

GEOL 362Z

OGGM Lab 5: Water resources projection

Nov 16 - Dec 3

Background information

The goal of this lab is to produce and interpret projections of glacial runoff contribution to local water resources. You will select a location that interests you, then put together code to explore a research question.

Examples could be:

- In a given region, will larger glaciers or smaller glaciers release more water over the next ____ years?
- For glacier ____, how do projections of runoff depend on future climate scenario?
- If we were to abruptly cool the climate in 2030, what would happen to seasonal and inter-annual runoff from glacier ____? What about abrupt cooling in 2050? How long would it take for the glacier to recover its initial extent?

Materials

- Lab notebook
- Laptop computer
- OGGM Classroom: [go/OGGM](https://classroom.oggm.org) or classroom.oggm.org
- OGGM tutorial site: <https://oggm.org/tutorials/stable/notebooks/welcome.html>
- GLIMS viewer: <https://www.glims.org/maps/glims>

Pre-lab questions

Answer the following questions in your lab notebook. These answers, with accompanying citations, will help you write your Abstract and Introduction.

1. Why bother studying glacial water resources?
2. In what contexts are glacial water resources most important?

Experimental design (session 1, Nov 16)

These steps will help you write your Methods section.

1. Choose a location to study. Open the GLIMS viewer and find the RGI ID for your selected glacier. Write this down—you'll use it in OGGM later.
Tip: Interpretation and context with the literature will likely be easier if you choose a named (and decently large) glacier.
2. Describe the hypothesis or research question you will test.
3. Think about the pieces of evidence you will need to address your research question.
 - a. Identify three or more figures/tables you want to include in your lab report.
 - b. For each of the figures, identify what variables you will need to store during simulation in order to produce the visualization.
4. Write an outline of the steps you will need to take in simulation.
5. Begin setting up the simulation by translating your outline into a new Jupyter notebook. You can make notes in Markdown cells about what you plan to do in each section, and include place-holder code cells to be filled later.

Procedure (sessions 2 and 3, Nov 23 and 30)

These steps will help you do the simulation and write your Results section.

1. Scout around for bits of code that can do what you need in each section. Resources include the existing Jupyter notebooks in OGGM Classroom, the OGGM tutorial site, and Python answers on StackOverflow (yep!). Add these pieces to the relevant sections. You will probably have to revise a little bit to make sure that the variables are consistent from one cell to the next.
2. Test run your notebook. Errors? Ask Lizz for help, and/or Google the error message.
3. Repeat steps 1-2 as needed.
4. Once your notebook runs all the way through and produces sensible results, assess whether you need to change anything in your simulation (e.g. flow settings, time scale, climate scenario, what variables you save) to address your research question.
5. When you are satisfied, write a description of each figure/key result and craft the narrative for your Results section.

Writeup and context (session 3, Nov 30; report due Dec 3)

These steps will help you write your Discussion & Conclusions sections.

1. Highlight the key points of your analysis. Namely, did you successfully address your research question? What did you find?
2. Describe sources of error (or disagreement with reality) in your results.
3. Identify relevant literature to contextualize your results - this could be papers we read in class, your textbook, additional scholarly literature, policy documents, or popular media articles on the region you studied. Summarize how your results relate to findings in that literature.
4. Write your conclusions: a short paragraph of what you did, what you found, and how readers should move forward with this information.