

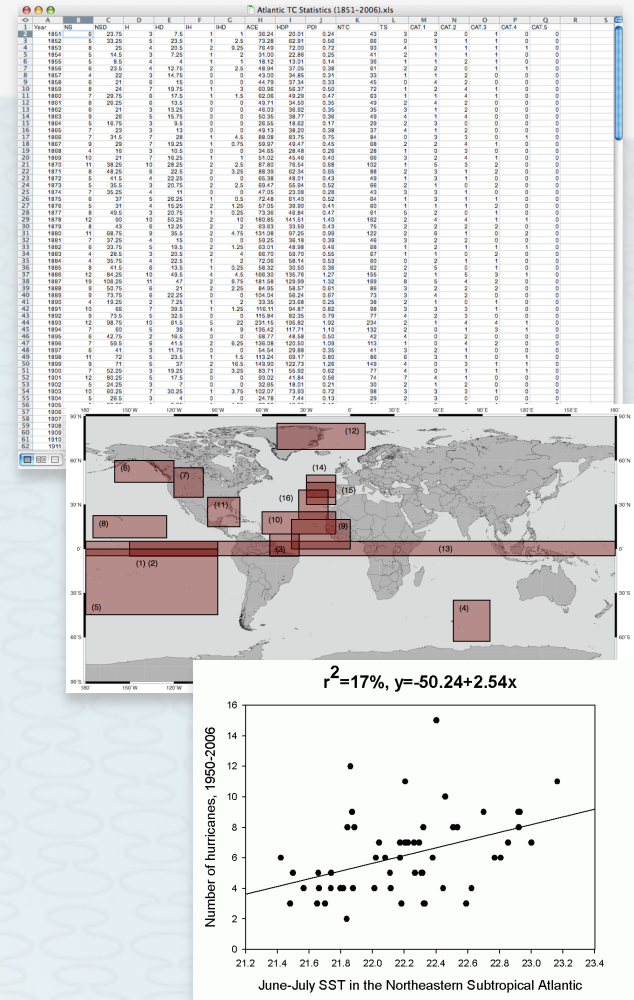


# Guided Analysis of Hurricane Trends Using Statistical Processes Integrated with Interactive Parallel Coordinates

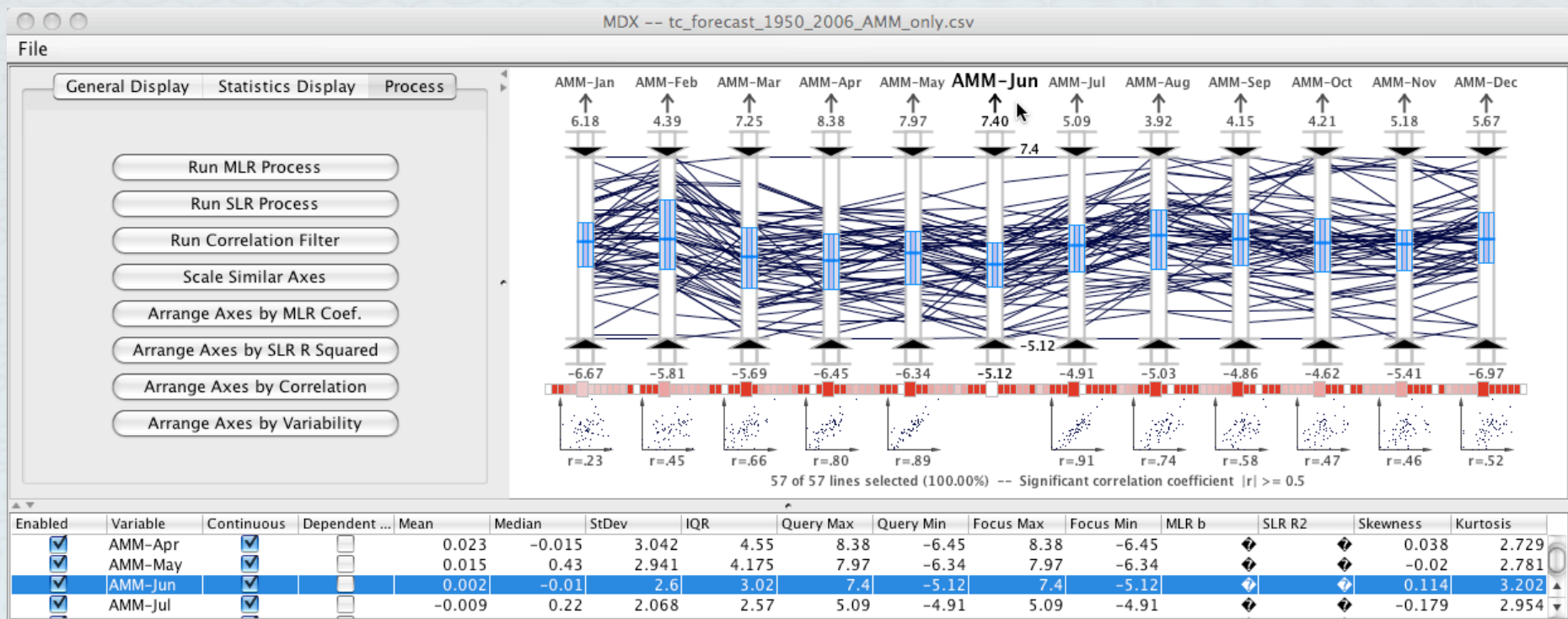
Chad A. Steed (NRL), J. Edward Swan II (MSU),  
T.J. Jankun-Kelly (MSU), and Patrick J. Fitzpatrick (MSU)

# Motivation

- Weather scientists use statistical methods to predict seasonal hurricane activity.
  - Statistics suggest causal relationships.
  - Using basic graphics
  - Visualizations lack direct connection to statistical processes.
- Goal:
  - Augment PC visualization with information from automated statistical processes.
  - Guide scientists to most interesting relationships.



# Multidimensional Data eXplorer (MDX)

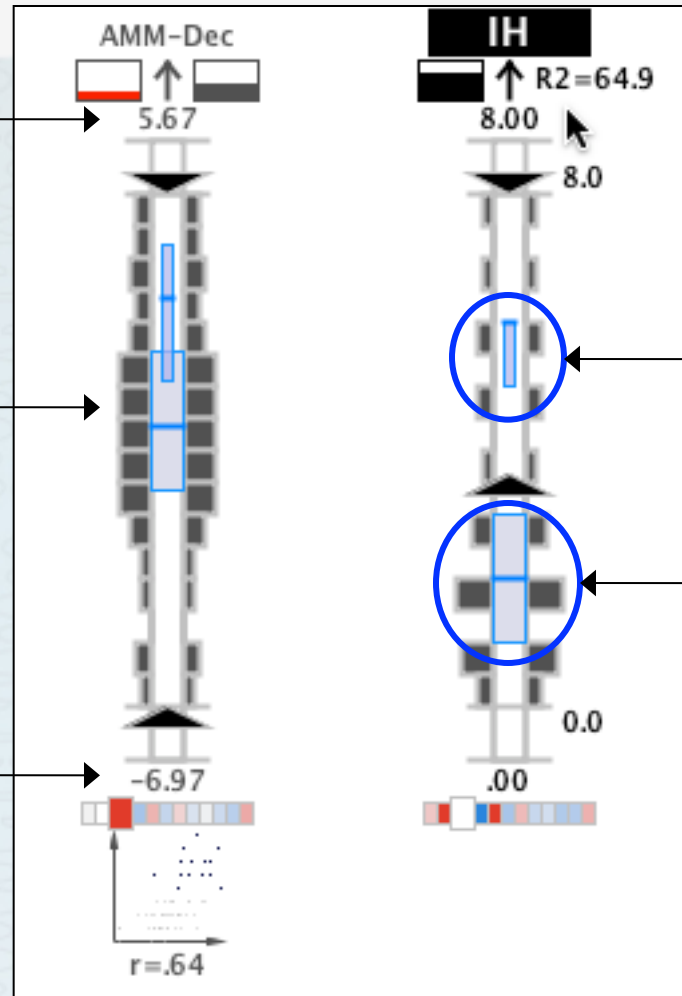


# Statistical Indicators

maximum

histograms

minimum

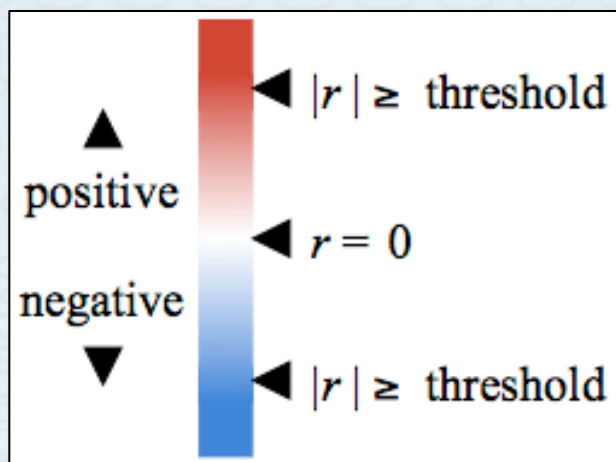
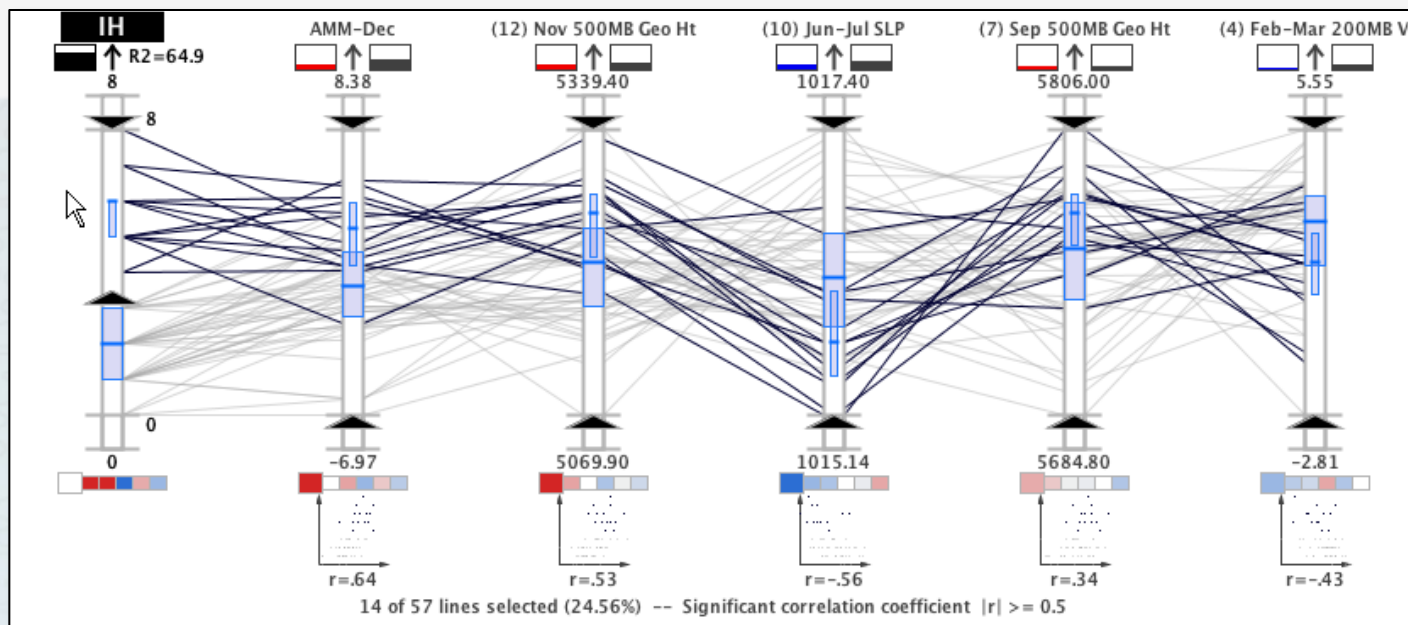


query summary box

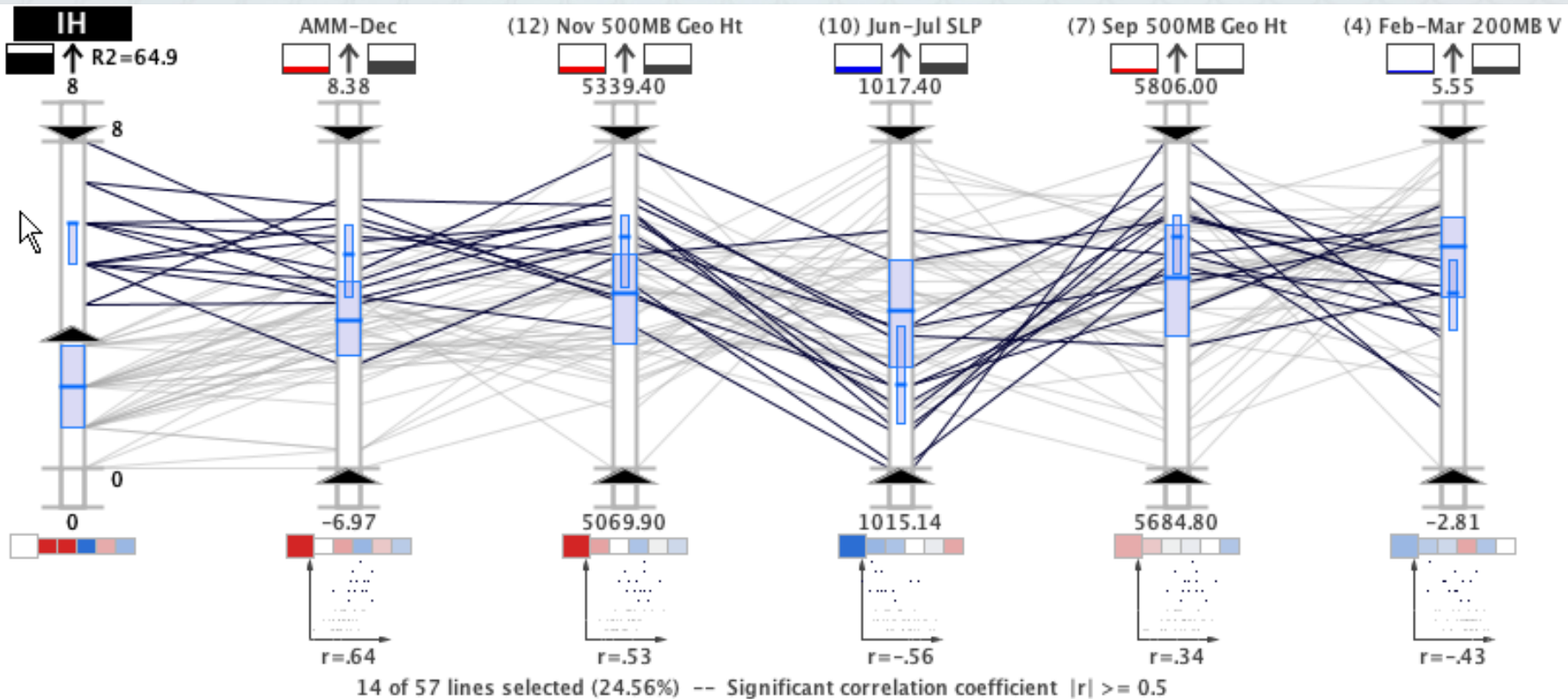
overall summary box



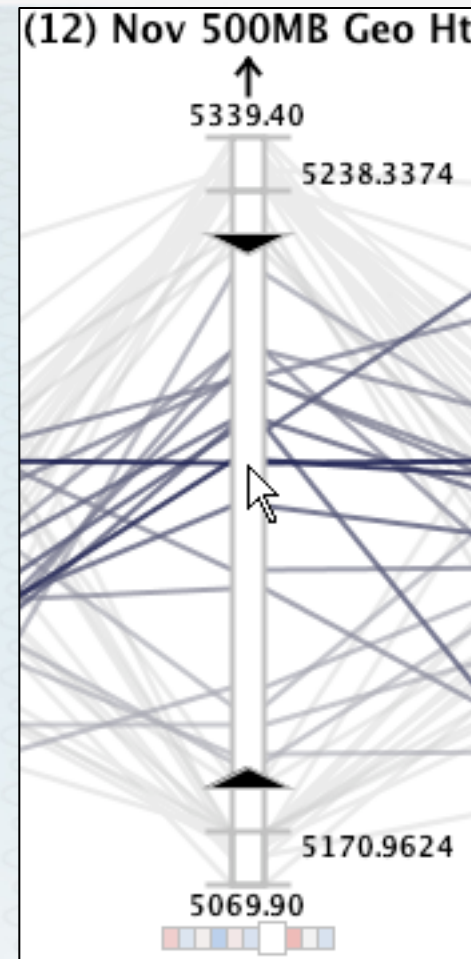
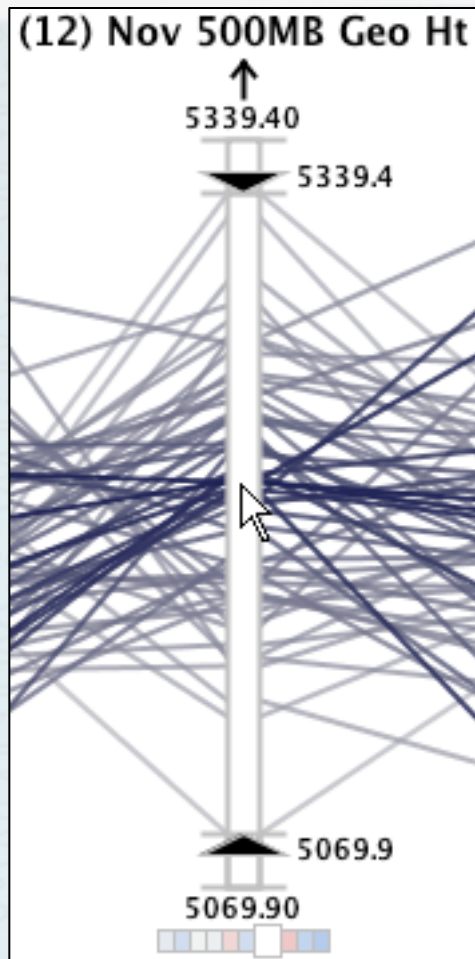
# Correlation Indicators



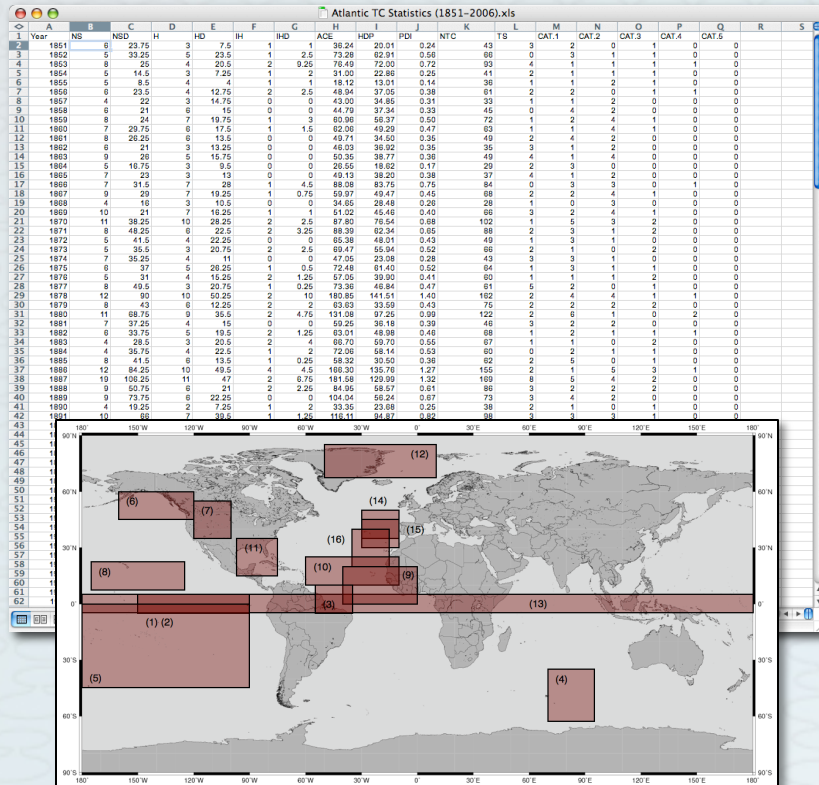
# Regression and Filters



# Dynamic Axis Scaling & Aerial Perspective Shading



# North Atlantic Hurricane Trend Analysis Climate Study

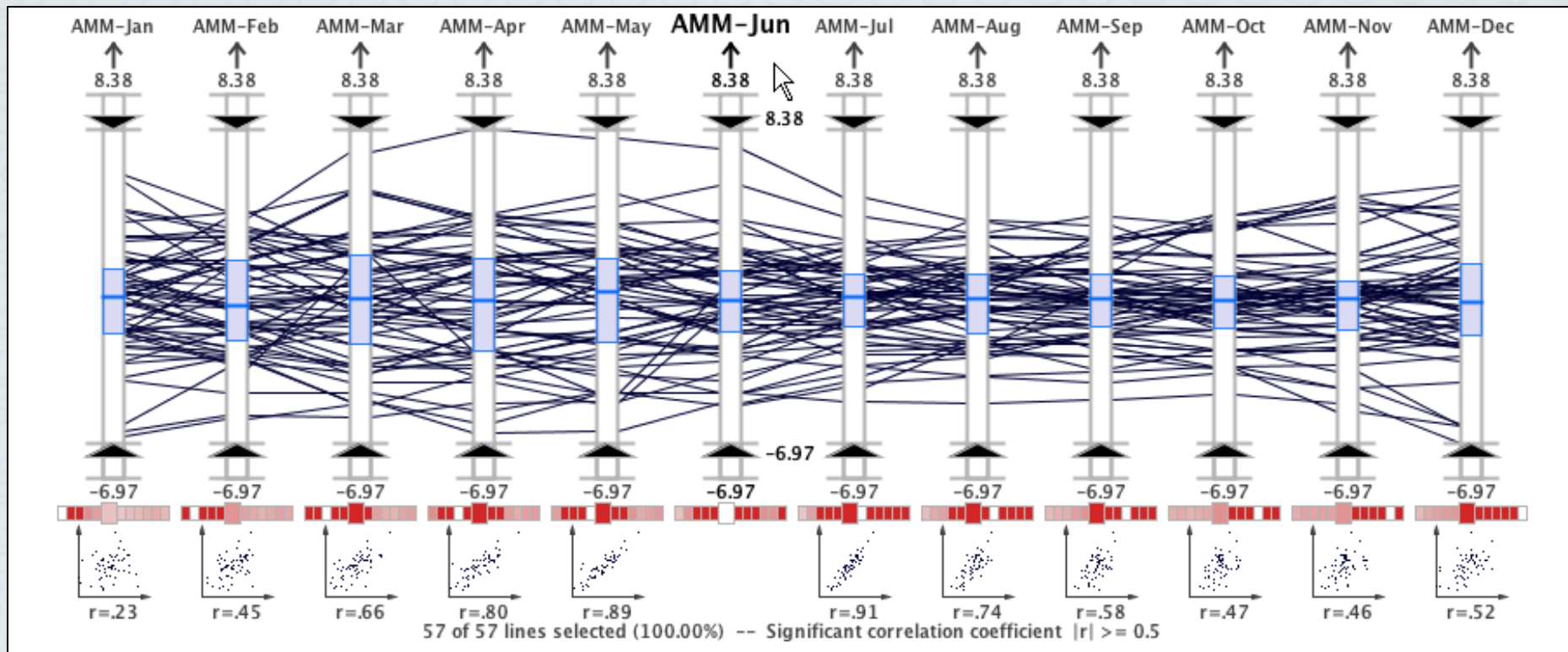


Statistical  
Methods

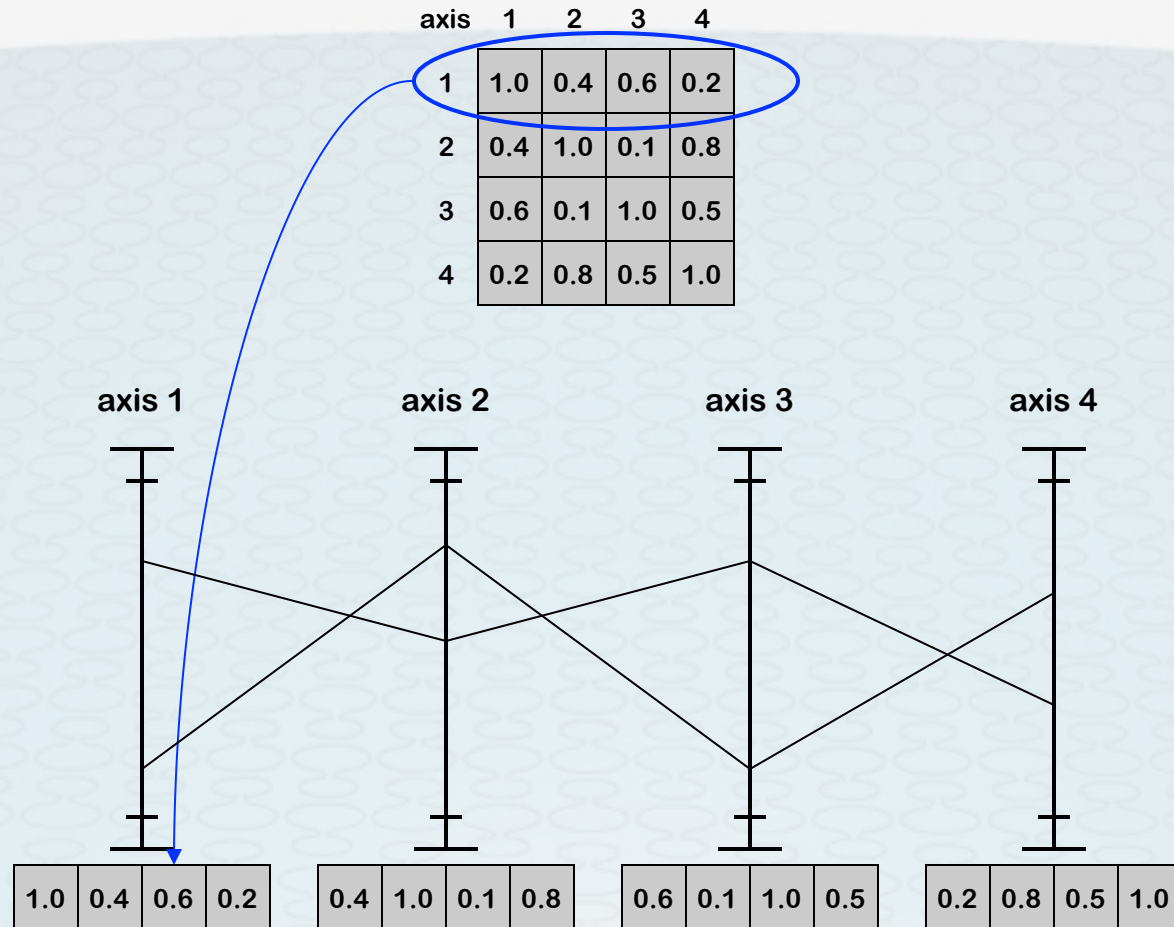
Static  
Graphics



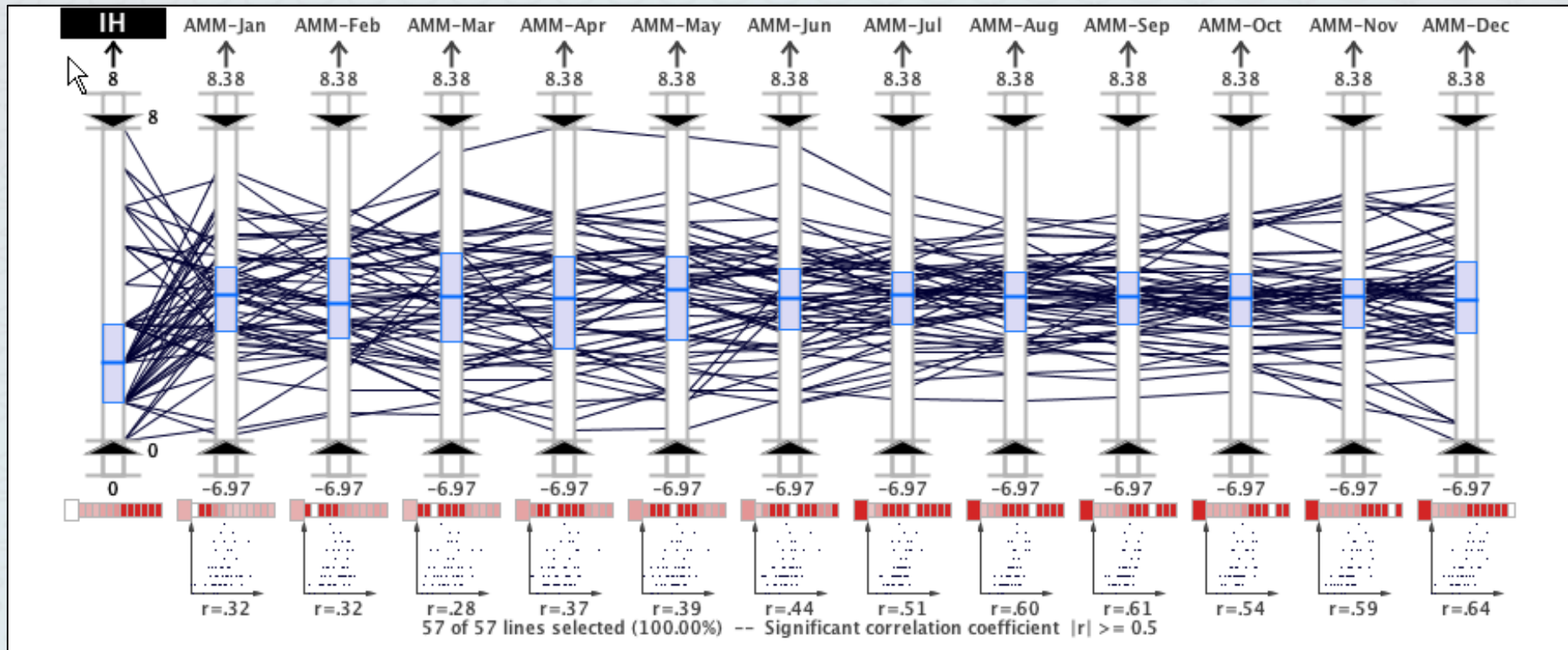
# Exploratory Analysis



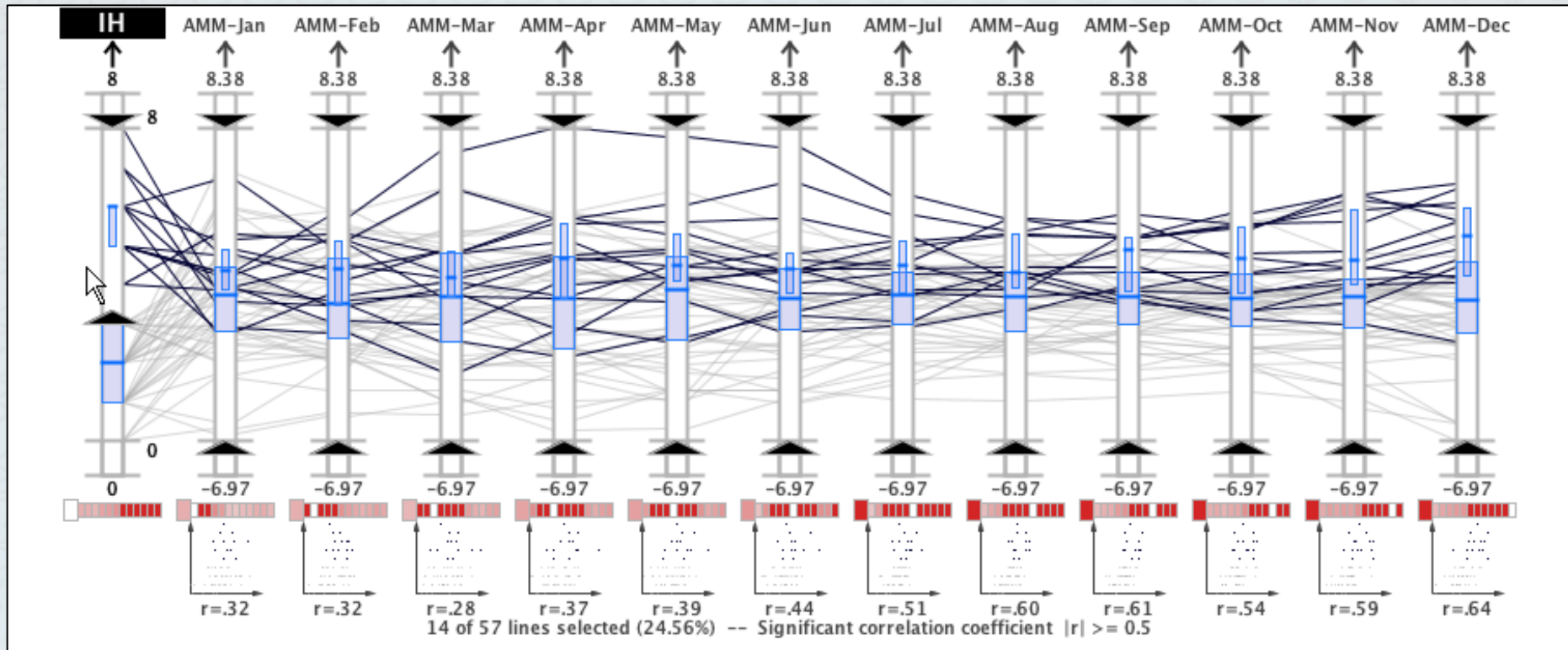
# Correlation Indicators



# Exploratory Analysis

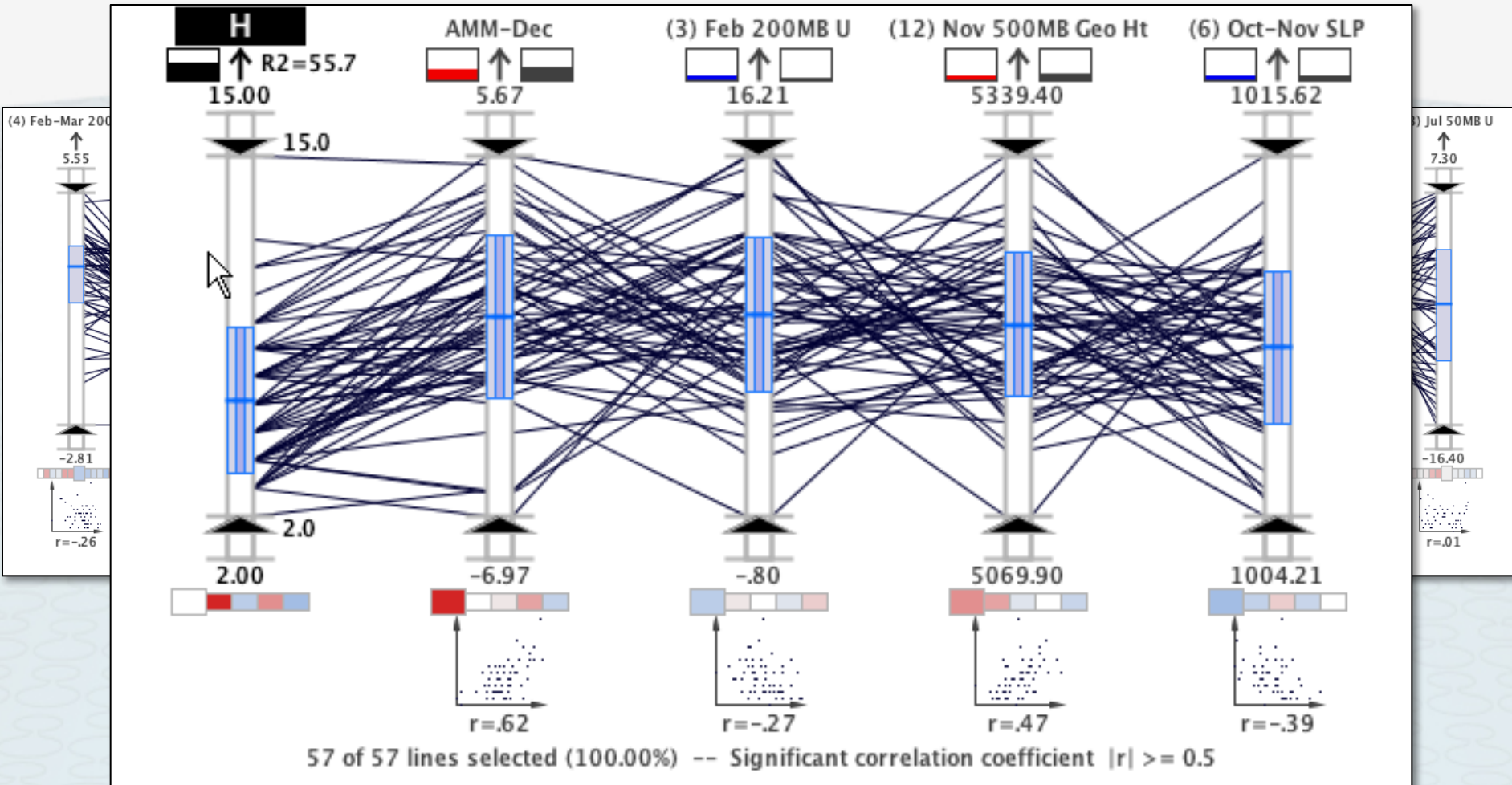


# Exploratory Analysis

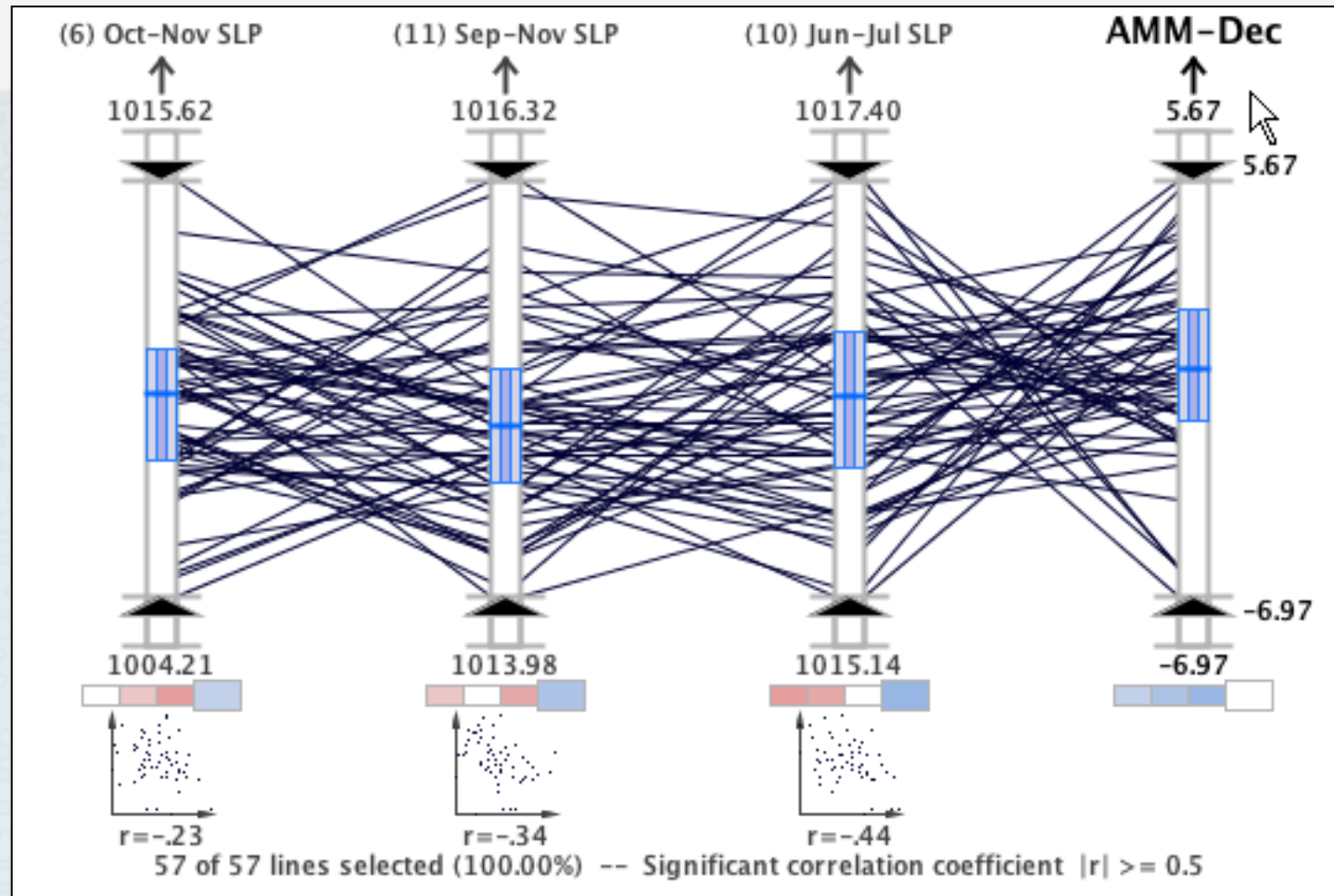




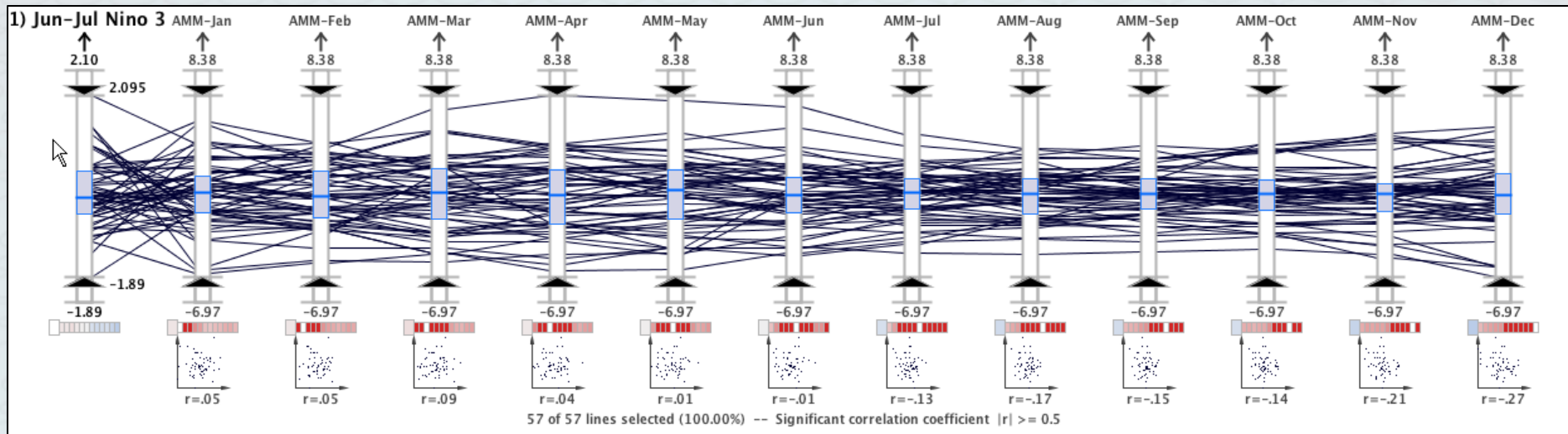
# Identifying Significant Predictors



# Identifying Significant Predictors



# Identifying Significant Predictors



# Case Study Discussion

- MDX facilitates more rapid and creative analysis through integration of statistical processes and visualization.
  - Reduced analysis timelines from days to hours.
  - Direct interaction with data vs. static plots.
- Domain expert feedback:
  - MDX made it possible to explore climate patterns more rapidly and comprehensively than traditional approaches.





# Conclusion

- Demonstration of the promise of PCP-based visual analytics approach with statistical information assistance for climate analysis.
- Overcomes several limitations in traditional climate analysis.
- Several remarkable patterns discovered in the analysis of the AMM and CSU data sets regarding seasonal activity.
  - First simultaneous analysis of these predictor data sets.
- This work was sponsored by the NRL Select Graduate Program, NOAA grants NA06OAR4600181 and NA05OAR4601145, and through the Northern Gulf Institute grant NA06OAR4320264.

