

## Paleoclimate (ENVI 360)

Macalester College – Spring 2023

**Class meetings:** MWF 1:10 – 2:10pm, Olin-Rice 243

**Labs:** Th 8:00 – 11:10am, OLRI 253/OLRI 189/OLRI 187/Keck lab   **Office hours:** TBD

**Instructor:** Louisa Bradtmiller   lbradtmi@macalester.edu; Olin-Rice 249D

### Course description

Earth's climate has evolved with the planet itself, as changing boundary conditions in the ocean, atmosphere, cryosphere and lithosphere have caused global icehouses, greenhouses and mass extinctions. Information about these events is recorded in the geologic record in the form of fossils and rock sequences, but also in lake and ocean sediment cores, ice cores, cave deposits and tree rings. This course will provide an overview of changes in climate throughout Earth history while also examining the proxies and archives used to reconstruct those changes. We will also construct our own record of paleoclimate using cores from a local lake and a variety of laboratory techniques. Prerequisites: an introductory course on either climate or Earth history.

### Course organization

Class periods will be a mixture of lecture, discussion and group exercises. The latter two will count towards the course participation grade (see below). Lab work will consist of computer modeling exercises and data analysis/interpretation, and some weeks focused on constructing our own record of paleoclimate from ocean or lake sediments.

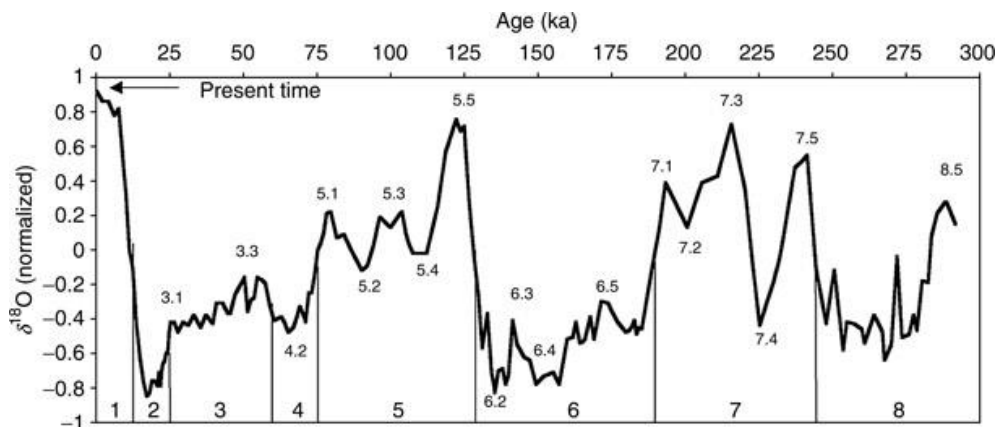
### Goals for students

By the end of this course, students should be able to demonstrate the ability to:

- Analyze data and draw reasonable inferences from it
- Read, comprehend and discuss scientific papers
- Communicate clearly and effectively through written and oral presentations of ideas

### Course Textbook

Ruddiman, W.F. Earth's Climate: Past and Future, 3<sup>rd</sup> Ed. New York: W.H. Freeman, 2013.



*The SPECMAP oxygen isotope timescale (Imbrie et al., 1984).*

## *What to expect in class*

### **Moodle**

The class Moodle page will be updated regularly, and should be your first stop for information about readings, assignments, and what to expect in class on any given day. The page is color-coded: anything in green or a link is a reading you should complete before class on the day of the entry, and anything in blue is an assignment due that day. This will require some looking/thinking ahead on your part.

### **Grading**

Your final grade for this course will be determined by the number of points you accumulate throughout the semester:

Point distribution	
Participation	100
Homework (4 @ 25 points, 2 @ 50 points)	200
Computer labs (5 @ 20 points each)	100
Science paper	100
TOTAL	500

### **Attendance and participation**

In addition to regularly attending and working actively with classmates during class time, small teams of students will rotate responsibility for presenting and leading discussion of papers. I also expect you to make positive contributions to the intellectual community of the course more regularly, which might include active participation in group discussions, asking and/or answering questions, listening and responding respectfully to others' ideas, and coming to class fully prepared. At the end of the course I will ask you to provide me with a short written evaluation of your own participation with respect to these general criteria and assign yourself a grade. As long as it is broadly consistent with my observations of your work, that will be your participation grade for the course.

### **Homework**

There will be 6 homework assignments to give you practice using the methods discussed in class. I encourage you to work in pairs/groups on these assignments, and we'll have some time built in to the class for you to do this. However, each student must turn in their own assignment, written in their own words. This means you may discuss the answers together, but must write them out yourselves. See me with any questions about what this means.

### **Computer labs**

Throughout the course we will complete 5 labs related to the course material. Write-ups of these exercises are meant to help you synthesize and reflect on what you gained from the experience and how it informs your understanding of other course material. These are not formal lab reports (i.e. no 'hypothesis' and 'methods' sections), but deal with many of the same themes. Labs will be completed in pairs or groups; turn in one report per group.

### Science paper

We will use material collected on our coring trip for part of the lab portion of this course. We will spend a lab period at Macalester getting an overview of equipment and methods, several lab periods sampling cores at the U of M. Students will then work to complete a set of downcore analyses on their own. You may work individually or in groups of no more than three. More information about this part of the course will be available as the semester progresses. **The results of this work will be presented to the class, and in a Science-style (~1500 word) paper at the end of the semester (one paper per group).**

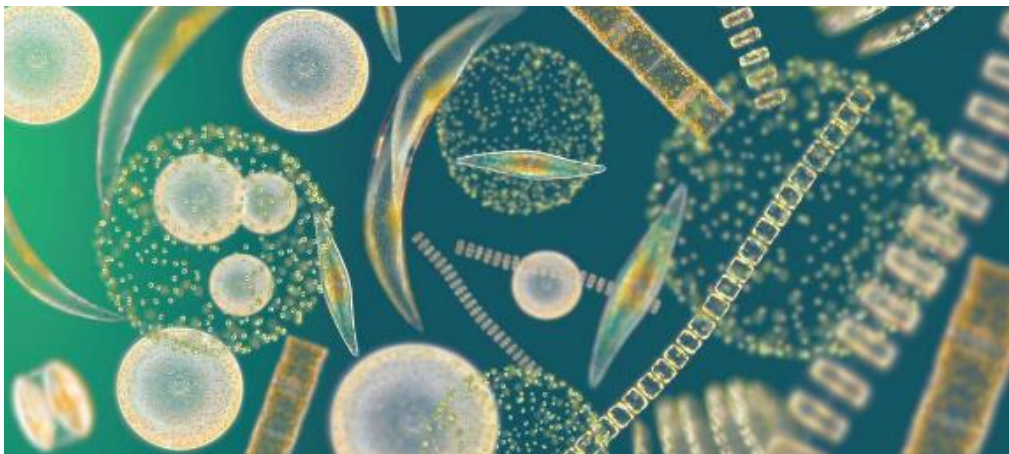
### *Other important information*

#### **Diversity**

It is my intent that students from diverse backgrounds and perspectives be well served by this course, that students' learning needs are addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. I am committed to presenting materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. I appreciate your feedback on this and every aspect of our course, and your suggestions for ways to improve the effectiveness of the course for you personally or for other students or student groups.

#### **Academic integrity**

I take all instances of cheating and plagiarism very seriously. **For this course, I consider the use of previous years' homework and exams to be cheating.** It is YOUR RESPONSIBILITY to become familiar with Macalester's other policies on what constitutes cheating and plagiarism and to behave accordingly. Instances of suspected academic dishonesty will be handled as outlined in college policies. <http://www.macalester.edu/academicprograms/integrity.html>



*Marine phytoplankton (Smithsonian Magazine)*

## Accommodations

Your experience in this class is important to me, and I am committed to creating an inclusive and accessible learning environment. If you have already established accommodations with the Disability Services office, please communicate your approved accommodations to me as soon as possible so that we can discuss your needs in this course. If you have not yet established accommodations, but have a temporary health condition or permanent disability that requires accommodations (this includes but is not limited to: mental health, attention-related, learning, vision, hearing, physical or health impacts), please contact Disability Services to make an appointment: [disabilityservices@macalester.edu](mailto:disabilityservices@macalester.edu) or 651-696-6974. Disability Services offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s), and the Disability Services staff.

## Health and wellbeing

I encourage you to be intentional about maintaining your physical and mental health during this and every semester at Macalester. Taking care of yourself in these ways will help you to be healthier, happier, and better able to focus on your academic work. Be aware of people, situations and circumstances that help you to feel focused and engaged, as well as those that cause you stress; try to maximize the former, and eliminate the latter as much as possible. While every person is different, for most of us regular and adequate sleep, healthy meals, regular exercise, and connecting with others are all ways to foster wellness. If you find that you are having trouble maintaining your health and wellbeing, please don't hesitate to talk with me, or with one of the many individuals or programs in the Hamre Center for Health and Wellness.

## Recording policy

In the hopefully very unlikely even that we need to shift online, I may record any synchronous class sessions in a manner consistent with [Macalester's classroom recording policy](#). I will share these recordings on Moodle via VoiceThread. If you download any class recordings, you must store them in a password-protected file or on a password-protected site. Please note that the recording policy clearly states that ***students may not share, replicate, or publish any class recording, in whole or in part, or use any of the recordings for any purpose besides knowing what happened during the class period, without my written approval.***



*Modern glaciers (National Geographic)*