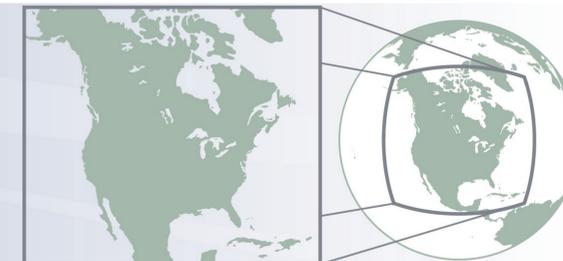


# Regional Variability of Seasonal Climate Change in NARCCAP

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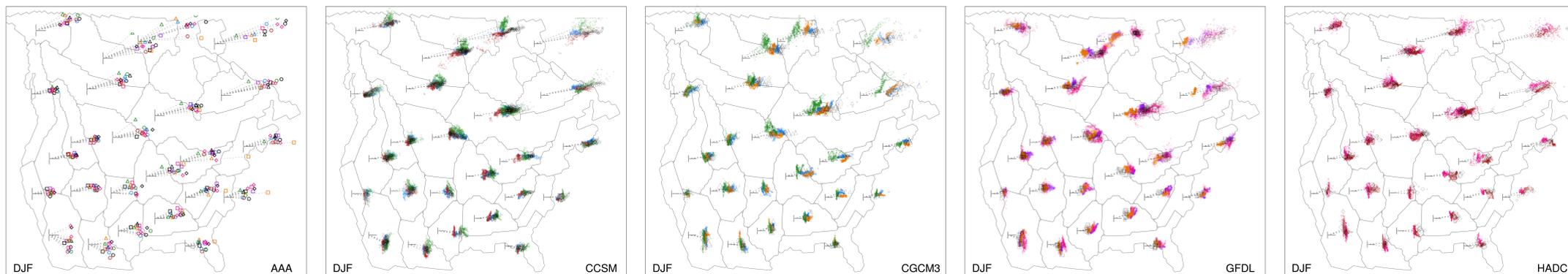
email: [mcginnis@ucar.edu](mailto:mcginnis@ucar.edu)



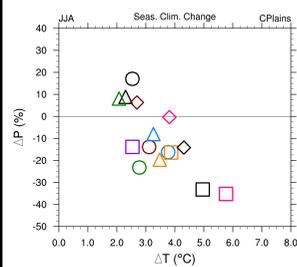
## ABSTRACT

The North American Regional Climate Change Assessment Program (NARCCAP) dataset contains output from six different regional climate models (RCMs) driven by four different global climate models (GCMs), plus two time-slice experiments. Comparing spatially-varying fields from more than a few simulations simultaneously is a challenge; one approach is to distill the spatial dimension by averaging over climatically-similar regions.

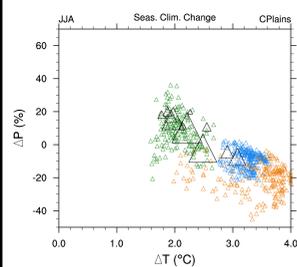
We present regional average changes in seasonal climatology for surface air temperature and precipitation over the Bukovsky regionalization of North America. However, because there can be considerable spatial variation even within a climatically-coherent region, we also use a novel visualization to show the complete spread of change in climatology within each region for comparison with the regional mean results. We examine these results for systematic patterns or relationships associated with the RCMs and GCMs.



## UNDERSTANDING THE VISUALIZATION



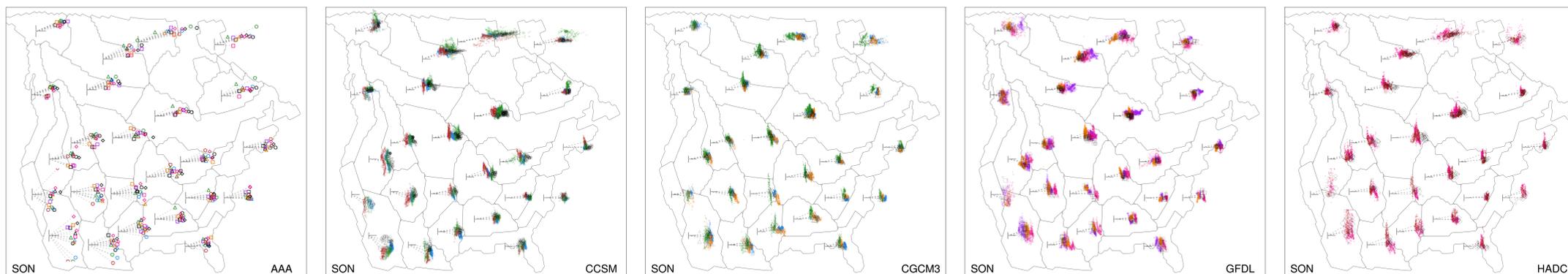
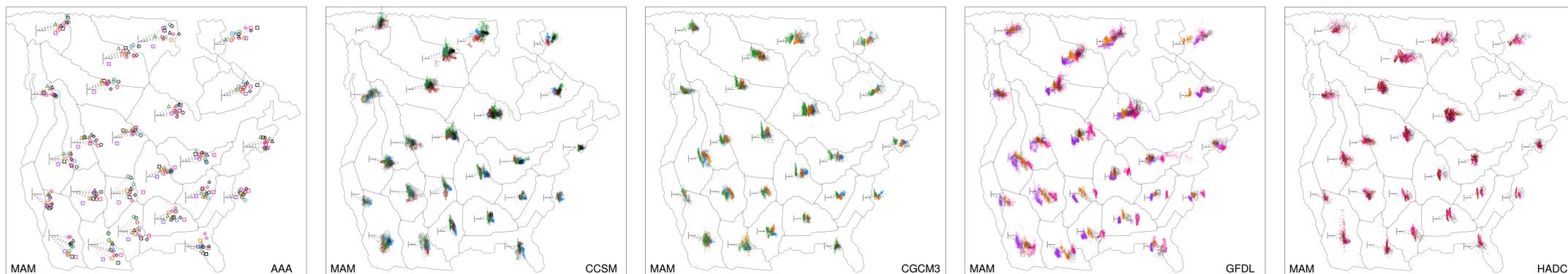
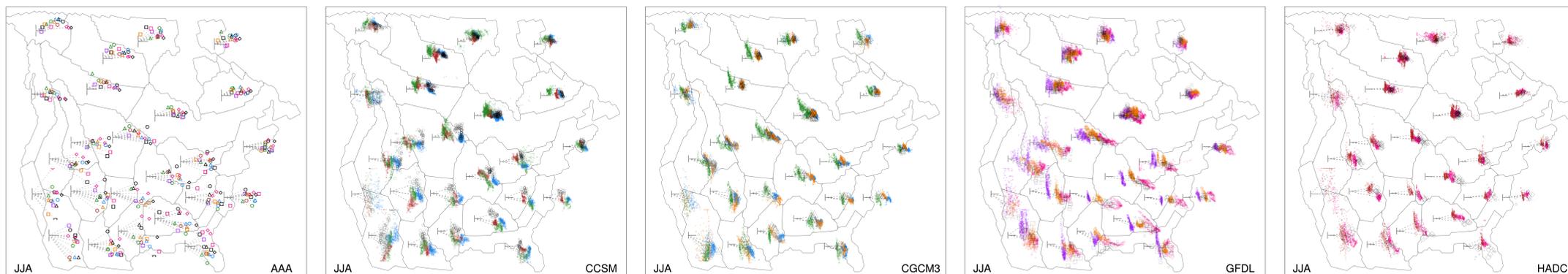
The scatter plot at left shows regional changes in temperature and precipitation for summer (JJA) in the "CPlains" Bukovsky region for 11 NARCCAP RCM simulations and the 4 GCMs used to drive the regional models. The values shown are area averages over the entire region. For the GCMs, the contributing grid cells have been weighted according to their area of overlap with the region.



The figure below left shows the same climate change data for CGCM3 and the three RCMs it drives. In this case, rather than an area average, a separate symbol is plotted for each grid cell that falls within the region. The size of the symbols is proportional to the area of overlap with the region. All of the RCM grid cells are 50 km<sup>2</sup> in area. The GCM grid cells are much larger, but may not overlap the region completely.

In the figures at right, these scatter plots have been placed on a map. The origin for each scatter plot is placed near the center of the corresponding region, and is indicated with a tee. The tee also acts as a scale marker (left).

Because the changes in temperature are often large, we have added a dashed gray indicator line to visually connect each point or cloud of points to its origin.



## OBSERVATIONS

This method of visualization reveals features that are not otherwise apparent, most obviously the scale of spatial variability relative to inter-model variability. The comparative sizes of the RCM and GCM grids also become clear. There is significant spread in precipitation %-change in the southwest in summer and the far northeast in winter, presumably due to arid conditions in the current climate. Some groups show high regional variation in temperature change (CCSM DJF), while others show high variation in precipitation change (GFDL JJA). Regional correlation between dP and dT is visible, and varies by driving GCM and season.