

GLOMAR/POLMAR Course 2013

February 18 - 22, 2013, Bremen

Introductory Course in Marine Sciences Part I: Physical Oceanography and Climate

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Programme

Location: Room 2070, MARUM, Leobener Strasse, Universität Bremen

PHYSICAL OCEANOGRAPHY

MONDAY 18 FEBRUARY

- 09:00 - 09:15 Welcome and introduction to the course (T. Bickert),
round of introducing (participants)
- 09:15 - 10:30 Physical properties of seawater (D. Kieke)
*Stewart, R. H. (2008) Introduction to Physical Oceanography. Available
online at http://oceanworld.tamu.edu/home/course_book.htm*
- Coffee break
- 11:00 - 12:30 Heat budget and ocean warming (D. Kieke)
*Solomon et al. (2007) The IPCC Report Climate Change - The Physical
Science Basis. Cambridge University Press. (<http://www.ipcc.ch>)*
- Lunch break
- 13:30 - 15:00 Thermohaline circulation, deep ocean convection (D. Kieke)
*Marshall, J. & F. A. Schott (1999) Open-ocean convection: Observations,
theory and models. Review of Geophysical Research, 3: 1-64.*
*Kuhlbrodt et al. (2007) On the Driving Processes of the Atlantic Meridional
Overturning Circulation, Review of Geophysical Research, 45- 2001: 1-32.*
- Tea break
- 15:30 - 17:00 Practical exercises (D. Kieke)

TUESDAY 19 FEBRUARY

09:00 - 10:30 Oxygen isotopes in the modern ocean-atmosphere system (J. Pätzold)
*Schmidt, G.A., G. R. Bigg and E. J. Rohling (1999) Global Seawater Oxygen-18 Database. <http://data.giss.nasa.gov/o18data/>
Global Network of Isotopes in Precipitation (GNIP) and Global network of isotopes in Rivers (GNIR) <http://www-naweb.iaea.org/napc/ih/index.html>*

Coffee break

11:00 - 11:45 Use of tracers in oceanography (R. Schlitzer)
W. Broecker, Tracers in the Sea, Eldigio Press; chapters 7 & 8. R. Weiss et al. (1985) Atmospheric chlorofluoromethanes in the deep equatorial Atlantic. Nature 314: 608-610. M. Rhein (1996) Convection in the Greenland Sea 1982-1993. J. Geophys. Res. 101: 18183-18192

11:45 - 12:30 Introduction to Ocean Data View (R. Schlitzer)
Ocean Data View <http://odv.awi.de>

Lunch break

13:30 - 15:00 Interactive exploration and visualization of oceanographic data: examples and exercises (R. Schlitzer)
eWOCE - Electronic Atlas of WOCE Data: <http://www.ewoce.org>

Coffee break

15:30 - 17:00 Interactive exploration and visualization of oceanographic data (*continued*)

PALEOCEANOGRAPHY AND CLIMATE CHANGE

WEDNESDAY 20 FEBRUARY

09:00 - 10:30 Paleooceanography - an introduction (T. Bickert)
*Fischer, G., Wefer, G., eds (1999) Use of proxies in paleoceanography: Examples from the South Atlantic. Springer, Berlin, pp. 735
Elderfield, H., Ed (2006) The Oceans and Marine Geochemistry: Treatise on Geochemistry, Volume 6, pp. 664*

Coffee break

11:00 - 12:30 Exercise on the application of marine proxies (T. Bickert)
Arz, H., et al. (2003) Influence of Northern Hemisphere climate and global sea level rise on the restricted Red Sea marine environment during termination I. Paleoceanography 18: 1053

Lunch break

13:30 - 14:15 The Paleocene-Eocene Thermal Maximum - an example for a global warming event (T. Bickert)
Higgins, J.A., Schrag, D.P. (2006) Beyond methane: towards a theory for the Paleocene– Eocene Thermal Maximum. Earth Planet. Sci. Lett. 245, 523–537

14:15 - 15:00 Tour through MARUM, visit of the IODP Bremen Core Repository, demonstration of selected cores (T. Bickert)

Tea break

15:30 - 17:00 The importance of exact geological timescales (T. Westerhold)
Gradstein, F. M., J. G. Ogg, M. D. Schmitz, and G. M. Ogg (2012), The Geological Timescale 2012, 1176 pp., Elsevier.
Gradstein, F. M., J. G. Ogg, and F. J. Hilgen (2012), On The Geologic Time Scale, Newsletters on Stratigraphy, 45(2), 171-188, doi: 10.1127/0078-0421/2012/0020.

THURSDAY 21 FEBRUARY

09:00 - 10:30 Abrupt climate changes (S. Mulitza)
Alley, R., et al. (2003) Abrupt climate changes: Inevitable surprises. National Academy Press, Washington, pp.

Coffee break

11:00 - 12:30 Abrupt climate changes - exercise (S. Mulitza)

Lunch

13:30 - 15:00 Radiocarbon - dating (T. Bickert)
*Mollenhauer, G., M. Kienast, F. Lamy, H. Meggers, R. R. Schneider, J. M. Hayes, and T. I. Eglinton (2005) An evaluation of ¹⁴C age relationships between co-occurring foraminifera, alkenones, and total organic carbon in continental margin sediments. *Paleoceanography*, 20, PA1016, doi:10.1029/2004PA001103.*

Tea break

15:30 - 17:00 Radiocarbon dating - exercise (T. Bickert)

FRIDAY 22 FEBRUARY

09:00 - 10:30 Climate reconstructions from corals (T. Felis)
*Corrège, T. (2006) Sea surface temperature and salinity reconstruction from coral geochemical tracers. *Palaeogr., Palaeoclimatol., Palaeoecol.*, 232, 408-428., doi:10.1016/j.palaeo.2005.10.014*
*Lough, J. M. (2010) Climate records from corals. *Wiley Interdisciplinary Reviews: Climate Change*, 1, 318-331, doi:10.1002/wcc.39*

Coffee break

11:00 - 12:30 Climate reconstructions from corals *continued* (T. Felis)

12:30 - 13:00 End of course and evaluation