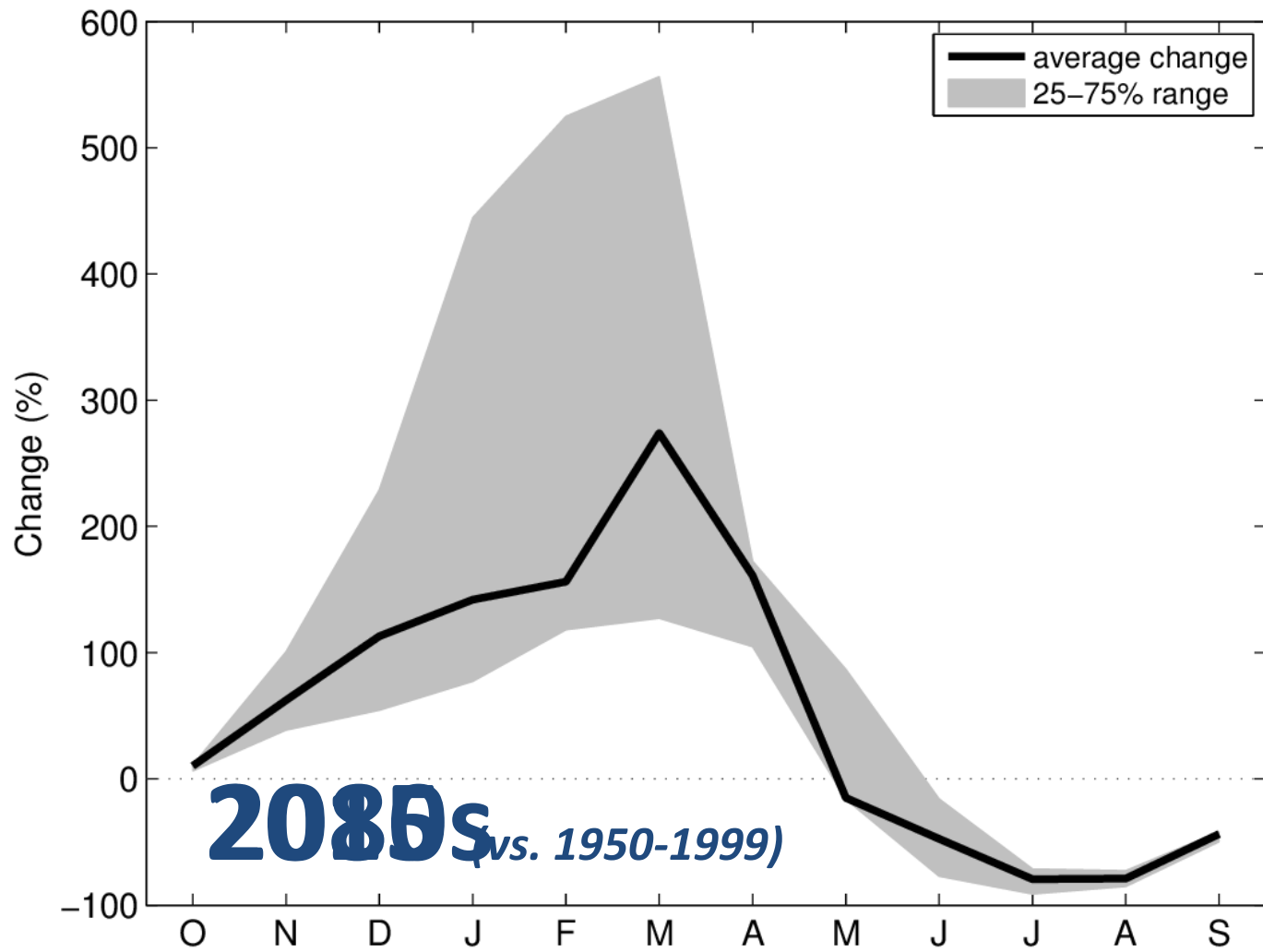
Undo | Redo | Reset

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Consensus results: Average for each dataset

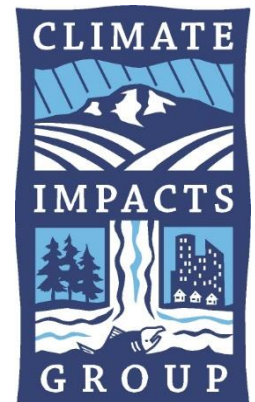






Guillaume Mauger
gmauger@uw.edu
[@guillaumemauger](https://twitter.com/guillaumemauger)
(206) 685-0317

UW Climate Impacts Group
cig.uw.edu



*Climate Science in the
Public Interest*



COLLEGE OF THE ENVIRONMENT
UNIVERSITY *of* WASHINGTON

Comparison with Obs: Peshastin

