Lakes, Landscapes, and R:

A framework for open science on freshwater cyanobacteria

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US-IALE 2018
Chicago, IL
2018-04-11

Twitter and Photos?

#usiale2018 #rstats #cyanobacteria

@jhollist

Open Science?

What is open science?

- Access to materials
- Reproducible/ Repeatable
- A process, not a state

Open Science Solutions

- Open Access
- Open Data
- Open Source Code

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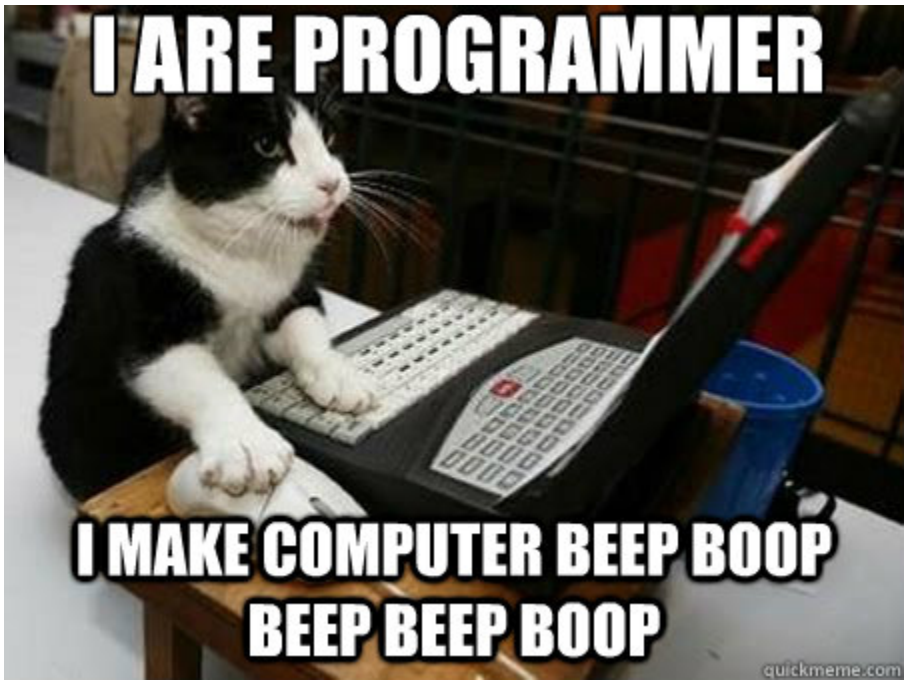
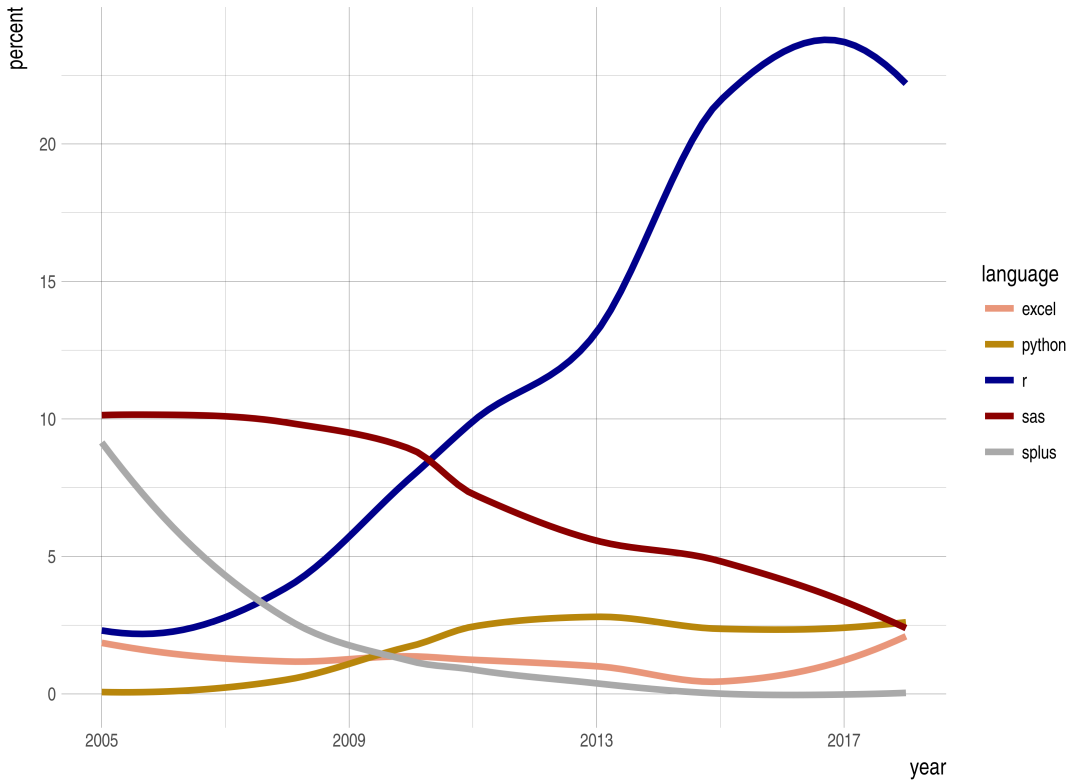


R and Landscape Ecology

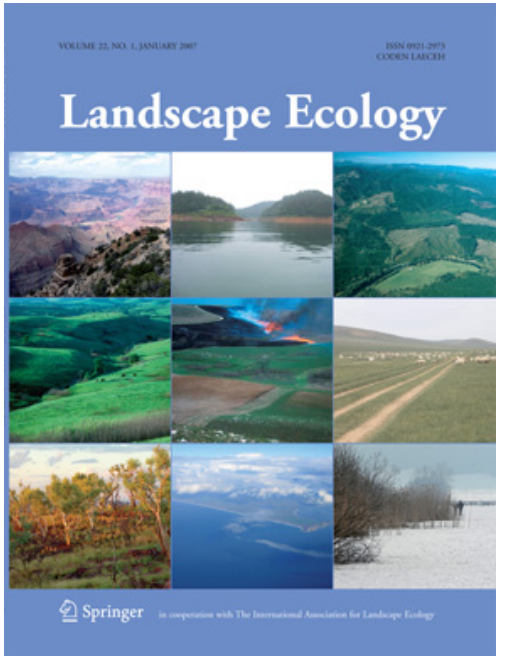


Text mining facilitated by rOpenSci's awesome `fulltext` package

R and Landscape Ecology

- Foundations
  - sp
  - rgdal
  - raster
  - rgeos
- The Future
  - sf
  - stars

- Specialty (Missing many!)
  - landsat
  - SDMtools
  - nlmr
  - landscapetools



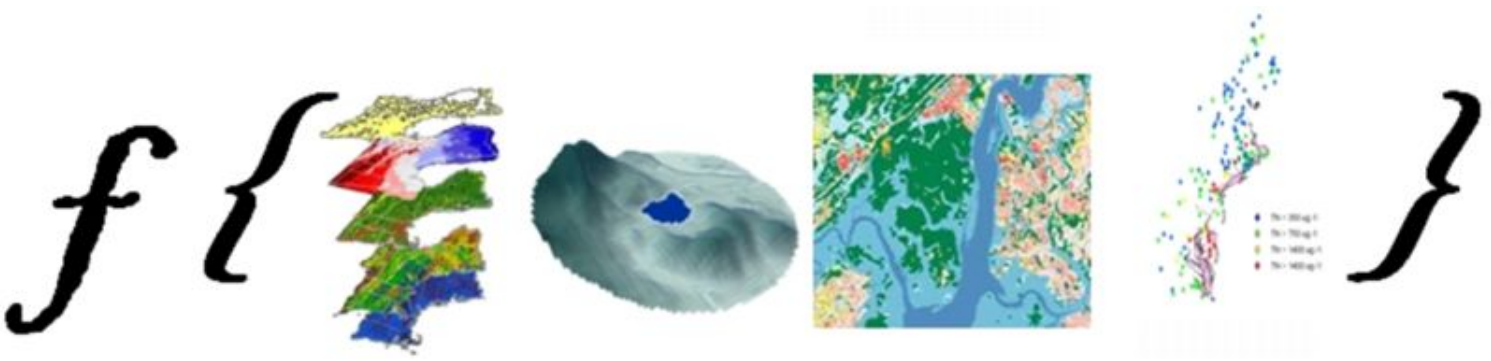
R, lakes, and cyanobacteria at USEPA

Who are we?

- Ecologists
- 3 FTE
  - Myself
  - Betty Kreakie
  - Bryan Milstead
- 1 Post-doc
  - Stephen Shivers
- Alum
  - Farnaz Nojavan

What do we do?

- Apply computational approaches to understand water quality impacts in lakes
- Focus on cyanobacteria
- Multiple Scales
- Open Science
- Use R
  - Analysis
  - Sharing code
  - Solve common problems

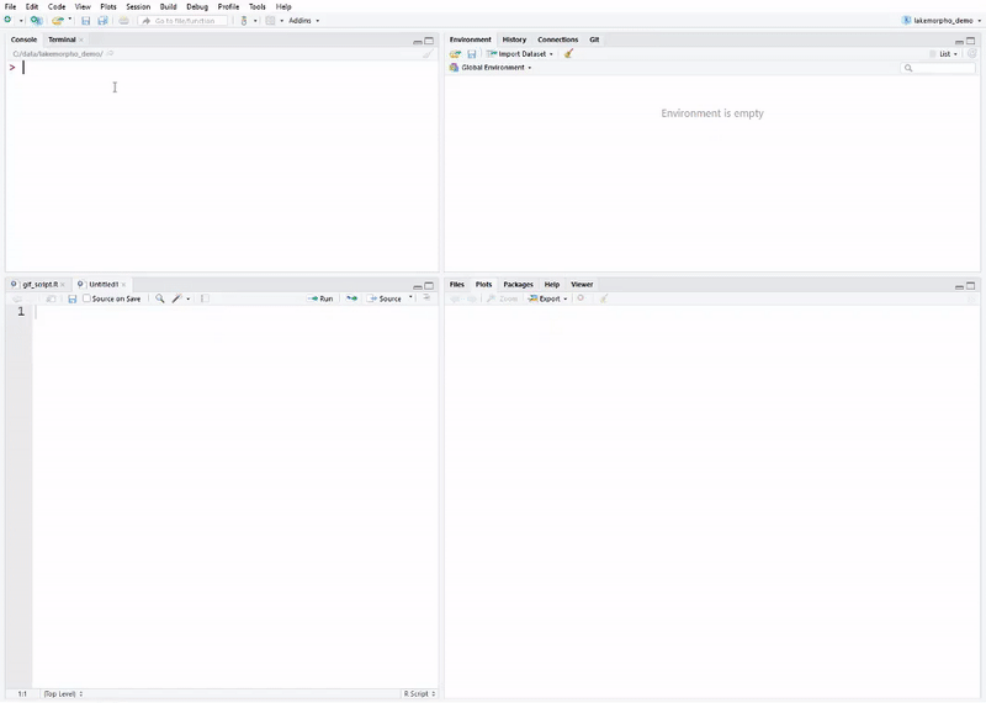


R to solve common problems

- `lakemorpho`
- `elevatr`
- `goatscape` (in development)

lakemorpho

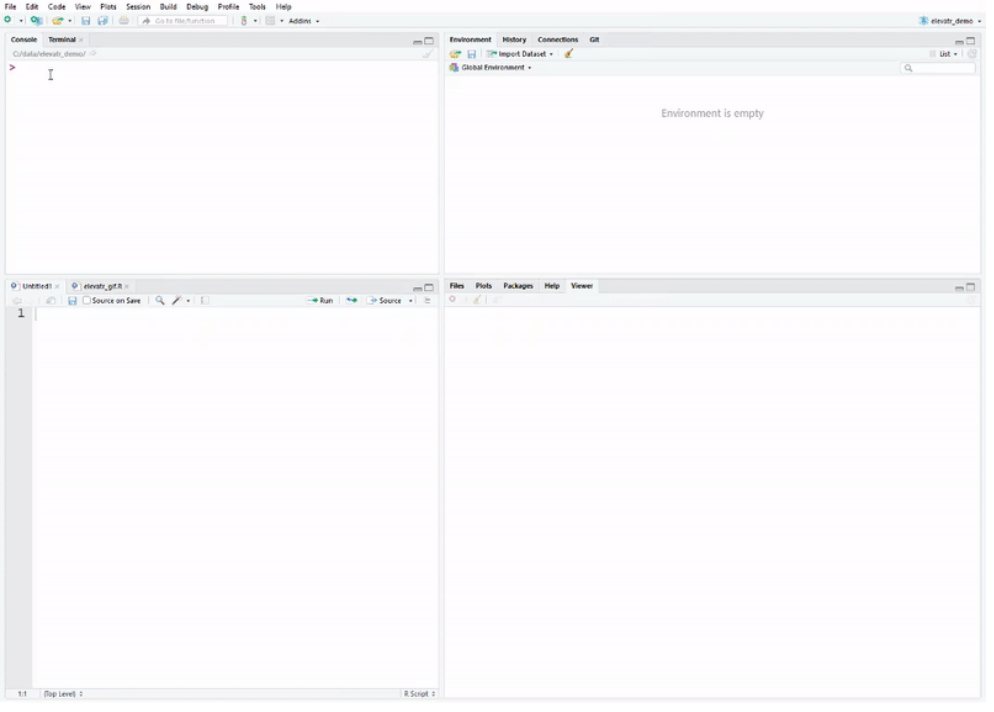
- Lake morphometry metrics in R
- `sp`, `rgdal`, `rgeos`, and `raster`
- `sf` support to be added
- National Lake Morphometry
- NHD Plus
- Hollister and Milstead (2010)
- Hollister *et. al.* (2011)
- Hollister and Stachelek (2017)



Package URL: https://cran.r-project.org/package=lakemorpho

elevatr

- Access elevation data in R
  - ~~Mapzen~~
    - closed!
  - AWS
  - USGS
- Built off of `sp`, `rgdal`, `rgeos`, and `raster` suite
- `sf` support to be added
- Incorporate https://www.nextzen.org/



Package URL: https://cran.r-project.org/package=elevatr

goatscape

- What's in a name?
- Summarizes ancillary data for a user-defined landscape polygon
  - Census (via `censusapi`)
  - Landcover and Impervious (via `FedData`)
- Accepts arbitrary spatial data for the landscape
- Based on `sf`
- Tidy by design

Repository URL: https://github.com/usepa/goatscape

Thanks!

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Package acknowledgements

- Slides created with `xaringan`
- Figures created with `ggplot2` and `hrbrthemes`
- Data analysis made **MUCH** easier with the `tidyverse`
- Text mining of Landscape Ecology done with `fulltext` and `rcrossref`

Slides and Source Code

- Slides: https://jwhollister.com/lakes_landscapes_r
- Repo: https://github.com/jhollist/lakes_landscapes_r