

# From Greenland to Our Coasts: Learning about Earth systems with open-source GIS

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**AGU** FALL  
MEETING

SCIENCE LEADS THE FUTURE



# QGreenland

## From Greenland to Our Coasts: Learning about Earth systems with open-source GIS

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Award #1928393



# Why teach using GIS?

GIS in education isn't **just** map-making. It can be used for:

- Leverage students' existing knowledge (GPS, Apps)
- Data visualization and effective communication (embedded in articles, videos, storymaps)
- Creative problem-solving and problem based learning
- Scientific inquiry and data analysis



# Authentic Data in Education

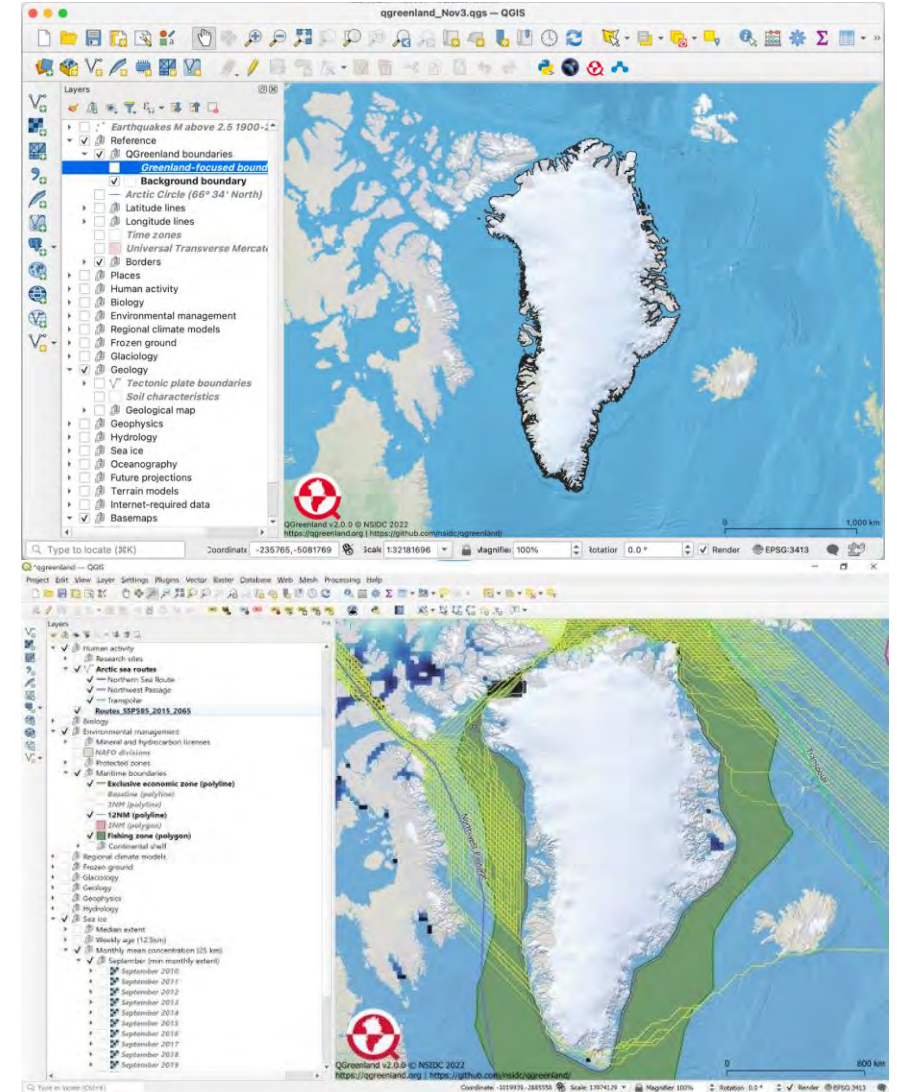
- **Critical thinking**
  - analyzing, evaluating, interpreting, or synthesizing information
- **Problem-Solving Skills**
  - Compute
  - Simplify
  - Build a model



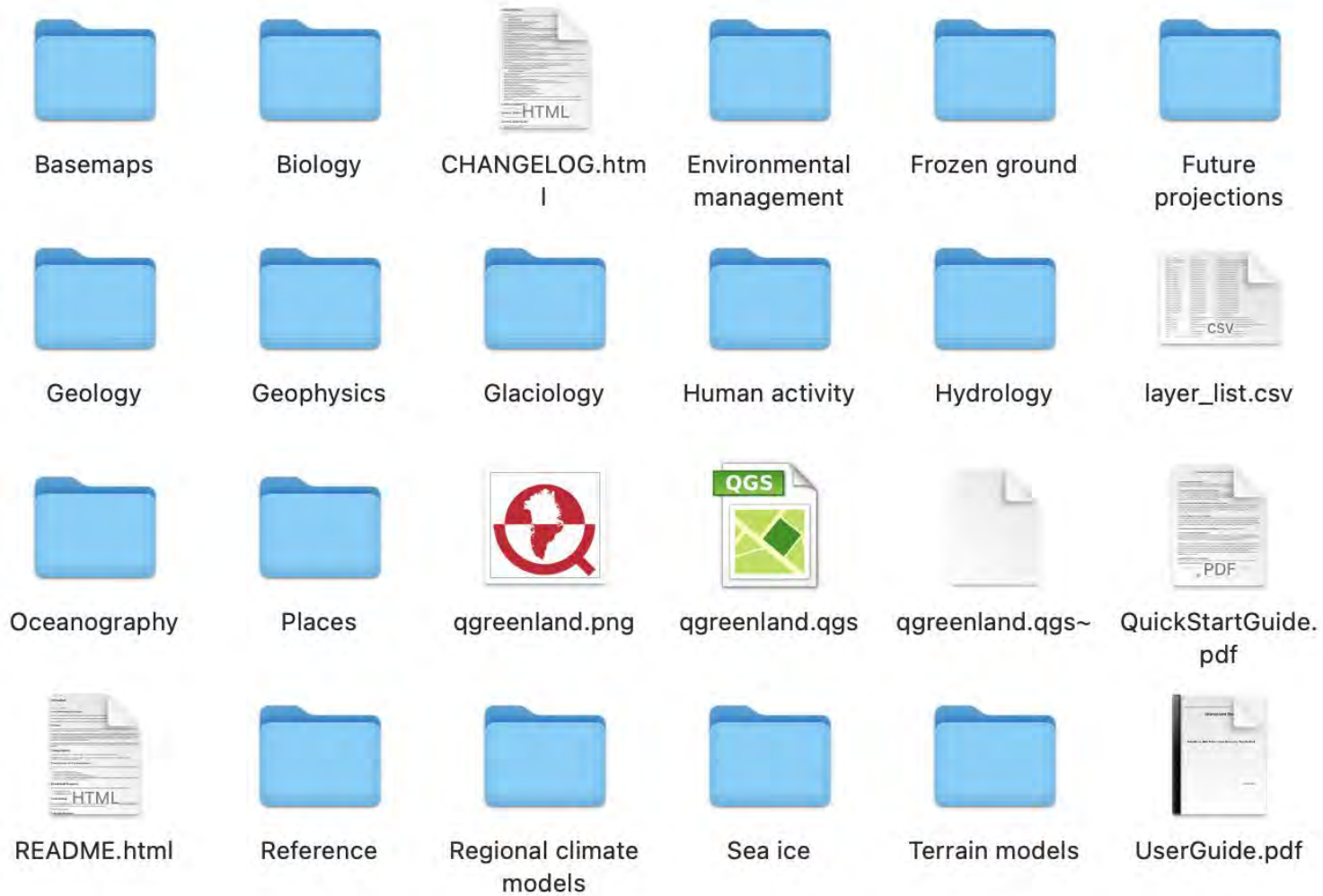


# QGreenland

- **Free**, All-in-one Greenland-focused geospatial data environment for offline and online use
- Data sets representing many diverse disciplines
- QGIS is a **free**, open-source GIS software
  - Has a lot of functionality, used by GIS professionals.
  - Software, not browser based. Requires a laptop for download
- Like All GIS Learning curve, but the benefit of extensive resources available



# QGreenland: Interdisciplinary



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# QGreenland:

- **Systems**
  - NGSS: Seven crosscutting concepts standards that bridge disciplinary boundaries



Image Credit: NASA/JPL-Caltech



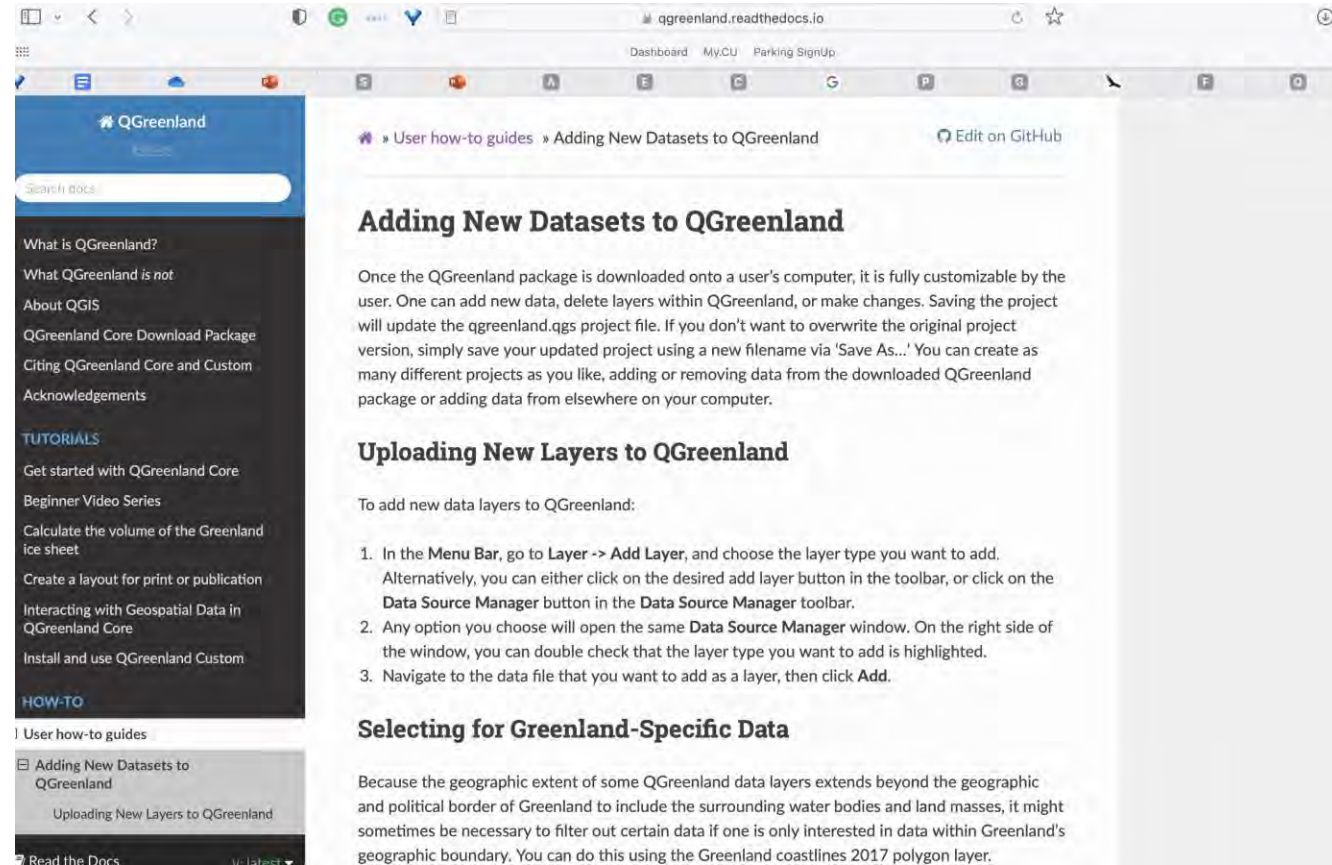
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# Resources

## User Guide & Documentation

- How to Download and Get started with QGreenland
- Basic Spatial Queries
- Generating Publication-quality Maps and Figures
- How to Create New Data Layers



[qgreenland.readthedocs.io](https://qgreenland.readthedocs.io)





# Resources

## Beginner Video Tutorial Series

- Series of 7 short videos, each less than 10 minutes (~one-hour play time)
- Designed for those with no prior experience with either GIS or QGIS
- Videos walk you through step-by-step:
  - Data in Qgreenland
  - Navigating QGIS interface
  - Types of GIS data
  - Editing, adding data
  - Geoprocessing Toolbox
  - Exporting map



A screenshot of a YouTube video player. At the top, the YouTube logo and search bar are visible. The video title is "QGreenland Beginner's Tutorial Series" by the channel "QGreenland". Below the title, it says "7 videos Last updated on May 18, 2022". A description reads: "The beginner's tutorial series will familiarize users with both GIS and the QGreenland data package. This 1-hour series was adapted from th ...More". There are "Play all" and "Shuffle" buttons at the bottom of the player area.

- 1  **QGreenland Beginner's Tutorial Series, Session 1: What is...**  
QGreenland • 87 views • 6 months ago
- 2  **QGreenland Beginner's Tutorial Series, Session 2: Introduction t...**  
QGreenland • 56 views • 6 months ago
- 3  **QGreenland Beginner's Tutorial Series, Session 3: Navigating th...**  
QGreenland • 47 views • 6 months ago




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# Examples of Instruction: Complete Curriculum

## Advanced High School – Intro undergraduate

Students explore changes to the Greenland Ice Sheet and local importance through data analysis:


- Calculate the average glacial retreat of the Greenland Ice Sheet
- Calculate the contribution of the Greenland Ice Sheet to global average sea level rise
- Estimate future contribution of a to average sea level rise
- Compare and contrast regional sea-level rise in different communities in Alaska
- Create a flood map of a coastal community and assess the flood risk to important community infrastructure



Scientist: \_\_\_\_\_ Date: \_\_\_\_\_

**Reading passages:**

**Newtok, Alaska**  
Newtok is located on the Ninglik River near the Bering Sea on the Western coast of Alaska (see map). There are about 400 year round residents that live in Newtok. Newtok has recently been losing 70 feet of land a year due to both sea-level rise and permafrost collapse on the coast. When the once-permanently frozen ground melts, it causes the soil and vegetation to slide away and into the river. This loss of land threatened not only homes in Newtok, but also their freshwater source and waste site. The village has been undertaking the lengthy process to relocate to new land in Mertarvik, 9 miles south of Newtok. About 100 residents made the move in 2019 after many years spent obtaining funding and building infrastructure. All 400 residents will continue to move as housing, schools, and other facilities continue to be built over the coming years. (Source: [Interviews](#) at the Wilson Center)



**Juneau, Alaska**  
Juneau Alaska is located in Southeast Alaska, on the coast of the Pacific Ocean (see map). Juneau is home to about 32,000



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# Examples of Instruction: Complete Curriculum



**POLAR PASS: Undergraduate Advanced Geoscience and Environmental Science**

**Module 1: Exploring the Glacier Basin System**

**Module 2: Long-term Spatial Transformations of the Glacier Basin System**

<https://serc.carleton.edu/polarpass/index.html> **Public 2023**

14. Looking at the Landsat images and considering the different zones of interest: What do they show about the character of the Earth surface? What is changing through these months? Why might a couple of months of data be missing?



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# Thank you!

**QGreenland.org**

[github.com/nsidc/qgreenland/](https://github.com/nsidc/qgreenland/)

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