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casein.epoc.u-bordeaux.fr

Context and Objectives

A Marie Curie Initial Training Network (01.04.2010 – 31.03.2014), CASE provided research and training opportunities for 12 Early Stage Researchers (PhDs) in the field of paleoceanography and paleoclimatology, with special emphasis on recent (Holocene) climate and hydrological changes in the Arctic and Sub-Arctic regions. It implemented a multidisciplinary and intersectorial training on biotic proxies and modelling of past marine environments in the form of generic and specialized courses, workshops, and open conferences.

- Assemble paleoclimate data for the Holocene through field programmes in the Nordic Seas.
- Integrate paleoclimate information with modern biological and climate modelling data
- Train a new generation of European polar scientists
- Develop a network of European experts in polar research to build structures focused on long-term collaboration in Arctic science.

CASE concentrated its research actions in areas close to strong physical chemical gradients in surface waters, which are the seat of enhanced primary production associated with strong vertical mixing and seasonally receding ice edge.



Platforms used by members of the CASE consortium in 2011 for CASE-related research cruises.

Scientific Deliverables

- Proxy Validation, Calibration (surface sediment, water column)
- Application of calibrated marine biotic proxies to fossil material (sediment cores)
- Quantification of empirical data
- Transient paleoclimatic simulation and model-data comparison

Marine Biotic Indicator of Recent Climate Changes in the High Latitudes of the North Atlantic

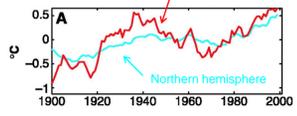


WPs definition

- WP1 Surface circulation changes from phytoplankton skeletal remains
- WP2 Surface water productivity changes from bulk organic properties
- WP3 Water mass properties from stable isotopes in foraminifers
- WP4 Sea-ice reconstructions from phytoplankton biomarkers
- WP5 Reconstruction of surface to bottom water masses from foraminiferal assemblages
- WP6 Transient Arctic climate modelling experiments



- Coord.: EPOC (J. Giraudeau)
- 4 years (2010-2014)
- Overall budget: 2,8 M€
- 6 beneficiaries, 4 ass. partners

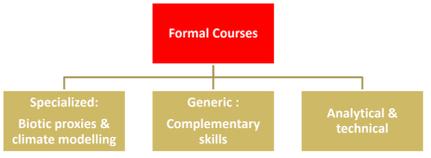
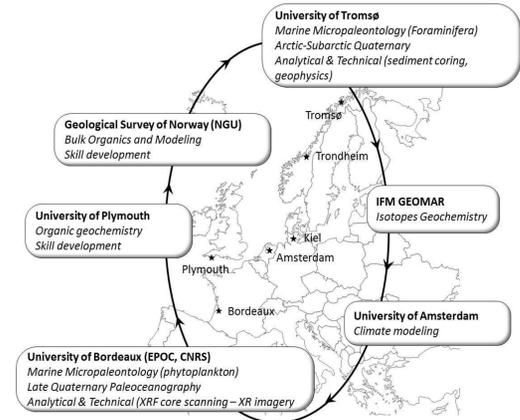


Annual mean surface atmospheric temperature anomalies (vs mean 1900-2000) From Moritz et al. 2002 – Science vol. 297



An example of recent change in ecosystem structure linked with polar amplification of global warming: Coccolithophore bloom in the Barents sea as captured by AQUA satellite in July 2003 (courtesy MODIS Rapid Response Team at NASA GFC)

Training rationale



Achievements

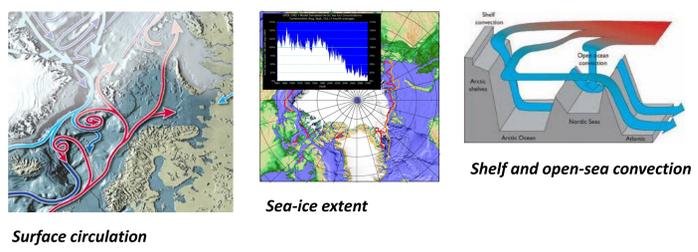
- Recruitment of 12 Early Stage Researchers on 1st CASE yr
- Recruitment of 6 Visiting Scientists (within 5 partner inst.)
- 2 Open Conferences:
 - * EGU 2012 (CASE-sponsored session)
 - * 1st Bordeaux Int. Arctic Conf. (80 pp, 15 nations)
- 12 specialized, generic and technical courses
- Training at sea (RV Helmer Hansen – Greenland Sea)
- 4 Scientific Steering Committees/ESRs CASE-workshops
- 2 Open Conferences:
 - * EGU 2012 (CASE-sponsored session)
 - * Bordeaux Int. Arctic Conf. 2014 (80 pp, 15 nations)



Key scientific questions

- * Is the present global warming and its amplification in the Arctic and Subarctic domains a unique event at the scale of the Earth recent history (last 10 000 years)?
- * How do past decadal to centennial-scale natural climate changes stand in the context of the present human-induced modulation of climate?
- * How did Holocene variability in key physical elements affect the structure and diversity of the planktonic ecosystem in the Arctic and Subarctic domains?

Key processes



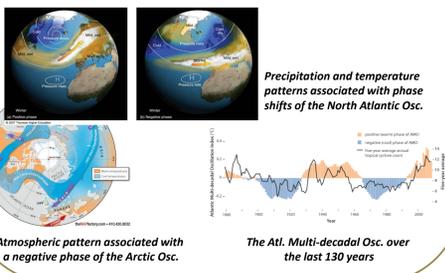
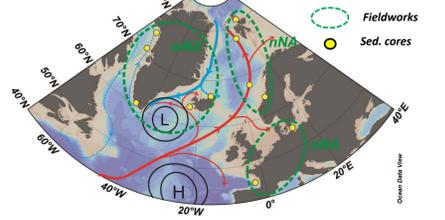
Achievements

- 10 Doctoral degrees delivered before fall 2014.
- 25 papers in international peer-reviewed journal (*Climate of the Past, Quaternary Sc. Res., Clim. Dynamics*)
- CASE-dedicated Special Issue: *Climate of the Past*, Feb. 2014.
- 70+ communications in international workshops and congresses (majority in AGU, EGU, ICP, and Goldschmidt confs).

Next step:

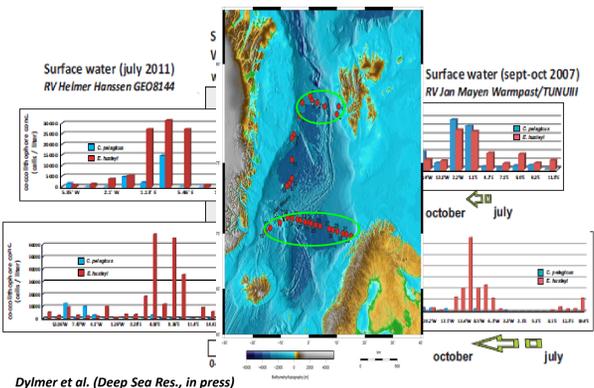
H2020 ITN 2015 « AMOR »: Atmosphere-ocean coupling and rapid climate changes – Past, present, and future scenarios for the North Atlantic

- 8 beneficiaries, 13 partners (14 academic, 7 non-academics)
- Overall budget: 3,4 M€
- Coord.: Univ. Tromsø; EPOC-beneficiary and WP leader



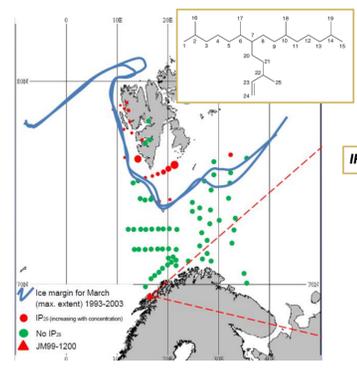
Flashes

Distribution of coccolithophore standing stocks across Fram Strait and the Norwegian-Iceland Sea



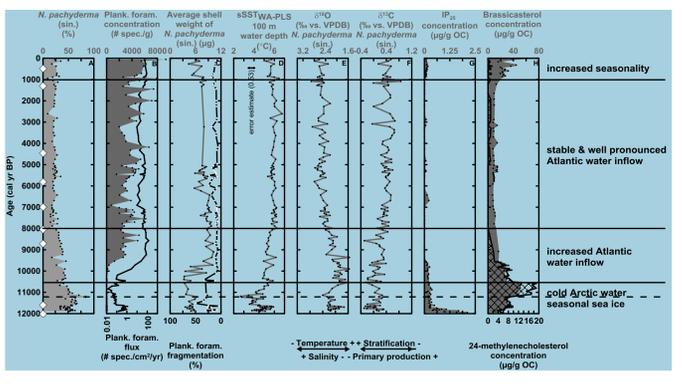
Dylmer et al. (Deep Sea Res., in press)

Sea-ice biomarkers in surface sediments of the Barents Sea



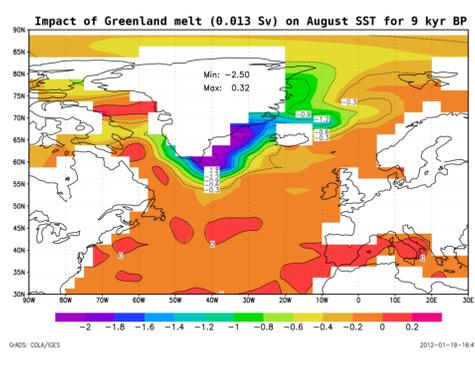
Navarro-Rodriguez et al. (Quat. Sc. Rev., 2013)

Holocene paleoceanographic development in the NW Barents Sea: the message from planktic foraminifera



Berben et al. (Climate of the Past., 2013)

Sensitivity experiments: Holocene (HTM – 9kyr BP) Sea Surface Temperatures versus Greenland meltwater



Blaschek and Renssen (Climate of the Past., 2013)