

Second PAST Gateways International Conference and Workshop**Trieste, Italy, May 19-23, 2014***Meeting Report*

'PAST Gateways' is an IASC endorsed network that started in 2012. The scientific goal of the programme is to understand Arctic environmental change during the period preceding instrumental records and across decadal to millennial timescales. The focus of the six-year programme is on the nature and significance of Arctic gateways, both spatial and temporal, with an emphasis on the transitions between major Late Cenozoic climate events such as interglacials to full glacials and full glacial to deglacial states, as well as more recent Holocene fluctuations.



Palazzo Vivante

The Second International PAST Gateways Conference and Workshop was organised by OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale) and was held at *Palazzo Vivante* (Largo Papa Giovanni XXIII°, Trieste). Over 70 delegates attended the meeting. Funding to support the participation of 17 early career researchers and two key note speakers was generously provided through ICARP III. The structure of the meeting followed the previous PAST Gateways meeting in St. Petersburg in 2013 with all the delegates staying in the same venue as that of the meeting thereby resulting in strong interaction between the participants and facilitating a mix of early career researchers with more established researchers of Arctic palaeoclimate. A meeting of the 'Arctic Holocene Transitions' network took place on the 19th of May and the

delegates at that meeting then stayed on for PAST-Gateways.

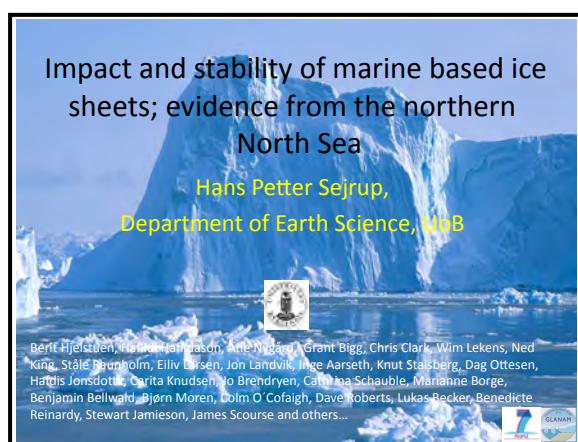
The first day of the meeting, May 20th, was a fieldtrip that covered two topics - cirque glaciers of the Julian Pre-Alps during the LGM and more recent glaciation of the Julian Alps. This was run by Dr. Roberto Colucci and Dr. Giovanni Monegato and introduced the meeting participants to some spectacular evidence of alpine glaciation. The following day the meeting opened with welcoming addresses by Dr. Angelo Camerlenghi (OGS), Dr. Laura DeSantis (OGS) and Professor Colm O'Cofaigh (Durham; Chair of PAST-Gateways). The meeting comprised 32 oral and 30 poster presentations delivered over the course of two days and divided into three major themes: (1) Growth and decay of Arctic Ice Sheets; (2) Arctic sea ice and palaeoceanography; (3) Non-glaciated Arctic Environments including permafrost change.



Recent glaciation of the Julian Alps



Presentation during the congress



Keynote presentations

The first day of the conference (May, 21st) comprised a series of oral presentations on the theme of the Growth and Decay of Arctic ice sheets. Professor Hans Petter Sejrup (University of Bergen) started the scientific presentations with a keynote talk entitled 'Impact and stability of marine based ice sheets: evidence from the northern North Sea' and this was followed by a range of presentations on themes including ice streams of the Fennoscandian Ice Sheet, landform assemblages related to surging glaciers on Svalbard, the chronology of the last Eurasian Ice Sheet, ice sheet collapse and sea level change during the last glaciation of Iceland and marine geophysical records of glaciation in the western Arctic Ocean. The history of the Greenland Ice Sheet also formed a major focus and presentations ranged in both temporal and spatial scale and from modelling to field observations; e.g., there were presentations on the Holocene history of local ice caps on west Greenland vs the ice sheet; the nature of glacier-influenced sediment delivery to Baffin Bay from Greenland during the late Quaternary; modelling Greenland outlet glacier retreat; and exposure age dating of Greenland Ice Sheet retreat since the last glacial maximum. This session produced lively debate surrounding the controls on ice sheet retreat and on the nature of glacial marine sedimentation on Arctic continental margins.

The second day of the meeting focused on (2) Arctic sea ice and palaeoceanography and (3) non-glaciated Arctic environments including permafrost evolution. It commenced with a keynote presentation by Dr. Leonid Polyak (Byrd Polar, Ohio) on 'Quaternary Arctic sea-ice changes: a microfaunal perspective'. This was followed by a diverse range of talks including presentations on sea ice changes in Fram Strait during the Holocene; testing the evidence for a

northern meltwater trigger for the Younger Dryas from analysis of cores from the Arctic Ocean Basin; and Holocene palaeoceanographic records from east and west Greenland. The final session of the conference focused on non-glaciated Arctic environments including evidence for permafrost evolution. Professor Carlo Barbante (IDPA-CNR & University of Venice) gave a keynote talk on 'Records of past and present contamination in the Arctic' and the rest of the session included a set of excellent talks on lacustrine records of palaeoenvironmental change from North Greenland, palaeo-limnological reconstructions of the interglacial-glacial sediment record from Lake Ladoga and investigations of large ice-wedge casts and permafrost from Northern Siberia and their implications for Holocene Arctic climate warming.



Pasterze Glacier field excursion

The oral presentations were accompanied by dedicated poster sessions on the three themes. The posters were displayed throughout the meeting but dedicated poster sessions on the two days ensured there was ample time for presentation and discussion of the posters. The final day of the meeting comprised an optional fieldtrip to the Pasterze Glacier, Austrian Alps. This was led by Monika Dragosics (Institute of Earth Sciences, University of Iceland) and explored evidence of LGM and contemporary glacial geology and geomorphology.

What made this meeting a success was the mixture of presentations across a wide range of topics on Arctic palaeoclimate over the two days and the fact that all the delegates attended all the sessions. This both facilitated and encouraged discussion and interaction between a wide range of Arctic climate scientists who ranged from numerical modellers, paleoceanographers, glacial



Participants of the PAST Gateways International Conference and Workshop 2014

geologists, marine geologists, palaeolimnologists, and palynologists to permafrost specialists. We highlight this here because sometimes previous Arctic research has not always recognised the interconnectedness of the Arctic palaeoclimate system tending to focus on single components rather than adopting a multi-disciplinary integrated approach across different climate states and timescales. This was a goal of the meeting and we believe we largely succeeded in achieving it. The other successful aspect of the meeting was the mixture of senior Arctic scientists and early

career researchers. The format of the meeting – all delegates staying in the same place, presentations in the same location as the meeting and no split sessions – ensured strong interaction between researchers at different stages of their careers. This resulted in a stimulating and enjoyable meeting and the funding we received meant that we were able to ensure good participation by early career researchers at the meeting and we gratefully acknowledge this.

Colm O’Cofaigh and Renata Lucchi

August 6, 2014

Second PAST-Gateways Conference and Workshop, Trieste (Italy), 2014

Scientific Program

Monday 19 May

Guests arrange their own transportation to Trieste and Guest House *Semente Nova* (Largo Papa Giovanni XXIII°, 7, http://www.ofpts.it/altre_attivita/altre_attivita.htm).

Tuesday 20 May

7.30 Pickup at the Guest House *Semente Nova*

Field Excursion on the South-Eastern Italian Alps and Prealps:

Alpine Würm (LGM) moraines and evidences of the Little Ice Age in the area of the Monte Canin.

Roberto R. Colucci (Dep. of Earth System Sciences and Environmental Technology, CNR-ISMAR Trieste)

Giovanni Monegato (Institute of Geosciences and Earth Resources, CNR Torino)

19.30 Ice breaker cocktail and welcome dinner (Restaurant AI FIORI, Piazza Hortis).

Wednesday 21 May

8.45-8.50 Welcome addresses by Laura De Santis, OGS representative in the Italian National Scientific Committee for Antarctic Research (CSNA)

8.50-8.55 Welcome by the PAST gateways chairman Colm O’Cofaigh

8.55-9.00 Practical info by the local organizer Renata G. Lucchi

MORNING SESSION Oral presentations on Growth and decay of Arctic Ice Sheets

(Chairman Colm O’Cofaigh)

9.00-9.30 KEYNOTE PRESENTATION

Impact and stability of marine based ice sheets: evidence from the northern North Sea.

Hans Petter Sejrup, University of Bergen.

9.30-9.45 **Anne Hormes**: Preliminary temperature reconstructions from Bjørnøya, Svalbard.

9.45-10.00 **Katharina Streuff**: Landform assemblages in Inner Kongsfjorden, Svalbard: Evidence of recent glacial (surge) activity.

10.00-10.15 **Michele Rebesco**: Onset and growth of Trough-Mouth Fans on the North-Western Barents Sea margin – implications for the evolution of the Barents Sea/Svalbard Ice Sheet.

- 10.15-10.30 **Chris R. Stokes:** Asynchronous response of marine terminating outlet glaciers during deglaciation of the Fennoscandian Ice Sheet.
- 10.30-10.45 **Nina Kirchner:** Capabilities and limitations of ice sheet models revisited – A Svalbard case study.
- 10.45-11.15** Coffee break
(Chairman Angelo Camerlenghi)
- 11.15-11.30 **James M. Lea:** 140 years of fluctuations at a major Greenlandic tidewater glacier driven by changes in air temperature: insights from observations and modelling.
- 11.30-11.45 **Svend Funder:** The last decay of the Greenland ice sheet – the contribution from exposure dating.
- 11.45-12.00 **Jason P. Briner:** Contrasting history between local glaciers and the Greenland Ice Sheet during the Holocene: Emerging results from western Greenland.
- 12.00-12.15 **Colm O'Cofaigh:** Glacially-influenced submarine fans on the Greenland continental margin bordering Baffin Bay.
- 12.15-12.30 **Frank Niessen:** Seismic evidence of a Pleistocene glaciated continental margin off Beringia in the western Arctic Ocean.
- 12.30-14.00** Lunch break (Restaurant AI FIORI, Piazza Hortis)

AFTERNOON SESSION **Oral presentations on Growth and decay of Arctic Ice Sheets**

(Chairman Michele Rebesco)

- 14.00-14.15 **Hreggvidur Norddahl:** Glacio-isostasy and ice sheet collapse in Western Iceland.
- 14.15-14.30 **Daniel Praeg:** Meltwater drainage and the southern limits of glaciation on the European margin.
- 14.30-14.45 **Ekaterina Kaparulina:** Detection of the mineralogical indicators for decay of the late Pleistocene Eurasian Arctic ice sheets.
- 14.45-15.00 **Darrell S. Kaufman:** A new Arctic Holocene proxy climate database – Principal millennial-scale patterns.
- 15.00-15.15 **Anna L.C. Hughes:** The last Eurasian Ice Sheets: a chronological database and time-slice reconstruction.
- 15.15-15.30 **Ólafur Ingólfsson:** APEX Legacy and the Dynamic Arctic
- 15.30-16.00** Coffee break
(Chairman Renata Lucchi)
- 16.00-16.30 **Tim Freudenthal and Michele Rebesco:** Challenges and progress in drilling offshore buried glacial deposits: The Mebo drilling experience during the CORIBAR cruise at Svalbard. Short report and workshop.
- 16.30 **Poster session**
- 19.30** Dinner (Restaurant AI FIORI, Piazza Hortis)

EVENING SESSION WITH WINE TASTING

(Chairman Renata Lucchi)

- 21.00-21.30** Glacier and permafrost in the Mediterranean: The case study of the South-eastern Alps and coastal Dinaric Mountains. **R.R. Colucci** (Dep. of Earth System Sciences and Environmental Technology, CNR-ISMAR Trieste) and **Manja Žebre** (Dep. of Geography, Faculty of Arts, University of Ljubljana).

Thursday 22 May**9.00-9.30**

KEYNOTE PRESENTATION

Quaternary Arctic sea-ice changes: a microfaunal perspective.

Leonid Polyak, Byrd Polar, Ohio.MORNING SESSION: **Oral presentations on Arctic sea-ice and ocean changes**

(Chairman Carlo Barbante)

9.30-9.45

Anne de Vernal: Contrasted climatic trends in the Atlantic vs. Pacific sectors of the Arctic Ocean during the Holocene.

9.45-10.00

Juliane Müller: From full glacial to current interglacial conditions: A high-resolution record of sea ice variability in Fram Strait.

10.00-10.15

Kirstin Werner: Core-top versus Holocene samples from the Fram Strait and the Nordic Seas: Restrictions in Mg/Ca-paleotemperature estimations in high-latitude bottom waters.

10.15-10.30

Michael Stürz: The evolution of Miocene ocean circulation controlled by the Greenland-Scotland Ridge.**10.30-11.00**

Coffee break

(Chairman Leonid Polyak)

11.00-11.15

Jeremy Lloyd: Holocene palaeoceanographic evolution of Disko Bay, West Greenland, from surface and subsurface proxies.

11.15-11.30

Anne de Vernal: The final drainage of Lake Agassiz (Ojibway) ~ 8.3 ka ago and its impacts on the North Atlantic climate/ocean system: facts and hypothesis.

11.30-11.45

Martin Miles: Constraining Holocene changes and effects of the Earth's largest ice and freshwater pathway.

11.45-12.00

Robert F. Spielhagen: Arctic Ocean meltwater outflow as a trigger for the Younger Dryas event – a review of available evidence from sediment cores.**12.00-12.30**

KEYNOTE PRESENTATION

Records of past and present contamination in the Arctic.

Carlo Barbante, IDPA-CNR & University of Venice, Italy.**12.30-14.00**

Lunch break (Restaurant AI FIORI, Piazza Hortis)

14.00-14.30

Conference pictureAFTERNOON SESSION **Oral presentations on non-glaciated Arctic environments including permafrost change**

(Chairman Hans Petter Sejrup)

14.30-14.45

Henning A. Bauch: Peat growth in the Lena Delta and its relation to late Holocene climate change in the Arctic.

14.45-15.00

Jörn Thiede: Siberian Fresh Water Gateways to the Arctic Ocean.

15.00-15.15

Hanno Meyer: North Siberian ice wedges reveal Arctic winter warming throughout the Holocene.

15.15-15.30

Ole Bennike: Holocene environmental changes in the Skallingen area, eastern North Greenland, based on a lacustrine record.

15.30-15.45

Grigory Fedorov: Lake Ladoga interglacial – glacial sediment record obtained in 2013 – initial results of the Russian-German PLOT project.**15.45-16.15**

Coffee break

16.15-16.30

Steering Committee communication

16.30 **Poster session**

19.30 Conference dinner and official closing of the Second PAST-Gateways Conference and Workshop.

Friday 23 May

Guests arrange their own departure from Trieste.

7:30 Pickup at the Guest House *Semente Nova***Optional field Excursion at the Pasterze Glacier (Großglockner 3798 m, Austrian Alps)***

Evidence of LGM and contemporary glacial geology and geomorphology of the Pasterze Glacier.

Monika Dragosics (Institute of Earth Sciences, University of Iceland, Reykjavík, Iceland)

Return to Trieste in the evening (approx. 20:00).

*Only for guests that confirmed participation.

Second PAST-Gateways Conference and Workshop, Trieste (Italy), 2014**Cost Statement**

IASC kindly contributed with 8000.00 € to the workshop budget of 32263.00 €. The IASC sponsorship covered the conference's registration fee (420.00 €) of 17 early career scientists and 2 invited keynote speakers (note: of the initially 3 invited keynote speakers, Prof. K. Andreassen declined her participation few weeks before the start of the congress. The contribution assigned to Andreassen was devoted to another early career scientist). The conference fees included accommodation for 4 nights (19 – 22 May), all meals starting with breakfast on 20th May and ending with breakfast on 23rd May, ice breaker-welcome dinner, conference dinner, transportation during scheduled program and excursion, and conference book with excursion guide and conference abstracts.

The remaining 20 euro off the 7980 employed for fee payment, were included in the rest of the budget necessary to run the workshop.

IASC Supported Participants:

Last name	First name	Affiliation	Country	E-Mail address	Fee
Early career scientists					
Auriac	Amandine	Durham University	UK	a.m.auriac@durham.ac.uk	420.00 €
Carbonara	Katia	Università degli Studi di Parma	Italy	katia.carbonara@live.it	420.00 €
Colleoni	Florence	Centro Euro-Mediterraneo Cambiamenti Climatici	Italy	florence.colleoni@cmcc.it	420.00 €
Dragosics	Monika	Institute of Earth Sciences, University of Iceland	Iceland	mod3@hi.is	420.00 €
Flink	Anne	University of Svalbard	Norway	AnneF@unis.no	420.00 €
Fransner	Oscar	University of Svalbard	Norway	oscarjacob.fransner@unis.no	420.00 €
Grimoldi	Elena	Durham University	UK	elena.grimoldi@durham.ac.uk	420.00 €
Kaparulina	Ekaterina	Thule Institute, University of Oulu	Finland	kaparulina_katya@mail.ru	420.00 €
Lea	James	University of Aberdeen	UK	j.lea@abdn.ac.uk	420.00 €
Müller	Juliane	Alfred Wegener Institute	Germany	juliane.mueller@awi.de	420.00 €
Opel	Thomas	Alfred Wegener Institute	Germany	thomas.opel@awi.de	420.00 €
Sheldon	Christina	Aarhus University	Denmark	christina.sheldon@geo.au.dk	420.00 €
Spolaor	Andrea	Ca Foscari University of Venice	Italy	andrea.spolaor@unive.it	420.00 €
Staerz	Michael	Alfred Wegener Institute	Germany	michael.staerz@awi.de	420.00 €
Streuff	Katharina	Durham University	UK	katharina.streuff@durham.ac.uk	420.00 €
Syrykh	Liudmila	Department of Geography, HSPU, St. Petersburg	Russia	lyudmilas@gmail.com	420.00 €
Werner	Kirstin	Byrd Polar Research Center, Ohio	USA	werner.192@osu.edu	420.00 €
Invited keynote speakers					
Polyak	Leonid	Byrd Polar Research Center, Ohio	USA	polyak.1@osu.edu	420.00 €
Sejrup	Hans Petter	University of Bergen	Norway	Hans.Sejrup@geo.uib.no	420.00 €
TOTAL					7,980.00 €

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Auriac, Amandine Marie-Claude**

Durham University, United Kingdom

I was hoping the PAST Gateways Conference would enable me to get a broad overview of the research carried out in the Arctic region. I was also aiming at gaining knowledge and understanding on the glacial history of the Barents Sea region, area where my work is focussed at the moment. I was also looking forward to the networking and discussion easily occurring at these type of conferences due to the relatively small amount of participants. I thought the field trip would also be a good opportunity to get to know people working in similar areas and using similar methods as me, and learn more about the glacial history of this part of Italy.

During the duration of this workshop, I was able to talk extensively with scientists doing research over the Barents Sea region and increase my knowledge on the work being done there. I increased my knowledge and understanding of the glacial history of the area around Svalbard and the Barents Sea, as well as their connection to the rest of the Arctic. The conference also enabled me to have fruitful conversations with other modelers and get contacts from persons I could contact/collaborate with in the future for my project.

The PAST Gateways workshop enhanced my understanding of the glacial history of the Barents Sea region and of the processes I will be dealing with during my research. It gave me a better understanding of what my work could bring to the general knowledge on this region by enabling me to put my research into a broader context. New ideas and possibilities of focus of my research have also been brought to me thanks to the interaction with the other scientists.

I intend to stay in touch with the persons I met and had a discussion with at the conference, for further discussion on the glacial history of the Barents Sea and on modelling in general, and look for potential collaboration. The organisers of the conference are also planning to submit a proposal for a PAST Gateways journal special issue for which I would like to contribute by presenting some of my research. The PAST Gateways Conference has been a great experience and I plan to attend it also next year.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Colleoni, Florence**

Centro Euro-Mediterraneo Cambiamenti Climatici, Italy

What did I expect to get out of the workshop

During my Ph.D. (2006-2009), I was part of the APEX meeting, following Martin Jakobsson's research about Arctic unusual glaciological feature. I participated to one the special issue of the APEX network at the time. Participating to PAST GATEWAYS network was a way for me to reconnect with the Arctic Network following up APEX working group. Since I am a paleoclimate modeller, I expected an update about the new campaigns that were carried out through the Arctic as well as an update about new Arctic datasets of various nature. Those points are crucial in order to understand where were the need for paleoclimate modelling and if there were new hypothesis that could deserve some specific test using climate and ice sheets models.

What did I get out of the workshop

I have been impressed by the all the efforts that have been led in the Arctic regions since I attended the first two APEX workshops. I have been particularly impressed by the progresses made in the reconstruction of glacial extents over the last glaciation as well as all the knowledge that the community have been able to accumulate about glacial processes of the small ice caps, such as Island and Svalbard. As said by Olafur Ingolfsson, we are now able to understand what, when and how specific events happened because the technics to gather and analyse samples of different nature have considerably evolved over the last decades. For examples, 30 years ago, the entire polar community was convinced that Greenland melted totally during MIS5e. But recently, thanks to a better understanding of ice cores analysis and ice sheet dynamical processes, the community was able to retrieve some ice dated back to MIS5e, demonstrating that Greenland probably melted only a little. Improvement can reshape our view of processes and our understanding of the whole Earth climate system. From the talks that were presented, it appears clearly that we still need to improve our overall knowledge of processes by combining data and modelling to understand why specific events happened, which is the most difficult part of interpretation and research. In PAST GATEWAYS, as for APEX, most of the participants are geologists or geophysicists, but not modeller. Being hybrid myself, i.e. I grew up as a geologist but I started climate modelling for my PhD, I am really convinced that there is still a huge gap between the two approaches. Many people told me in front of my poster that was strictly modelling, that they did not want to enter into details since it was modelling. But the contrary is also true, many modellers do not try to understand the fields and the data. In my opinion, more space should be dedicated to modeller in general and modeller should try to make the exercise clear to non expert scientists in order to better stress the need to test specific hypothesis deriving from data analysis and to improve the models.

Description of how the workshop enhanced my research goals

There are three specific things that I found particularly interesting for my own research objectives:

- Nina Kirchner ice sheet modelling strategy: combining full stokes equation and shallow ice approximation is very clever. To model ice sheet margin processes or ice sheet processes over steep topography areas, such as mountain range, the shallow ice approximation, commonly used

in ice sheet model, is not enough. The shallow ice approximation is a simplification of physics equations, describing the ice motion, based on a size ratio. When ice sheets accumulated over the Northern Hemisphere, their size were of continental scale. At such scale, horizontal movement of the ice flow is more important than the vertical ones. Consequently, most of the ice sheet models used this approximation, which is cheap in terms of calculation resources. However, over steep mountain ranges or along the ice sheet margins, vertical processes are dominant. In those cases, the shallow ice approximation is not valid anymore. This is why a more complex set of physical equations has to be used. However, increasing the physics complexity is more expensive in terms of numerical resources and is not indicated for paleoclimate modelling that requires very long simulation times. Nina and her team combined both solution by applying the shallow ice approximation and the full Stokes equations where it needs to be. The gain in calculation time is enormous. That's why I find those development particularly interesting.

- Frank Niessen new data about an ice sheet over Beringia: this area has always been very controversial because in literature, many papers indicate that now large ice sheet could develop over Eastern Siberia and also over this area because of loess deposit and the positive feedback that it has on local temperatures. However, many ice sheet models still have tendency in accumulating ice sheets over those areas, and this is the case in my own ice experiments. I am particularly glad that some evidence of ice cap were found recently. This will help explaining some of the results deriving from climate and ice sheet modeling. It will also change our view on those areas and provide new insight of the glaciation of Eastern Eurasia.

- Leonid Poliakov's talk about the evolution of the state of Arctic sea-ice cover. Since many transitions have been identified over the last 5 million years, the Plio-Pleistocene transition, the Mid-Pleistocene transition and the Mid-Bruhnes Event, our view of climate tipping points is evolving rapidly. I have been focusing regularly on MIS7-MIS6 time periods because of many unusual aspects found in data. Leonid's talk also showed that sea-ice characteristics changes from MIS 7. He has been also interested in the content of my poster about extensive glacial inception over MIS7 compared to MIS5. The more I see about MIS7-MIS6, the more it shows that this period is particular in the last half million years. Understand why is complicated since I agree with Leonid that this might only concern Arctic regions. The southern regions data indeed, do not show particularities during this time periods. There is more work to do on that in the future.

Follow-up activities related to their workshop participation

About the follow-up activities:

- There are potential collaborations with OGS about ice sheet modelling that might come up at some point. I really hope that since we are very few ice and paleoclimate modelers in Italy. I hope that it will be the occasion to start a stronger Italian ice community network, discuss the objective at local, regional and national level for polar research.

- Based on Frank Niessen's talk, Nina Kirchner and I will collaborate to model polar regions by comparing our two models based on two different physical approaches.

- Nina Kirchner, Frank Niessen and I will submit a paper in the special issue for 2015 about the Beringia ice sheet. We will try to model it under the last two glaciations climate conditions (LGM and MIS6).

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Katia, Carbonara**

Department of physics and Earth Sciences, University of Parma, Italy

Expectations:

I expected the PAST Gateways Conference 2014 to be a good chance for meeting scientists who deal with similar research topics as me. As a result, the meeting could represent a means for networking and offer possibilities for further collaborations. In addition, I hoped to hear talks that were remarkable to me as a person and interesting for my own research; moreover I hope also to observe some of the local geology of the Italian Alps, which is useful for comparative reasons.

Results and Research Goals:

The workshop exceeded my expectations in many ways. Not only did a lot of notorious scientists give talks on important subjects, but I had a possibility to talk to many of these people. The stimulating discussions with many of the participants resulted in new insights into different branches of research and opened up a few possibilities of future collaborations. The field trips were useful to acquaint terrestrial settings as opposed to the marine setting, my main area of research, which enriches my knowledge.

Follow-Up Activities:

The activities following the workshop include a collaboration in progress for palaeoceanographic reconstructions working with Rudiger Stein group (AWI, Germany), editing of the manuscript I am working on, and continued research on my data. A possible cooperation might offer further insight into my study area. My manuscript draft will be edited according to the input I received from fellow scientists and a collaboration with AWI might result in a co-authorship on a paper currently prepared there.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Flink, Anne**

PhD Arctic Geology UNIS

When attending the PAST Gateways meeting in Trieste between the 19-22th of May I expected to be able to hear interesting presentations about the newest research in my field. Since I work with marine data (geophysical data and with sediment cores), in order to reconstruct the configuration and dynamics of the Barents Sea ice sheet during the Last Glacial Maximum and the deglaciation, most of the talks in the conference were very relevant to my research. In particular the talks during Wednesday were of interest to me and I think I got a lot of interesting ideas from listening to these talks.

I also looked forward to meet other researchers in my field. I think this is one of the main points with a conference. Especially for younger researchers it is very relevant to meet all the people who have been performing research in their field during a longer time and thus have more knowledge in the field. This is important both for networking as well as for sharing ideas.

I presented my first poster during this conference, which was a good opportunity to get feedback on my current work. I'm working with the Wahlenbergfjord in North Eastern Svalbard and I got several tips from different people on different ideas that I could look into in the future. I would see this as an enhancement of the research goals. I will however not change my original idea, nor focus, for the article from Wahlenbergfjorden, but some of the ideas from the conference are definitely worth checking up and I will most likely put more focus into certain matters that I had not originally intended to focus on.

I plan on publishing my work in the special issue from PAST Gateways, so this will be a natural follow up on the conference participation.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Frasner, Oscar**

PhD Arctic Geology UNIS

What I expected to get out of the workshop

My major expectation with the PAST gateways workshop was to create contacts and exchange ideas in a creative and stimulating environment with people from similar research fields. This would naturally lead to feedback on my presented work (poster) as well, which would help me in the process of building my first scientific article. Further, I expected that PAST gateways would be important for me to get conference experience, since I only have been to one conference/workshop as a PhD student before this one.

What I got out of the workshop

The PAST gateways conference and workshop gave me strengthen my connection to previous contacts, but also gave me new contacts. Due to the similar research topics, these contacts will be of greatest value to me during my scientific career, where we will be able to share ideas, support each other and also work together later on. A bonus of the workshop was of course the one-day long bus excursion to the Italian pre alps, which gave me an introduction to how this region of Europe is and has been affected by glacial processes.

A description of how the workshop enhanced my research goals

My current work was presented in the workshop as a poster. During the poster sessions, I got some valuable feedback from workshop participants that I will consider when writing my final draft for the upcoming paper. The input from my colleagues will take my thinking to a new level which will help to enhance the research goals for the actual work, but also help me to improve as a scientist,

Follow-up activities related to the workshop participation

In my case, this workshop participation led to two important follow-up activities. First of all, I signed up for the PAST gateways special issue in Quaternary Science Reviews. The goal here is that all the workshop participants who signed up for this issue will publish a scientific article including the work presented during the PAST gateways workshop. This is a great opportunity to get our work into a reputable journal.

Further, a contact I made during the workshop invited me to Uppsala, Sweden during fall this year, where a few ice-sheet modelers will and have a workshop together with marine geologists from Svalbard discussing future collaboration. This will be an interesting following-up activity related to the PAST gateways workshop.

All in all, I am very satisfied with the structure of the PAST gateways workshop, and with the people attending it. It gave me new experience and contacts that will be useful in the future.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Grimoldi, Elena**

Durham University, United Kingdom

I started my PhD project at Durham University, UK, in October, 2013 and the first official conference I attended was the Past-Gateways conference and workshop, held in Trieste, ITALY, from the 19th to the 23rd of May 2014. Given that I had only started my project six months earlier, I did not really have a lot to present but I decided to attend anyway in order to network with people working on similar fields.

The workshop started with a fieldtrip on the first day to the South-Eastern Italian Alps and Prealps and was followed on the second and third day by oral presentations. These were divided into the three main conference themes: 1) **Growth and decay of Arctic Ice Sheets**, 2) **Arctic sea-ice and ocean changes**, 3) **non-glaciated Arctic environments including permafrost change**. Finally, we concluded with a second, optional, excursion at the Pasterze Glacier (Großglockner 3798m) in the Austrian Alps.

I found the experience really interesting in all its aspects. I was looking forward to hear from the speakers, especially the ones belonging to the first theme. But what I mostly expected to get out of the workshop was to network with the community and to create a nice net of contacts. I was really pleased because, even though I only presented a poster to introduce my project and its future developments, I got the attention of a few, which led to very interesting and helpful conversations. I got the chance to explain what I wanted to do for the project and to look at my research from an external point of view and I was lucky enough to receive some advice and tips.

I also managed to catch up with the other fellows from the GLANAM project and to see how their projects were developing and I had the opportunity to discuss a few details of my research and future plans with my external supervisor (from Norway), who also attended.

In the immediate future I plan on continuing with my research keeping in mind all the opinions and feedbacks I gathered at the workshop. I would also like to participate at the next Past-Gateways conference that will be held in Germany next year. Hopefully, I will have more data and updates regarding my project to present and share with the community.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Ekaterina Kaparulina**

Doctoral student, Thule Institute, University of Oulu, Finland

The workshop was held on 19-23 May 2014 in Trieste, Italy, the II PAST Gateways International Conference and Workshop endorsed by IASC was very successful event. More than 70 scientists from across Europe, Russia, Canada and the USA were involved in this network. There were three major themes to the program of conference: (1) Growth and decay of Arctic Ice Sheets; (2) Arctic sea-ice and ocean changes; (3) Non-glaciated Arctic environments including permafrost change, within which the participants presented their research with poster and oral presentations.

In addition to the conference content, two field excursions were organized. The first one took place on the South-Eastern Italian Alps and Prealps where Alpine Würm (LGM) moraines and evidences of the Little Ice Age in the area of the Monte Canin were taken under consideration. Also it was a great opportunity to take a part in optional field excursion at the Pasterze Glacier (Grossglockner, Austrian Alps) to study the evidence of LGM and contemporary glacial geology and geomorphology of this glacier.

The participation in PAST Gateways conference has proven, in my experience, to deliver the best value in professional development. I have attended this conference in last year in Zelenogorsk, Russia and have found the quality of educational value for early career scientists to be consistent and cost beneficial. In this year I presented my current work through the talk “Detection of the mineralogical indicators for decay of the late Pleistocene Eurasian Arctic ice sheets” under the 1st theme “Growth and decay of Arctic Ice Sheets”. The abstract was included to the Proceedings volume of the conference.

The goals that I set before attending this conference comprised:

- presentation the current research;
- discussion my work with colleagues;
- obtaining feedbacks and advices related to my work;
- sharing our common knowledge between the colleagues;
- paying attention to the others scientist’s research works more or less related to mine.

My participation met all the preceding goals in addition to providing the opportunity to discuss with scientists whose area of research interest corresponded to mine. Some of them offered the opportunity to get additional data related to my research. I also met and discuss my research with follow-up group members, obtained some suitable comments and additions to my work. I hope that their support and useful advices will help me to finish one the planning paper and I will able to start new part of my research that probably I can present within the next PAST Gateways workshop.

I am very thankful to the organizing committee comprising Renata G. Lucchi, Colm O’Cofaigh, Michele Rebesco, Michele Zennaro, Franca Petronio, Ivana Apigalli, Paolo Giurco, as well as field excursions guides, PAST Gateways Steering Committee, authors, presenters, and all the Conference Sponsors.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT

Lea James

University of Abardeen, United Kingdom, and Stockholm University, Sweeden

Expectations from the workshop:

To communicate my research with the wider research community, both within and without my specialty area (glaciology), and to gain a better understanding of the potential wider context of my work

What have you got out of the workshop?

Highly useful discussions with other attendees regarding both my work, and that of others, including potential for future collaborations.

How the workshop enhanced your research goals?

The feedback gained from other attendees provided me with new perspectives on my current research, and helped me shape ideas for future research both related, and unrelated to ongoing projects.

Follow-Up Activities related to workshop participation:

Agreements to share data were made for both current and potential future projects, in addition to expanding current research to potentially include new field sites relevant to timescales varying from the last glaciation, to the present day.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Müller Juliane**

Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Germany

What was expected to get out of the PAST Gateways 2014 conference and workshop?

The PAST Gateways conference and workshop 2014 provided an ideal platform to present and discuss my research on sea ice reconstructions in the Fram Strait - the only deep water passage connecting the Arctic and the Atlantic Ocean and thus an ideal study area to document palaeoceanographic changes associated with sea ice and climate fluctuations. Several participants of the workshop have been or are working on sediment cores from the subpolar North Atlantic and the adjacent Arctic Ocean and they have a valuable expertise in environmental and palaeoceanographic reconstructions. With focus on my recent study of late glacial and deglacial sea ice fluctuations in the Fram Strait, I was thus looking forward to discussing the different mechanisms and feedbacks of a changing thermohaline circulation and a variable advection of warm Atlantic water into the Fram Strait.

What has got out of the workshop?

The role of sea ice as an important control mechanism for oceanic-atmospheric heat and moisture exchange (crucial for ice sheet dynamics) has been addressed within several talks. With regard to my current manuscript (submitted to EPSL) where I discuss the role of sea ice changes for the Last Glacial Maximum (LGM) and deglacial climate shifts (i.e. Heinrich Event 1, the Younger Dryas etc.) I received some helpful suggestions from H. Bauch concerning IRD events and the advection of Atlantic water along the western Laptev Sea continental margin during the last deglaciation. L. Polyak's presentation on long-term Pleistocene Arctic Ocean sea ice changes derived from foraminifer and ostracod data also gave insight into ice-ocean feedback mechanisms on longer timescales. In his talk, L. Polyak also pointed out that pan-Arctic LGM sea ice reconstructions are hampered due to the very low sedimentation rates in the central Arctic Ocean during glacial times and that more studies of sediment cores from continental margins are required to fill this gap of knowledge. R. Spielhagen's talk about the abrupt freshwater forcing during the Younger Dryas and how this event can be traced in different cores from the central Arctic Ocean (dependent on the individual temporal resolution of the respective cores) supported my assumption that a pan-Arctic meltwater routing caused an overall increase in the formation of sea ice, which was finally exported through Fram Strait causing the sea ice maximum that we observe at our core site in eastern Fram Strait.

Description of how the workshop enhanced individual research goals

The overall impact of LGM and deglacial climate variability recorded in High Latitude (marine) sedimentary archives and also the question as how to accurately identify the respective driving mechanisms behind these large-scale changes highlight the significance of these time intervals and encourage for more (high-resolution) reconstructions of sea ice conditions in the subpolar marginal seas of the Arctic Ocean.

In particular, the discussions with M. Stärz about proxy and model data comparisons and if model data may support the identification of trigger mechanisms causing the abrupt fluctuations that we observe in our sea ice proxy data, motivates for future co-operations with the modelling community. Transient model runs with prescribed (i.e. deduced from sea ice proxy data) boundary conditions for Arctic Ocean sea ice coverage could help with the interpretation of the proxy data and give insight into oceanic and/or atmospheric feedback mechanisms.

Follow-up activities related to workshop participation

A. de Vernal and I agreed to share sample material of sediment core MSM5/5-712-2 from the eastern Fram Strait that covers the late glacial and deglacial time interval. Her study of dinoflagellate cysts in the respective sediment samples will provide valuable palaeoenvironmental information and helps to address the following research questions:

- 1) is it possible to trace the LGM short-term variability in sea ice cover at the core site (as indicated by the biomarker data) by means of dinoflagellate cysts?
- 2) is there a general agreement/disagreement between biomarker-based and dinoflagellate cyst-based sea ice reconstructions?

Further, K. Werner and I agreed to work on the Holocene section of sediment core MSM5/5-723-2 from eastern Fram Strait to combine foraminiferal, stable isotope and biomarker approaches for a high-resolution reconstruction of Holocene sea surface (and subsurface) conditions in eastern Fram Strait. We expect to submit the results of these studies to the PAST Gateways Special Issue (presumably within Quaternary Science Reviews).

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Opel Thomas**

Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Germany

The participation at the PAST Gateways 2014 Conference and Workshop was a great addition to the European Geosciences Union General Assembly 2014 in Vienna I had attended three weeks before.

Before travelling to Trieste I had expected a comparatively small and therefore quite informal meeting with good opportunities for scientific exchange within the PAST Gateways community. My expectations were completely fulfilled. Both the relatively small number of participants and the pleasant and beautiful historical conference venue provided the space and atmosphere necessary for an intensive exchange and discussion of ideas and recent research findings. We nonetheless addressed a variety of topics and specific research questions related to past and recent Arctic climate variability on different timescales from glacial-interglacial to seasonal. The sessions on “Growth and decay of Arctic Ice Sheets”, on “Arctic sea-ice and ocean changes” as well as on “Non-glaciated Arctic environments including permafrost change” provided a broad and excellent overview on the recent progress in these highly dynamic debates. I was thus able to see the bigger picture by learning something about, for instance, the evolution of Miocene ocean circulation, an issue far away from my own day-to-day work.

However, for me personally, working on Siberian Arctic Holocene climate variability, talks and posters on the Holocene were the most interesting contributions. I therefore greatly appreciated that the meetings of the PAGES working groups “Arctic2k” and “Arctic Holocene Transitions” had taken place immediately before the PAST Gateways conference as they increased the number of participants working on the Holocene significantly.

Consequently, I greatly benefited from extensive exchanges and could present and discuss my own results on specific spatial and temporal aspects of Russian Arctic Holocene climate variability based on ice core and ice wedge studies.

Thanks to the personal contacts which I established during the meeting, I will be able to better contribute to the scientific work by the PAGES working groups as well as to group publications. Based on data exchanged at the workshop, at least one cooperative paper on Russian Arctic sea ice extent reconstruction is already in preparation.

In sum, I have to say that my participation at the PAST Gateways 2014 Conference and Workshop was really useful for me as an early career scientist. It inspired new ideas and research. I therefore want to thank IASC for the financial support of my participation and the organizers for this very successful meeting in Trieste.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Sheldon Christina**

Ph.D. at Aarhus University, Denmark

The reasons I chose to attend this conference were twofold: I wanted to learn more about current research projects concerning sea ice in the Arctic and North Atlantic, and I wanted to network with both professional researchers and other early career scientists involved in the field. At my university in Aarhus, there is very little sea ice research, so to stay up to date on new research projects and results, it's important to attend conferences to meet and network with other researchers.

I found the conference to be very informative, both in the content of the talks and posters and the discussions I had with other attendees. I was able to get feedback on my research project from experts and find out how I could better interpret my own work. I made quite a few new contacts with other early career researchers with whom I hope to collaborate in the future. Even though I work in a slightly different field (paleoclimatic and paleoceanographic reconstruction through analysis of foraminiferal assemblages and geochemistry), the research of the other early career scientists is complementary to my own and together can provide a more comprehensive picture of the climatic and oceanographic conditions in the North Atlantic after the last glacial period ended. This area of research is a very hot topic due to the rapidly melting Arctic sea ice and it is thus imperative to combine different proxy records to better understand the dynamics governing ice in the Arctic and North Atlantic Oceans.

After the conference, I have remained in contact with several of the other early career scientists with an eye toward possible future collaboration, and I have a long reading list of new sea ice papers that were either presented or referenced at the conference. I enjoyed the conference very much and I learned quite a lot about the field of sea ice research and gained ideas about how to include that research in my own projects.

I am grateful to the IASC for funding my trip to the conference as an early career researcher.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Spolaor Andrea**

Ca Foscari University of Venice, Italy

What they expected to get out of the workshop

A workshop can be considered as a small meeting or congress. The advantages of workshops are the limited number of researchers involved and the specificity of the theme discussed. The limited number of participants is a particularly strong incentive to interact and meet other researchers specialised in a specific theme, such as sea ice dynamics and the methods used to reconstruct past sea ice changes. What I expected from the meeting was to discuss with other researchers, evaluate the progress in the field of sea ice studies, and create new contacts, ideally leading up to future collaborations.

What they got out of the workshop

As I expected, the workshop proved very useful for meeting people and evaluating the progress made in the field of sea ice studies. Comparing my research progress as well as my ideas and future perspectives with other researchers was really interesting and useful, also for planning possible future activities. In addition, the limited number of people encouraged stronger connections and gave us the opportunity to interact. A preliminary collaboration with Dr. Thomas Opel from the Alfred Wegner Institute in Potsdam has been started.

Description of how the workshop enhanced their research goals

As I wrote in the previous sections, discussing and comparing results and ideas with other researchers who work as I do in the field sea ice reconstructions through different archives and proxies was extremely important. I particularly appreciated the opportunity to compare my results with outstanding researchers such as Anne De Vernal or Leonid Polyak. In addition, while discussing with Dr. Thomas Opel, I realized that he has worked with an ice core in the Arctic (Severnaya Zemlya) and that some of his analyses, especially, for Bromine would be highly useful for my research. The collaboration with Dr. Opel will be extremely important for my research, as it will grant me access to unique archives\data from the Siberian Arctic. These data will increase my own dataset and therefore improve my understanding of how to use halogen for sea ice reconstruction from an ice core.

Follow-up activities related to their workshop participation

The main activity decided after the meeting was the evaluation of the data received from Dr. Thomas Opel for the Severnaya Zemlya ice core. In any case, the connections made during the meeting are sure to prove important to keep in touch with the people working in the field of sea ice studies, and to exchange and compare progress with them also after the PAST – GATEWAYS 2014 workshop.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Stärz Michael**

Alfred Wegener Institute, Germany

The conference “PAST Gateways 2014” was held in Trieste and was organized by members of the “Istituto Nazionale di Oceanografia e di Geofisica Sperimentale”.

In first instance my motivation to participate on the conference was in order to meet other colleagues in the same field of research. Furthermore I aimed to get an overview of the recent work of my colleagues and in order to give a report of the recent development in Arctic paleo climatology community in the research section of my institute. Additionally I intended to report my own recent findings at the conference in order to get some feedback on my work of the scientific community.

During the conference I have attended a lot of interesting presentations and have met a lot of researchers. I think I profited from the rather medium size of the conference in that way that I was able to talk to the senior scientists personally (Henning Bauch, Robert Spielhagen, Jörn Thiede, Hans Petter Sejrup,...). They have provided me further scientific input to my present research topic and gave me the contact address of several experts in order to discuss my present work.

I will try to incorporate the scientific expertise in my present project wherever possible.

Furthermore I have arranged a potential collaboration with a Postdoc from the Byrd Polar Research Center (Ohio, USA) for a different potential model data intercomparison project. Either I or one of my colleagues will supervise this follow-up project by the use of an internal university student (i.e., Master student).

On top of this, based on the talks at the conference, I got some new ideas for testing geoscientific hypotheses by the use of a numerical model. This will be reported and discussed within one of the group meetings at the Alfred Wegener Institute.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Steuff Katharina**

Durham University, United Kingdom

Expectations:

I expected the PAST Gateways meeting to be an excellent opportunity for meeting scientists, who focus on similar research topics as me. As a result, the workshop should offer good possibilities for networking, opening up possibilities for further contacts and perhaps future collaborations. Furthermore, I hoped to hear numerous talks that were both, interesting to me as a person, but also relevant, at least in parts, for my own research, and to observe some of the local geology of the Italian Alps, which is useful for comparative reasons. The talk I was scheduled to give myself was supposed to be good practice for presenting my results in a larger group and thus prepare me for future conferences and meetings.

Results and Research Goals:

The workshop exceeded my expectations in many ways. Not only did a lot of renowned scientists give talks on relevant subjects, but I had a chance to talk to many of these people. I received a lot of feedback on my talk and poster, which I believe is extremely helpful to improve the manuscript I am currently working on and to steer my ongoing research into directions I might not previously have thought of. The stimulating discussions with many of the participants resulted in new insights into different branches of research and opened up a few possibilities of future collaborations. The field trips were helpful to familiarize myself with terrestrial settings as opposed to the marine setting, my main area of research, which diversifies my knowledge.

Follow-Up Activities:

The activities following the workshop include a collaboration with BAS, editing of the manuscript I am working on, and continued research on my data. As my poster only showed preliminary results I will check the data regarding questions of fellow workshop participants and will attempt to finalise my investigations soon. A possible collaboration with GEUS might provide further insight into my study area. My manuscript draft will be edited according to the input I received from fellow scientists and a collaboration with BAS might result in a co-authorship on a paper currently prepared there. It might also strengthen my manuscript by adding a few more results from work a colleague has done in previous years.

PAST Gateways Conference 2014 (Trieste, 19th – 23rd May 2014)

STUDENT REPORT**Werner Kristin**

Byrd Polar Research Center, Columbus OH, USA

I have been involved into APEX/Past Gateways activities since 2008 when starting my PhD project. In particular, it was this community consisting of geologists, biologists, and modelers working on the glacial and interglacial changes in the Arctic Ocean, that allowed me to establish a broad Arctic research network which not only enables for wide discussions on Arctic research topics between scientists representing different Arctic research fields but also is a strong basic tool for me now to develop joint project ideas and research proposals.

Oral presentation

During the Past Gateways Conference in Trieste I presented new data on the Mg/Ca ratio of the benthic foraminifer species *Cibicidoides wuellerstorfi* from the northern North Atlantic. My presentation entitled 'Coretop versus Holocene samples from the Fram Strait and the Nordic Seas – Restrictions in Mg/Ca-paleotemperature estimations in high latitude bottom waters' consisted of two parts. (1) have been showing that a calibration of modern water mass data to benthic Mg/Ca ratios from surface sediments is not straightforward in the high northern latitudes but probably is influenced by other factors such as the carbonate ion effect. (2) In addition, I presented Holocene trace metal/Ca ratios from an sediment eastern Fram Strait core. While based on core top results temperature estimations cannot be easily concluded, the results have the potential to draw conclusions on the paleo pH/CO₂ content of bottom water masses during the Holocene in the eastern Fram Strait.

The response of conference participants to my presentation was all over positive. People were interested to follow up this study in particular with regard to an improved understanding of changes in bottom water masses from the Early to Mid and Late Holocene in the Arctic Gateway region, which potentially also provides implications on Holocene intervals of higher foraminiferal carbonate dissolution.

Knowledge gained during the workshop and networking activities

As the conference was divided into three sessions consecutively (ice sheets; sea-ice and ocean changes; non-glaciated environments) participants gained a good overview on research topics of each session through both oral and poster presentations. The attendance of Darrell Kaufman who has not been a regular member of the Past Gateways community yet was of particular interest for me. During his talk, D. Kaufman presented a new proxy data base of Holocene records from the Arctic including data from Fram Strait.

Networking activities have always been a major component during APEX/Past Gateways conferences. Not only I made new contacts with colleagues and had great discussions especially with modelers and statisticians working in the field of Arctic sea ice and Atlantic Water impact but also found interesting impulses through various conversations with well-known colleagues.

Follow-up activities

Potential future collaboration has been brought up during various discussions and will be consolidated during upcoming weeks. In addition, I have been able to sign up for a paper contribution (Werner, K., Husum, K., Müller, J. et al.: Holocene sea (sub-) surface temperature in

the eastern Fram Strait) to the Past Gateways special issue planned to be published in Quaternary Science Reviews next year.

I really much enjoyed the productive and warm atmosphere during the conference and hope to be able to continue participating in future Past Gateways conferences. I very much appreciate the given opportunity by IASC to participate in the Past Gateways conference.