

# OGGM-EDU

*An interactive platform to learn (and teach)  
about glaciers*

# ACKNOWLEDGMENTS

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OGGM-Edu contributors:

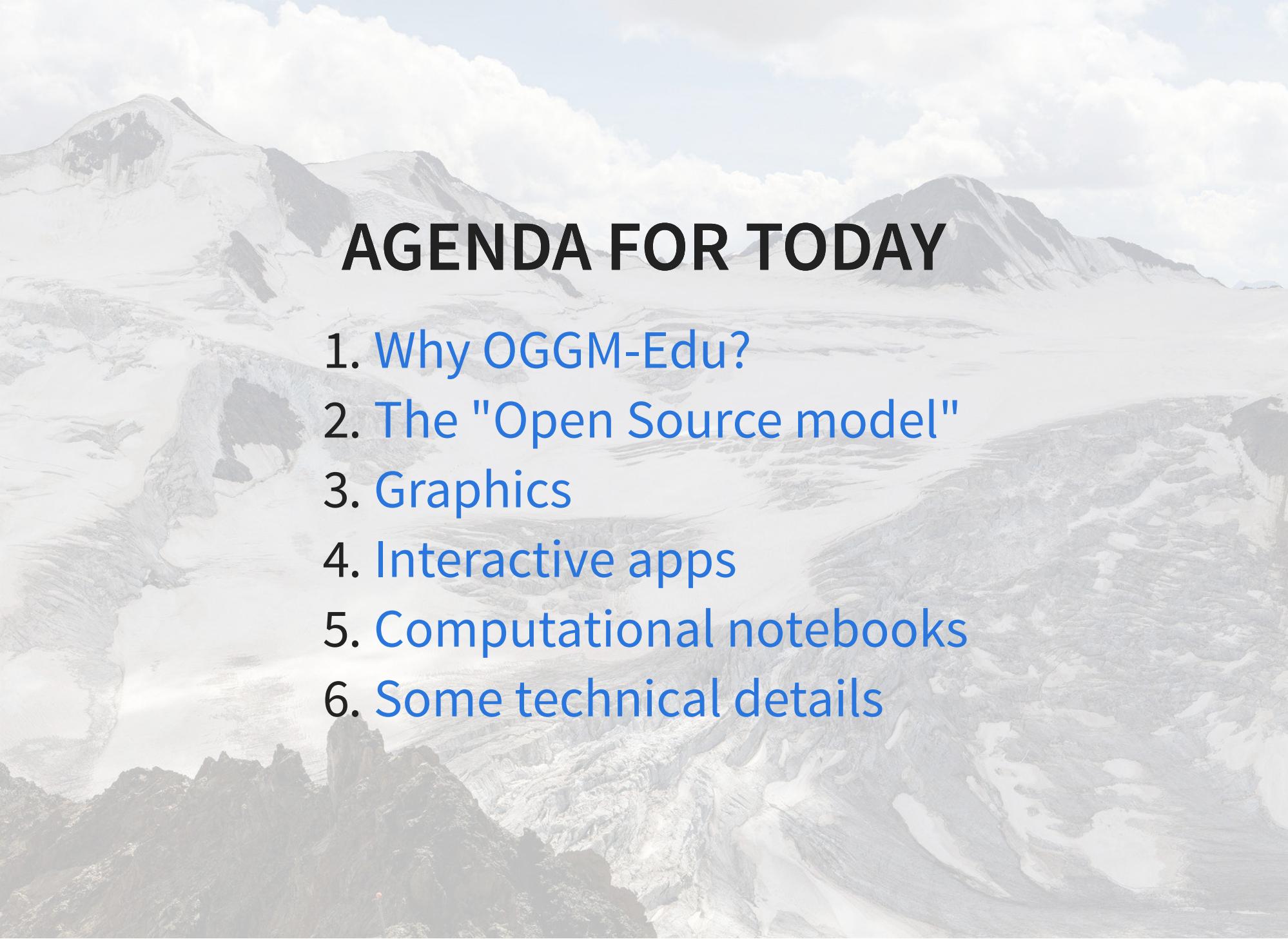
Lizz Ultee, Daniel Frisinghelli, Betka Medvedova

+ many OGGM and other open-source package contributors

unterstützt von



Google for Nonprofits



# AGENDA FOR TODAY

1. Why OGGM-Edu?
2. The "Open Source model"
3. Graphics
4. Interactive apps
5. Computational notebooks
6. Some technical details

A wide-angle photograph of a massive, multi-tiered glacier. The glacier's surface is a mix of white snow and dark, weathered rock. In the background, several rugged mountain peaks rise, their slopes partially covered in snow and ice. The sky above is filled with soft, white clouds.

**WHY OGGM-EDU?**



[Home](#) » [Glaciers and Climate](#)

## NAVIGATION

[Antarctic Glaciers](#)

[Antarctica](#)

### **Glaciers and Climate**

[Climate Change](#)

[Antarctic Ice Sheet mass balance](#)

[Reconstructing climate from moss banks](#)

[Ice cores](#)

[Calculating glacier ice volumes and sea level equivalents](#)

[Glacier recession](#)

[What is the global volume of land ice and how is it changing?](#)

[Ice-Ocean Interactions](#)

[Shrinking Ice shelves](#)

[Sea level rise](#)

[Numerical Ice Sheet Models](#)

[Glacier Processes](#)

[Glacial Geology](#)

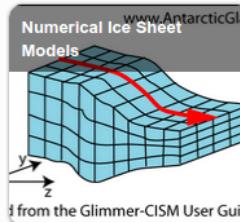
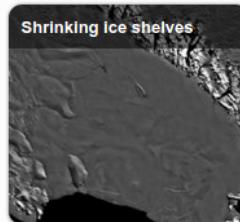
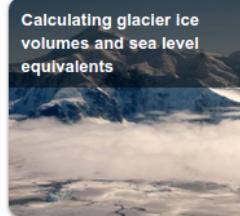
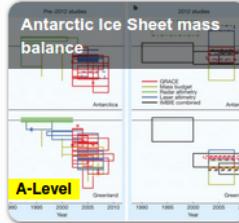
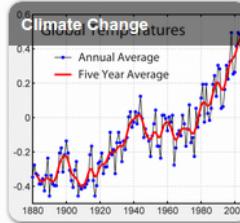
[Students](#)

[A-Level](#)

[About](#)

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## Glaciers and Climate



and the balance rate by

$$\dot{b} = \beta(h - E) ,$$

where  $E$  is the equilibrium-line altitude. (2.1.2)

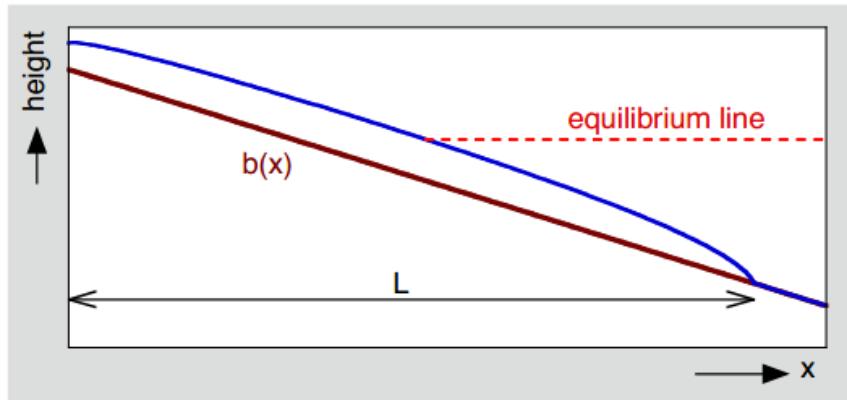
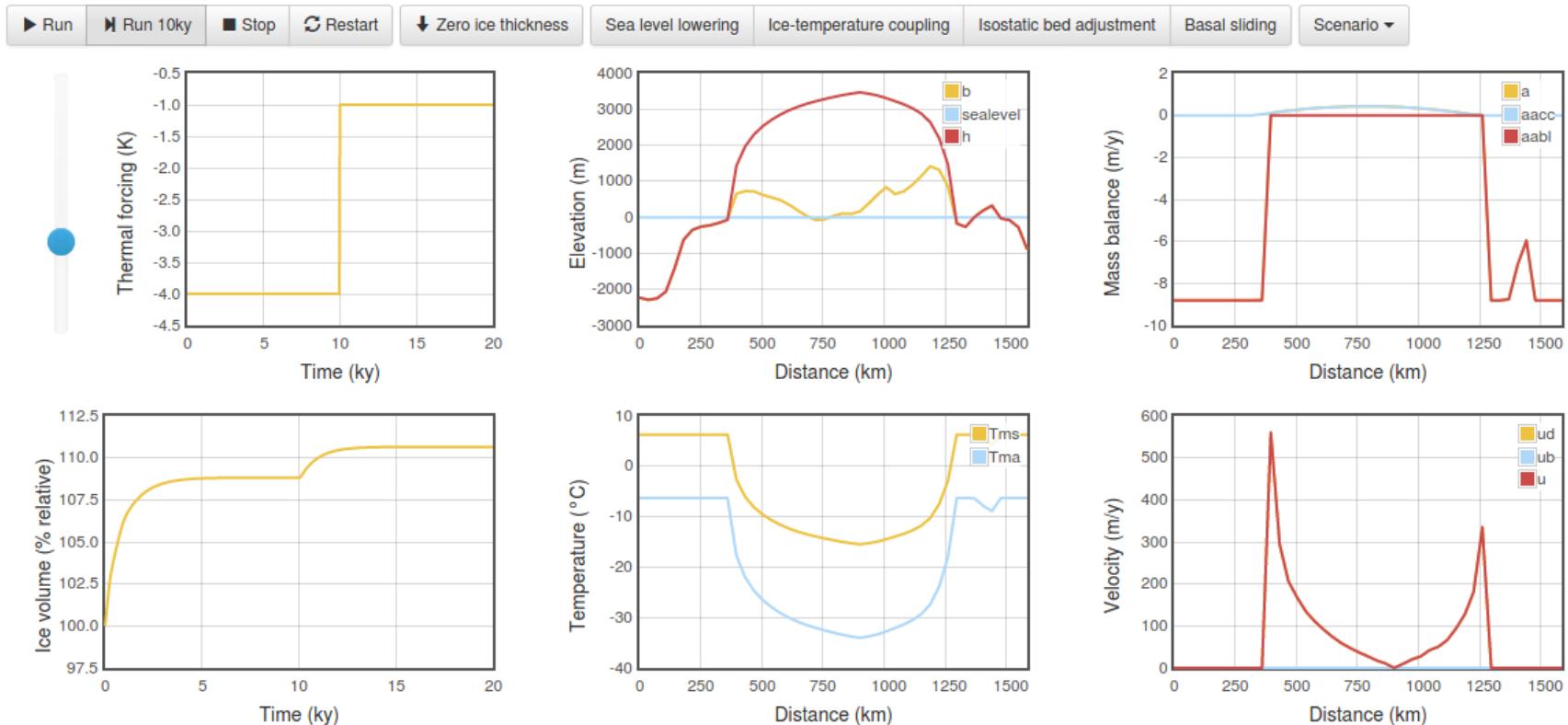


Fig. 2.1. Geometry of the simple glacier model; the slope of the bed is constant and the equilibrium line horizontal.



"Glaciers", <https://phet.colorado.edu>

# JS-ISM An interactive ice sheet model



Frank Pattyn, Martin O'Leary: [JS-ISM](#), An interactive ice sheet model

# Why [edu.oggm.org](http://edu.oggm.org) ?

- A **complement** to existing online resources
- Focus on **numerical** models and **global themes** (OGGM)  
but we are open to more topics
- Target group: **instructors** and independent learners
- **Open-source**, decentralized and **collaborative** content creation
- No HTML/Java/CSS/WordPress/...: Python programming language  
(easier entry level for scientists)

A wide-angle photograph of a massive, multi-tiered glacier. The glacier's surface is a mix of white snow and dark, weathered rock. In the background, several rugged mountain peaks rise, their slopes partially covered in snow and dark rock. The sky above is filled with soft, white clouds.

# **THE OPEN SOURCE MODEL**

- All content/code [on GitHub](#) with an open license allowing reuse
- Content independent from the online layout
- [Computational environments](#) and resources freely available ([MyBinder](#), OGGM-Hub)
- [Independent/decentralized](#) content can be readily run on OGGM-Edu

```

.. figure:: _static/oggm.gif

Welcome to OGGM-Edu!
=====
This platform is an educational website about glaciers.

Our main goal is to **provide tools and materials for instructors** who want to teach about glaciers at school, in workshops or at the university level. For example, OGGM-Edu was used to conduct a 'weeklong workshop <https://oggm.org/2019/12/06/OGGM-Edu-AGU/>' on glaciology and glacial water resources for Peruvian students.

**OGGM-Edu has four independent components**, serving complementary purposes:

1. :ref:`title_apps` , to illustrate glaciological processes with the help of interactive graphics on the web. The targeted audience is very broad, from school children to adults, with or without scientific background.
2. :ref:`title_graphics` , open access images and graphics that can be used for lectures or presentations.
3. :ref:`title_notebooks` , for students willing to run and develop their own experiments. The targeted audience are students at the undergrad or graduate level with some programming experience, or under the supervision of an instructor who can show them how to run the experiments.
4. :ref:`title_tuto` , for current and future users of the Open Global Glacier Model. These notebooks are targetting graduate students or scientists aiming to learn how the model works.

OGGM-Edu focuses on interactive content and numerical glacier experiments. We do not provide resources about fundamentals in glaciology or climate science: for good textbook material refer to :ref:`other_resources` , which OGGM-Edu intends to complement.

..._title_apps:
Interactive apps
=====

These interactive apps can be run on any computer with an internet connection.

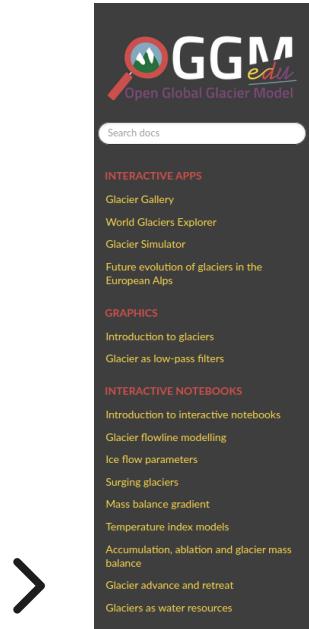
* :doc:`gallery` 
* :doc:`explorer` 
* :doc:`simulator` 
* :doc:`alps_future` 

...tocfree:
:hidden:
:caption: Interactive apps

gallery.rst
explorer.rst
simulator.rst
alps_future.rst

... title graphics:

```



Docs » Welcome to OGGM-Edu! [Edit on GitHub](#)

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- Interactive apps**, to illustrate glaciological processes with the help of interactive graphics on the web. The targeted audience is very broad, from school children to adults, with or without scientific background.
- Graphics**, open access images and graphics that can be used for lectures or presentations.
- Interactive Notebooks**, for students willing to run and develop their own experiments. The targeted audience are students at the undergrad or graduate level with some programming experience, or under the supervision of an instructor who can show them how to run the experiments.
- OGGM tutorials**, for current and future users of the Open Global Glacier Model. These notebooks are targetting graduate students or scientists aiming to learn how the model works.

# Application example: Clubes de Ciencia Peru

## Instructor: Lizz Ultee

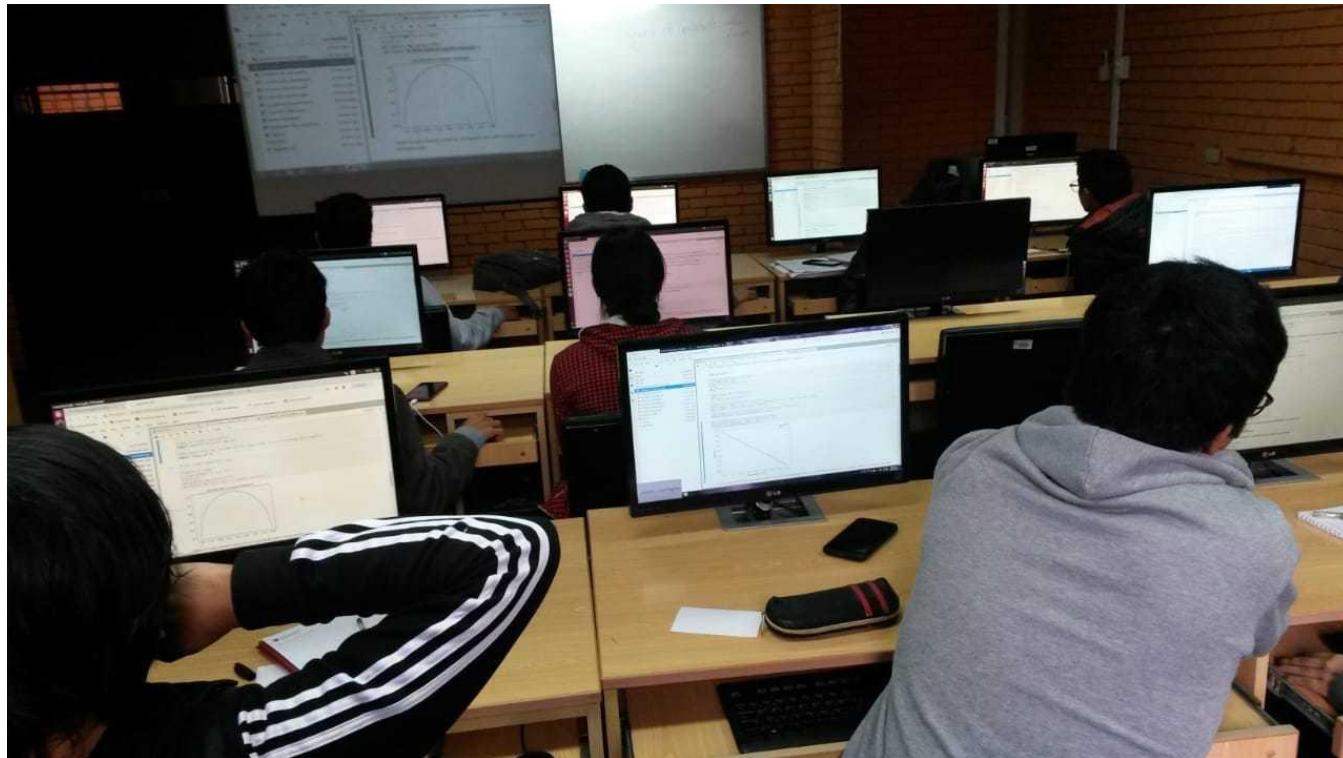
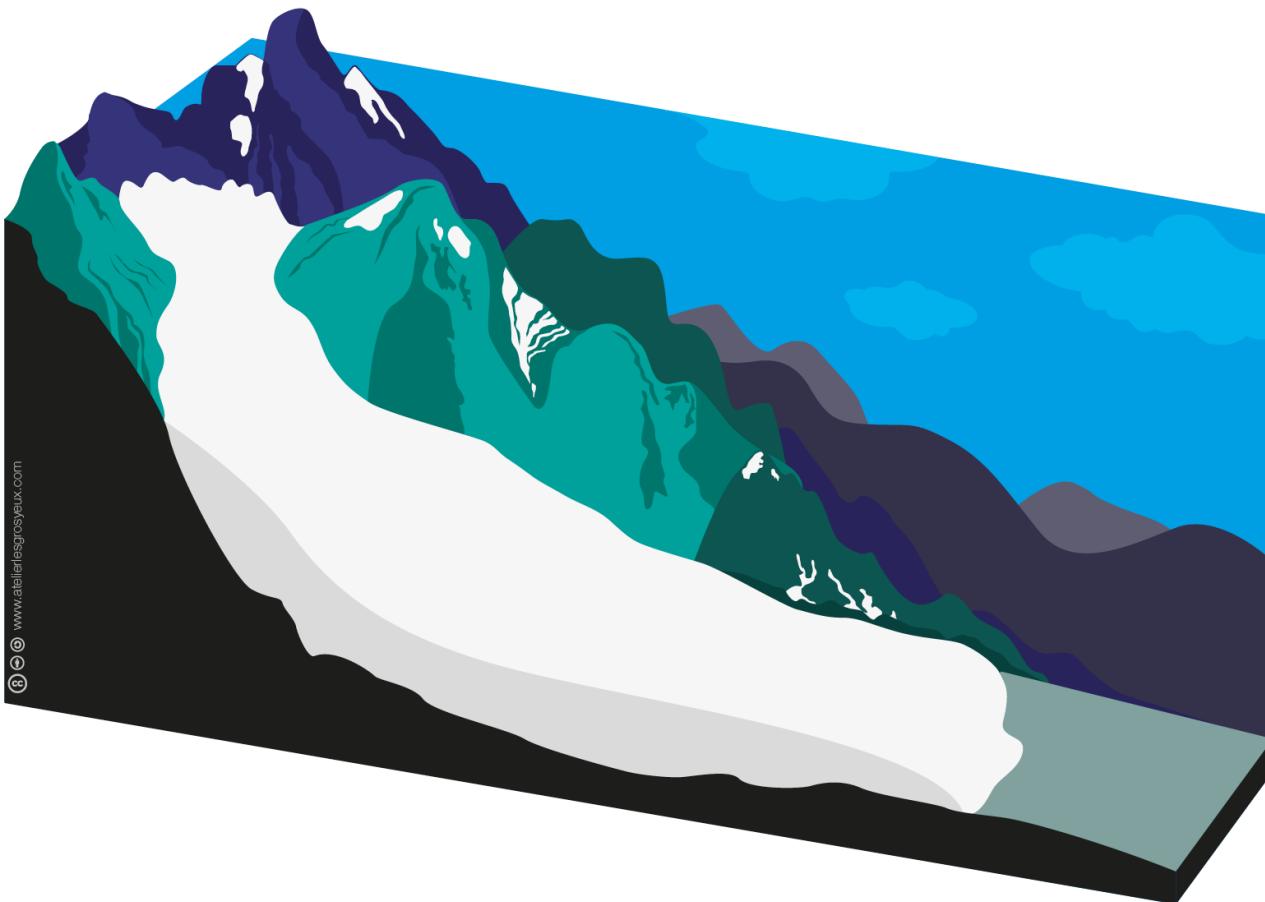


Photo: T. León Rojas



# GRAPHICS

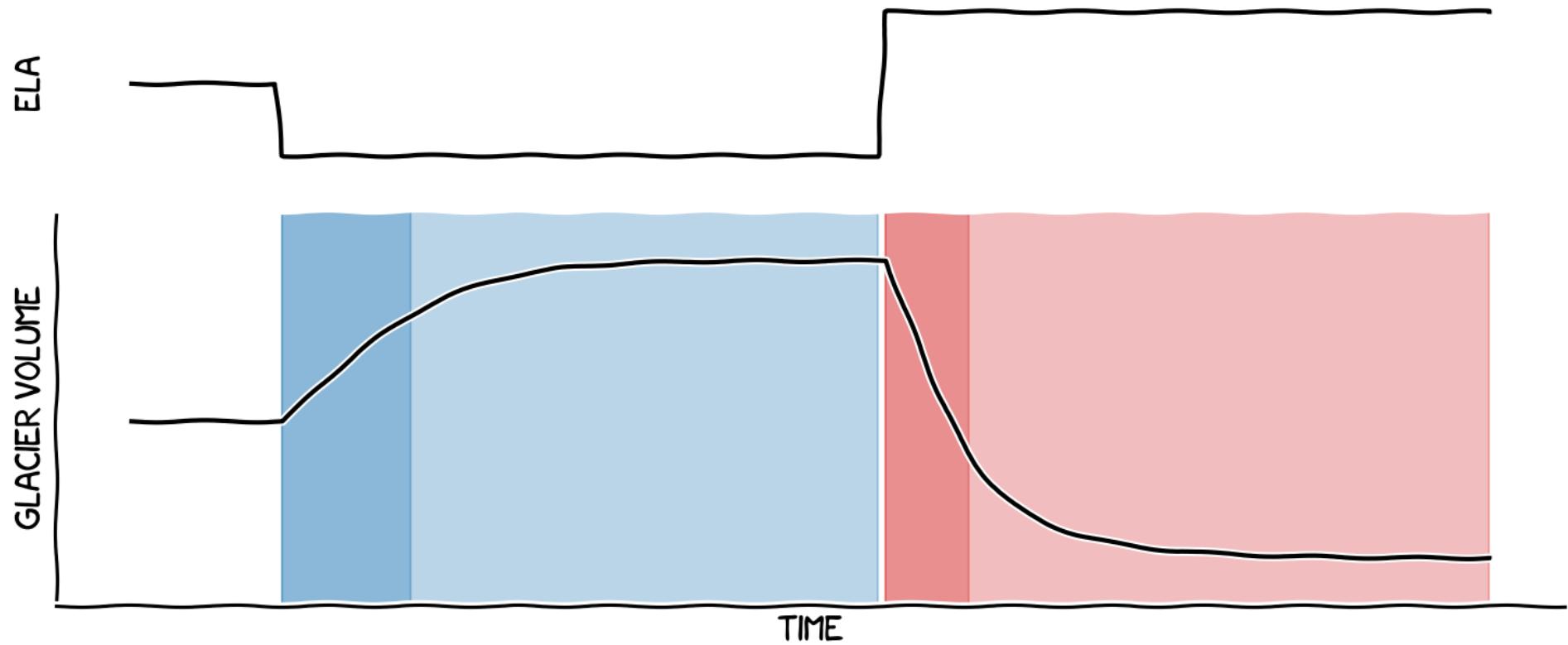
# Glaciers and climate



© www.atelierlesgrosyeux.com

Click on the image to advance. Source: [Anne Maussion, Atelier les Gros yeux.](#)

# Glacier response time



Source: OGGM-Edu.

A wide-angle photograph of a massive, light-colored glacier. The surface is covered in deep, irregular crevasses and ridges, showing the complex geological processes that shaped it over millennia. In the bottom right corner, three small figures wearing bright yellow and red jackets are standing on the glacier, providing a clear sense of its enormous scale.

# INTERACTIVE APPLICATIONS

- Glacier Gallery
- World Glaciers Explorer
- Glacier Simulator
- Future evolution of glaciers in the Alps

# COMPUTATIONAL NOTEBOOKS

**GRAPHICS**

Introduction to glaciers

Glacier as low-pass filters

**INTERACTIVE NOTEBOOKS**

Introduction to interactive notebooks

**Glacier flowline modelling**

Ice flow parameters

Surging glaciers

Mass balance gradient

Temperature index models

Accumulation, ablation and glacier mass balance

Glacier advance and retreat

Glaciers as water resources

**OGGM TUTORIALS**

# Glacier flowline modelling

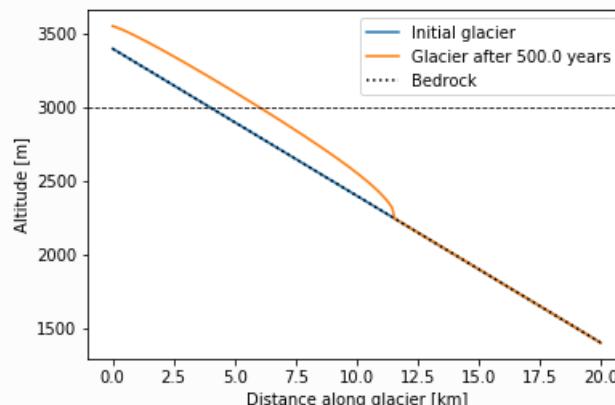


Figure: Geometry of a glacier model after 500 years, that moves only from deformation processes.

This notebook is an introduction to flowline modelling with OGGM. To open the notebook in your browser use the button below:

[Launch Edu Notebooks](#)

A wide-angle photograph of a massive, multi-tiered glacier. The glacier's surface is a mix of white snow and dark, weathered rock. In the background, several rugged mountain peaks rise against a sky filled with soft, white clouds. The overall scene conveys a sense of the scale and permanence of natural landscapes.

**TECHNICAL "DETAILS"**

- Computational environments ("software capsules") hosted on [Docker](#), generated with [Repo2Docker](#)
- Computational notebooks run in [JupyterLab](#) hosted on [MyBinder](#)
- Apps written in Python with the [HoloViz](#) visualization ecosystem. Server on Google Cloud.
- OGGM-Edu website generated with [Sphinx](#) and hosted on [ReadTheDocs](#)

# THANK YOU!

These slides are available at [oggm.org/oggm-edu-talk](http://oggm.org/oggm-edu-talk)



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