



**ACCESS**  
Arctic Climate Change  
Economy and Society



**Project no. 265863**

## **ACCESS**

### **Arctic Climate Change, Economy and Society**

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### **D6.251 – 1st ACCESS summer school**

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<b>PU</b>	Public	X
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

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Arctic Climate Change, Economy and Society (ACCESS)

## **Cross-sectoral Summerschool**

**23.-27. September 2013**

In the week 23-27 September 2013 the ACCESS project organized the ACCESS cross-sectoral summerschool in the 'Haus der Wissenschaft (House of Science)' in Bremen. The summerschool was hosted jointly by ACCESS partners Alfred Wegener Institute – Helmholtz Centre for Polar and Marine Research (AWI) and Ocean Atmosphere Systems GmbH (OASys) and led by OASys. In addition to the support from the 7<sup>th</sup> framework program by the European Commission via the ACCESS project the summerschool was generously supported by the Helmholtz Graduate School for Polar and Marine Research (POLMAR) by allowing for travel cost support for non-ACCESS lecturers. In addition the AWI supported the meeting by sponsoring room rental and a reception for the students and lecturers.

21 students from a diverse set of scientific disciplines were accepted for participation. Travel costs, accommodation and subsistence were covered by the students.

The aim of the summerschool was to provide the students an opportunity to learn about the different aspects of Arctic climate change, changes in the economic sectors of shipping, tourism, fisheries, oil and gas exploitation and governance.

The concept of the summerschool allowed for a balance between learning, discussing and own work on behalf of the students. The week started out with 2 /2 days of 'briefing' lectures covering the relevant fields of Arctic change from scientific, economic and societal perspectives. A focus was on ample time for cross sectoral discussions during and after the lectures. These were followed by 1 ½ days of breakout group work by the students to develop own ideas regarding 4 different topics, resulting from the first days of the summerschool. The topics were:

- How can scientists better cooperate with local and indigenous people(s)?
- Industry – Science cooperation, beneficial for both sides?
- Developing a “socio-economical ecosystem” map
- What is needed in terms of student education/training to be prepared for the cross-sectoral challenges in Arctic research?

On the last day the student groups prepared presentations and were able to present and discuss these while participating in the WP5/synthesis workshop taking place on 26/27 September. Based on this material the students will be able to publish their findings in the next ACCESS newsletter.

On the following pages the original announcement, the agenda, background information on the lecturers as well as the list of students can be found.

All presentations, the background and the agenda can also be found on the project website

[http://www.access-eu.org/en/publications/access\\_workshops/cross\\_sectoral\\_summerschool.html](http://www.access-eu.org/en/publications/access_workshops/cross_sectoral_summerschool.html)

## **ACCESS Cross-sectoral summerschool: Announcement**



Arctic Climate Change, Economy and Society (ACCESS)

**Cross-sectoral Summerschool 23.-27. September 2013**

Haus der Wissenschaft (House of Science), Bremen

We cordially invite applications for the ACCESS cross-sectoral summerschool organized and hosted by the ACCESS partners Alfred Wegener Institute – Helmholtz Centre for Polar and Marine Research (AWI) and Ocean Atmosphere Systems GmbH (OASys) and co-sponsored by the Helmholtz Graduate School for Polar and Marine Research (POLMAR).

The summerschool is open for ca. 20 participants from Science, Economy and Administration and is intended for graduate level and above.

The aim of the summerschool is to provide the students an opportunity to learn about the different aspects of Arctic climate change, changes in the economic sectors of shipping, tourism, fisheries, oil and gas exploitation and governance. Experts from all of these fields will give an insight into recent developments and present their view on chances and risks connected to the changes in the climate system and associated changes in the economic sectors.

The students will be able to work in small groups on topics related to cross-sectoral questions in the context of Arctic climate change, economy and society. They will present their results to a group of experts and are provided with the opportunity to publish them in the ACCESS Newsletter.

There will be no fee for the participation in the summerschool. Costs for meals, accommodation and transport will have to be covered on the students' own expenses.

Applications will be received by Lilian Schubert ([Lilian.Schubert@awi.de](mailto:Lilian.Schubert@awi.de)) and Michael Karcher ([michael@oasys-research.de](mailto:michael@oasys-research.de)).

Additional information on the school as well as suggestions for accommodation and transport will be updated regularly and sent to the participants.

related websites:

<http://access-eu.org>

<http://awi.de>

<http://oasys-research.de>

<http://polmar.awi.de>



## **ACCESS Cross-sectoral summerschool: Agenda**

### **Monday, Sep 23, 2013, Room: Olberssaal 1st floor**

- 09.30 Welcome and housekeeping
- 10.00 ACCESS project overview and concept of the summerschool
- 10.30 Break
- 11.00 Round of students' introduction
- 12.00 How to understand climate models/what are their uncertainties with a focus on the Arctic – Frank Kauker/Kathrin Riemann-Campe (AWI)
- 13.00 Lunch
- 14.00 Observing physical properties of sea ice - Marcel Nicolaus (AWI)
- 15.00 Changing Polar Low frequency over the northern North Atlantic in a changing climate – Matthias Zahn (HZG)
- 16.00 Break
- 16.30 Arctic Ocean Biology – from the surface to the deep sea - Christina Bienold (AWI)
- 17.30 Arctic Conservation - act now or repair later? - Gert Polet (WWF)
- 18.30 Icebreaker reception in the ‚Haus der Wissenschaft‘  
(ca 2h)

### **Tuesday, Sep 24, 2013, Room: Olberssaal 1st floor**

- 09.30 What do we know about current and future sources of Arctic air pollution and their impact? Anke Roiger (DLR) and Jennie Thomas (LATMOS-UPMC)
- 10.30 Break
- 10.30 Oil Spills – C.J. Beegle-Krause (SINTEF)
- 11.30 Climate change and the benefits of cooperation in harvesting shared fish stocks – Nils-Arne Ekerhovd (SNF)
- 12.30 Lunch
- 13.30 Introduction to Arctic Law and Governance – Birgit Lode (IASS)
- 14.30 Security issues – Andreas Raspotnik (The Arctic Institute)
- 15.30 Break
- 16.00 Shipping in the Arctic – Julia Köster (JADE-HS)
- 17.00 What global change science messages matter for Arctic governance? – Sarah Cornell (Stockholm Resilience Centre)

18.00 tentative closure

**Wednesday, Sep 25, 2013, Room: Kleiner Saal 1st floor**

09.00 Environmental Balance Modelling – Anne-Sophie Crepin (Beijer Institute)

10.00 Marine Spatial Planning – Rosemary Edwards (NOC)

11.00 Break

11.30 Energy production in the Arctic Ocean: Status quo and prospects under Climate Change – Sebastian Petrick (IFW)

12.30 The Economics of Global Resources Markets – Timo Panke (EWI)

13.30 Lunch

14.30 Wrap-up of briefings and start information for working groups

15.00 Student working group sessions

15.30 Break

16.00 Student working group sessions

18.00 Tentative closure

**Thursday, Sep 26, 2013**

09.00 Student working group sessions, Room: Kleiner Saal 1st floor

parallel: ACCESS Synthesis workshop, Room: Olberssaal 1st floor

11.00 Break

11.30 Student working group sessions

parallel: ACCESS Synthesis workshop

13.00 Lunch

14.00 Student working group sessions

parallel: ACCESS Synthesis workshop

15.30 Break

16.00 Student working group sessions

parallel: ACCESS Synthesis workshop

18.00 Finish for the day

18.30 Joint visit at an art exhibition in the „Neues Museum Weserburg“ afterwards Joint dinner

**Friday, Sep 27, 2013, Room: Olberssaal 1st floor**

09.00 Joint Summerschool and Synthesis workshop day, Presentation of student working groups session results (incl. Breaks...)

16.00 Closure

## **ACCESS Cross-sectoral summerschool: Lecture abstracts and Lecturer information**

**Frank Kauker (AWI/OASys) / Kathrin Riemann-Campe (AWI)**

### **How to understand climate models/what are their uncertainties with a focus on the Arctic**

This lecture intends to provide an overview on changes related to Climate Change to be expected in the Arctic. It will be shown that the uncertainties of climatic projections are larger in the Arctic than in other areas of the world, which is connected to feedback processes in the high-latitude compartments: the atmosphere, the (sea) ice, and the ocean.

The second part of this lecture focuses on a short overview on possible causes of uncertainty in climate projections, e.g. the uncertainty of emission scenarios applied to climate models and model variability. These uncertainties result in a range of possible future sea ice distributions, which will be discussed.

### **Suggestion for voluntary preparatory reading:**

Hawkins, Ed, Rowan Sutton, 2009: The potential to narrow uncertainty in regional climate predictions. *Bull. Amer. Meteor. Soc.*, 90, 1095–1107. doi: <http://dx.doi.org/10.1175/2009BAMS2607.1>

### **Background:**

Frank Kauker is a senior scientist in the sea-ice physics group at the Alfred-Wegener Institute for Polar and Marine Research and one of three shareholders of the scientific company OASys. He is mainly concerned with sea ice-ocean modelling and inverse modelling in high-latitudes.

Kathrin Riemann-Campe is an early-career scientist (postdoc) in the sea-ice physics group at the Alfred-Wegener Institute for Polar and Marine Research. She focuses on future projections of Arctic sea ice properties.

### **Christina Bienold (AWI)**

#### **Arctic Ocean Biology – from the surface to the deep sea**

The Arctic Ocean is rapidly changing due to increasing temperatures and the loss of sea ice. One of the central questions about the consequences of the shrinking sea ice cover is to what extent primary production and subsequent export of organic matter to the seafloor will be affected, and how this will influence the structure and functioning of marine communities in the Arctic. We will explore the Arctic Ocean from the sea ice to the water column to the deep sea, to better understand the links and feedbacks between these different compartments and how they may be affected by climate change. Measuring biological change, e.g. in Arctic productivity, biodiversity and ecological functioning is a difficult task, especially because reliable baselines are missing. It needs long-term observations in order to be able to better understand and assess the impacts of climate change on the Arctic Ocean ecosystem. I will present findings from the only open-ocean Arctic long-term observatory (HAUSGARTEN), located in the Fram Strait and maintained by the AWI since 1999, and we will discuss what we can learn from such projects. From the Fram Strait, we will also take a trip to the central Arctic Ocean and I will report from one of our recent cruises where we were on site with the research vessel Polarstern during the record sea ice minimum in September 2012.

#### **Voluntary reads:**

Central Arctic: Boetius A, Albrecht S, Bakker K, Bienhold C, Felden J, et al. (2013). Export of Algal Biomass from the Melting Arctic Sea Ice. *Science* 339: 1430-1432.

HAUSGARTEN: Soltwedel T, Bauerfeind E, Bergmann M, Budaeva N., Hoste E, et al. (2005). HAUSGARTEN: multidisciplinary investigations at a deep-sea, long-term observatory in the Arctic Ocean, *Oceanography*, 18 (3), pp. 46-61.

### **Christina Bienhold**

I studied Marine Biology in Hamburg and Bremen and completed my PhD on the “Diversity and ecology of bacterial communities at the deep seafloor” in Antje Boetius working group at

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the Max Planck Institute for Marine Microbiology in 2011. During a number of research cruises I was able to participate in international and interdisciplinary teams, mainly investigating the deep ocean floor, from cold seeps in the Mediterranean Sea and the Congo basin to the central Arctic deep sea. I am fascinated by the deep sea, because it still holds a lot of mystery and is full of new discoveries. Until the mid-19<sup>th</sup> century the deep sea was considered to be a monotonous desert with no life. Now we know that the deep sea actually harbors a high biodiversity, and with the discovery of hydrothermal vents and cold seeps only about 30 years ago, we began to explore a new kind of ecosystem which is not based on sunlight but on chemical energy for primary production.

As a Postdoc I am currently part of the Joint Research Group for Deep Sea Ecology and Technology shared between the AWI for Polar and Marine Research and the MPI for Marine Microbiology. Within the ERC project ABYSS (Antje Boetius) I continue to do research on microbial communities at the deep-sea floor, with a special focus on the Arctic.

### **Birgit Lode (IASS)**

#### **Introduction to Arctic Law and Governance**

This lecture intends to provide a rather broad and general overview of the legal framework and governance aspects in the region, with a focus on current environmental and economic challenges. Amongst others, it will highlight the importance of the United Nations Convention on the Law of the Sea (UNCLOS) as well as its relation to other agreements and key institutions in the region, in particular, the International Maritime Organization (IMO). In addition, some more recent developments pertaining to the Arctic Council and the development of a 'Polar Code' will be addressed. The lecture will be given in a way suitable for students with various backgrounds and establish links to other lectures, allowing the students to engage in transdisciplinary discussions in the ensuing days.

#### **Suggestion for voluntary preparatory reading:**

Loukacheva, N., *Introduction to Polar Law*, in: Polar Law Textbook (2010), pp. 13-22, available at <http://www.norden.org/en/publications/publikationer/2010-538>.

#### **Background:**

<http://www.iass-potsdam.de/people/dr-birgit-lode>.

**Cross sectoral key question:**

„The Arctic is undergoing major changes. In which ways could the legal framework and / or governance regimes encourage a sustainable transformation of the Arctic region?“

**Matthias Zahn (HZG)****Changing Polar Low frequency over the northern North Atlantic in a changing climate**

Polar lows are small short lived yet vigorous cyclones over Polar oceans. Accompanied by wind speeds at or above gale force and heavy precipitation, they pose a potential threat to human offshore activities and to coastal communities in the Polar regions.

I will present the results of recent research on the statistics of polar low cases with a focus on the North Atlantic. Over the past couple of decades the average annual number of polar lows has remained on a similar level and no trend could be found. Under simulated climate warming conditions, however, the frequency of polar lows is projected to decrease significantly. I will discuss what this may mean for the Arctic climate system and offshore activities.

**Recommended reading:**

On polar lows in general:

Rasmussen, E. A. & Turner, J. Polar Lows: Mesoscale Weather Systems in the Polar Regions (Cambridge Univ. Press, 2003)

Summary of my own research on frequency changes of polar lows:

Zahn, M. and Storch, H. v. (2012) Investigation of Past and Future Polar Low Frequency in the North Atlantic, in Extreme Events and Natural Hazards: The Complexity Perspective (eds A. S. Sharma, A. Bunde, V. P. Dimri and D. N. Baker), American Geophysical Union, Washington, D. C.. doi: 10.1029/2011GM001091

**On me: (<http://coast.hzg.de/staff/zahn/>)**

I currently work as a scientist at Helmholtz-Zentrum Geesthacht on tracking various types of mesoscale storms in global model data. Before I have been focusing my research on changes in the hydrological cycle at the University of Reading. Large parts of what I am

going to present will be based on my PhD work on polar low frequency changes. I earned my PhD in 2009 in Meteorology from the Universitaet Hamburg and my Diploma in 2005 in Environmental Sciences from the Universitaet Lueneburg.

**Marcel Nicolaus (AWI)**

### **Observing physical properties of sea ice**

It is not possible to observe all physical properties of sea ice at every time and place. But in order to understand the observed changes of Arctic sea ice, it is necessary to gather comprehensive data sets of key variables together with complementary observations in the atmosphere and the ocean. Another aspect is the increasing importance of interdisciplinary sea ice observations with the aim of connecting findings from physical, biological, and geochemical studies.

In order to describe the Arctic sea ice and its interactions, a suite of methods is applied from various research platforms in and around the Arctic. Here I present an overview of state-of-the-art measurements of sea ice mass and energy balance. Key variables, which still belong to the greatest unknowns for describing the state and future of Arctic sea ice, are: sea ice thickness, snow depth, and surface albedo. Related to those, also surface (incl. melt ponds) and thermal properties of sea ice, as well as light transmittance through sea ice play key roles in actual sea ice studies. Most of these variables may be observed in-situ on the ice, from ships, from helicopters, from planes, from satellites, or from autonomous devices. Depending on research questions and scales of interest (temporally and spatially), one or more of these methods are applied. I will give some insight into these methods and present exemplary results in order to discuss their advantages and disadvantages. In addition, aspects of spatial and temporal variability as well as data archiving and accessibility will be presented.

### **Background:**

Marcel Nicolaus is coordinating the observational sea-ice physics program at AWI. As a geophysicist he has a strong background on physical properties of sea ice and its snow cover in both, the Arctic and Antarctic. Most of his work is based on in-situ observations of

optical properties, thickness, snow properties, and texture of sea ice. In recent years he was mostly working on the spatial variability and temporal changes of those properties, including autonomous stations (buoys), remotely operated vehicles (ROVs), and different interdisciplinary approaches to understand the sea ice system. His current focus is on merging energy and mass balance observations of sea ice.

### **Suggested literature**

- Perovich, D. K., and J. A. Richter-Menge (2009), Loss of Sea Ice in the Arctic, in Annual Review of Marine Science, edited, pp. 417-441.
- Petrich, C., and H. Eicken (2010), Growth, Structure, and Properties of Sea Ice, in Sea Ice, edited by D. N. Thomas and G. Dieckmann, pp. 23-78, Blackwell Science, Oxford, UK.
- Nicolaus, M., C. Katlein, J. Maslanik, and S. Hendricks (2012), Changes in Arctic sea ice result in increasing light transmittance and absorption, Geophysical Research Letters, 39(24), L24501, doi:10.1029/2012GL053738.

### **Timo Panke (EWI)**

#### **The Economics of Global Resources Markets**

##### **Summary of the lecture's scope**

The lecture will start-out by providing a brief overview of the basic economic theory of spatial markets and the various approaches to modeling global resource markets. In a next step, we will do a deep-dive into so called mixed equilibrium programs (MCP), which allow simulating competitive as well as non-competitive market behavior. Finally, we will briefly discuss a (or potentially two) paper(s) that use(s) MCP models to answer its (their) research question (see literature suggestions).

##### **A few to words about myself**

Timo Panke has been a research associate and doctoral candidate at the Institute of Energy Economics at the University of Cologne since September 2010. After studying Economics in

Münster and Rome with a focus on monetary economics, econometrics and energy and environmental economics, he started working at the Chair of Energy Economics at the University of Cologne in June 2009. During this time he held classes in the areas of microeconomics, competition and regulation as well as energy trading. Mr. Panke's consulting activities focus on electricity and resource (particularly natural gas and coal) markets. Clients include German and European companies as well as national and international authorities. His research focusses on applied industrial organization using equilibrium and optimization models as well as econometric methods.

### **Literature suggestions**

Growitsch, C.; Hecking, H. and T. Panke (2013), Supply Disruptions and Regional Price Effects in a Spatial Oligopoly - an Application to the Global Gas Market, *EWI Working Paper* 13/08.

[http://www.ewi.uni-koeln.de/fileadmin/user\\_upload/Publikationen/Working\\_Paper/EWI\\_WP\\_13-08\\_Supply\\_disruptions\\_and\\_regional\\_price\\_effects.pdf](http://www.ewi.uni-koeln.de/fileadmin/user_upload/Publikationen/Working_Paper/EWI_WP_13-08_Supply_disruptions_and_regional_price_effects.pdf)

J. Trüby (2013), Strategic Behaviour in International Metallurgical Coal Markets, *Energy Economics*, Vol. 36, pp. 147-157.

[http://www.ewi.uni-koeln.de/fileadmin/user\\_upload/Publikationen/Working\\_Paper/EWI\\_WP\\_12-12\\_Update\\_Strategic\\_behaviour\\_in\\_int\\_metallurgical.pdf](http://www.ewi.uni-koeln.de/fileadmin/user_upload/Publikationen/Working_Paper/EWI_WP_12-12_Update_Strategic_behaviour_in_int_metallurgical.pdf)

### **Sebastian Petrick (IFW)**

#### **Energy production in the Arctic Ocean: Status quo and prospects under Climate Change**

The talk will focus on the economic and regulatory dimension of oil and gas production in the Arctic Ocean. After a short description of the general setting and the implications of climate change in this challenging environment, the talk will present the current status of Arctic oil and gas production, particularly in the European Arctic. You will learn about the central decision making determinants of businesses in the area and some of the basic economic concepts used to assess the situation. We will close with a lookout on the governance challenges.

**Reading:**

Lawson W. Brigham (2007): Thinking about the Arctic's future: Scenarios for 2040. [Link](#).

Charles Emmerson and Glada Lahn (2012): Arctic Opening: Opportunity and Risk in the High North. [Link](#).

**Cross-sectoral question:** How should policymakers balance the trade-off between the environmental risk, economic benefits, and social implications of a potentially increased exploitation of hydrocarbons in the Arctic Ocean? How can the outcome of this decision be implemented in an effective way?

**Background and scientific activities:**

Sebastian Petrick is an energy economist at the research area "The Environment and Natural Resources" at the Kiel Institute for the World Economy (IfW) in Kiel, Germany. His main fields of specialization include the feasibility and implications of energy resource exploration and exploitation in the Arctic Ocean. Outside the Arctic realm he works on energy use in Germany, especially the German manufacturing sector. He studied in Leipzig and Kiel, Germany, and has been working in Kiel and at UC Berkeley.

**Gert Polet (WWF)**

**Arctic Conservation - act now or repair later?**

The Arctic is home to a unique ecosystem and people. And it is under rapid change. Ecological shifts bode a somber future for sea ice dependent species. At the same time the Arctic is becoming accessible for new economic activities. What is needed to conserve the Arctic wilderness and its globally important ecosystem functions under a regime of rapid ecological and economical change? And what are the opportunities?

**Background:**

Gert Polet from The Netherlands is trained as a geographer and biologist. He is part of WWF's Global Arctic Programme which strives to secure a new future for the top part of this planet.

**Nils-Arne Ekerhovd (SNF)**

**Climate change and the benefits of cooperation in harvesting shared fish stocks**

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The expected change in productivity as climate changes and temperature increases is not necessarily a straightforward process. This may shift the balance of bargaining power between the competing coastal states. For example, it may take several years before all of the coastal states accept the new status quo, as the shift in temperature and recruitment can be a gradual process with considerable short-term variation. This entails considerable uncertainty as to whether any shift in productivity is merely the result of a temporary change or if the fish stock has actually changed its process of recruitment and productivity permanently. In particular, during the transition period, any underlying uncertainty may put an established agreement on stock management between the coastal states at risk, as the shift in bargaining power of a coastal state could entice it to maintain its claim to a greater share by severely increasing its fishing efforts, and commensurately its catches, in order to establish rights to the fishery and gain acceptance for its new status.

The remaining coastal state may then attempt to limit the profits of the first coastal state by also increasing its fishing efforts. Accordingly, if the transient period lasts for some time, and if the noncooperative behavior is allowed to continue, it may threaten the sustainability of the fishery, as the stock will be unable to maintain excessive fishing mortality indefinitely without either becoming extinct or being driven to the breakeven stock level (the level at which further fishing becomes unprofitable). The initial terms of the agreement may then be no longer incentive compatible for the participating countries in the new environment. If so, renegotiation of the initial agreement is necessary.

Examples from fisheries in the Barents Sea and the Norwegian Sea will be discussed.

#### **Profile Dr. N.A. Ekerhovd**

Nils-Arne Ekerhovd is a research fellow, SNF - Institute for Research in Economics and Business Administration, Bergen, Norway. Dr Ekerhovd received his Ph.D. from the Norwegian School of Economics and Business Administration, NHH, Bergen. Prior to his academic training he worked several years as a fisherman on a purse seiner operating in Norwegian waters. Dr Ekerhovd has been engaged in research on the effects of climate change on fisheries in the Northeast Atlantic.

#### **Andreas Raspotnik (The Arctic Institute)**

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## **The Geopolitics of the Arctic region**

The lecture will briefly highlight on-going developments in the Arctic region, especially with regard to Arctic governance, shipping, resource exploitation, related environmental considerations and its geopolitical relevance. Consequently the discussion will not only focus on the Arctic (coastal) states but will comprise external Arctic actors, such as the European Union, China or Japan. The lecture aims, in interaction with the students, to scrutinize an often-depicted common perception of the Arctic as geopolitical hotspot of the (near) future.

## **Background and Scientific Activity**

Andreas Raspotnik is currently a Research Fellow at the University of Cologne (Jean Monnet Chair - Prof. Dr. Wessels), within the professional training program of the Marie Curie Initial Training Network EXACT ([www.exact-training.net](http://www.exact-training.net)), leading to a double PhD (“co-tutelle”) issued by the University of Cologne and the University of Edinburgh. His dissertation discusses the European Union and its Arctic endeavour from a critical geopolitical perspective. During his academic career he has focused his research particularly on Arctic security and energy policy, fisheries and environmental protection. His master theses were titled “Norwegian Security Policy in the High North - Energy resources and the Norwegian rationale in the High North” (University of Vienna, Austrian Magister in Political Science; BA in History) and “Unilateral Pollution Control in the Arctic – Canada’s NORDREG regulations in the context of UNCLOS, Article 234” (University of Tromsø, LLM in Law of the Sea).

Andreas is an Analyst for *The Arctic Institute* ([www.thearcticinstitute.org](http://www.thearcticinstitute.org)), an independent Washington-based think tank focusing on Arctic policy issues. In addition to his interest in the European Union’s Arctic policy making he is mainly concerned about Arctic shipping and future-related shipping scenarios, International (Environmental) Law and its Arctic relevance as well as theoretical considerations regarding political geography (geopolitics and its critical components).

## **Suggestion to read (and deliberate) (find articles attached)**

Scott G. Borgerson (2008). Arctic Meltdown. The Economic and Security Implications of Global Warming, in: *Foreign Affairs*, Vol. 87, Issue 2, pp. 63-77

Scott G. Borgerson (2013). The Coming Arctic Boom. As the Ice Melts, the Region Heats Up, in: *Fore*

**Sarah Cornell (Stockholm Resilience Centre)**

**What global change science messages matter for Arctic governance?**

**Abstract:** The governance of the Arctic requires a perhaps unique degree of attention to global biophysical processes, as well as to an increasingly complex interplay of social demands and aspirations for the region. In this presentation, I will describe ongoing research that aims to characterize the social-ecological resilience of the Arctic region. This work needs to link what is known about the biophysical state, trends and dynamics (of the Arctic and the Earth system) with perspectives on societal drivers, vulnerabilities, opportunities and adaptive capacity.

This research is resulting in new approaches for transdisciplinarity. It highlights both long-standing and emerging transsectoral and transboundary policy concerns, and its outcomes may call for transformative change in governance.

**Voluntary reads:**

Arctic Council (2013) Arctic Resilience Interim Report. Stockholm Environment Institute and Stockholm Resilience Centre, Stockholm, Sweden.

Chapter 2 – *The resilience approach*; chapter 4 – *Thresholds in the Arctic*.

[www.sei-international.org/mediamanager/documents/Publications/ArcticResilienceInterimReport2013-LowRes.pdf](http://www.sei-international.org/mediamanager/documents/Publications/ArcticResilienceInterimReport2013-LowRes.pdf)

**Sarah Cornell** is an environmental scientist at the Stockholm Resilience Centre. Her research background is in global environmental dynamics. She has a strong interest in improving ways to integrate different discipline-based knowledges about the world we live in. Sarah currently coordinates the steadily expanding Planetary Boundaries Research Network, an international collaboration initiative on Earth system science for global sustainability, led by the Stockholm Resilience Centre. In her previous role, she was the science manager and synthesis leader for the UK Natural Environment Research Council's Earth system science research program *Quantifying and Understanding the Earth System*. Sarah has also worked in environmental consultancy and policy roles.

[www.sarahcornell.org](http://www.sarahcornell.org)

**Jennie Thomas (LATMOS) and Anke Roiger (DLR)**

**What do we know about current and future sources of Arctic air pollution and their impact?**

It is common to view the Arctic as a pristine region, far removed from pollution sources. Air pollution however is pervasive in the Arctic, especially during spring when aerosol layers (referred to as Arctic Haze) are very common. The origin of these aerosol layers is air pollution emitted outside the Arctic (in Europe, Asia, and N. America), which is transported long distances into the region. The impact of pollution on the Arctic is not limited to decreased air quality, but is also tied to Arctic climate. It is well known that climate change is proceeding much faster in the Arctic than the global average, and one contributing factor is the role of short lived climate forcers (most of which are also air pollutants, e.g. ozone and black carbon aerosols) in Arctic warming. For example the sea-ice albedo feedback mechanism enhances warming in the region and is caused by soot and other dark aerosols being deposited onto snow surface, resulting in additional melting. The ongoing climate change in the Arctic region is also opening the area to new industrial activities, including transit shipping and resource extraction. We present an overview of current knowledge of Arctic air pollution as well as an overview of new and increasing Arctic pollution sources. We will highlight the results from the recent ACCESS aircraft campaign (conducted in N. Norway in July 2012), which focused on Arctic pollution including ships and hydrocarbon extraction facilities.

Anke Roiger is a research scientist at the DLR-IPA (Deutsches Zentrum für Luft und Raumfahrt - Institut für Physik der Atmosphäre). Her main interest is in developing and operating airborne measurement instruments on different research aircraft. Data from these measurements are used to investigate chemical and transport processes in the troposphere, such as long-range transport of air pollutants and photochemical ozone production.

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Jennie Thomas will join LATMOS as a permanent CNRS (Centre National de la Recherche Scientifique) researcher in October 2013. Her main interests include understanding Arctic tropospheric chemistry using 1D and 3D models. Her past work has focused on air-snow interactions and how they impact Arctic atmospheric chemistry. She is also studying long-range transport of air pollution and emerging Arctic pollution sources using regional modeling.

Voluntary reads attached.

### **Julia Köster (Jade-HS)**

#### **Shipping in the Arctic**

This lecture intends to provide a rather broad and general overview of shipping in the Arctic region – from a seafarer's point of view. Amongst others, it will mention the requirements and preparations of ships in order to trade in that area.

#### **Background:**

Julia Köster is employed at the Jade University of Applied Science at the Department of Maritime Studies along with working as a project manager for Bugsier Reederei. After her Nautical Studies she was sailing on container ships and an expedition cruise ship all over the world as well as working for a research project and taking her Master Course in Operations and Management of Maritime Systems.

#### **Venue**

Haus der Wissenschaft

Sandstraße 4/5

28195 Bremen

Phone: +49-421-21 86 95 00

Web:

<http://www.hausderwissenschaft.de/English.shtml>

## Accepted Students

1.	Tanja	Stratmann	Aarhus University, Denmark	Master student	projects in the arctic realm; Master Thesis(Aarhus) on degradation of dissolved organic matter in deep sea Bachelor Biology (Bremen)
2.	Anna	Vesman	Arctic and Antarctic Research Institute, St. Petersburg, Russia	Junior Scientist	since 2008 at St-Petersburg University, degree in oceanography 2013 Several trainee jobs and scientific cruises in Russian Arctic sea
3.	Ilona	Kemp	University of Alaska, Fairbanks	PhD Student	anthropology dep. Uni Alaska Fairbanks Studies on fisheries and climate change in Alaska
4.	Ima	Kusumanti	Uni Bremen	Master student	Inter. Study in aquatic tropical ecology (Bremen) Bachelor in Fisheries Science (Indonesia) several trainings in marine science (Ind./Vietnam) ruises with Uthörn and Polarstern
5.	Stefan	Königstein	Uni Bremen	PhD Student	Student in BIOACID phase II (impacts of ocean acidification and warming on ecosystem services, Bremen) Bachelor in Environmental Engineering
6.	Nathanael	Melia	University of Reading, Dep. Meteorology	PhD Student	Meteorology, University of Reading PhD on 'Predicting the opening of Arctic Sea Routes' she wants to broaden her knowledge in economic sector
7.	Oziel	Laurent	Laboratoire LOCEAN-IPSL	PhD Student	Master in physical and chemical Oceanography, Toulouse Since 2012 PhD on hydrologic climate changes in the Barents Sea, funded by ACCESS much interested in interdisciplinary work group
8.	Hörner	Tanja	AWI	PhD Student	Bachelor of Sciences Geosciences, Uni Bremen PhD at AWI: Late quaternary variability of sea ice cover
10.	Koenig	Zoe	Laboratoire LOCEAN-IPSL	Student	Second year of Master's degree Ocean, Atmosphere, Climate and Satellite observations, degree in physics, Paris, research training in LOCEAN laboratory, Paris and in Scripps, Institute of Oceanography, San Diego
11.	d'Armengol	Laia	Stockholm Resilience Center, Uni Stockholm	Master Student	Bachelor degree in Environmental Science (Barcelona), Master Programme in Environment (Girona) Master Programme in Social-Ecological Resilience for Sustainable Development, Stockholm University. Master thesis: Social diversity for ecosystem management in La Palma Biosphere Reserve

12.	Suslova	Anna	TERI University (India)	Master Student	Since 2012 Master Student in Climate Science and Policy, India Degree in Economics At North Eastern University, Yakutsk, Russia Internship at Woods Hole on 'The Polaris Project' and at the Asia Institute, South Korea on 'Research Paper on Impact on Eco-Cities'
13.	Loy	Daniel	University of Hull, Scarborough	Master Student (?)	Bachelor of Science Coastal Marine Biology
14.	Hoffmann	Katy	AWI	PhD Student	Bachelor for Molecular Biotechnology (Munich) Master for Molecular Biotechnology Since 2013 PhD candidate at Max Planck, Bremen and HGF MPG Joint Res. Group for deep sea ecology and technol.
15.	Hartl	Lea	Institute of Geography, Innsbruck	PhD Student	degree in Meteorology on changes at a tyrolean glacier working on obtaining better understanding of mass and energy balance of rock glacier interested in cross sectoral aspects of summer school and to learn more about climate research
16.	Koresheva	Olga	University St. Petersburg	PhD Student	Geography and Geoecology, deep interest in nordic landscapes and paleoclimate. Scientific work on quaternary climate change in Siberia. Plans to make her doctor's degree this year.
17.	Oberle	Ferdinand	MARUM/GLOMAR	PhD Student	PhD project on 'Quantifying the long-term anthropogenic and natural effects of sediment resuspension in a mudbelt environment'.
18.	Jónsdóttir	Ingibjörg	Institute of Earth Sciences, Uni Iceland	Associate Professor	Gives courses on remote sensing, cartography and historical geography. Focus on sea ice in Greenland Sea. Jointed an expedition on Chinese ice breaker in the Arctic last year.
19.	Engels	Jessica	Max Planck Research School for Earth System Modelling	PhD Student	Master in Meteorology at Max Planck in Hamburg. Studies about deforestation fire carbon emissions over the last millenium. PhD thesis on changes in albedo following boreal forest fires including changes caused by deposition of black carbon aerosols on snow following a fire.
20.	Tetzlaff	Amelie	Alfred-Wegener Institute	PhD Student	Meteorologist with special interest in boundary layer processes, atmosphere/sea ice interaction
21.	Van Pelt	Thomas	North Pacific Research Board	Project Manager	Manager for a large ecosystem-scale, integrated research project in the Bering Sea. Main interest marine ecology.