

MARUM / GLOMAR Basic Knowledge Course

Carbon cycle chemistry for beginners: concepts and consequences

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Objective

Although carbon makes up less than 0.1 % of the mass of the Earth, its particular properties mean it has a disproportionately significant role in biological and climate cycles. The ability of carbon to form long chains is fundamental to the composition of all living things, while the structure of carbon's gas phases (e.g. methane and carbon dioxide) means that these act as 'greenhouse gases'. These gases amplify solar warming, controlling global temperature and thus ice volume and sea-level. Dissolved inorganic carbon (DIC) in sea-water controls the pH of the oceans with consequences for marine life.

An appreciation of carbon and its chemical behaviour is therefore important for an understanding of earth science, on both geological timescales and when considering consequences of human perturbations to the carbon system.

This short course will take the form of a workshop, involving practical experiments and group discussions. The aim is to give an overview of the important concepts of carbon chemistry with particular reference to its effect on Earth's climate.

Topics include

- Important concepts of carbon chemistry
(Carbonate system equilibrium, alkalinity, pH)
- Carbon cycles on various timescales
(Atmospheric-ocean cycle, ocean acidification, biological pump, rock-weathering cycle)
- Carbon cycle controls on Ice Age glacial-interglacial cycles
(Coral reef hypothesis, the importance of Southern Ocean sea ice cover)
- Extreme carbon system settings
(The Pre-Cambrian Snowball earth and the Eocene thermal maximum)

Papers referenced

Sigman & Boyle (2000),
Glacial/interglacial variations in atmospheric carbon dioxide
Nature 407,
<http://www.nature.com/nature/journal/v407/n6806/abs/407859a0.html>

Zachos, Roehl, Schellenberg, Sluijs, Hodell, Kelly, Thomas, Nicolo, Raffi, Lucas, Lourens,
McCarren & Kroon (2005),
Rapid Acidification of the Ocean during the Paleocene Eocene Thermal Maximum,
Science 308, 1611 doi: 10.1126/science.1109004
www.sciencemag.org/content/308/5728/1611.full.pdf

Hoffman, Kaufman, Halverson & Schrag (1998),
A Neoproterozoic Snowball Earth,
Science 281, 1342, 10.1126/science.281.5381.1342
<http://www.sciencemag.org/content/281/5381/1342.abstract>

Target group

The course addresses early career scientists with an interest in the topic. A background in chemistry is not necessary.

Location

MARUM, University of Bremen, Leobener Str., 28359 Bremen, Germany, Room 2060

Time

09.00 – 12.30

Registration

To register for this course, please fill in the [registration form](#).
Please note that your registration will be binding.

The registration deadline for this course is **12 July 2015**.

Any enquiries regarding the course should be addressed to glomar-courses@marum.de.