Data Science in Hydrogeology and Hydrogeochemistry

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EAR 419/619

Freshwater Salinization in U.S.

Freshwater salinization syndrome on a continental scale

Sujay S. Kaushal[a,1], Gene E. Likens[b,c,1], Michael L. Pace[d], Ryan M. Utz[e], Shahan Haq[a], Julia Gorman[a], and Melissa Grese[a]

[a]Department of Geology and Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD 20740; [b]Cary Institute of Ecosystem Studies, Millbrook, NY 12545; [c]Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, CT 06269; [d]Department of Environmental Sciences, University of Virginia, Charlottesville, VA 22904; and [e]Falk School of Sustainability, Chatham University, Gibsonia, PA 15044

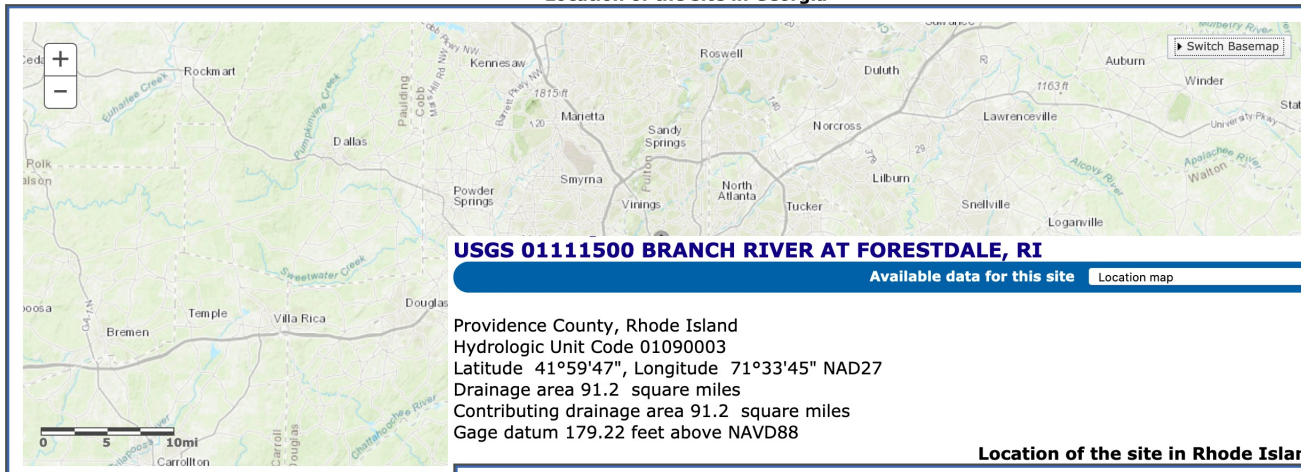# Are U.S. streams getting saltier over time?

USGS 02336300 PEACHTREE CREEK AT ATLANTA, GA

Available data for this site | Location map | GO

Fulton County, Georgia
Hydrologic Unit Code 03130001
Latitude 33°49'13.1", Longitude 84°24'27.5" NAD83
Drainage area 86.8 square miles
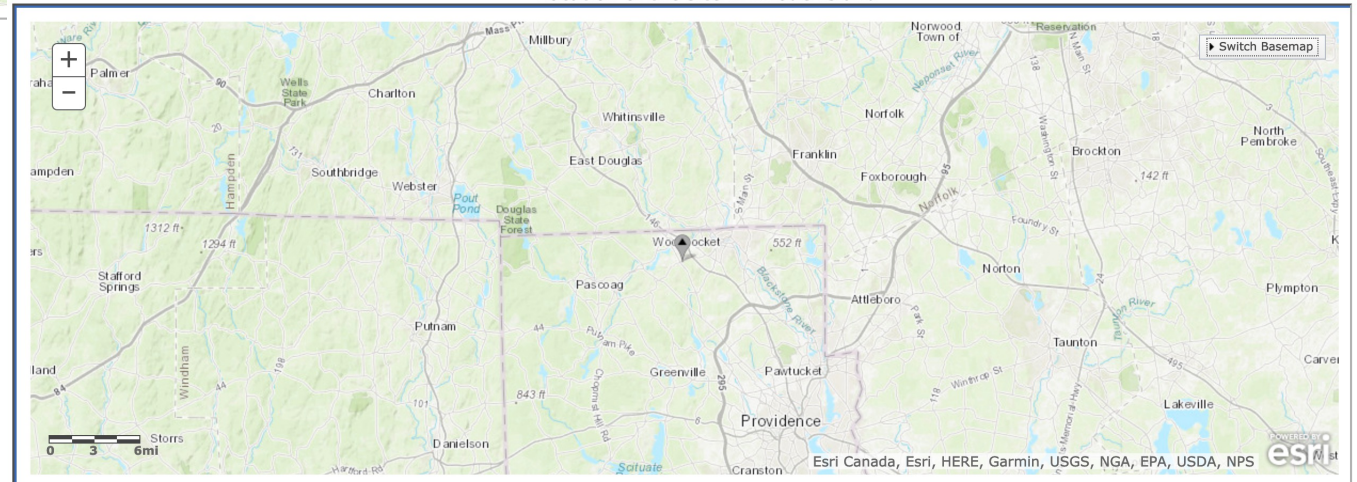Gage datum 763.96 feet above NGVD29

Location of the site in Georgia

USGS 01111500 BRANCH RIVER AT FORESTDALE, RI

Available data for this site | Location map | GO

Providence County, Rhode Island
Hydrologic Unit Code 01090003
Latitude 41°59'47", Longitude 71°33'45" NAD27
Drainage area 91.2 square miles
Contributing drainage area 91.2 square miles
Gage datum 179.22 feet above NAVD88

**Location of the site in Rhode Island**

What is R?

R is a programming language and free software environment for statistical computing and graphics supported by the R Foundation for Statistical Computing. It has these features:

- FREE!
- Graphics capabilities very sophisticated and better than most stat software
- Very active and vibrant user community; a lot of online learning resources . . .

What is Google Colab?

- Google Colab is a free, browser-based tool (i.e., integrated development environment or IDE) that allows users to write and run Python and R code.
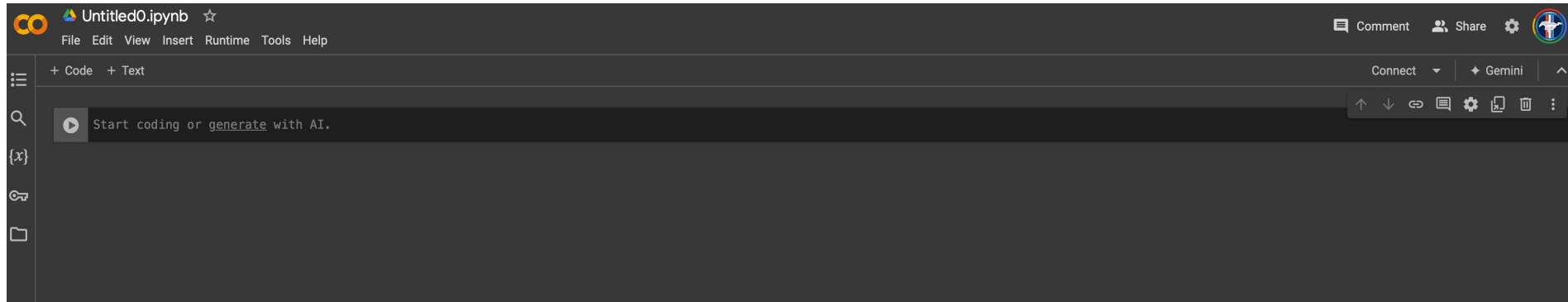
A brief tour of Google Colab

https://www.youtube.com/watch?v=inN8seMm7UI

What if you want to learn more about R coding or any coding in general?

- EAR 201 – Introduction to Earth and Environmental Sciences Data Analysis
- EAR 400/600 – Statistics in Earth & Environmental Sciences
- EAR 413/613 – Physical Hydrology
- EAR 409/609 – Environmental Data Sciences
- EAR 402/602 – Numerical Methods Geosciences
- EAR 400/600 – Machine Learning in Earth & Environmental Sciences
- HydroLearn Online Course: [Data Science in Earth and Environmental Sciences](#)

- There are also many free online learning resources

R and Colab Basics

- Refer to the Demo Codes

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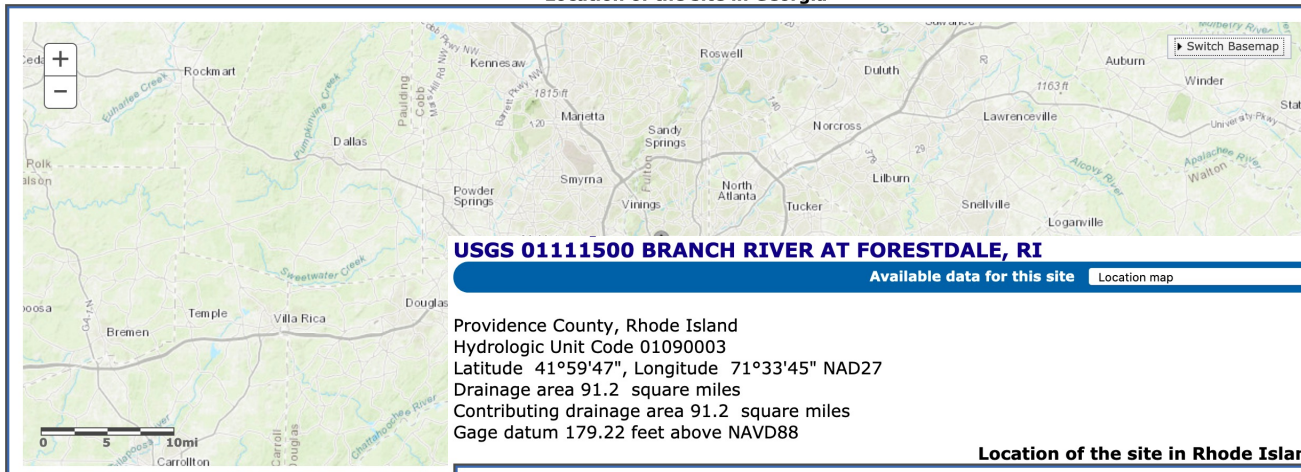**USGS 02336300 PEACHTREE CREEK AT ATLANTA, GA**

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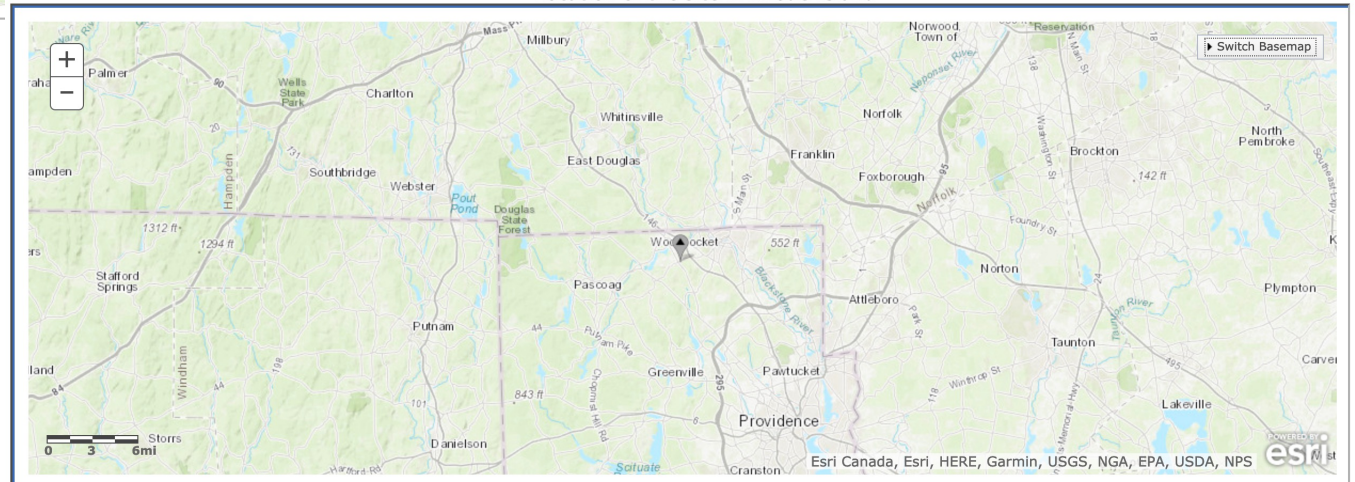
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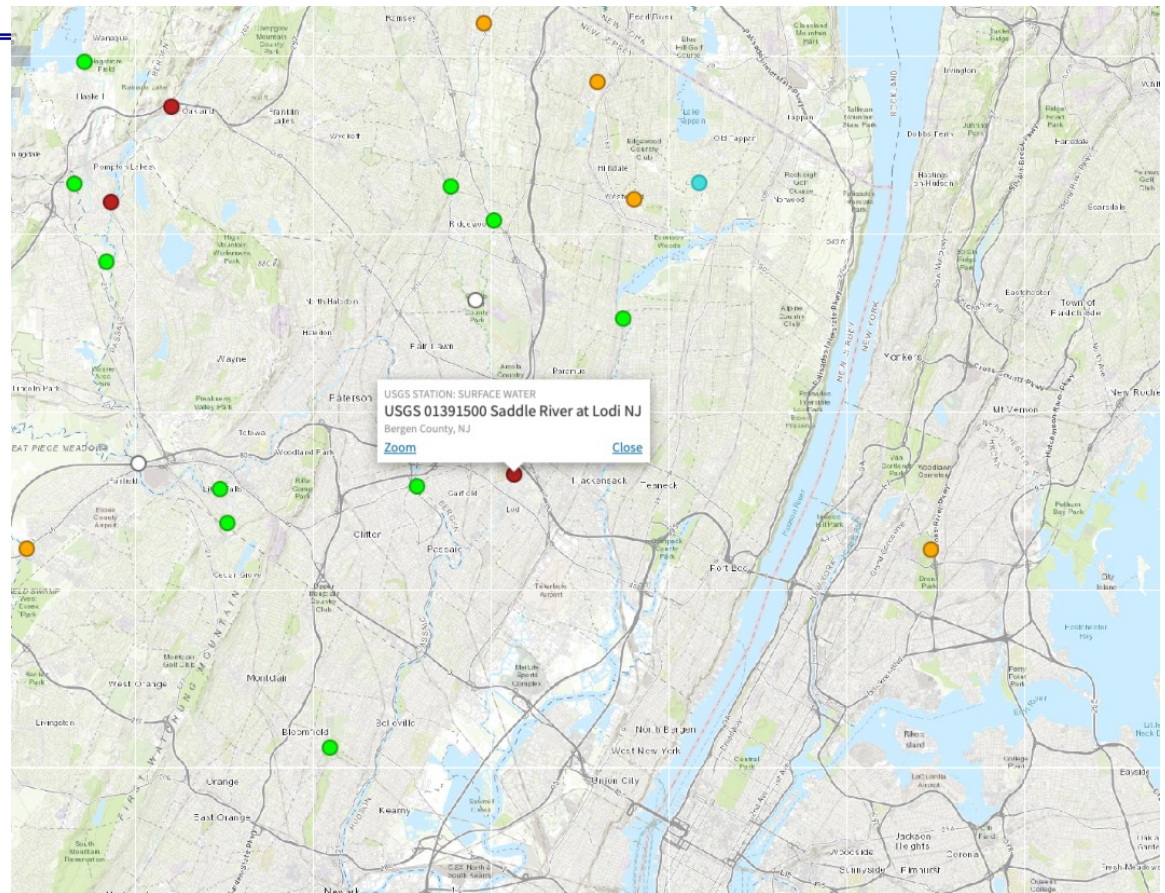
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Lab 04 Deliverables
due 12:30 PM Thursday 10/31/2024

- Modify and rerun the demo code to generate the temporal plot of Na concentration for the other two sites (USGS-01111500 and USGS-02336300) and perform the regression analysis for both sites

- Submit a single-page PDF file including these two plots plus 2-3 paragraphs describing these two plots and what might explain the difference (refer to papers in Lab 01 and previous lectures) in the temporal trend at these two sites