HYDROLOGIC DATA ANALYSIS

Hydrologic Data Analysis

Fall 2019

WELCOME TO HYDROLOGIC DATA ANALYSIS

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Background:

- Limnology, biogeochemistry
- Environmental informatics
- Empirical and process-based modeling

WELCOME TO HYDROLOGIC DATA ANALYSIS

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Background:

- Biogeochemistry, chemistry, molecular biology
- Rivers
- High frequency environmental data analysis

OFFICE HOURS

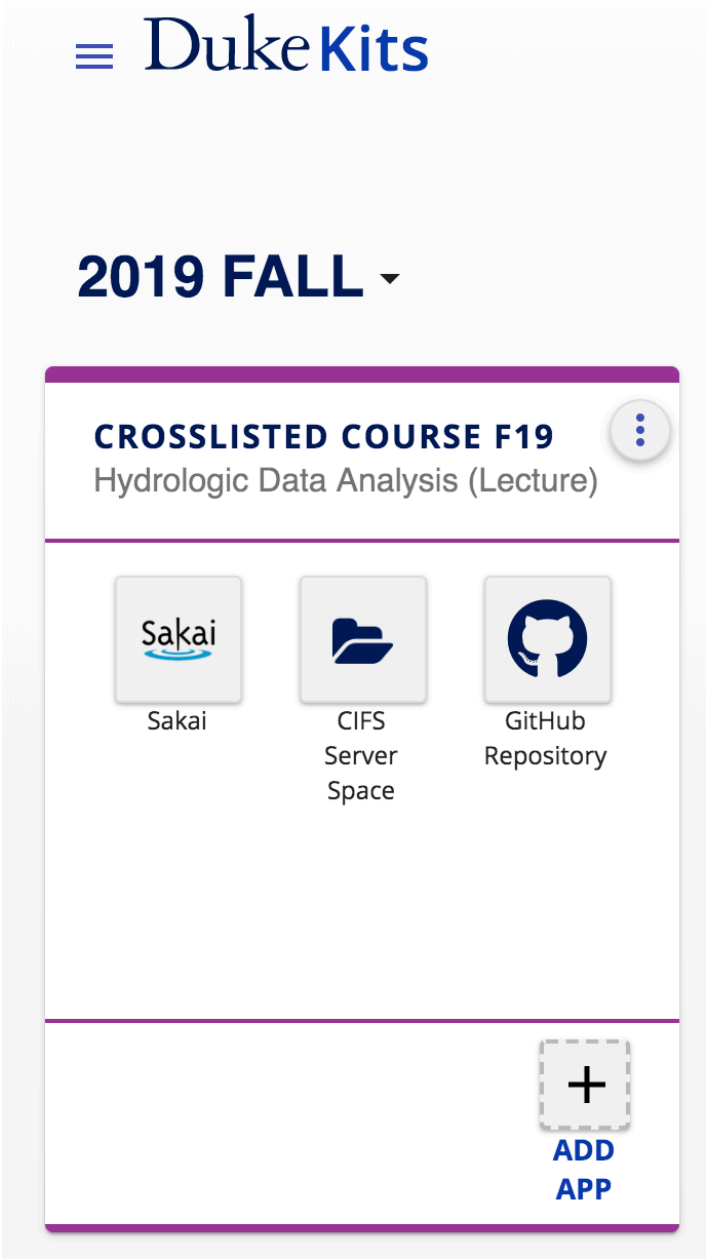
We will set office hours based on student schedules. Fill out the poll!

https://www.when2meet.com/?8002020-pRpzX

COURSE ACCESS

kits.duke.edu

- Sakai
- GitHub
- CIFS server space
- More to come…



COURSE OBJECTIVES

1. Synthesize information on fundamental and applied topics in water resources using quantitative analysis
2. Apply the appropriate steps of the data analytics pipeline to answer questions about aquatic systems
3. Develop oral, visual, and written skills for communicating findings and connecting topics to societal issues

COURSE SCHEDULE

Week 1: Intro and R boot camp

Weeks 2-3: Physical properties of lakes & rivers

Weeks 4-5: Water quality in lakes & rivers

Weeks 6-8: Time series analysis, high frequency data, mapping

Each week will have an assignment (homework) (60 % of grade)

COURSE SCHEDULE

Weeks 9-13: Course project

- Teams chosen early in the course
- Teams will choose research topic and dataset
- Components:
  - Initial proposal and plan (5 %)
  - Brainstorming sessions (5 %)
  - Report draft (5 %)
  - Final report (15 %)
  - Final presentation (10 %)

OTHER SYLLABUS STUFF

- Schedule specifics
- Accommodations
- Emergency procedures
- Use the campus resources!

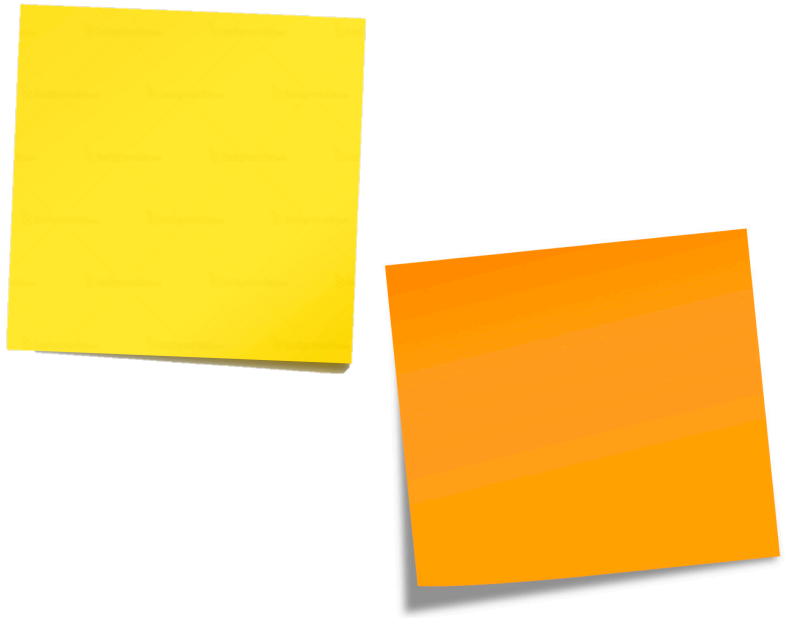
TECHNICAL LOGISTICS

Computers

- Option 1: Lab computer, mapped to CIFS server
- Option 2: Personal computer, download all necessary software
- Software installation guide provided

During class

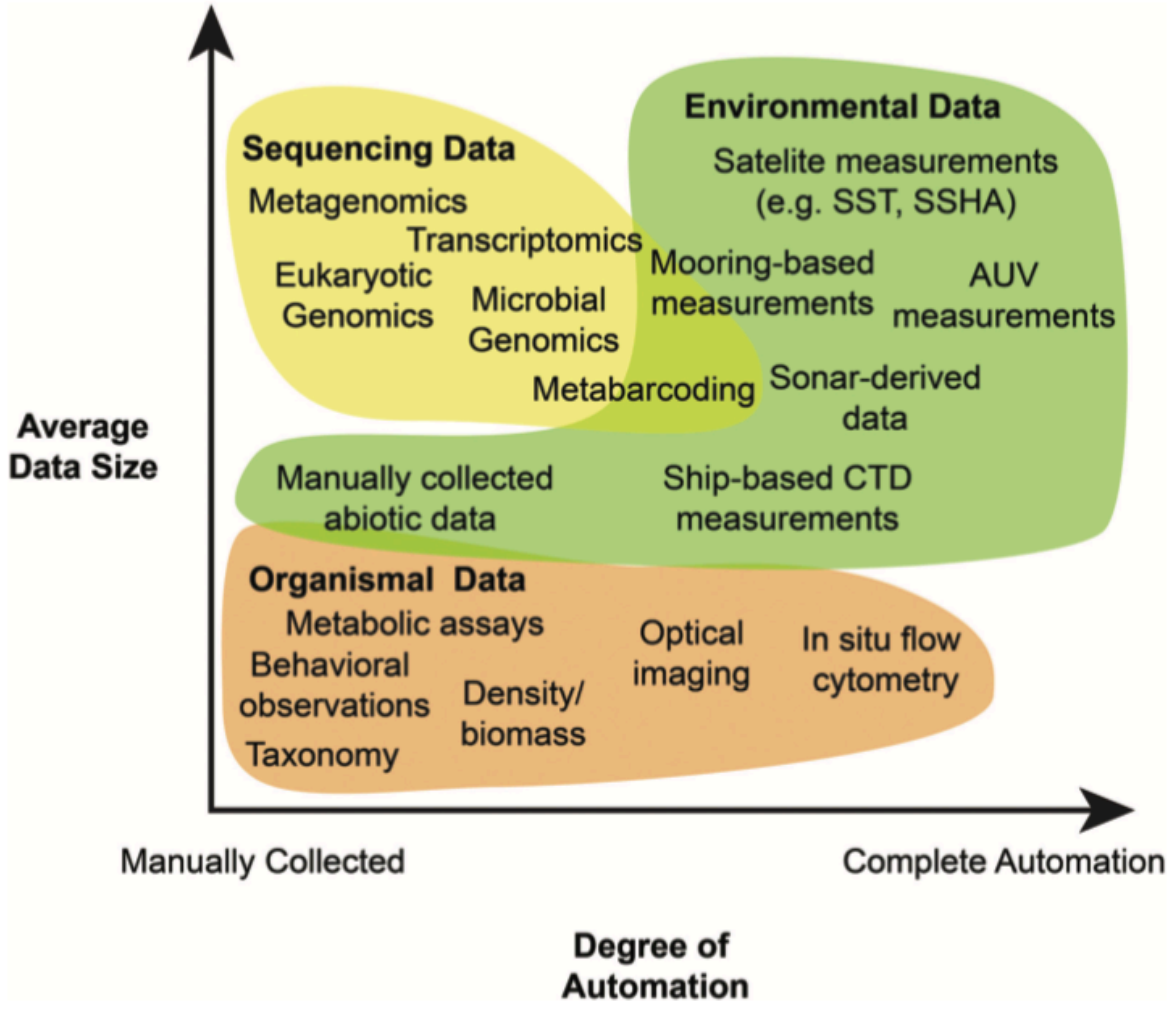
- Yellow sticky note: I am behind
- Orange sticky note: I am stuck



INTEGRATING BIG DATA INTO AQUATIC ECOLOGY

Durden et al. 2017

- What are the big ideas of this paper?
- Examples of big data in your field → how do these examples relate to the ideas presented in the paper?
- Unique opportunities and challenges related to big data in the aquatic sciences? Which of these do you see as most important or distinctive?



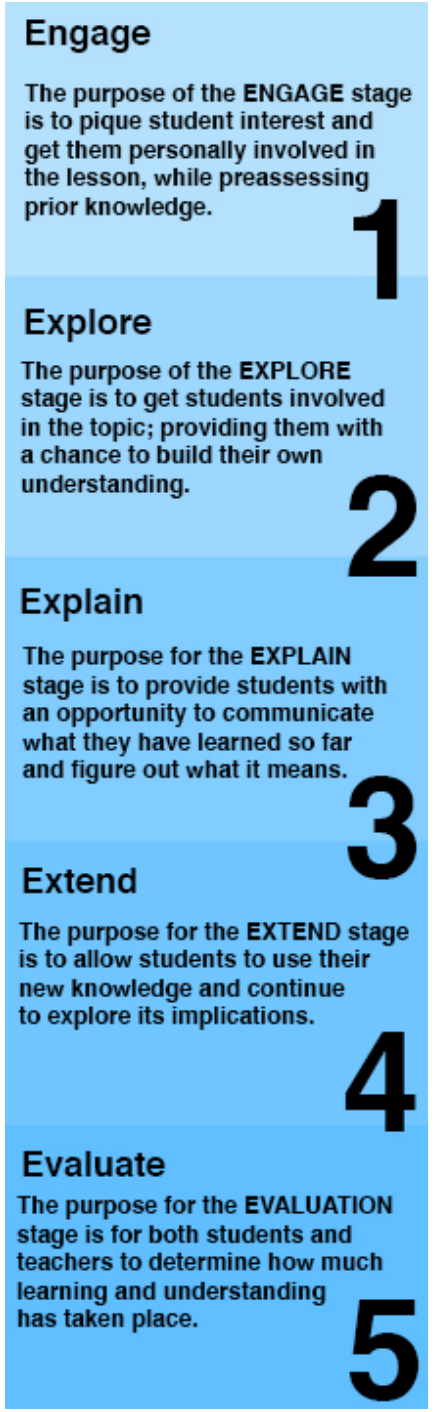
INQUIRY-BASED LEARNING

Construction of knowledge through scientific practices

Involves:

- Problem solving skills
- Active participation
- Knowledge discovery by the learner
- Inductive and/or deductive approach

Outcomes: inquiry based learning > traditional instruction



INQUIRY-BASED LEARNING

Research questions:

1. How does an inquiry-based approach impact student learning of a) fundamental processes in aquatic systems and b) skills in data analytics?
2. How is big data changing the way we analyze and interpret aquatic systems?

Opt in to participating in this research study (consent form in Sakai)

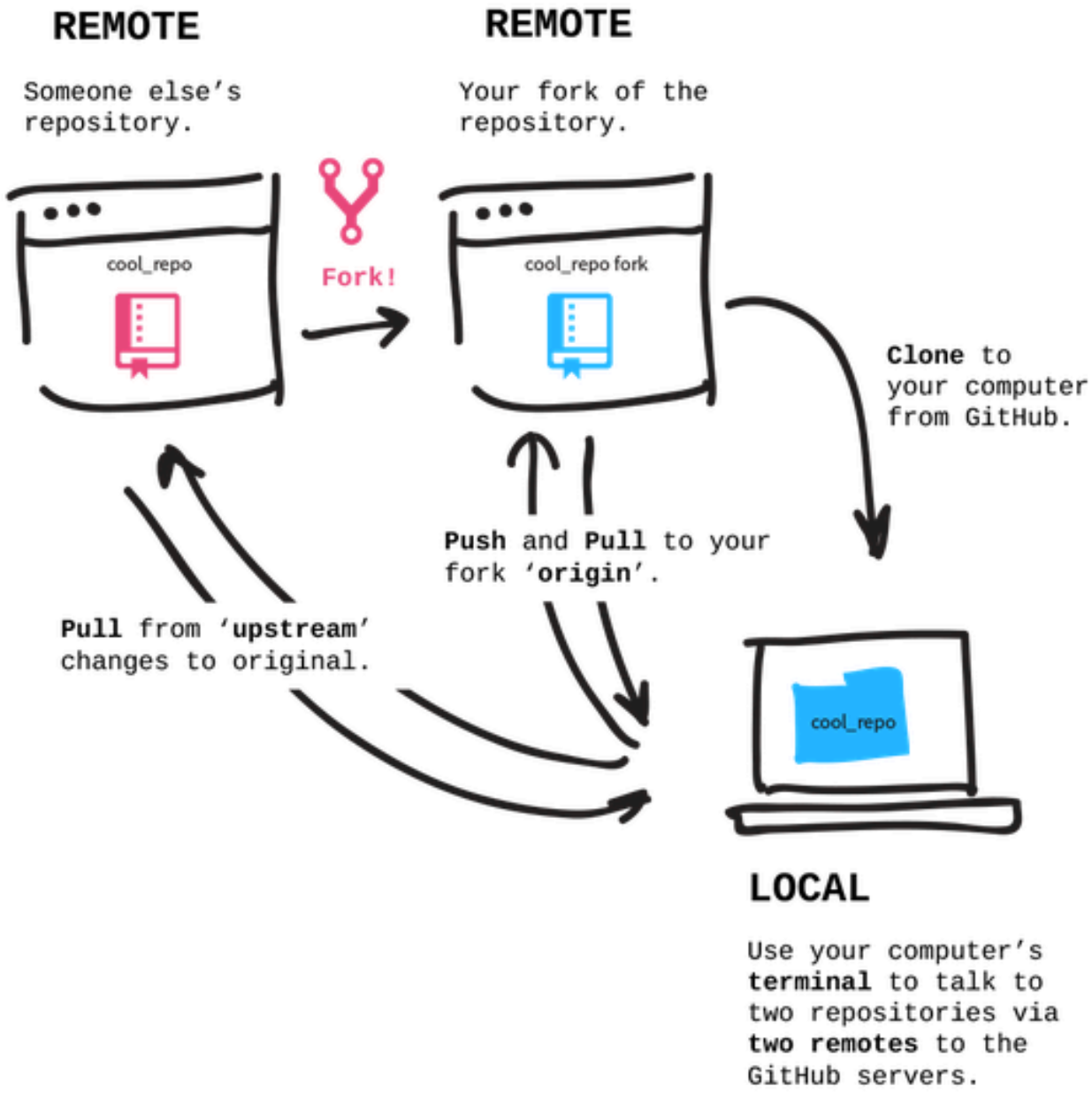
GATHERING DATA ON OUR CLASS

- Take 1 post-it of each color and write your name on each

- How would you rate your knowledge or skills in the following topics?
  - Place the post-it on the number corresponding to your answer
  - If 2+ people choose the same number, stack post-its on each other

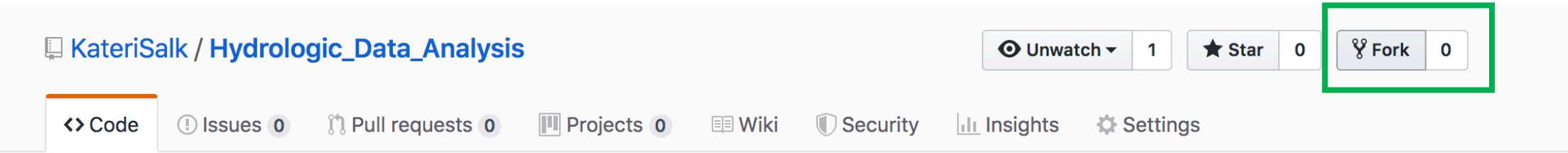
- In addition, add a star to the post-it corresponding to the topic you would most like to improve during this course.

GITHUB SETUP



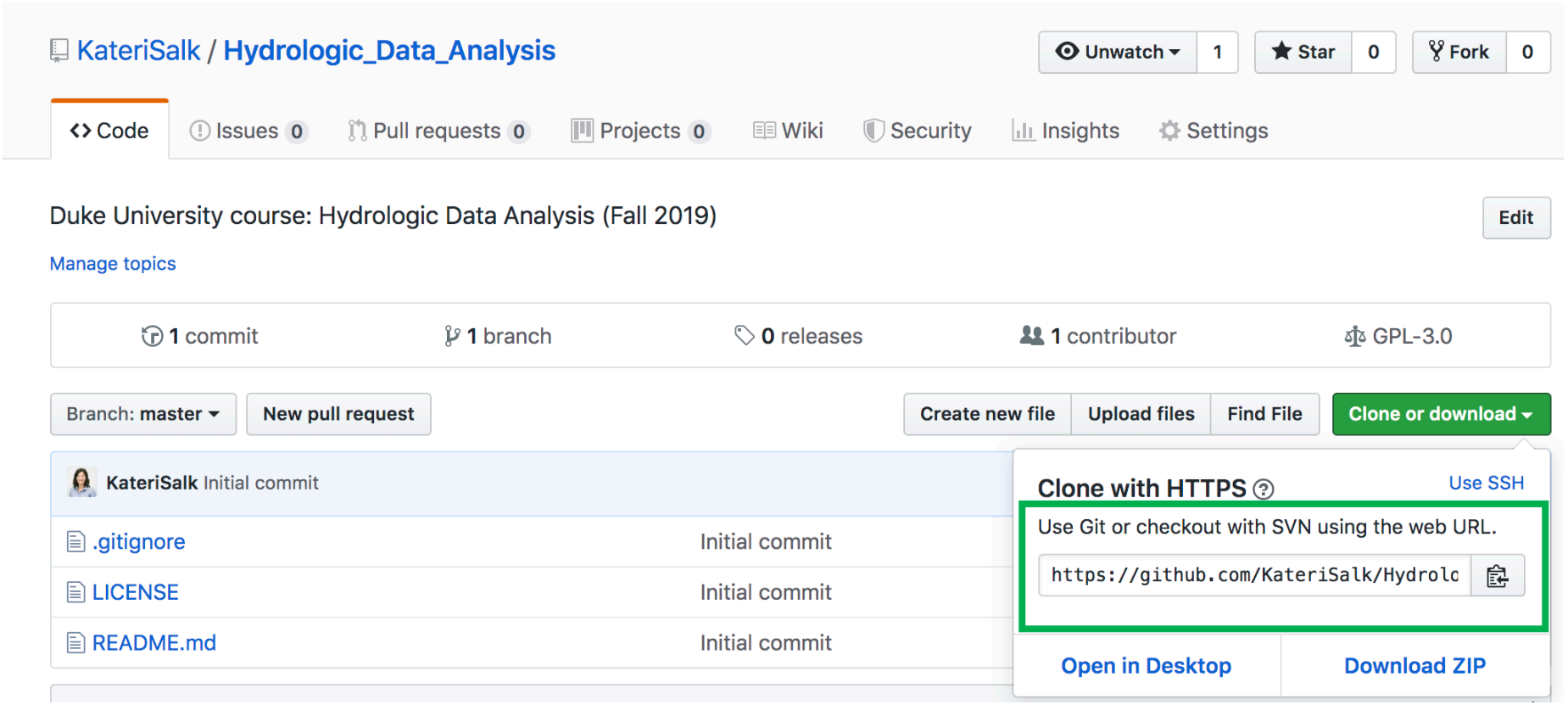
GITHUB SETUP: FORKING

1. Navigate to https://github.com/KateriSalk/Hydrologic_Data_Analysis
2. Fork the repository to your GitHub account



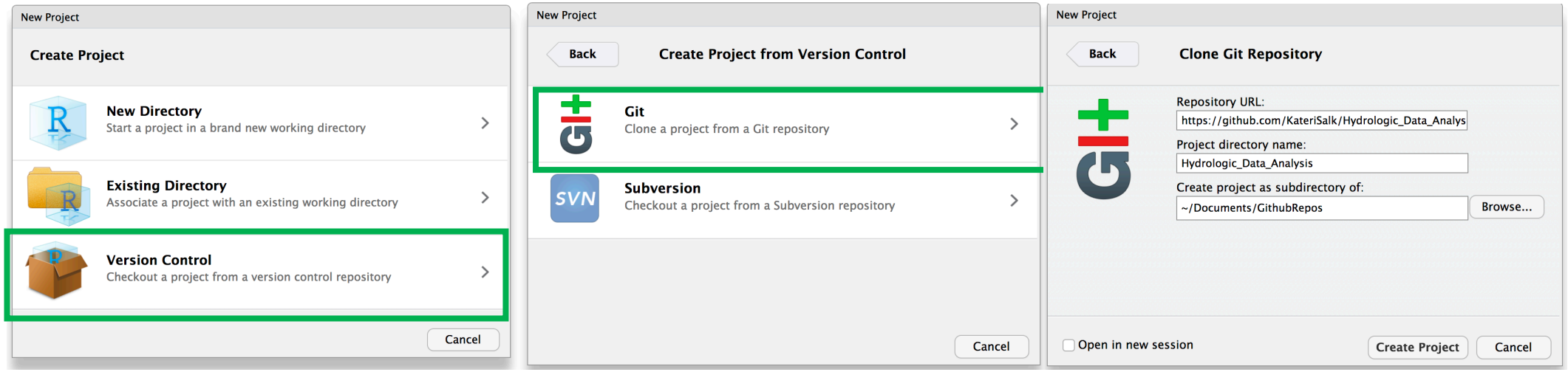
GITHUB SETUP: CLONING

3. Copy the link to your forked repository



GITHUB SETUP: CLONING

4. Open RStudio and go to File > New Project…
5. Select “Version Control”, then “Git”
6. Paste your forked repo URL and choose a folder where the local repo will be saved



GITHUB SETUP: COMMIT AND PUSH

- Open the Git_Help file and follow the instructions in the Editing, Committing, Pushing section.
- Familiarize yourself with how to keep the local, remote, and upstream remote repositories up to date with each other.

- Help others if you are finished!