

## SIO115 Ice and the Climate System Syllabus & Timetable 2015 Monday/Wednesday/Friday 11am in Revelle Conference Room (4301)

***Please put your cell phones/iPhones etc away before coming into my classes. If you are a medical person on call, or if you have children or if there is some other legitimate reason why you might need to take a phone call during my class, then let me know. But otherwise, please do not text/surf the web/whatever during my classes!***

**Homework is given each Friday and collected the following Friday.**

### Week 1. Introduction to the Cryosphere in the Earth System

- 4 January: Elements of the cryosphere; importance of the cryosphere [Week 1 lecture slides](#)
- 6 January: Role of the cryosphere in the climate system; sea-level change
- 8 January: Discussion papers: [Scambos et al. 2011](#); [Flanner et al., 2011](#)

**Homework 1 (due Friday 15 January):** [The cryosphere and its importance for climate](#)

### HELPFUL NOTES TO ASSIST IN PAPER READING AND DISCUSSION

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### Week 2. Past climate change and past climate records

- 11 January: Ice cores [Video](#) [All lecture slides](#)
- 13 January: Ice ages (Jeff Severinghaus guest lecture)
- 15 January: paper discussion

Discussion papers: [Lorius et al. 1985](#) [Petit et al. 1999](#)

**Homework 2 (due Friday 22 January):** [Ice ages and ice cores](#) Data for homework [Icecore\\_data.txt](#) [NHinso1.txt](#)

Suggested additional reading: (i) Chapter 5 of "The Cryosphere"; (i) Chapter 6 of the IPCC (Palaeoclimate)

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### Week 3. *Past climate change and past climate records, contd - Snow cover*

- 18 January: MARTIN LUTHER KING DAY -- NO CLASS
- 20 January: Snow cover
- 22 January: Lake Ice [Lecture slides](#)

[Greenland Ice Sheet Ice Age video](#)

**Homework 3 (due Friday 29 January): [Lake ice and permafrost](#)**

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### Week 4. *Lake ice & permafrost*

- 25 January: Permafrost [Lecture slides](#)
- 27 January: Permafrost
- 29 January: Permafrost contd  
Discussion papers on permafrost:  
Airborne electromagnetic imaging of discontinuous permafrost [Minsley et al., 2012](#)  
The impact of the permafrost carbon feedback on global climate [Schaefer et al., 2014](#)  
Week 3 game

Suggested additional reading: [Duguay 2005 AGU book chapter](#)  
Chapter 7 of UNEP report [NEW UNEP REPORT ON PERMAFROST](#)

**Homework 4 (due Friday 5 February): [Sea-ice](#)**

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### 8Week 5. *Sea ice*

- 1 February: Sea ice; ice-albedo feedback; sea-ice types
- 3 February: Sea ice growth and modelling (Ian Eisenman guest lecture)
- 5 February: Monitoring sea-ice extent and thickness 1978-2012. [All lecture slides](#) Discussion papers:  
article in the [Huffington Post](#)

[Laxon et al., 2013](#)  
[Schroeder et al., 2014](#)  
[Interactive sea-ice map from NSIDC](#)  
[Arctic Sea-ice 101 \(Program Manager Tom Wagner\)](#)

Suggested additional reading: Chapter 5 of UNEP report [Arctic Report Card 2014](#) (see 18 December item on class media page)

**Homework 5 (due Friday 12 February): [Glacier mass balance](#)**

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### Week 6. Land ice: Glaciers and ice caps (GIC)

- 8 February: Introduction to glaciers; contribution of GIC to sea-level; transformation of snow to ice [All lecture slides](#) [Glacier animation shown in class](#)
- 10 February: Glacier mass balance
- 12 February: Glacier mass balance & measurement Discussion paper: [Gardner et al., 2013](#)

Suggested additional reading: relevant section of Chapter 6 of UNEP report

Link to Matt's blog Scripps on Ice: <http://scrippsonice.wordpress.com/2014/04/17/ground-truthin/>

[Link to class quiz](#)

**Homework 6 (due Friday February 19th): [Ice sheet mass balance](#)**

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Week 7. Land ice: Ice sheets (Greenland & Antarctica)

- 15 February: PRESIDENTS DAY HOLIDAY - NO CLASS
- 17 February: Mass balance of ice sheets; ice streams [All lecture slides](#)
- 19 February: Ice-ocean interaction; basal melting; surface melting

Discussion paper: [Rignot et al., 2002](#)

**Homework 7 (due Friday 26 February):** [Glacier dynamics](#)

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Week 8. Land ice: Ice sheets (Greenland & Antarctica)

**\*\*\*\* A FRIENDLY REMINDER TO PLEASE FILL IN YOUR CAPE EVALUATIONS** <http://www.cape.ucsd.edu>\*\*\*\*

- 22 February: Surface melting and iceberg calving -- Greenland and Antarctica [All lecture slides](#)
- 24 February: Glacier dynamics: creep; flow-law; force balance ice dynamics
- 26 February: Subglacial water; subglacial processes; subglacial lakes

**Homework 8 (due Friday 5 March):** [Subglacial hydrology; sea-level rise](#)

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Week 9. *Changes in glaciers and ice sheets*

- 1 March: Subglacial lakes; glacier surges [All lecture slides \(some extras here too\)](#)
- 3 March: Marine ice sheet instability; ice sheet changes

Discussion paper: [Das et al., 2008](#)

- 5 March: Ice sheet changes & future predictions

Discussion papers: [Rignot and others, 2014](#); [Joughin and others, 2014](#)

Read [Recent media page](#) about the West Antarctic Ice Sheet instability

- [READ THESE INSTRUCTIONS FOR TERM PAPER](#)

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Week 10. Student presentations of term papers

**\*\*\*\* PLEASE FILL IN YOUR CAPE EVALUATIONS** <http://www.cape.ucsd.edu> \*\*\*\*

- 8 March: Group 1: Group 1
- 10 March: Group 2: Group 2
- 12 March: Group 3: Group 3

Please show up to all term paper presentations to support your fellow students!

Final term papers are due by 4pm on **Friday 12th March**, typed up and printed out as a hard-copy on both sides of the paper.

There will be no exceptions to this deadline unless there is a valid medical reason.

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### *Week 11. Exam week*

[EXAM STUDY GUIDE](#)

**Final Exam Monday 15th March 2015 11:30am (2 hours)**

Good luck everyone !

[Link to VICE program on Antarctic mass loss](#)

[Link to Daniel Schwartz's movie](#)

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## Course texts

[UNEP Report: Global Outlook for Snow and Ice](#)

CliC Intergrated Global Observing Strategy Report:



[Download File](#)

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IPCC AR5 Chapter 4 (FINAL DRAFT)

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