

Enhanced Data Exploration and Visualization Tool for Large Spatio-Temporal Climate Data

UMBC REU Site: Interdisciplinary Program in High Performance Computing

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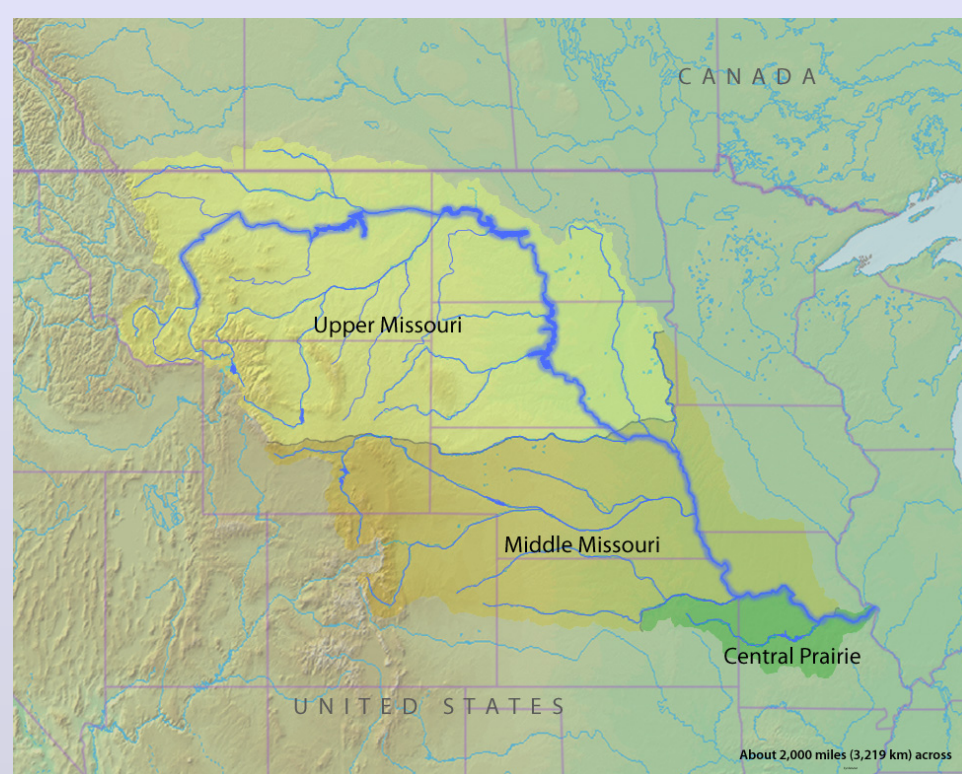
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Summary

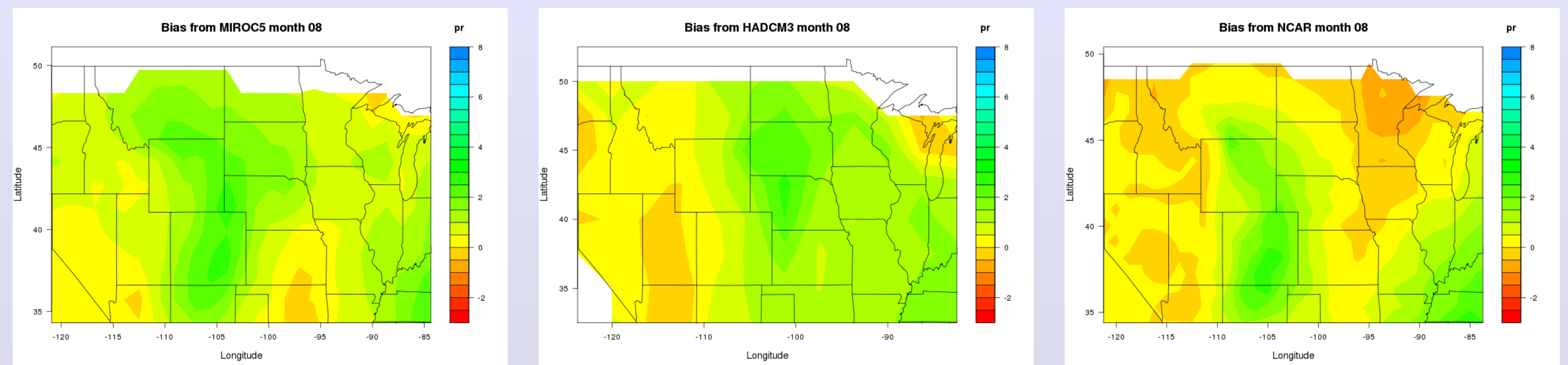
The Missouri River Basin



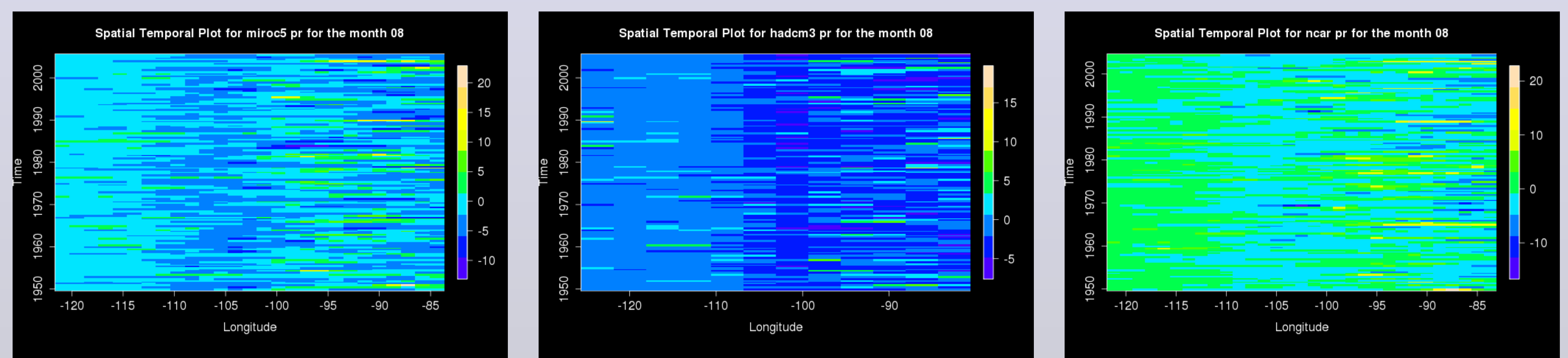
In this project we developed CMIViz, a Graphical User Interface (GUI) for visualizing spatio-temporal Coupled Model Intercomparison Project Phase 5 (CMIP5) climate data from the Missouri River Basin (MRB), using the R package Shiny. This exploratory tool can be used as a precursor to statistical modeling.

CMIViz Highlights

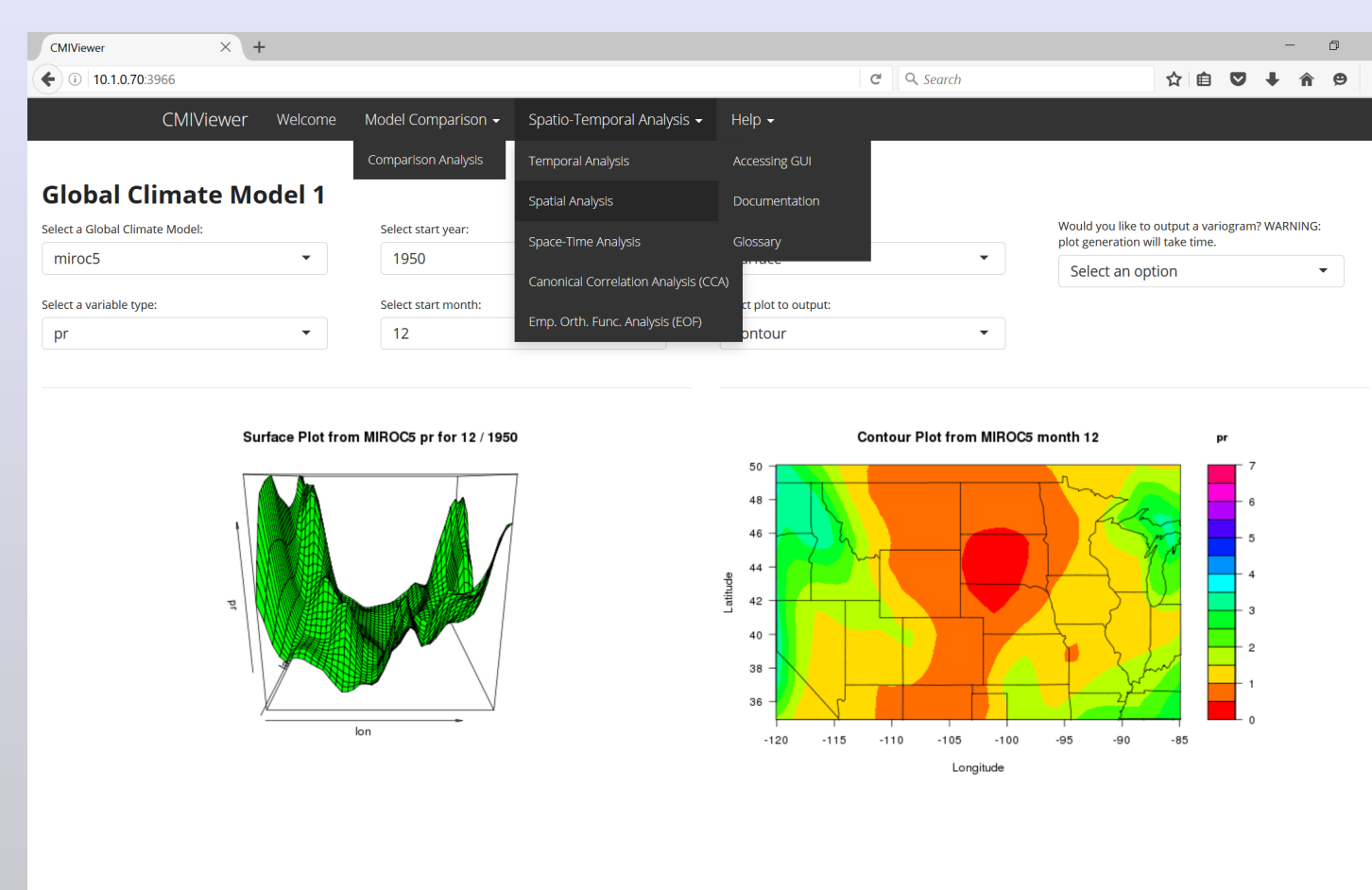
Bias between MIROC5, HadCM3, NCAR and Observed Data



Space-Time Plots of Bias between MIROC5, HadCM3, NCAR and Observed Data

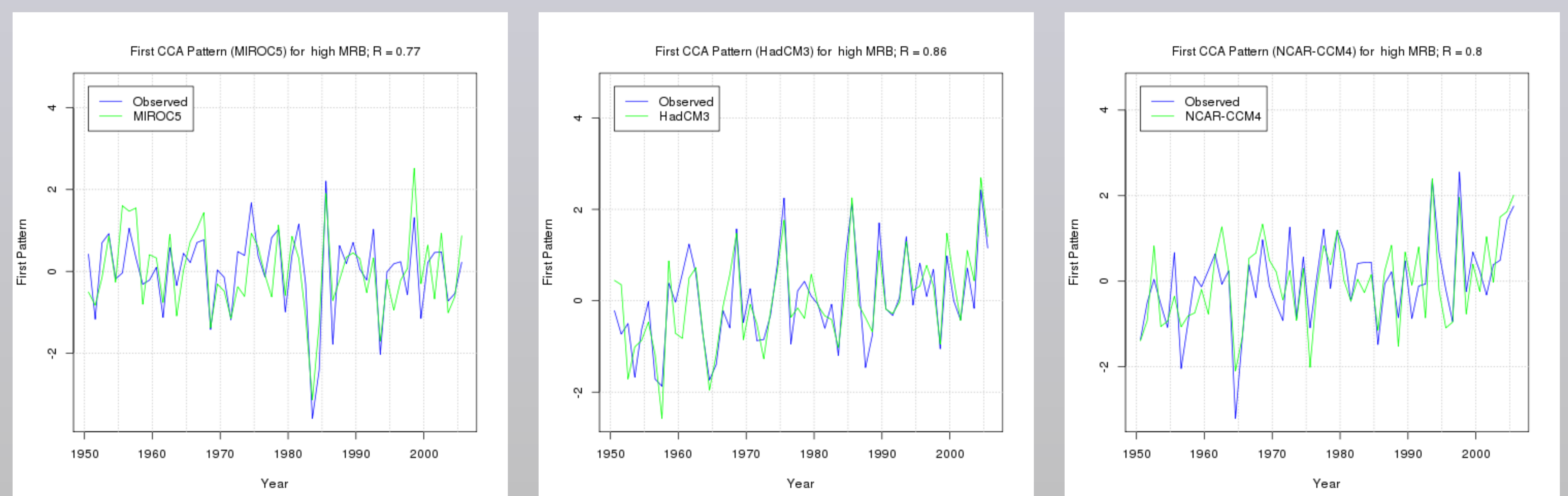


CMIViz Functionality



Features: CMIP5 model comparison plots, temporal plots, spatial plots, spatio-temporal plots

First Canonical Correlation Pattern for MIROC5, HadCM3, NCAR



CMIP5 Climate Data

CMIViz displays monthly data from 1950-2005 for -123.75° to -82.5° latitude and 32.5° to 52.5° longitude.

	MIROC5	HadCM3	NCAR
Lat,N	13	12	31
Lat,Inc	1.4	2.5	.942
Lon,N	27	9	9
Lon,Inc	1.4	3.75	1.25

Precipitation (pr): mm/day
Max/Min Temperature (tasmax/tasmin): K

Future Directions

- Update CMIViz as more features become available in Shiny.
- Implement advanced forecasting techniques from REU colleagues for spatio-temporal data.
- Host CMIViz Shiny application for users to access and interact with in real time.

References and Acknowledgments

- [1] Source of data: cmip-pcmdi.llnl.gov/cmip5
 - [2] Source of MRB image: commons.wikimedia.org/wiki/File:Missouririvercoregions.jpg
 - [3] Source of CCA code: github.com/marchtaylor/sinkr
 - [4] Full technical report: HPCF-2016-12 hpcf.umbc.edu > Publications
- REU Site: hpcreu.umbc.edu
 - NSF, NSA, DOD, UMBC, HPCF, CIRC
 - Shiny Site: shiny.rstudio.com