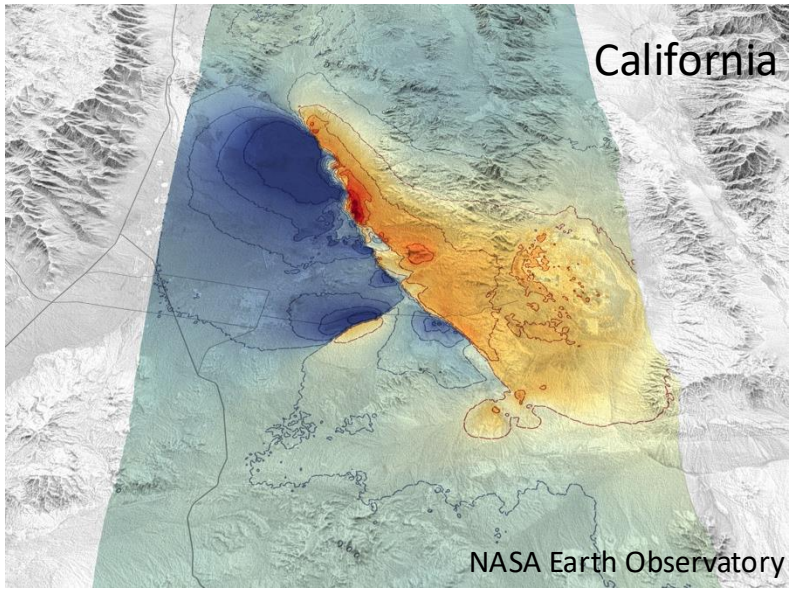
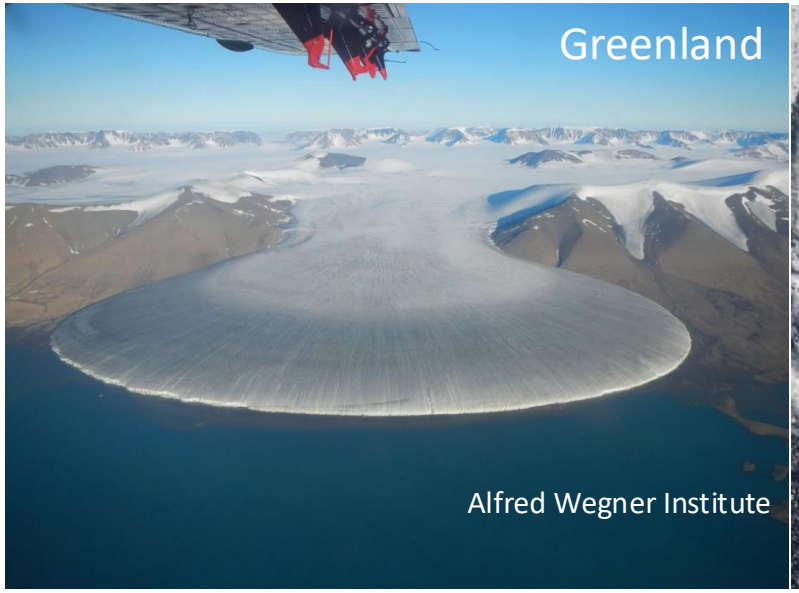
GEO 325C/398C Continuum Mechanics



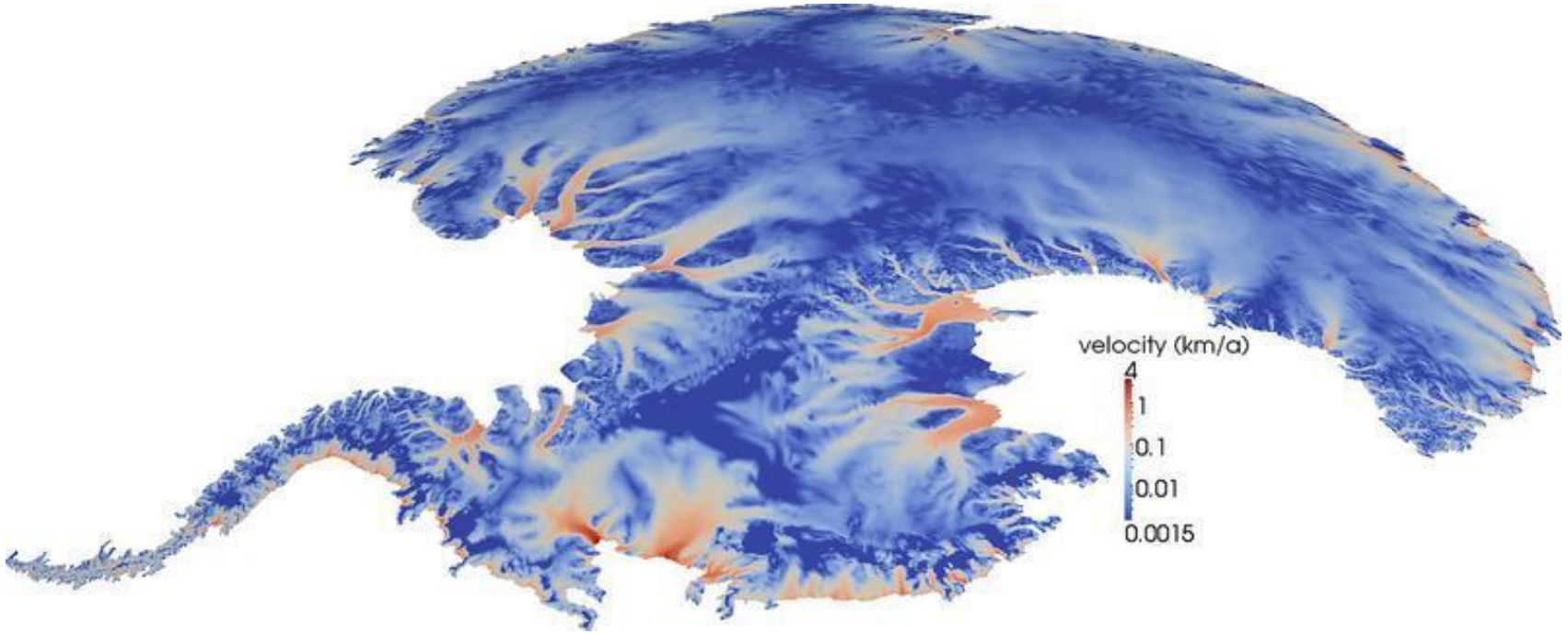


Why take this class?

This class provides the foundation for the modeling of all* dynamical processes in the Earth Sciences. It is excellent preparation for higher division classes in geodynamics, seismology, geomechanics, glaciology, atmospheric and ocean modeling.

Numerical model of the Antarctic ice sheet by former UT graduate student Tobin Isaac, taken from the website of the ODEN Institute.

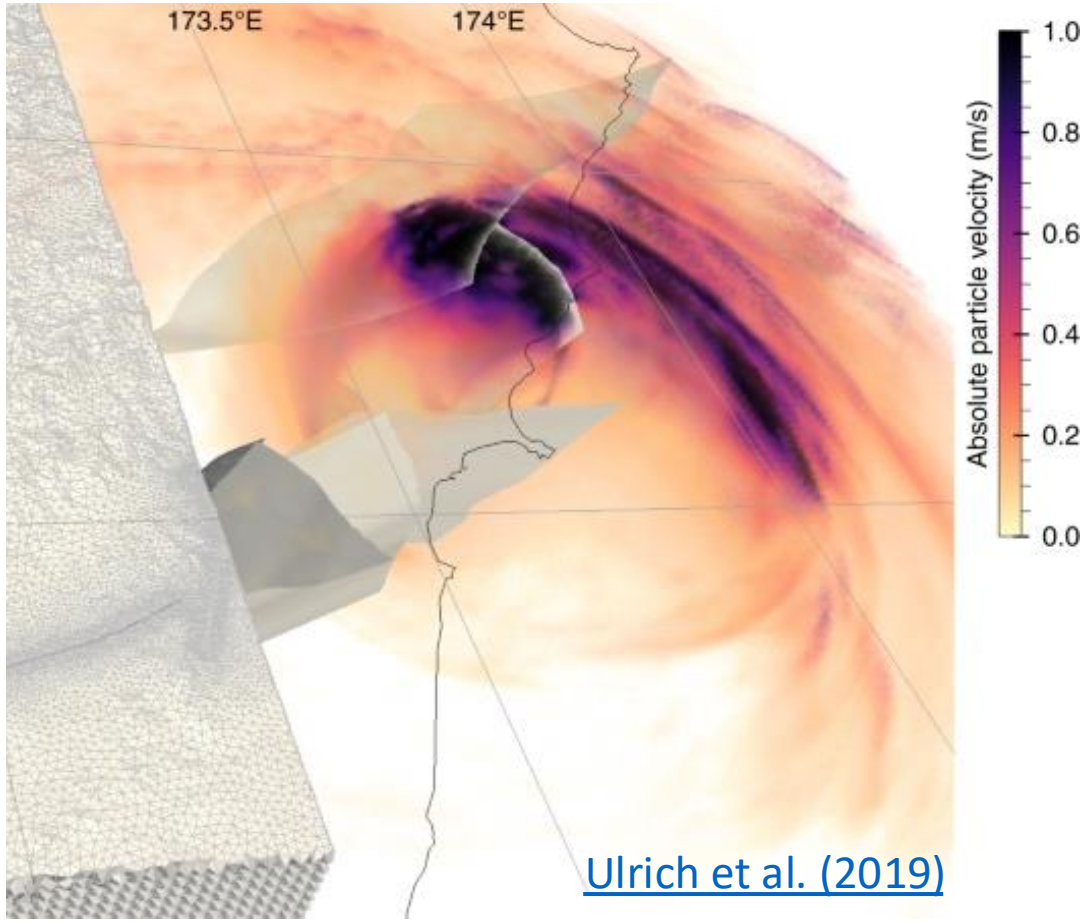
*almost all



What you will learn:

In this course we will take concepts such a mass, force and deformation that are familiar from point systems or simple spring and dash-pot models and extend them to continuum bodies such as solids and fluids.

This will allow you to understand the governing and constitutive equations of modern computational models and enable you to use and interpret them correctly.

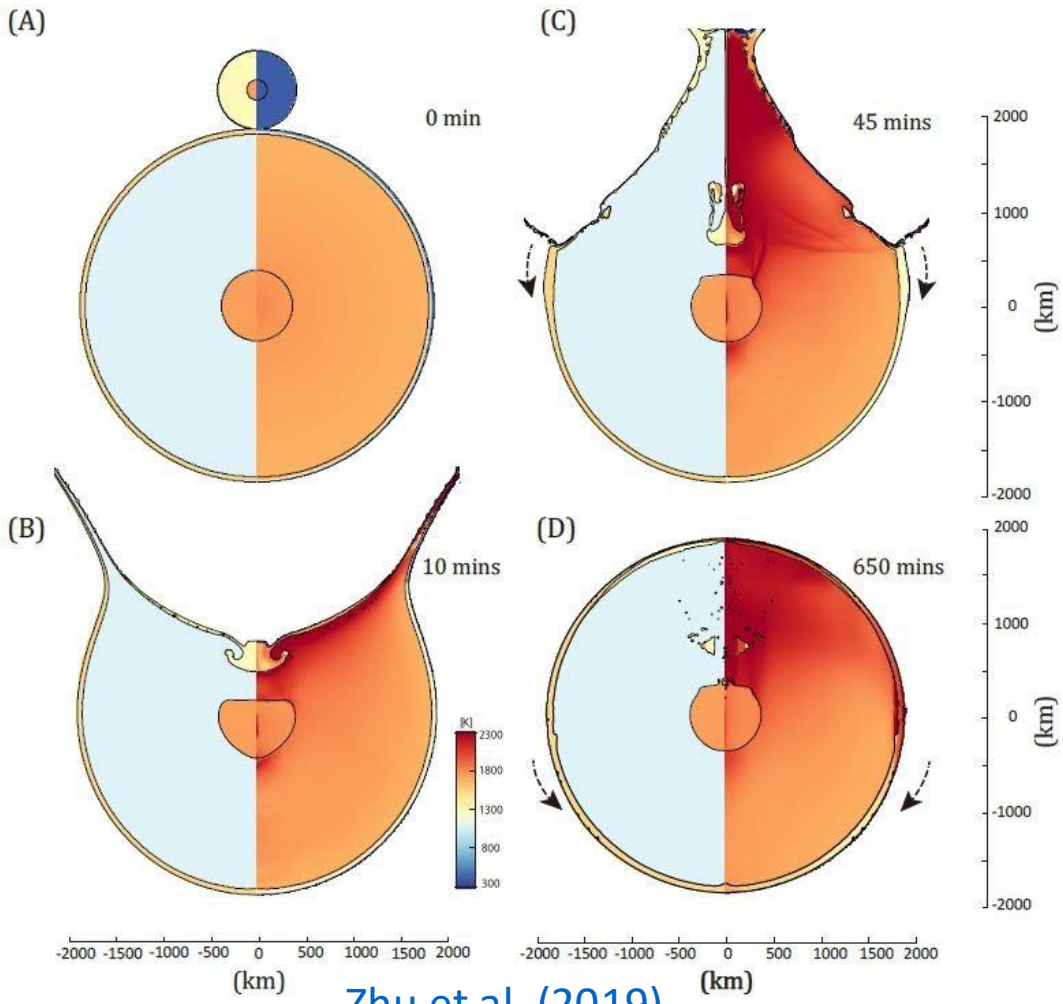


Ulrich et al. (2019)

What you will be doing:

Topics:

- **Review (3 lec)**
- **Tensors and stress (9 lec)**
- **Kinematics and strain (5 lec)**
- **Constitutive theory (2 lec)**
- **Conservation laws (2 lec)**
- **Fluid mechanics (3 lec)**
- **Solid mechanics (3 lec)**



Zhu et al. (2019)

Course website(s)

- Class website: https://mhesse.github.io/continuum_mechanics/
  Post all notes, lecture, and recordings (main resource)

- Canvas: https://utexas.instructure.com/courses/1396276
  (Post and submit homeworks, post grades)

- Piazza: https://piazza.com/class/m0bi9mnhp935l/
  (class discussion, has latex editing!)

Office hours

Office hours are integral part of the class!

- Conceptual questions answered
- Help with manipulations
- Discuss broader context

We need to find time for office hours:

Complete poll: https://www.when2meet.com/?26050532-hIYTg

Assessment

- Regular (weekly) homeworks (HW) – due Thursday in class
- Midterm exam on October 8.
- Only for graduate students:
  Class Project (CP): Generate a homework problem for class that applies concepts from class to a/your research problem!
- Complete class evaluation (CE)!
- Grade breakdown:

Undergraduates: 70% Homework + 20% Midterm + 10% Participation

Graduate students: 60% Homework + 20% Midterm + 20% Project

Submitting Homework

- Homework is mostly paper and pencil work.
- Homework needs to be submitted electronically as **PDF files**. (please don't submit photos of paper sheets)
- If your PDF is very large (MB's), please compress it before submitting (https://www.ilovepdf.com/compress_pdf)
- Look at it before you submit to check your HW is readable ☺.

Changes from last year

Three problems:

1. Attendance of undergraduate students.
2. Coping homeworks.
3. Learning wrong things online.

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Solutions:

1. Class will not be broadcast on zoom and recorded.
2. Midterm exam (in class).
3. You must complete HW in the spirit of the class (notation & approach).
4. New collaboration policy.

Collaboration policy

- You can discuss the homework problems.
- You must write up your own solution on your own (cannot copy!)
- Cheating penalty:

I catch you once
-> ask you to work though the HW problem after class
-> if you cannot do the problem -> half points off HW

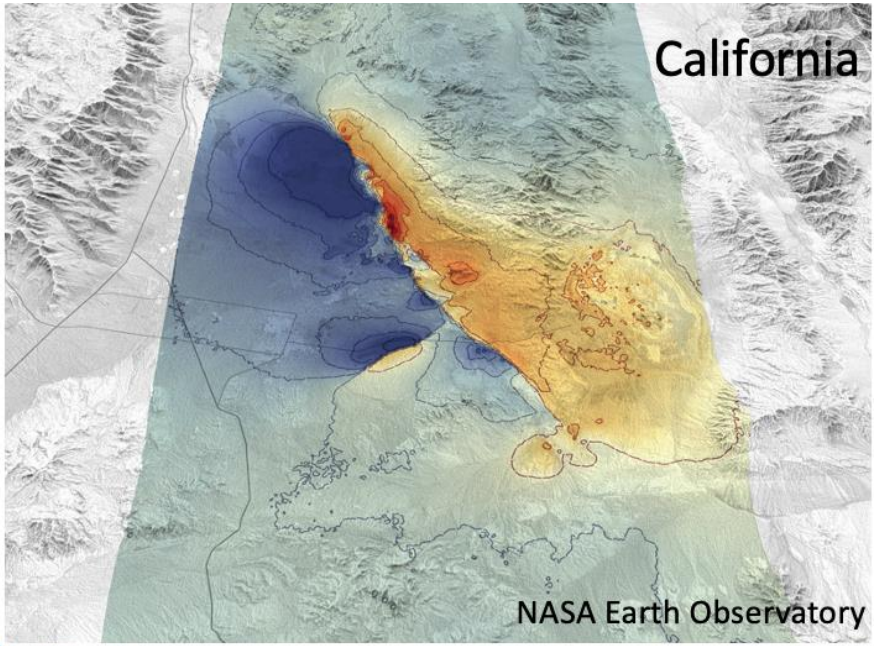
I catch you again

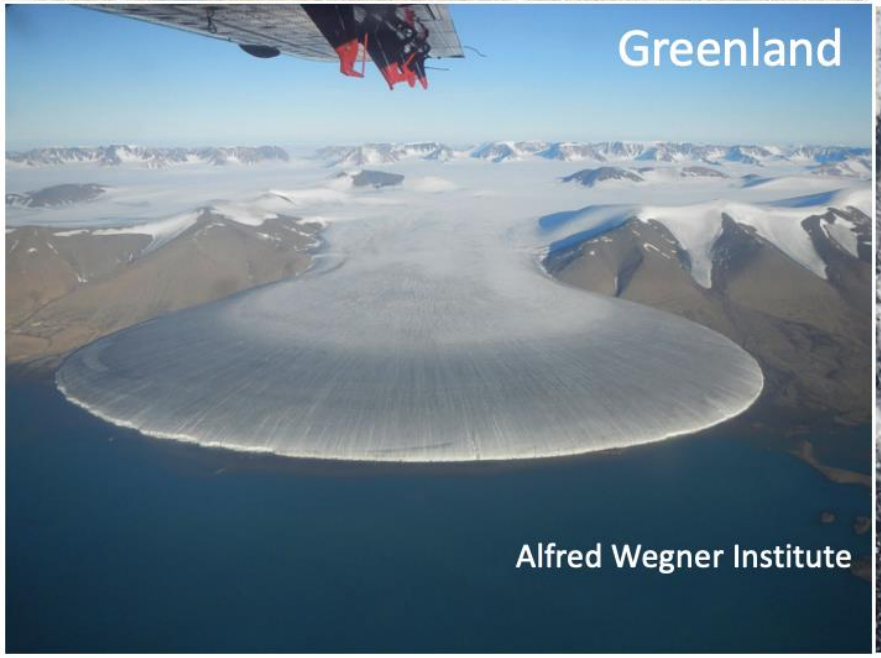
-> 0 points on HW
-> I'll report you to student affairs.

Graduate class project.

- Aim is to generate interesting up-to-date homework problems that apply class concepts for future classes!
- It is a HW problem so it should not be too complicated!
- Should apply some concept learned in class.
- Short individual meetings weeks 6-8 to discuss potential topics
- Decide on topic in weeks 16-18.
- Projects due before Thanksgiving
- Present/Discuss/Work through Last day of class


Crete
Geology is the way


California
NASA Earth Observatory


Greenland
Alfred Wegner Institute


Iceland
National Snow and Ice Data Center