

Ice-age dynamics

Overview




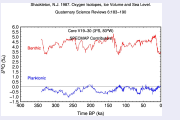

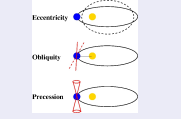
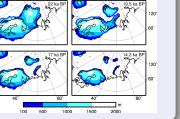

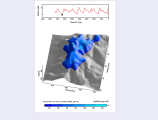
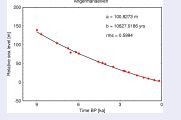

Overview: Structure of lecture

Structure of lecture

This lecture introduces **ice ages** as a tool to examine the dynamical behaviour of both the **Earth's surface** and the **Earth's interior**.

- We discuss **causes and consequences of global ice ages** and discuss reconstructions of past ice sheets, depending of changes in the past and present climate.
- We use **observations** such as strand lines, GPS-determined uplift rates, the Earth's changing gravity field to describe the dynamical response of the Earth to ice-age cycles.
- We will develop a **process-based understanding** of the dynamical response of the Earth to changes in the ice-ocean mass balance.

Overview: Lectures

1. Ice on Earth 	2. Geomorphology 	3. Dating 	4. Paleoclimate 
5. Karst 	6. Earth orbit 	7. Ice models 	8. Sea level 
9. Landscape 	10. GIA 	11. Outlook 	

Overview: Tentative schedule

Week

- | | |
|-----------------|---------------------------------|
| 1 Overview | 9 Sea level |
| 2 Ice on Earth | 10 Landscape |
| 3 Geomorphology | 11 Glacial isostatic adjustment |
| 4 Dating | 12 Outlook |
| 5 Paleoclimate | 13 (spare time) |
| 6 Karst | 14 Exam |
| 7 Earth Orbit | |
| 8 Ice models | |

Exercises

- We will have practical exercises, which follow some of the (mathematical) concepts introduced in the lectures.
- We introduce **PYTHON** as simple programming language.
- For some of the lectures a link is given to a running **JUPYTER NOTEBOOK**.
- Explore and play with it!

Seminar

- In the seminar, we discuss one or two **scientific papers** related to our lecture.
- **One student** will present the content, we will listen and discuss.
- **Everyone** needs to summarise the paper with 1/2 page.
- **Five** summaries are needed for **evaluation** (Or four plus the presentation)!

Suggested reading

- Alley, R. B. (1999):
The Two-Mile Time Machine: Ice Cores, Abrupt Climate Change, and Our Future. Princeton University Press.
- Bradley, R. S., Holton, J. and Dmowska, R. (1999):
Paleoclimatology: Reconstructing Climates of the Quaternary. Academic Press.
- Faure, G. (1977):
Principles of Isotope Geology. John Wiley and Sons.
- Fraedrich, W. (1996):
Spuren der Eiszeit. Springer Verlag.
- Press, F. and Siever, R. (2001):
Understanding Earth. Freeman.
- Schönwiese, C. (1995):
Klimaänderungen. Springer Verlag.
- Schwarzbach, M. (1974):
Das Klima der Vorzeit. Enke Verlag.
- Siegert, (2001):
Ice Sheets and Late Quaternary Environmental Change. John Wiley and Sons.