



**Second workshop of the PAGES Sea Ice Proxy (SIP) working group  
From proxies towards reconstructions**

Madingley Hall, Cambridge, July 22-24 (arrival 21<sup>st</sup>), 2013

**Topic:** In the first meeting we discussed the strengths and weaknesses of each proxy individually. At this meeting we plan three topics:

- To briefly consider again each proxy in the light of the QSR review papers, and of progress in the last year, and to set the parameters for an overall review paper on methods for sea ice reconstruction
- To facilitate the second goal of the WG (“where different proxies are available, to inter-compare their findings and develop a strategy for multi-proxy compilation and reconstructions”), we would compare different proxies claiming to provide similar information for the same geographical area, and make recommendations for multi-proxy reconstructions. This part requires work to be completed in advance and I will be pushing some of you about this.
- We would also spend time exposing all the key datasets, with the aim of facilitating the work (with e. g. Past4Future) of combining these data. This could be a key aim of the third workshop

Programme (note, as this was a workshop, the actual timings differ from those shown here)

Monday 22<sup>nd</sup> July

9.00 Welcome, introductions, practical issues, aim of workshop, reminder of outcome of 1<sup>st</sup> workshop, QSR special issue (Eric Wolff, Anne de Vernal, Rainer Gersonde)

*Updates on proxies: 1. Biomarkers*

09.30: Biomarker analytical intercomparison (Simon Belt)

10.00 Ruediger Stein: Quaternary variability in Arctic sea ice: New IP25/PIP25 records from the central Arctic Ocean

10.20 Xiaotong Xiao: Modern sea-ice variability in the central Arctic Ocean and adjacent marginal seas: Reconstruction from biomarker data in surface sediments

10.40 Jim Kocis: Distribution of IP<sub>25</sub> in the Bering and Chukchi seas: implications for reconstructing past sea ice concentration in the Beringian Gateway. (poster intro)

*10.45 Coffee*

11.10 Discussion of next steps in biomarker development and use (led by Simon Belt)

*Updates on proxies: 2. Ice core proxies*

11.40 James Levine: Exploring the potential of sea salt as an ice core proxy for sea ice extent at multiple Antarctic sites

12.00 Alison Criscitiello: Tropical Pacific influence on source and transport of MSA and sea salts to West Antarctica

12.20 Andrea Spolaor: The prospect of using halogens in ice cores as a sea ice proxy

12.40 Simon Schüpbach: High-resolution Na records of Talos Dome and NEEM

*13.00 Lunch*

14.00 Discussion of current status, next steps in ice core sea ice proxy development and use (led by Eric Wolff)

14.30 Jeremy Wilkinson: Current state of sea ice

*Updates on proxies. 3a: biological indicators of sea ice extent in the Arctic*

14.50 Anne de Vernal: Reconstruction of in the Arctic Seas and subarctic North Atlantic during the Holocene based on dinocysts

15.10 Beth Caissie: Sea ice vs. glacial ice during MIS 11 in the Bering Sea based on diatom assemblages and grain size distributions

*15.30 Tea/coffee*

16.00 Christina Sheldon: how sea ice proxies are used in Baffin Bay and the Labrador Sea

16.20 Kaarina Weckstrom: Comparison of multiple sea ice proxies analysed from NE Newfoundland cores

16.40 Discussion of current status for biological proxies of Arctic sea ice, including those not discussed here (led by Marit-Solveig Seidenkrantz)

    Include strategies for multiproxy reconstruction

    Include latest attempts at reconstruction by Anne de Vernal and Marit-Solveig Seidenkrantz

*Close by 18.00*

*19.15 Dinner*

Tuesday 23<sup>rd</sup> July

*Updates on proxies: 4. Other methods*

09.00 Claude Hilaire-Marcel: Seasonal sea ice, multiyear sea ice and icebergs... sedimentological & geochemical discriminants

09.20 Marc Macias-Fauria: The potential role of driftwood as a sea ice proxy during the Holocene

09.40 Julie Brigham-Grette: Testing Assumptions of Pliocene and Pleistocene sea ice history and northward watermass migration during past interglacials in the Beringian Pacific gateway

10.00 Discussion of other methods (led by Julie Brigham-Grette)

*Methodology and modelling*

10.20 Alex Ferry: Southern Hemisphere focused assessment of statistical methods for sea-ice extent

*10.40 Coffee*

11.10 Hugues Goosse: Data assimilation as a tool to identify (in)compatibilities between proxies, between proxies and models and model biases

*Updates on proxies. 3b: biological indicators of sea ice extent in the Antarctic*

11.30 Leanne Armand: recent estimates of sea-ice extent in the Australian region using a new method in comparison to previous estimates

11.50 Oliver Esper and Rainer Gersonde: Southern Ocean sea ice fields during Termination II and the Last Interglacial

12.10 Discussion of current status for biological proxies of Antarctic sea ice, led by Rainer Gersonde

13.00 Lunch

14.10 Carry forward of talks from morning, and continuation of discussion

15.30 Tea/coffee

16.00 Further discussion of outstanding topics, including methodological, reporting and synthesis issues

- Possibilities and strategies for proxy intercomparison
- Strategies and actions for multiproxy reconstructions
- What marine and ice core proxies are available from specific areas e.g. Southern Ocean, Arctic Ocean, polar North Atlantic, polar North Pacific, Greenland ice cores, Antarctic ice cores
- Examples for comparisons that have already been made (ice core/sediment core, marine biomarker-diatom)
- Specific plans for further comparisons
- Strategies for multiproxy reconstruction in specific regions
- Development of quality control/error estimates (with input from the modellers concerning their requirements)

Close by 18.00

19.15 Conference dinner

### Wednesday 24<sup>th</sup> July

Breakouts: marine and ice core groups

- Marine: Methodological issues
- Ice core: How to develop joint use of MSA, sea salt, halogens

How can/should sea ice “density” be reported in syntheses?

11.00 Coffee

11.30: Products of this meeting

- PAGES report, EOS, common paper or not?

11.45: What work has to be done before next meeting:

- should there be a proxy study comparison (common core, many proxies)?; If so how and who to organise?
- Data synthesis and model-data comparison completed in advance

12.15: Date, place and aims of next meeting

- Is aim to further improve use of proxies or to make specific reconstruction?
- Who else should be invited
- Confirm follow-up AGU session and agree who convenes

12.30 Close

13.00 Lunch

## Attendees

|                |               |                                  |
|----------------|---------------|----------------------------------|
| Allen          | Claire        | BAS, UK                          |
| Ampel          | Linda         | Stockholm University             |
| Armand         | Leanne        | MacQuarie University, Australia  |
| Belt           | Simon         | Plymouth, UK                     |
| Brigham-Grette | Julie         | Umass                            |
| Caissie        | Beth          | University of Iowa               |
| Criscitiello   | Alison        | Woods Hole                       |
| de Vernal      | Anne          | UQAM                             |
| Esper          | Oliver        | AWI                              |
| Ferry          | Alex          | MacQuarie University, Australia  |
| Gersonde       | Rainer        | AWI                              |
| Goosse         | Hugues        | UCL Belgium                      |
| Hilaire-Marcel | Claude        | UQAM                             |
| Kocis          | James         | UMass                            |
| Levine         | James         | BAS                              |
| Macias-Fauria  | Marc          | Oxford                           |
| Pike           | Jennifer      | Cardiff                          |
| Ribeiro        | Sofia         | GEUS Denmark                     |
| Rosell-Mele    | Toni          | UAB                              |
| Schüpbach      | Simon         | U Venice (U Bern from Sept 2013) |
| Seidenkrantz   | Marit-Solveig | U Aarhus                         |
| Sheldon        | Christina     | U Aarhus                         |
| Spolaor        | Andrea        | U Venice                         |
| Stein          | Rudinger      | AWI                              |
| Thompson       | Natalie       | University of Iowa (soon)        |
| Weckstrom      | Kaarina       | GEUS Denmark                     |
| Wilkinson      | Jeremy        | BAS                              |
| Wolff          | Eric          | U Cambridge                      |
| Xiao           | Xiaotong      | AWI                              |

### *Additional local attendees for parts of meeting:*

Liz Thomas (BAS)

Natalia Vazquez Riveiros (U Cambridge)

Katy Pol (BAS)

The workshop was supported by the IGBP project Past Global Changes (PAGES) and by the British Antarctic Survey.

It was organised by Eric Wolff , Rainer Gersonde and Anne de Vernal.