

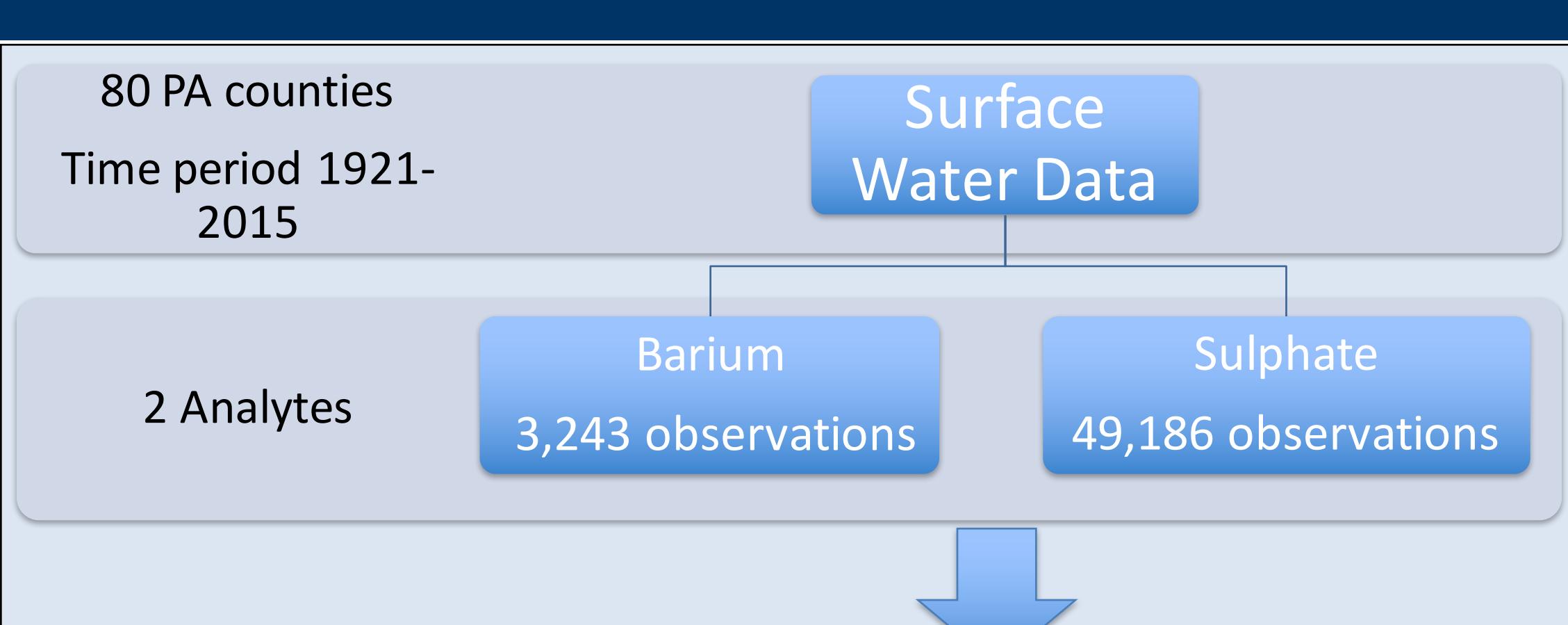


Statistical Spatial Temporal Modeling of PA Surface Water Data

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1. Introduction



Objective

Gaining insights about water quality deterioration due to energy extraction processes

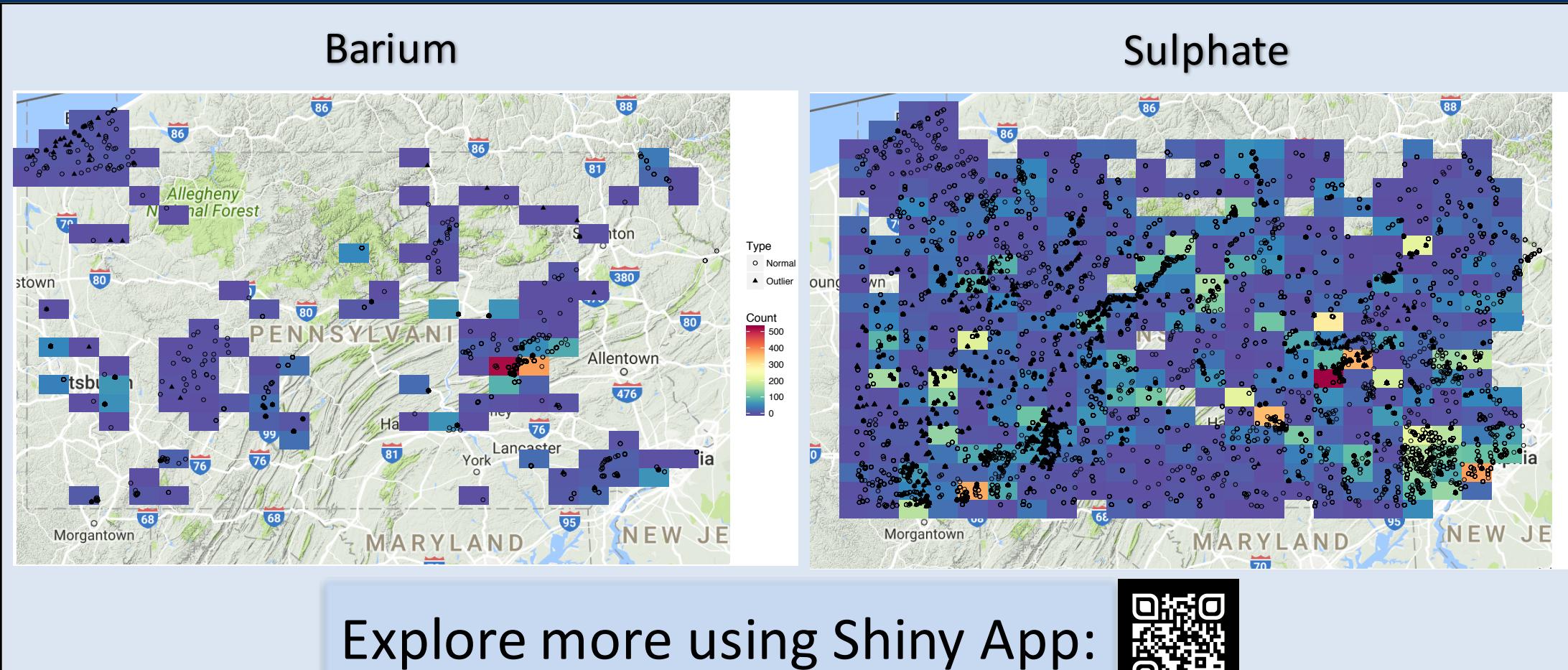
Process Outline

Building and analyzing river network Modeling spatial and temporal correlations

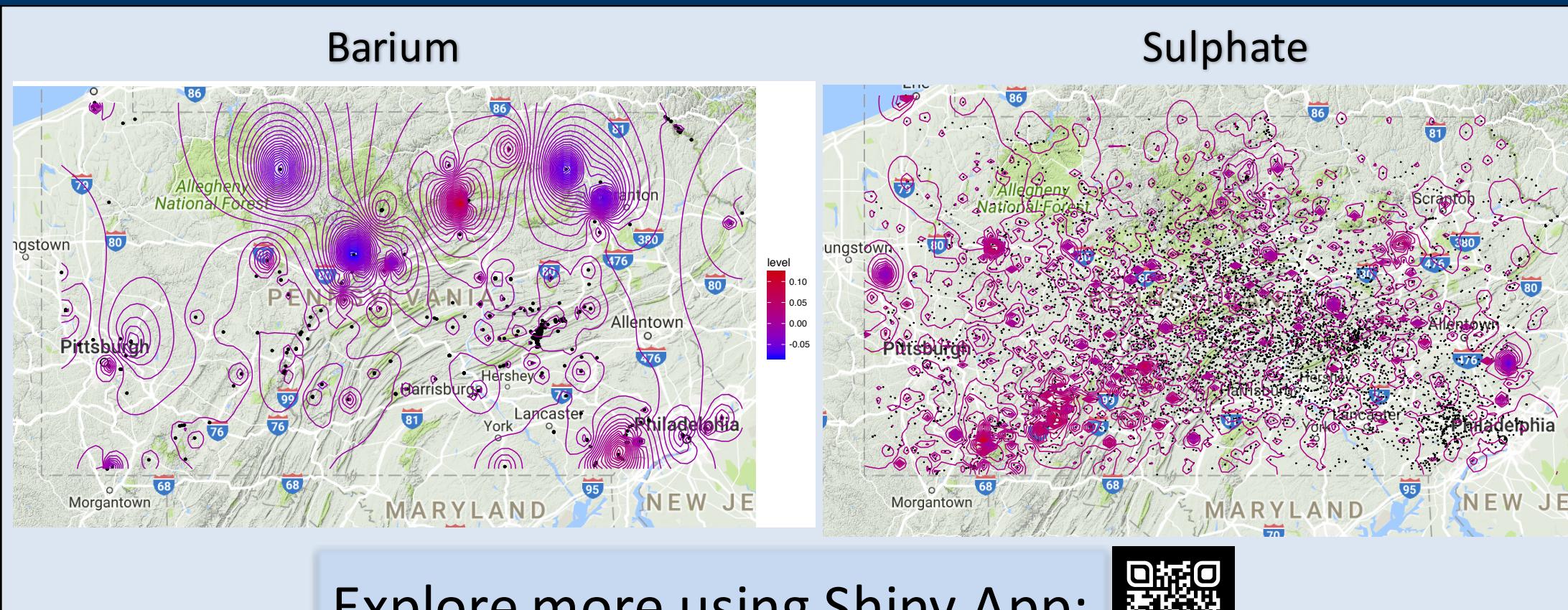
Challenges

Irregularly spaced time series Spatial and temporal sparsity

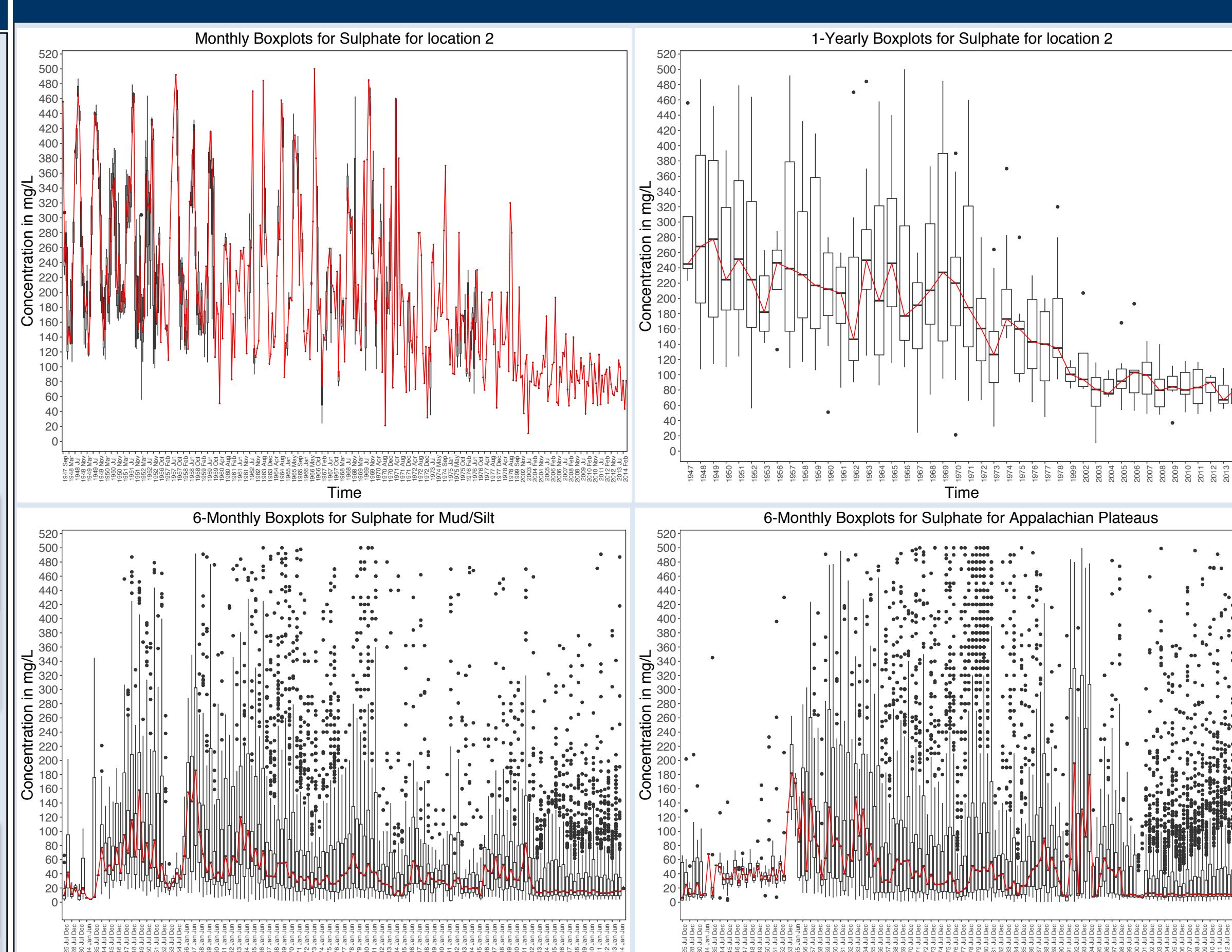
2. Spatial Distribution & Outlier Visualization



3. Geographically Weighted Regression

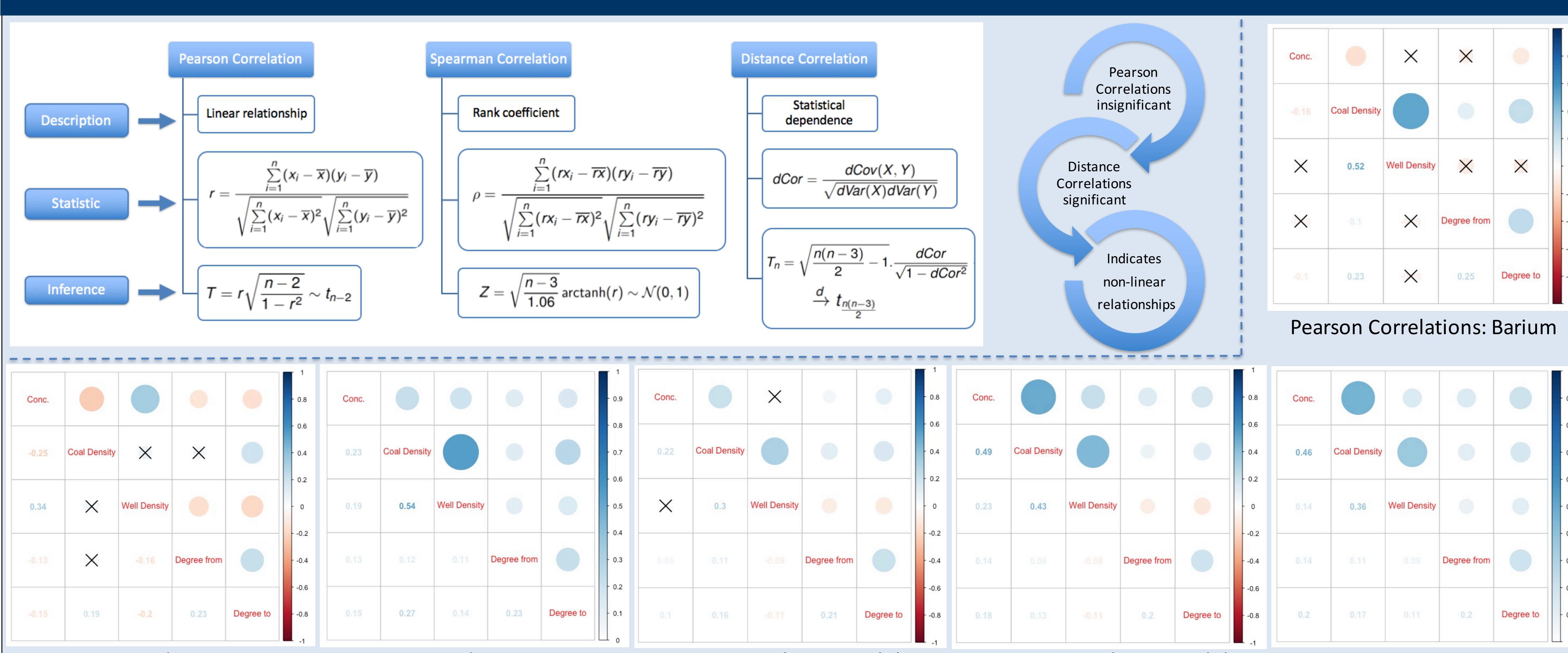


4. Trend Analyses



Explore more using Shiny App:

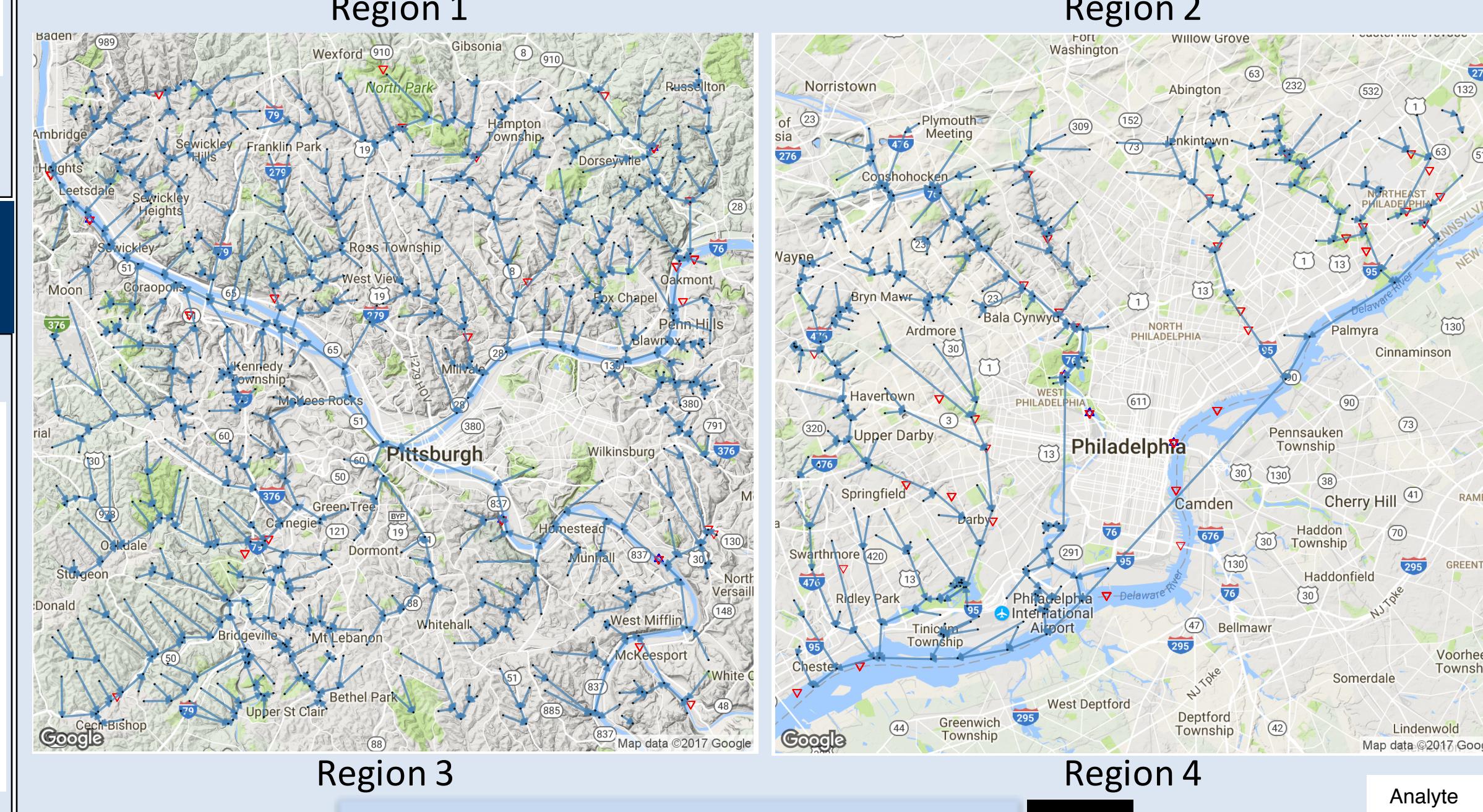
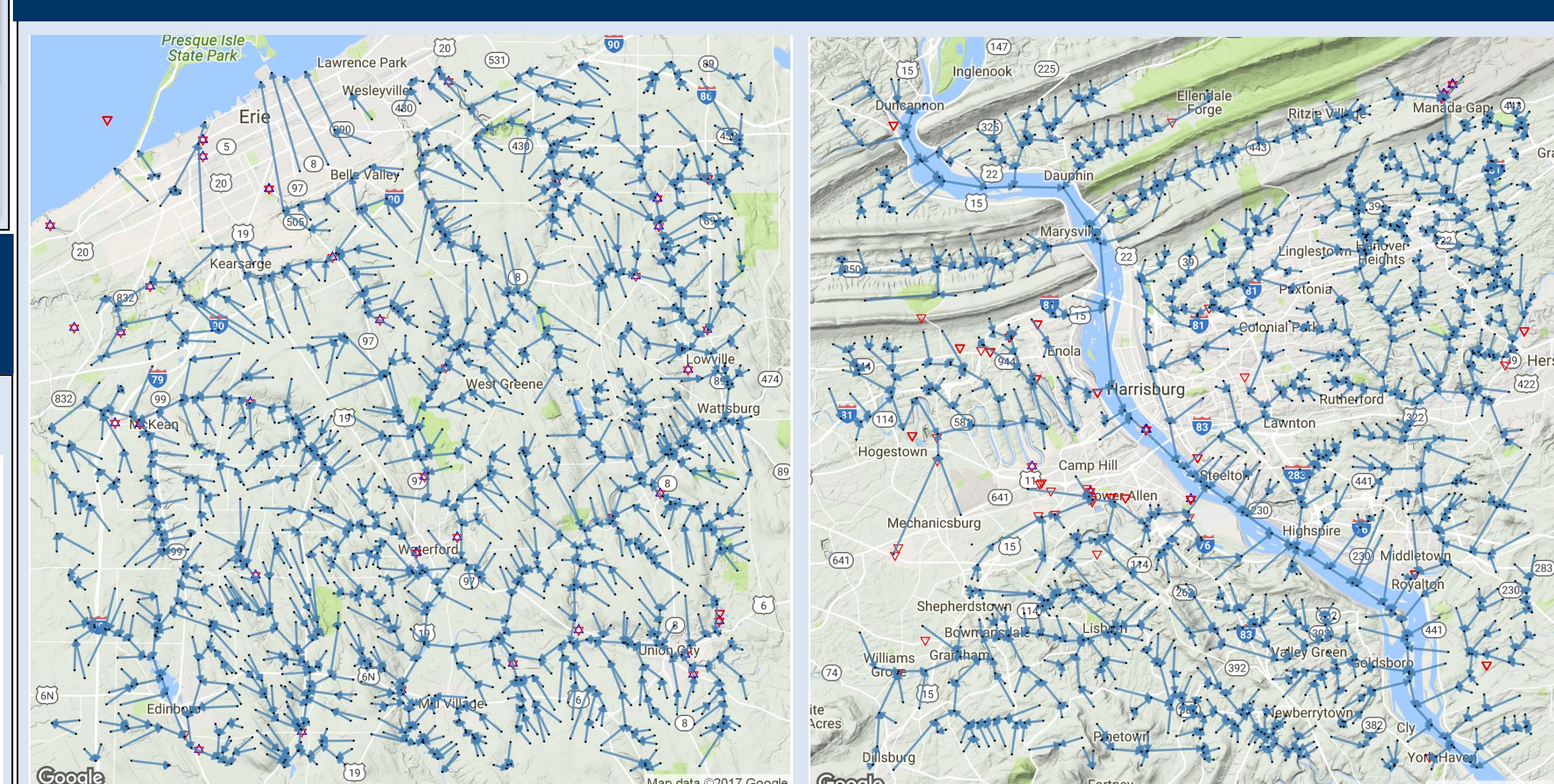
6. Correlation Analyses



● : Significant

Explore more using Shiny App:

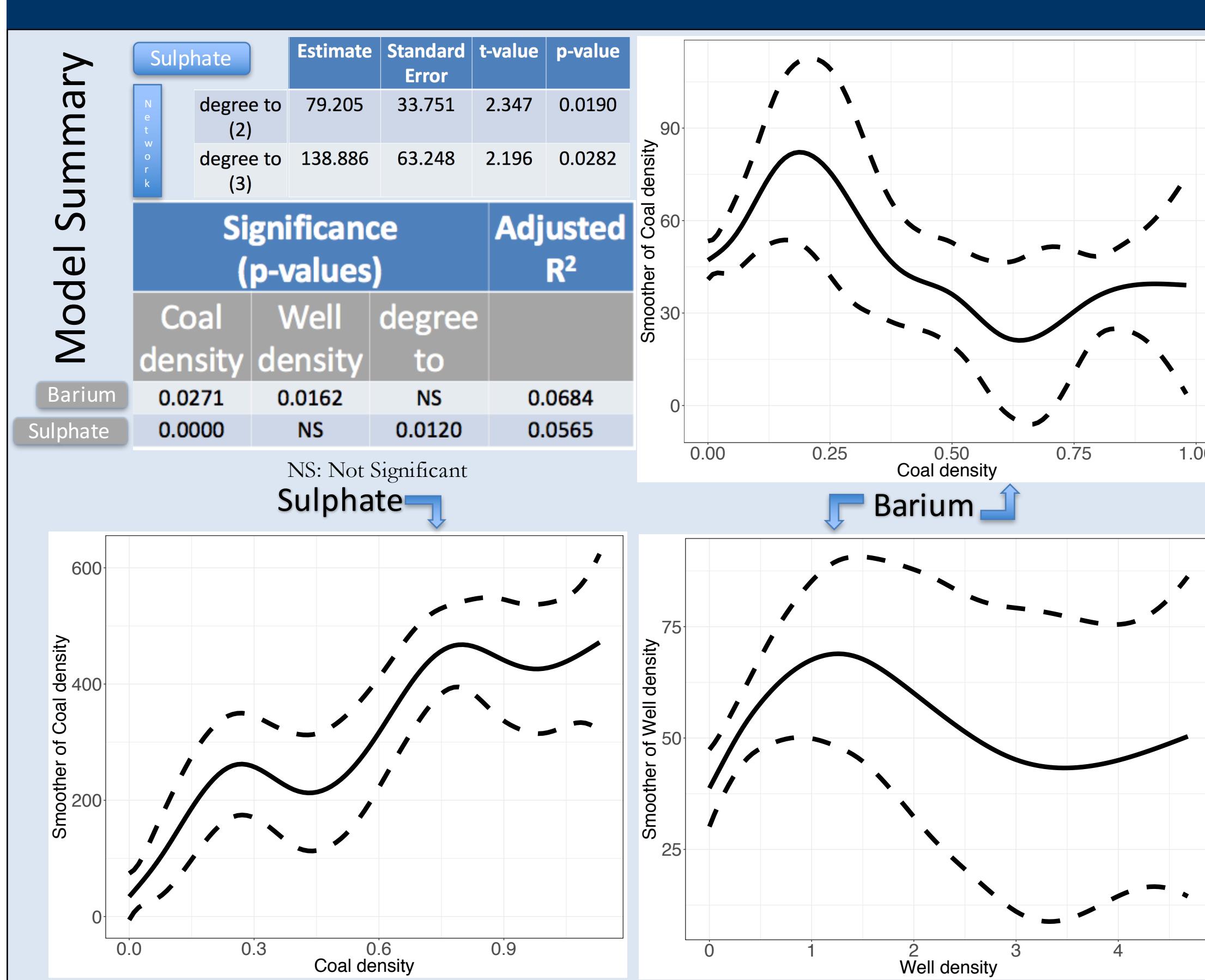
5. River Network Visualization



7. Model Selection

Analysis of Deviance	Residual Df	Residual Deviance	Df	Deviance	F-value	p-value
	Linear Model	Non-Parametric Model	Linear Model	Non-Parametric Model		
					Barium	
	364	5.53×10^5				
	356	5.20×10^5	8	3.36×10^4	2.74	0.0052
					Sulphate	
	2670	1.27×10^9				
	2664	1.26×10^9	6	8.14×10^6	2.80	0.0096

9. Results



12. References

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- Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani (2013), An introduction to statistical learning, Vol. 6. New York: Springer
- Other relevant references:

- Kevin Lee, Assistant Professor, Department of Statistics, Western Michigan University, Kalamazoo, MI 49008, USA
- Debmalya Nandy, Doctoral Candidate, Department of Statistics, The Pennsylvania State University, University Park, PA 16802, USA

13. Acknowledgements