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

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AGU FALL MEETING

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QGreenland

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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
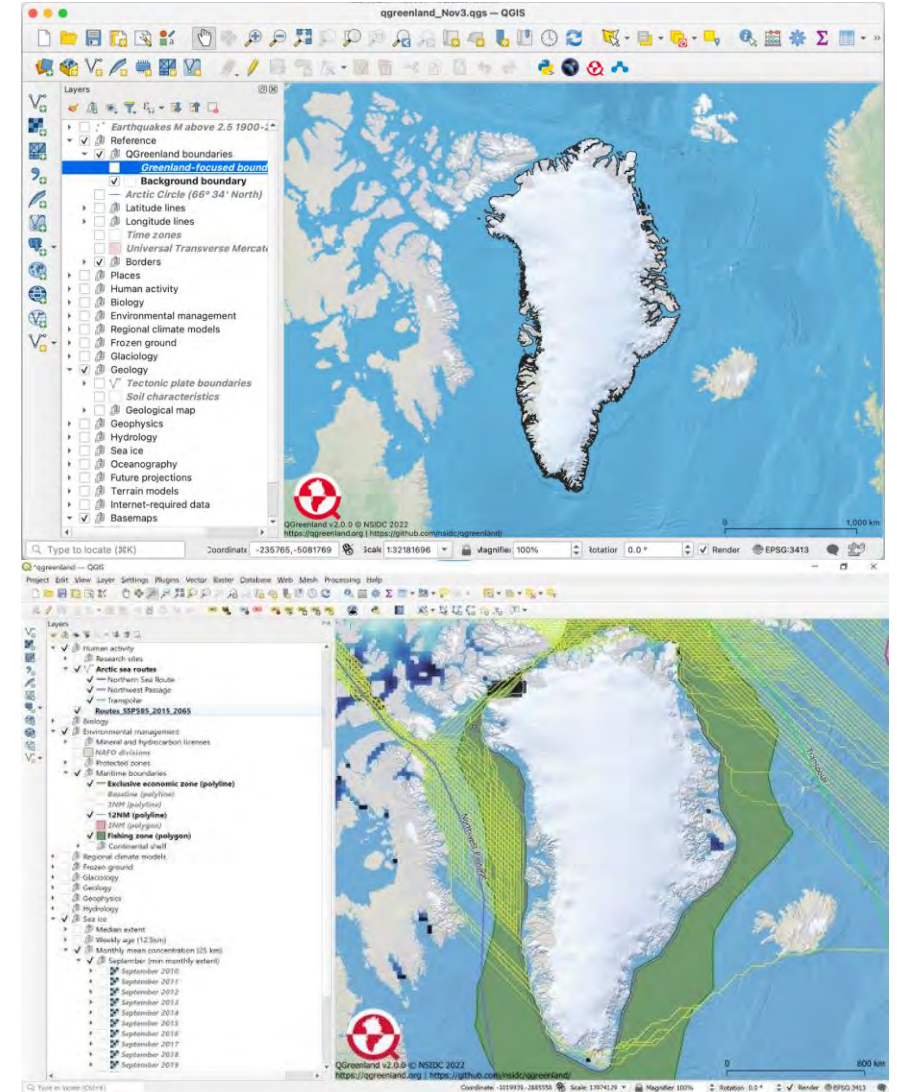
QGreenland: Interdisciplinary
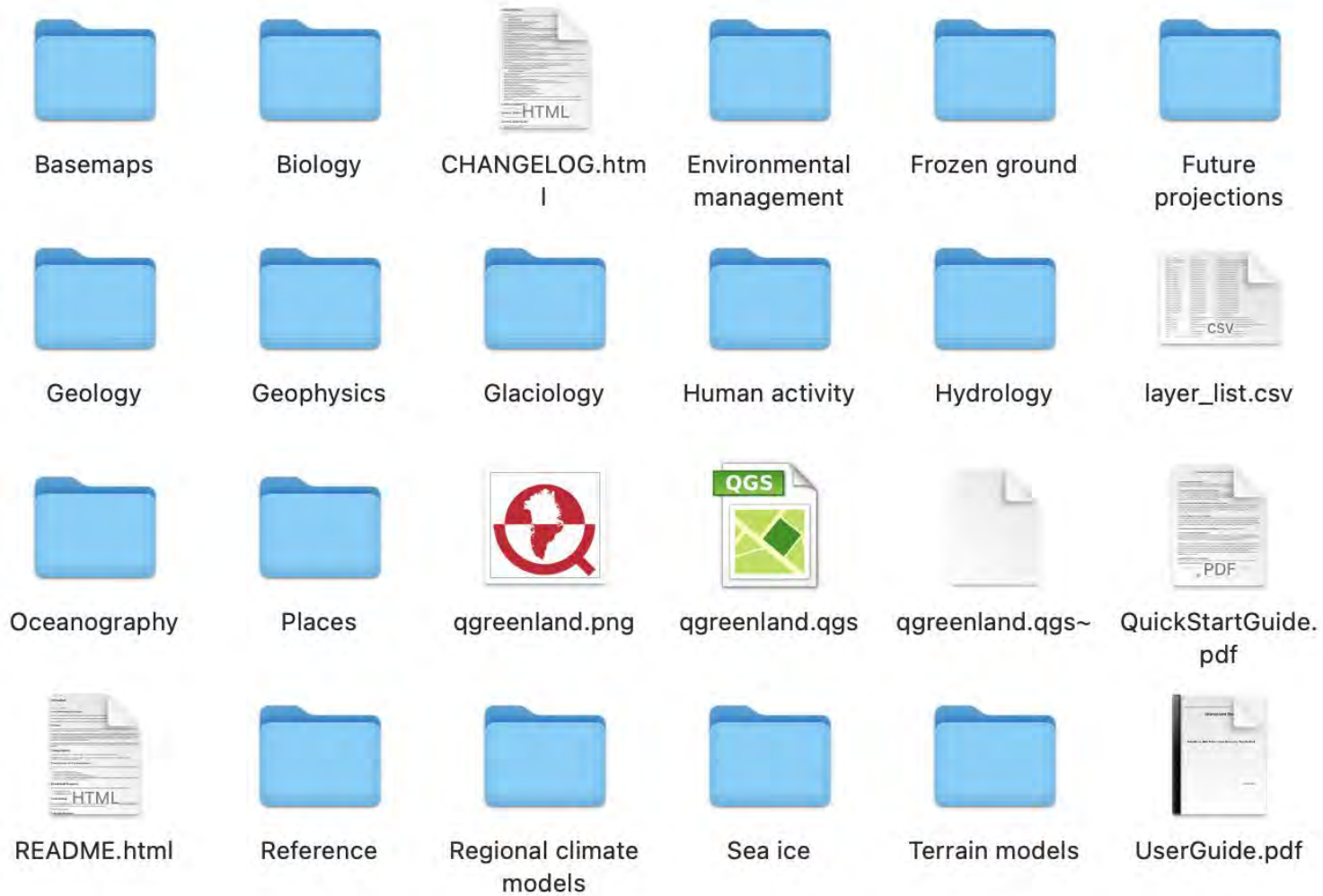
QGreenland:

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

Image Credit: NASA/JPL-Caltech
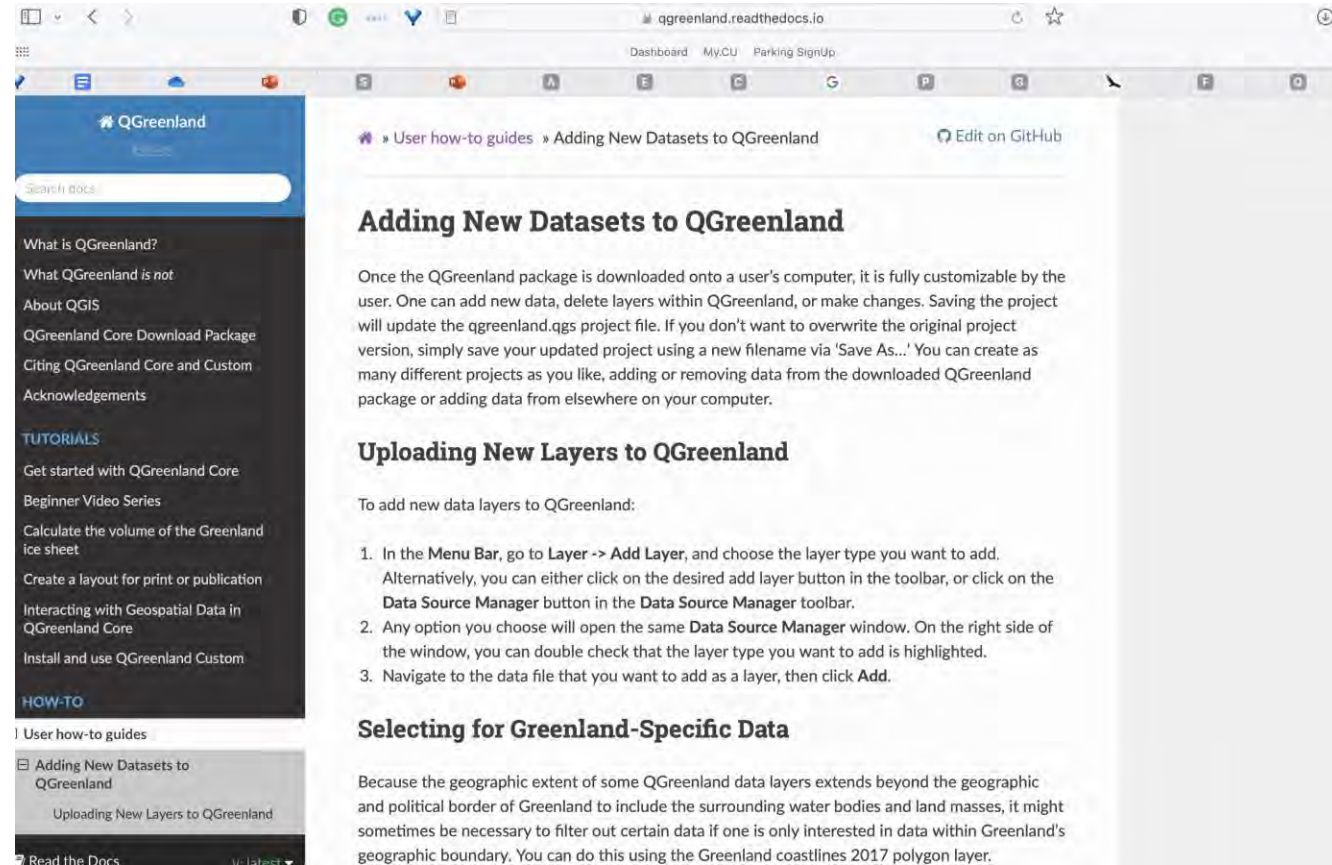
Resources

User Guide & Documentation

- How to Download and Get started with QQreenland

- Basic Spatial Queries

- Generating Publication-quality Maps and Figures

- How to Create New Data Layers

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

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

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?

Thank you!

QGreenland.org

github.com/nsidc/qgreenland/

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