



Rapport fra Antarktisseminaret

7.-8. mai 2018
Tromsø, Norge



Rapporten er sammenstilt av Christine Daae Olseng og Marie Eide (Norges Forskningsråd), og Christina A. Pedersen og Birgit Njåstad (Norsk Polarinstitutt).
Tromsø, 6. juni 2018

Innledning

I 2016 ble det første tematisk brede nasjonale forskningsseminaret om Antarktis i Norge avholdt. Seminaret var en stor suksess og viste at det er et behov for å skape en møteplass for det norske antarktiskforskingsmiljøet. Det var dermed ikke et vanskelig valg å legge til rette for et nytt nasjonalt antarktisseminar i 2018, med et ønske om å gjøre dette til en tradisjon.

Også i 2018 stod Norges Forskningsråd og Norsk Polarinstitutt sammen om arrangementet, som fant sted i Tromsø 7.-8. mai. Seminaret hadde samme målsetninger som i 2016 om på lik linje med det forrige seminaret å være:

- møteplass for norske antarktiskforskere innenfor hele det vitenskapelige spekteret (natur, samfunn, historie, statsvitenskap, mv.)
- arena for formidling av pågående antarktiskforskningsprosjekter
- arena for formidling av rammer for norsk antarktiskforskning
- tankesmie for utvikling av nye idéer og strategier knyttet til tverrfaglig antarktiskforskning

Rundt 80 representanter for norske forskningsmiljøer, næring og myndigheter deltok på arrangementet. Se deltakerlisten i vedlegg.

Presentasjonene ga en bred oversikt over og innsikt i norsk forskningsaktivitet i og om Antarktis. Programmet ble innledet med en overordnet del som belyste både forvaltningens kunnskaps- og forskningsfaglige behov og problemstillinger aktuelt for Antarktis. Det var i denne sammenheng spesielt gledelig å ha presidenten for SCAR, Steven Chown, tilstede for å sette den norske antarktiskforskningen i et internasjonalt perspektiv. Et mål med seminaret er å formidle resultater fra pågående prosjekter finansiert hovedsakelig gjennom NARE eller Forskningsrådet. Prosjektene er i ulike faser. I første del av det faglige programmet ble prosjekter som er midt i eller i avslutningsfase presentert, mens andre del inneholdt kortere presentasjoner som ga et blikk inn i nylig påstartede prosjekter. Også denne gang ble det satt av tid til presentasjoner som viste til en rekke muligheter og begrensninger knyttet til forskning i Antarktis i sesjonen *Verktøykasse*, inkludert en presentasjon av det nye isgående forskningsfartøyet Kronprins Haakon. I løpet av seminaret informerte både NP og HI også om planlagte tokt januar/februar 2019 med RV Kronprins Haakon. I tillegg til vanlig postersesjon, ble alle posteransvarlige gitt mulighet til å promotere sin poster i en ett-minuttspresentasjon før mingletid rundt posterene.

Alle presentasjonene er tilgjengelige fra den norske [SCAR-nettsiden](#) og [Polarforskningsprogrammets](#) nettside.

På seminarets første dag ble det også gjennomført tre parallelle tankesmier for å diskutere ulike aspekter ved ulike fagfelt i norsk antarktiskforskning. Deltakerne fordelte seg i tre grupper med hver sine målsetninger:

- **Gruppe 1: The Open Ocean and ocean-shelf interactions:** Denne gruppen diskuterte forskningsproblemstillinger og –behov, på tvers av fagfelt og disipliner, relevant for den atlantiske delen av Sørishavet, et område av særlig interesse for Norge. Målsetningen var blant annet å utforske hvilken forskning og overvåking er påkrevd for å øke den vitenskapelige kunnskapen for dette området, blant annet for å ivareta behov knyttet til de pågående forvaltningsmessige og politiske prosessene i dette området.

- **Gruppe 2: Inland Antarctica:** I denne arbeidsgruppa diskuterte man forskningsspørsmål og prioriteringer for det antarktiske innlandet rundt temaene geologi, glasiologi, klima og atmosfære/ionosfære, med hovedfokus på Dronning Maud Land og muligheter for tverrfaglig samarbeid. Målsetning var å i) oppsummere pågående og planlagte forskningsaktiviteter, ii) prioritere de viktigste forskningsspørsmålene i hvert fagfelt, iii) identifisere tverrfaglige koblinger mellom forskningsspørsmål og feltlokaliteter og iv) diskutere samarbeid og ressurser som trengs for å løse våre forskningsutfordringer.
- **Gruppe 3: Antarctica and Society:** I denne gruppen var målsetningen å utforske og diskutere hva som skal til for å gjøre Norge til en tydelig og strategisk forskningsnasjon på de ikke-naturvitenskapelige områdene. Norge har i dag, slik det fremstår, ikke en omfattende forskningsinnsats på de ikke-naturvitenskapelige områdene knyttet til Antarktis, og det ligger ingen klar strategi og prioritering til grunn som føring for fagmiljøene. Gjennom diskusjon i tankesmien var det et ønske å få grunnlag for å utvikle anbefalinger – grep og mekanismer – til Antarktismyndigheter og –finansierer.

En kort rapport fra hver gruppe er gitt på de neste sidene.



Deltagerne fra Antarktissemnaret samlet i Lysgården i Framsentret. Foto: Ann-Kristin Balto, NP.

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Program

Mandag 7. mai		
Registrering og lett lunch fra kl 10:30		
Velkommen og formål 11:15-11:30		
	Velkommen	Ole Arve Misund, Norsk Polarinstittutt
	Velkommen	Rune Vistad, Forskningsrådet
Nøkkelinledninger 11:30-13:00		
Chair: Nalan Koc		
11:30-11:50	Antarktismeldingen i et historisk perspektiv	Harald Dag Jølle, Norsk Polarinstittutt
11:50-12:05	Norges interesser og kunnskapsbehov	Svein Tore Halvorsen, Klima og – miljødepartementet
12:05-12:15	Status for norsk Antarktisforskning	Rune Vistad, Forskningsrådet
12:15-12:45	Choosing our Future - Antarctic Science in a Global Setting	Steven L. Chown Monash University, Australia; Scientific Committee on Antarctic Research
Kaffe og benstrekk 12:45-13:00		
Felles innledninger til tankesmier 13:00-13:45		
Chair: Birgit Njåstad		
13:00-13:15	Kronprins Haakon – oversikt over muligheter	Øystein Mikkelsen, Norsk Polarinstittutt
13:15-13:35	Presentasjon av KPH Sørishavstokt	Harald Steen, Norsk Polarinstittutt og Bjørn Krafft, Havforskningsinstituttet
13:35-13:45	Innledninger tankesmiene	Birgit Njåstad, Norsk Polarinstittutt
Kort pause med kaffe og kake 13:45 – 14:00		
Tankesmie – parallelle sesjoner 14:00-15:50		
14:00-15:50	Arbeidsgrupper: 1) Open Ocean og marine-coastal interaction. Chairs: Harald Steen og Laura De Steur, Norsk Polarinstittutt 2) Inland Antarctica. Chair: Geir Moholdt, Norsk Polarinstittutt	

	3) Antarctica and society. Chairs: Birgit Njåstad, Norsk Polarinstitut og Christine Daae Olseng, Forskningsrådet	
Verktøyskasse 15:50 – 16:40		
Chair: Christine D. Olseng		
15:50-16:05	My Science and SCAR	Steven L. Chown Monash University, Australia; Scientific Committee on Antarctic Research
16:05-16:20	Karttjenester	Yngve Melvær, Norsk Polarinstitut
16:20-16:25	Nyheter i Quantarctica	Kenichi Matsuoka, Norsk Polarinstitut
16:25-16:35	Ny infrastruktur Troll og omeng – felles nasjonal søknad til Forskningsrådets infrastrukturutlysning	Nalan Koc, Norsk Polarinstitut
Posterpresentasjoner 16:35-17:05		
Chair: Christina A. Pedersen		
	Posterintroduksjon, 1 min-1 slide per poster	
POSTERMINGLING med øl/hvitvin og snacks 17:05-18:30		
Middag 19:00->: Fiskekompaniet, Killengrens gate		

Tirsdag 8. mai		
Nye funn fra pågående Antarktisprosjekter 09:00-10:30		
Chair: Thor Aleksander Klevjer		
09:00-09:15	Highlights from the latest research and monitoring activities at the Trollhaugen Observatory	Wenke Aas, Norsk Institutt for Luftforskning
09:15-09:30	Contaminants in Antarctic and Arctic avian wildlife: Climatic and ecological drivers, comparative polar perspective, and effects	Katrine Borgå, Universitetet i Oslo
09:30-09:45	Response of Antarctic seabirds to a changing environment: linking oceanographic conditions, foraging behaviour and demography in the Antarctic petrel	Sebastian Descamps, Norsk Polarinstitut
09:45-10:00	"Looking through a glass darkly": filling in the gaps of an Ecosystem Based Management strategy for the west Antarctic peninsula.	Andrew Lowther, Norsk Polarinstitut
10:00-10:15	Understanding and predicting size selectivity and escape mortality in commercial zooplankton fisheries: case study on Antarctic krill	Bjørn Krafft, Havforskningsinstituttet
10:15-10:30	Legal frameworks for bioprospecting and bioinnovation in Polar Regions.	Tore Henriksen, UiT -Norges Arktiske Universitet
Kaffepause 10:30-11:00		
Nye funn fra pågående Antarktisprosjekter II 11:00-12:30		
Chair: Wojciech J. Miloch		
11:00-11:15	The annual variability of living benthic foraminifera in the Amundsen Sea Embayment, western Antarctica	Patrycja E. Jernas, UiT -Norges Arktiske Universitet

11:15-11:30	Ice shelves in a warming world: The Filchner-Ronne Ice Shelf system	Svein Østerhus, Uni Research
11:30-11:45	Linkages between Antarctic and tropical climate change through the global atmospheric circulation	Thomas Toniazzo, Uni Research
11:45-12:00	Mass balance of the Antarctic ice sheet from remote sensing	Geir Moholdt, Norsk Polarinstitut
12:00-12:15	Changing coastal Dronning Maud Land	Kenichi Matsuoka, Norsk Polarinstitut
12:15-12:30	Preliminary reconstruction of ice sheet surface variations since the Pliocene in Dronning Maud Land, East Antarctica	Hans Ola Fredin, Norges Geologiske Undersøkelse
Ta fellesbilde av alle deltagerne		
LUNSJ POLARIA 12:30-13:30		
Verktøykasse fortsetter 13:30-14:00		
13:30-14:00	Steg-for-steg guide for feltarbeid i Antarktis	Birgit Njåstad, Norsk Polarinstitut
Korte presentasjoner av nye prosjekter 14:00-14:35		
Chair: Elisabeth Isaksson		
14:00-14:07	Antarctic ionospheric and space weather research at Troll station	Wojciech J. Miloch, Universitetet i Oslo
14:07-14:14	From swarming behaviour to trophic interactions: forecasting dynamics of Antarctic krill in ecosystem hotspots using behaviour-based models	Thor Aleksander Klevjer, Havforskningsinstituttet
14:14-14:21	Topographic barriers controlling warm water inflow and Antarctic ice shelf melting	Elin Darelus, Universitetet i Bergen
14:21-14:28	Political Philosophy Looks to Antarctica: Sovereignty, Resource Rights and Legitimacy in the Antarctic Treaty System	Maria Alejandra Mancilla, Universitetet i Oslo
14:28-14:35	Past behaviour of the Southern Ocean`s atmosphere and cryosphere	Jostein Bakke, Universitetet i Bergen
Kaffe 14:35-14:55		
Tankesmie presentasjoner og diskusjon 14:55-15:40		
Chair: Nalan Koc		
14:55-15:10	Oppsummering fra arbeidsgruppe 1 (5 min), kommentarer fra salen	Harald Steen og Laura De Steur, Norsk Polarinstitut
15:10-15:25	Oppsummering fra arbeidsgruppe 2 (5 min), kommentarer fra salen	Geir Moholdt, Norsk Polarinstitut
15:25-15:40	Oppsummering fra arbeidsgruppe 3 (5 min), kommentarer fra salen	Birgit Njåstad, Norsk Polarinstitut og Christine Daae Olseng, Forskningsrådet
Avslutning 15:40-15:55		
15:40-15:55	Framtidsvisjoner	Ole Arve Misund, Norsk Polarinstitut

Deltagerliste

Etternavn	Fornavn	Institusjon	E-post
Aas	Wenche	NILU	waa@nilu.no
Abu-Alam	Tamer	Norsk Polarinstitutt	tamer@npolar.no
Bakke	Jostein	Universitetet i Bergen	Jostein.Bakke@uib.no
Berthinussen	Ingrid	Norsk Polarinstitutt	ingrid.berthinussen@npolar.no
Borgå	Katrine	Universitetet i Oslo	katrine.borga@ibv.uio.no
Brannfjell	Rita	Norsk Polarinstitutt	rita.brannfjell@npolar.no
Brekke	Harald	Oljedirektoratet	harald.brekke@npd.no
Carlsson	Pernilla	NIVA	pca@niva.no
Chown	Steven L.	Monash University / SCAR	Steven.Chown@monash.edu
Cleary	Alison	Norsk Polarinstitutt	alison.cleary@npolar.no
Darelius	Elin	Universitetet i Bergen	elin@gfi.uib.no
De Lucia	Vito	K.G. Jebsen-senter for havrett, UiT	vito.delucia@uit.no
de Steur	Laura	Norsk Polarinstitutt	desteur@npolar.no
Descamps	Sébastien	Norsk Polarinstitutt	sebastien.descamps@npolar.no
Domaas	Christel	Polarmuseet	christel.m.domaas@uit.no
Donehue	Julie	UiT / University of Tasmania	jdo007@post.uit.no
Eide	Marie	Norges forskningsråd	mei@forskningsradet.no
Elvevold	Synnøve	Norsk Polarinstitutt	elvevold@npolar.no
Engvik	Ane K.	Norges geologiske undersøkelse	ane.engvik@ngu.no
Falk-Petersen	Stig	Akvaplan-niva / UiT	sfp@akvaplan.niva.no
Forwick	Matthias	UiT - Norges arktiske universitet	Matthias.Forwick@uit.no
Fredin	Ola	Norges Geologiske Undersøkelse	ola.fredin@ngu.no
Gerland	Sebastian	Norsk Polarinstitutt	gerland@npolar.no
Goodwin	Harvey	Norsk Polarinstitutt	harvey@npolar.no
Halvorsen	Svein Tore	Klima- og miljødepartementet	sth@ld.dep.no
Henaug	Cathrine	Norsk Institutt for Naturforskning	cathrine.henaug@nina.no
Henriksen	Tore	K.G. Jebsen-senter for havrett, UiT	tore.henriksen@uit.no
Hestem	Magne	NMBU (student)	mhestem@online.no
Hop	Haakon	Norsk Polarinstitutt	Haakon.Hop@npolar.no
Isaksson	Elisabeth	Norsk Polarinstitutt	elisabeth.isaksson@npolar.no
Jernas	Patrycja	UiT - Norges arktiske universitet	patrycja.e.jernas@uit.no
Jølle	Harald Dag	Norsk Polarinstitutt	harald.dag.jolle@npolar.no
Klevjer	Thor	Havforskningsinstituttet	thor.klevjer@hi.no
Koc	Nalan	Norsk Polarinstitutt	naln.koc@npolar.no

Kovacs	Kit	Norsk Polarinstitut	kit.kovacs@npolar.no
Krafft	Bjørn A.	Havforskningsinstituttet	bjorn.krafft@imr.no
Laberg	Jan Sverre	UiT - Norges arktiske universitet	jan.laberg@uit.no
Lauknes	Tom Rune	Norut	tom.rune.lauknes@norut.no
Lindbäck	Katrin	Norsk Polarinstitut	katrin.lindback@npolar.no
Lowther	Andrew	Norsk Polarinstitut	andrew.lowther@npolar.no
Mancilla	Alejandra	Universitetet i Oslo	alejandra.mancilla@ifikk.uio.no
Matsuoka	Kenny	Norsk Polarinstitut	matsuoka@npolar.no
Melvær	Yngve	Norsk Polarinstitut	yngve.melvar@npolar.no
Mikelborg	Øystein	Norsk Polarinstitut	oystein.mikelborg@npolar.no
Miloch	Wojciech	Universitetet i Oslo	w.j.miloch@fys.uio.no
Misund	Ole Arve	Norsk Polarinstitut	ole.arve.misund@npolar.no
Moholdt	Geir	Norsk Polarinstitut	moholdt@npolar.no
Myhre	Per Inge	Norsk Polarinstitut	myhre@npolar.no
Ndungu	Kuria	NIVA	knd@niva.no
Njaastad	Birgit	Norsk Polarinstitut	njaastad@npolar.no
Oldham	Paul	UNN	
Olseng	Christine Daae	Norges forskningsråd	cdo@rcn.no
Orme	Lisa	Norsk Polarinstitut	lisa.orme@npolar.no
Paulsen	Steinar	UiT - Norges arktiske universitet	steinar.paulsen@uit.no
Pedersen	Christina A.	Norsk Polarinstitut	xtina@npolar.no
Rautenberger	Ralf	NIBIO	ralf.rautenberger@nibio.no
Renner	Angelika	Havforskningsinstituttet	angelika.renner@hi.no
Rosendal	Kristin	Fridtjof Nansens Institutt	kristin.rosendal@fni.no
Rydningen	Tom Arne	UiT - Norges arktiske universitet	tom.a.rydningen@uit.no
Sandstå	Nils Rune	Oljedirektoratet	nils.sandsta@npd.no
Schweitzer	Johannes	NORSAR	johannes@norsar.no
Steen	Harald	Norsk Polarinstitut	steen@npolar.no
Stokke	Øyvind	UiT - Norges arktiske universitet	oyvind.stokke@uit.no
Storhaug	Ingrid Halsebø	Norsk Polarinstitut	ingrid@npolar.no
Storvold	Rune	Norut	rune.storvold@norut.no
Tarroux	Arnaud	Norsk Institutt for Naturforskning	arnaud.tarroux@nina.no
Toniazzo	Thomas	Uni Res. Klima, Bjerknæssenteret	thomas.toniazzo@uni.no
Tronstad	Stein	Norsk polarinstitut	tronstad@npolar.no
Tvedt	Morten Walløe	Fridtjof Nansens Institutt	mwt@fni.no
van Oostveen	Jelte	NP / Universitetet i Oslo	jelte.van.oostveen@npolar.no
Vistad	Rune	Norges forskningsråd	rvi@forskningsradet.no
Wegge	Njord	NUPI	njordw@nupi.no

Yoccoz	Nigel	UiT - Norges arktiske universitet	nigel.yoccoz@uit.no
Østerhus	svein	Uni Res. Klima, Bjerknessenteret	svein.osterhus@uni.no
Øvergård	Renate Alsen	Norsk Polarinstitut	renate.alsen.overgard@npolar.no

Innretning tankesmier Antarktisseminar 7. mai 2018

Tankesmiene er ment å være en arena for strategiske diskusjoner som på sikt kan bidra til videre fokus og innretning på norsk antarktiskforskingsinnsats, samtidig som de gir en anledning for faggrupper å ha relevante diskusjoner og utvekslinger knyttet til forskning i Antarktis.

Vi ønsker at det skrives et kort referat fra diskusjonene, og at hovedpunktene i disse presenteres i plenum for åpen diskusjon på slutten av seminaret.

Gruppe 1: The Open Ocean and ocean-shelf interactions

Chair: Harald Steen (NP) og Laura De Steur (NP)

The southern ocean is large with an almost unlimited number of open questions and a rather high monetary price to answer them. Taking this in to consideration we need to limit our focus to certain areas and research problems. Economically Norway has interest in the area around the Antarctic peninsula, politically the Weddell Gyre and Dronning Maud Land, and scientifically many knowledge and data gaps still exist along the coast from the peninsula to the Gunnerus ridge. Hence we should focus our discussion on research questions and needs in the Atlantic sector of the Southern Ocean.

From a management perspective it is important to assess to what extent the Weddell Gyre connects higher latitudes with the lower ones, via currents and upwelling, and shapes the ecosystem through nutrients for phytoplankton and hence krill and their predators. The large frontal zones in the northern end of Weddell Gyre are of specific interest for biological activity, while knowledge of the processes and coupling in the coastal zone are less well known. Vital to understand the effects of the physical forcing on the ecosystem is knowledge of foraging areas for top predators like whales, seabirds and seals and their prey. Coupling of physics with biogeochemical processes in e.g. ocean-ice sheet interactions, sea ice freezing and melting processes, signal propagation, subannual to interannual variability and frontal instabilities are themes that deserve attention. In future climate scenario's, heat and carbon uptake in the Weddel Gyre are large and it is unclear how the ocean, biogeochemistry and ecosystems will respond to that, stressing the need for increased process understanding as well as long-term monitoring of key variables.

During the discussion we will explore what science and monitoring can be done and needs to be prioritized in order to increase the scientific knowledge of Norway while at the same time feeding the management and political processes with vital information for their decisions.

We aim at starting out as one group and then see if we need to split into two groups where one talks about the open ocean and the other ocean-shelf interactions.

Gruppe 2: Inland Antarctica

Chair: Geir Moholdt (NP)

I denne arbeidsgruppa vil vi diskutere forskningsspørsmål og prioriteringer for det antarktiske innlandet. Vi ser for oss en åpen diskusjon rundt temaene geologi, glasiologi, klima og atmosfære/ionosfære, med hovedfokus på Dronning Maud Land og muligheter for tverrfaglig samarbeid. Gjennom tankesmien ønsker vi å:

- oppsummere pågående og planlagte forskningsaktiviteter
- prioritere de viktigste forskningsspørsmålene i hvert fagfelt
- identifisere tverrfaglige koblinger mellom forskningsspørsmål og feltlokaliteter
- diskutere samarbeid og ressurser som trengs for å løse våre forskningsutfordringer

Gruppe 3 Antarctica and Society

Chair: Birgit Njåstad (NP) og Christine Daae Olseng (NFR)

I denne gruppen skal vi utforske og vurdere hva som skal til for å gjøre Norge til en tydelig og strategisk forskningsnasjon på de ikke-naturvitenskapelige områdene. Norge har i dag, slik det fremstår, ikke en omfattende forskningsinnsats på de ikke-naturvitenskapelige områdene knyttet til Antarktis, og det ligger ingen klar strategi og prioritering til grunn som føring for fagmiljøene. Gjennom diskusjon i tankesmien er det et ønske å få grunnlag for å utvikle anbefalinger – grep og mekanismer – til Antarktismyndigheter og –finansierer. Vi ønsker at gruppens deltakere forbereder seg på følgende problemstillinger:

1. Hva er de store forskningsspørsmålene i Antarktis innen ditt fagområde?
2. Hvordan plasserer Norge seg i dette bildet?
3. Har Norge potensialet til å ta en tydelig og faglig sterk rolle her? Hva skal til, inkludert hindringer?
4. Hvem er de sterke internasjonale aktørene?
5. Hvilke fagfelt er relevante å se til for tverrfaglig samarbeid?

Oppsummering fra tankesmiene

Tankesmie 1: The Open Ocean and ocean-shelf interaction

Chair: Harald Steen (NP) og Laura de Steur (NP)

Goal: to identify key questions that can feed into the process of defining future Norwegian research projects in the Southern Ocean

Participants

Katrine Borgå (Universitetet i Oslo), Pernilla Carlsson (NIVA), Steven L. Chown (Monash University / SCAR), Alison Cleary (Norsk Polarinstittutt), Elin Darelius (Universitetet i Bergen), Laura de Steur (Norsk Polarinstittutt), Sébastien Descamps (Norsk Polarinstittutt), Julie Donehue (UiT / University of Tasmania), Stig Falk-Petersen (Akvaplan-niva / UiT), Sebastian Gerland (Norsk Polarinstittutt), Haakon Hop (Norsk Polarinstittutt), Thor Klevjer (Havforskningsinstituttet), Kit Kovacs (Norsk Polarinstittutt), Bjørn A. Krafft (Havforskningsinstituttet), Jan Sverre Laberg (UiT - Norges arktiske universitet), Andrew Lowther (Norsk Polarinstittutt), Kuria Ndungu (NIVA), Lisa Orme (Norsk Polarinstittutt), Ralf Rautenberger (NIBIO), Angelika Renner (Havforskningsinstituttet), Tom Arne Rydningen (UiT - Norges arktiske universitet), Harald Steen (Norsk Polarinstittutt), Arnaud Tarroux (Norsk Institutt for Naturforskning), Svein Østerhus (Uni Res. Klima, Bjerknæssenteret)

Background given to the group

The southern ocean is large with an almost unlimited number of open questions and a rather high monetary price to answer them. Taking this in to consideration, we need to limit our focus to certain areas and research problems. Economically Norway has interest in the area around the Antarctic Peninsula, politically the Weddell Gyre and Dronning Maud Land, and scientifically many knowledge and data gaps still exist along the coast from the peninsula to the Gunnerus ridge. Hence, we should focus our discussion on research questions and needs in the Atlantic sector of the Southern Ocean.

From a management perspective it is important to assess to what extent the Weddell Gyre connects higher latitudes with the lower ones, via currents and upwelling, and shapes the ecosystem through nutrients for phytoplankton and hence krill and their predators. The large frontal zones in the northern end of Weddell Gyre are of specific interest for biological activity, while knowledge of the processes and coupling in the coastal zone are less well known. Vital to understand the effects of the physical forcing on the ecosystem is knowledge of foraging areas for top predators like whales, seabirds and seals and their prey. Coupling of physics with biogeochemical processes in e.g. ocean-ice sheet interactions, sea ice freezing and melting processes, signal propagation, sub annual to inter annual variability and frontal instabilities are themes that deserve attention. In future climate scenario's, heat and carbon uptake in the Weddell Gyre are large and it is unclear how the ocean, biogeochemistry and ecosystems will respond to that, stressing the need for increased process understanding as well as long-term monitoring of key variables.

During the discussion we will explore what science and monitoring can be done and needs to be prioritized in order to increase the scientific knowledge of Norway while at the same time feeding the management and political processes with vital information for their decisions.

Process

To decide what topics to discuss we asked all the participants to write down on three pieces of paper three topics they think was interesting. We collected all notes and sorted them into groups of similar topics. The groups were hotspots, ocean shelf-interactions, climate of the past,

contaminants, and sea ice. Below is the summary of the discussions under the group heading given as bullet points.

Topics

“Hotspots” - Biophysical connectivity

Main question is the spatiotemporal distribution consistent areas of ecological significance, why they are where they are and how can they change. This will be done by identifying spatiotemporally drivers of primary productivity and how this shape the ecosystem. To increase the temporal footprint of a cruise we must equip existing platforms with state of the art technologies, increase the use of autonomous devices.

Other detailed questions are:

- A related question is krill swarms and mesopelagic coupling.
- How dependent is the Southern ocean ecosystem on krill? Krill is often portayed as the driver of the ecosystem in the Southern ocean. We do not doubt krill is important but are curious on how this dependency vary geographically.
- Impacts on predators – direct and indirect effects (fishing v climate change), multiple stressors and the knock-on effects of community / guild structural change. Spatiotemporal heterogeneity of guild species

Ocean-Ice Shelf Interactions

The main question is, what are the dominant environmental variables and oceanic drivers responsible for increased ice shelf mass loss in the future under a warming climate? And, what are the consequences of a warming climate for the coupled biogeophysical ocean and sea-ice processes in the coastal zone, for example, of enhanced freshwater input and changes in biogeochemical composition?

Closely related questions and urgent needs are:

- What does the near-shore bathymetry of DML look like and how may that impact the speed of ice-shelf break up? There is a need to get detailed bathymetry along the continental shelf break, coast and ice-shelves in DML.
- How to develop sustainable, continuous time series of hydrographic properties and currents at fixed locations? Funding through short-term projects typically cannot provide that.
- Which processes cause variability of the Antarctic Slope Front and coastal current (that deliver warm water to the ice-shelf cavities) and how are those expected to change in the future?
- How and where to best collect oceanographic data to be able to link signals (e.g temperature propagation and anomalies) on larger spatial scales?
- How to optimize existing platforms (ships, trawlers, buoys, floats) with more sensors to expand data collection, and best use/implement emerging new technology?

Climate of the past

Main question is what was the position of the East Antarctic Ice Sheet during the Last Glacial Maximum and what triggered its withdrawal to its present position?

Contaminants

Main question is to get an overview over contaminant levels and find out how they get to the continent.

Other detailed questions might be

- What is the role and impact of migrating species?

- Are these species a vector of pollutants in or out of Antarctica?
- Environmental pollution levels, time trends (are concentrations increasing or decreasing before/after legislations?) and impact as stressors on the ecosystem.

Sea Ice

Main question is how will the Weddell Sea / DML sea ice be developing in the next decades, what are the main forcing, mechanisms, and consequences.

Other detailed questions might be

- How important is freezing ice for iron availability for the spring bloom?

Tankesmie 2: Antarktis innland

Chair: Geir Moholdt, Norsk Polarinstitutt

Deltakere: Geir Moholdt (Norsk Polarinstitutt), Wenche Aas (Norsk institutt for luftforskning), Ane K. Engvik (Norges geologiske undersøkelse), Ola Fredin (Norges geologiske Undersøkelse), Johannes Schweitzer (NORSAR), Tamer Abu-Alam (Norsk Polarinstitutt), Synnøve Elvevold (Norsk Polarinstitutt), Kenny Matsuoka (Norsk Polarinstitutt), Katrin Lindbäck (Norsk Polarinstitutt), Richard Ashley Morris (Norsk Polarinstitutt), Per Inge Myhre (Norsk Polarinstitutt), Christina A. Pedersen (Norsk polarinstitutt), Rune Storvold (Norut), Jostein Bakke (Universitetet i Bergen), Thomas Toniazzo (Uni Research Klima, Bjerknessenteret), Wojciech Miloch (Universitetet i Oslo), Harvey Goodwin (Norsk Polarinstitutt)

Bakgrunn

I denne arbeidsgruppa diskuterte vi forskningsspørsmål og prioriteringer for det antarktiske innlandet rundt temaene geologi, glasiologi, klima og atmosfære/ionosfære, med hovedfokus på Dronning Maud Land og muligheter for tverrfaglig samarbeid. Målene for tankesmien var å:

- oppsummere pågående og planlagte forskningsaktiviteter
- prioritere de viktigste forskningsspørsmålene i hvert fagfelt
- identifisere tverrfaglige koblinger mellom forskningsspørsmål og feltlokalteter
- diskutere samarbeid og ressurser som trengs for å løse våre forskningsutfordringer

Prosess

Etter en innledende presentasjonsrunde rundt bordet snevret vi oss inn på tre hovedtema/områder for interne gruppediskusjoner, henholdsvis (1) Troll, (2) klima og innlandsis, og (3) Geologi. Til slutt oppsummerte vi gruppevis og diskuterte videre i plenum. Hovedelementene fra disse diskusjonene er gjengitt nedenfor og ble presentert for alle på fellesdelen av seminaret dagen etter.

Felles oppsummering av pågående og planlagte/ønskede feltbaserte prosjekter

- MADICE: glasiologi/klima, Maitri/Novo og isbremmen Nivlisen (samarbeid med India)
- Oldest Ice – Beyond Epica: Dome Fuji på innlandsplatået av DML (samarbeid med Japan)
- Fimbulisen isbrem: oseanografi og glasiologi (rigger med måleinstrument under isen)
- Troll: atmosfære/forurensing observatorium (NILU), ionosfærisk observatorium (UiO), array med seismologi og infralyd (NORSAR), planer om flere instrument
- Tor (Svarthammeren fugleovervåkning): potensial for seismometer og atmos./ionos. instr.
- MAGIC-DML: historisk klima og isutbredelse, nunataker i vestre DML, utvide lenger øst?
- NARE Geologi 2018: prøvetaking og kartlegging ved Troll, behov for oppfølging

- Kartlegging (NP): nye geologiske og topografiske kart
- Kerguelen Island (UiB): sedimentkjerner fra innsjø (samarbeid med Frankrike)
- Antarktishalvøya, dronekartlegging av pingviner (NORUT), potensial for felles infrastruktur

Gruppevis oppsummering (tema 1-3)

(1) Troll; prioriterte forskningsspørsmål og tverrfaglige koblinger:

- Lokale data i en global kontekst; koblinger mellom troposfære, ionosfære, stratosfære og seismologi
- Sammenligning mot andre stasjoner og potensielle tvilling-instrumenter på Tor
- Interaksjoner mellom hav, is og troposfære
- Seismologisk array og bærbare system for feltkampanjer (potensiell infrastruktur)

(2) Klima og innlandsis; prioriterte forskningsspørsmål og tverrfaglige koblinger:

- Gruppens forskning skjer på mange forskjellige tidsskalaer, men alle omfatter atmosfærisk fuktighetstilførsel og nedbør/snøakkumulasjon
- Observasjoner av energibalanse/meteorologi vs. klimamodeller
- Historiske og framtidige endringer i orografisk nedbør
- Klimatiske "teleconnections" mellom nord og sør
- Glasioisostatisk landheving (for rekonstruksjoner og satellittgravimetri)
- Isdynamikk (respons på endringer i klima og hav)

(3) Geologi; prioriterte forskningsspørsmål og tverrfaglige koblinger:

- Behov for et godt geologisk og geofysisk kartgrunnlag
- Storskala tektonikk for å forstå oppbygningen og utviklingen av Dronning Maud Land, inkludert strukturgeologi, geokronologi, petrologi
- Utarbeidelse av geodynamisk modell
- Kombinere geofysikk og geologi for å løse skorpestruktur og utvikling
- Hva befinner seg under isen? Geofysiske studier av sedimenter på kontinentalshelfen langs kysten; klassifikasjon av morenemateriale og løst materiale på land
- Hvor lenge har fjellene vært eksponert? (istykkelse/iserosjon og basement uplift) – Forvittringsprosesser; forvittringsmateriale; cosmogene nukleide isotoper; apatite fission track

Felles diskusjon av logistiske ressurser, behov og samarbeid:

- Begrenset logistisk kapasitet for feltarbeid utenfor nærområdet til Troll (det må investeres i egnede kjøretøy for å kunne støtte forskningstraverser og feltkampanjer i øvrige DML)
- Kostnader kan kuttes ved å samkjøre aktiviteter mellom ulike fagfelt og mellom andre nasjoner i DML (allerede samarbeid med Sør-Afrika, Tyskland, Sverige, India og Japan)
- Noe feltarbeid kan klare seg med enkle former for logistikk (eks. geologi), mens andre krever tyngre logistikk (eks. iskjerneboring)
- Behov for kompetanse på rekognosering av trasevalg og isforhold
- Helikopterstøtte nødvendige for enkelte studier (fra andre nasjoner?)
- Feltarbeid er i Antarktis er mye dyrere enn i Arktis, noe som gjør det vanskelig å konkurrere om forskningsmidler på like vilkår. Behov for tilleggsfinansiering av logistikk i Antarktis.

Tankesmie 3: Antarctica and Society

Chairs: Birgit Njåstad og Christine Daae Olseng

Deltakere: Birgit Njåstad (NP), Christine Daae Olseng (Forskningsrådet), Øyvind Stokke (UiT), Stein Tronstad (NP), Magne Hestem (NMBU), Tore Henriksen (UiT), Njård Wegge (NUPI), Morten Tvedt (FNI), Kristin Rosendal (FNI), Alejandra Mancilla (UiO), Christel Domaas (Polarmuseet).

Gruppens medlemmer dekket i stor grad fagområdene: filosofi, jus, statsvitenskap og historie.

Diskusjon

Gruppen hadde følgende overordnede problemstilling til vurdering: Hva skal til for å gjøre Norge til en tydelig og strategisk forskningsnasjon på de ikke-naturvitenskapelige områdene. Ønsker anbefalinger – grep og mekanismer – til Antarktismyndigheter og – finansierer.

Det var i utgangspunktet satt opp fem spørsmål til gruppen som utgangspunkt for diskusjonen. Det ble brukt mest tid på å diskutere punkt 1, men gruppen berørte også de øvrige problemstillingene.

1. Hva er de store forskningsspørsmålene i Antarktis innen ditt fagområde?
2. Hvordan plasserer Norge seg i dette bildet?
3. Har Norge potensialet til å ta en tydelig og faglig sterk rolle her? Hva skal til, inkludert hindringer?
4. Hvem er de sterke internasjonale aktørene?
5. Hvilke fagfelt er relevante å se til for tverrfaglig samarbeid?

Konklusjoner og anbefalinger

Det var enighet i gruppen at det er potensiale og kapasitet i det norske miljøet til å ta en faglig større rolle enn det vi har i dag. Med Norges særlige interesser i Antarktis er det viktig at Norge er tydelig og på banen. Utfordringen er i hovedsak knyttet til tilgangen på forskningsmidler. Gruppen indikerte at det er naturlig å se til og søke samarbeidspartnere fra de andre kravshaverlandene, i og med at det trolig kan være noe av de samme interessene som ligger til grunn for forskningsbehovene.

Av forskningsutfordringer som ble diskutert var knyttet til følgende tema:

- Samspillet mellom rettslige mekanismer og det vitenskapelige
- Regulering av tilgang til fellesskapets genetiske ressurser knyttet til bioprospektering
 - Hvordan multinasjonale selskaper kan påvirke statene? - selskapers rettigheter vs. plikter.
- Samspillet mellom de ulike konvensjonene slik som CCAMLR og UNCLOS knyttet til MPA
- Studier av ulike nasjoners bruk av forskning som virkemiddel for politikken – posisjonering gjennom etablering av stasjoner
- Begrepsavklaringer f.eks. bruk av ordet villmark
- Hvor robust er traktaten egentlig for nye og større utfordringer?
 - Det er ikke en klar autoritet. Mange utfordringer for forvaltningen framover: turisme, bioprospektering, nye stasjoner mv.
 - Foreslått stresstest av jussen – setter den inn i ulike scenarier

Under diskusjonen i gruppen kom det tydelig fram at forskningstemaene krysset flere fagdisipliner også naturvitenskapelige.

Gruppen oppfordret hverandre til videre samsnakk, utvikle prosjekter i lag og søke på hensiktsmessige arenaer.



Book of Abstract

Antarktisseminaret 7.-8. mai 2018
Tromsø, Norge



Denne *Book of Abstract* inneholder abstract til fagpresentasjonene i de to bolkene *Nye funn fra pågående Antarktisprosjekter* og *Korte presentasjoner av nye prosjekter*. Alle foredragsholderene i disse bolkene er invitert til å holde en presentasjon basert på pågående eller nylig avsluttede prosjekter finansiert av Forskningsrådet eller NARE. Utgangspunktet for *Book of Abstract* er abstract fra prosjektet. Foredragsholderne har fått mulighet til å oppdatere disse. I de tilfellene vi ikke har mottatt oppdatert abstract, er prosjekt abstract trykket her, og abstract er merket (*).

Presentation title: Highlights from the latest research and monitoring activities at the Trollhaugen Observatory

Institution: NILU

Speaker: Wenche Aas

Project title: Atmospheric Composition, Processes and Sources of Air Pollution in the Antarctic Environment

Abstract:

Climate change and environmental contaminants are, in addition to loss of biodiversity, the two key result areas on the environmental policy agenda in Norway. Polar regions are recognized as particularly vulnerable to global warming and accumulations of environmental contaminants, such as persistent organic pollutants (POPs), to surprisingly high levels. The existing knowledge base regarding relevant airborne pollutants and process understanding in polar regions are largely reflecting research in Arctic regions. It is not immediately obvious that existing paradigms regarding selected climate forcers (methane, aerosols) as well as organic contaminants (e.g. POPs) are equally relevant and applicable in an Antarctic context. It is therefore still a critical need to compare and contrast the occurrence, transport and behavior of selected airborne pollutants in the Arctic versus the Antarctic and to identify features, which merit further attention in Antarctic regions. Greatly facilitated by NILUs long-term atmospheric monitoring and research efforts at Troll, this project will target some of the critical research questions with respect to airborne pollutants in the Antarctic. Overarching goals are to improve the existing knowledge base, improve future monitoring strategies and to facilitate improved policy-oriented support relevant to the two key result areas. Facilitated by the diverse research expertise, will be to explore the utility of various cross-cutting tools and to apply these in a multi-pollutant and bi-polar context. This will include application of FLEXPART model and cluster analysis to identify major source regions of selected pollutants. NILU hosts monitoring stations in both polar regions facilitating comparable and consistent data, is in a unique position to carry out the proposed research. The results of AtmosCAir will disseminated widely through scholarly publications, popular science dissemination and to relevant policy makers

Presentation and project title: Contaminants in Antarctic and Arctic avian wildlife: Climatic and ecological drivers, comparative polar perspective, and effects*

Institution: UiO

Speaker: Katrine Borgå

Abstract:

The Arctic and Antarctica have proven to be final sinks for contaminants. Seabirds are common-used bioindicators for contaminants, but seabirds differ in both physiology and ecology, which in turn, may influence concentrations and potential effects of contaminants among species. As the Polar Regions are experiencing increased input of new contaminants, avian wildlife are experiencing increased environmental stress. In addition, climate change may also influence their exposure to contaminants (i.e. change in diet and released stored contaminants from melting sea ice) and susceptibility to individual and population level effects. The Polar Regions differ in contaminant levels and avian wildlife, moreover, the knowledge base differ; being large in the Arctic, but scarce in the Antarctica.

In this study we will analyse temporal trends of persistent organic pollutants (POPs) and Mercury (Hg) in the Antarctic King penguin (*Aptenodytes patagonicus*), and quantify the effect of direct and indirect climatic factors (temperature, long range transport of POPs and Hg, dietary changes) as well as species-specific ecological and physiological factors, such as diet and life history traits (age, sex) on the contaminant levels. We will compare current levels of legacy contaminants between resident and migratory Antarctic and Arctic seabirds (i.e. King penguin, Adèle penguin (*Pygoscelis adelia*), South polar skua (*Stercorarius maccormicki*), Black guillemot (*Cepphus grylle*) and Great Skua (*Stercorarius skua*)). We will also investigate potential population level effects of legacy POPs and Mercury, and coupling effects between contaminants and climatic changes in a King Penguin population.

*Prosjekt abstract

Presentation title: Response of Antarctic seabirds to a changing environment: Linking oceanographic conditions in the Southern Ocean to the foraging behavior and demography of Svarthamaren seabirds

Institution: NPI

Speaker: Sebastian Descamps

Project title: Seeing the trees and the forest: linking sea ice, foraging and demography at the individual and population level in an Antarctic seabird

Abstract:

Given the unprecedented rate of increase in multiple environmental stressors facing free-living populations, identifying the linkages between environmental variation and wildlife populations is of utmost importance. There is already strong evidence of rapid environmental changes in Antarctic marine ecosystems, but to understand their consequences on Antarctic wildlife is challenging. In case of top-predators, it requires understanding of the linkages between relevant environmental parameters, predator habitat use, diet and demography (survival, reproduction). Unravelling these relationships in Antarctic seabirds is the main objective of the *IceBird* project that took place at the Svarthamaren petrel colony, Dronning Maud Land. This colony is the largest known inland seabird colony on the Antarctic continent and constitutes a large portion of the world population of Antarctic petrels. Our work has shown that the demography of Antarctic petrels at Svarthamaren is tightly linked to large-scale oceanographic processes. More specifically, we found that the two main modes of large-scale climate variability in the Southern Ocean, the Antarctic Oscillation (AAO) and the El Niño-Southern Oscillation, explain most of the inter-annual variation in petrel survival and reproduction. Antarctic petrel reproduction is also affected by extreme events occurring inland, such as snow storms. Our project also looked at the contaminants in Svarthamaren seabirds and found that contaminants such as mercury are likely not a threat for the Antarctic petrel yet. They may however have detrimental effects on south polar skuas that have extremely high levels of pollutants. Environmental stressors are rapidly changing in Antarctica with a warming of the sea and loss of sea-ice in some regions, an increase in some contaminants, and in krill fisheries. Further monitoring and research at Svarthamaren are therefore needed, Svarthamaren being virtually the only site where research and monitoring on top predators is currently conducted in Dronning Maud Land.

Presentation title: "Looking through a glass darkly": filling in the gaps of an Ecosystem Based Management strategy for the west Antarctic peninsula

Institution: NPI

Speaker: Andrew Lowther

Project title: Developing Feedback Management for the Antarctic krill fishery

Abstract:

'Ecosystem Based Management' (EBM) is a term often used to describe attempts to distill down the functionality of an ecosystem into a core set of observable features, then condition management actions on the response of these features to exploitation. In this context, higher trophic organisms are often employed as ecosystem bioindicators because of their reliance on the lower aspects of the food web, their ability to integrate ecosystem information across broad spatial and temporal scales and the relative ease by which they can be monitored. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) seeks to manage the krill fishery along such lines. This fishery is currently seeking to increase the total allowable catch, yet it has become increasingly more spatially concentrated in recent years. CCAMLR has mandated that there will be no increased limits until a scientifically robust method for EBM is in place, leading to renewed interest in its development. CCAMLR has been collecting demographic and foraging data on several krill-dependent higher trophic species, however, translating data from the current suite of monitored 'bioindicators' into management actions can be challenging if causal relationships between predator performance and krill availability are derived inappropriately. We present results from three recent studies of krill predators in the region where over 95% of all fishing occurs, to highlight key fundamental aspects of ecosystem function which should be considered for appropriate EBM. Finally, we outline a multinational research program that will be conducted during the 2019 austral summer to further develop EBM of the krill fishery by addressing critical questions such as prey field requirements of predators and localized depletion of krill around predator colonies.

Presentation title: Antarctic krill size selectivity and escape mortality from fishing gear

Institution: Havforskningsinstituttet/Institute of Marine Research

Speaker: Bjørn A. Krafft

Project title: Understanding and predicting size selectivity and escape mortality in commercial zooplankton fisheries: case study on Antarctic krill

Abstract

There is much pressure on numerous fish stocks worldwide with several of them reported declining. It is likely for future harvesting of marine resources to increase focus on what today are regarded as less-exploited species lower in the food chain (*e.g.* zooplankton and micro nekton). The importance of considering unaccounted fishing mortality, including both the escape mortality and escape-predation mortality, as a factor in the overall management is well documented, but such information on Antarctic krill (*Euphausia superba*) is lacking. This, even though it is ecologically important as a key species in the Southern Ocean and has a considerable potential as a resource for the growing global human populations increased food consumption; classified as the world's most under-exploited fisheries. Both the Commission and Scientific Committee of CCAMLR strongly request knowledge about the effects of different fishing gear on krill escape and the assessment of indirect mortality on the krill stock caused by the fishery. The indirect fishing mortalities or 'unaccounted' mortality include organisms that die after either escaping or being discarded from fishing gear due to inflicted injuries, also such impact may cause higher vulnerability to predators. During this study we have: 1) quantified escape mortality of trawl caught Antarctic krill, 2) presented predictions for the size selectivity of a range of codend and trawl body netting configurations, relevant for the krill fishery, 3) developed methods to collect size-selectivity data with a trawl independent towing rig, 4) assessed physiological stress to understand causes for collateral mortality in trawl fishery. The methods developed, and results described are important tools for selecting optimal trawl designs for krill fishing, but also for the management to assess the total mortality of the krill stock caused by the fishery to develop the sustainable harvest for krill in the Southern Ocean. The methodologies and tools developed in this study are directly applicable to evaluate and optimize and predict catch efficiency, size selectivity and fishery induced mortality in also other potential future fisheries with species at lower trophic levels.

Presentation and project title: Legal frameworks for bioprospecting and bioinnovation in Polar Regions*

Institution: UiT

Speaker: Tore Henriksen

Abstract:

The project "Legal frameworks for bioprospecting and bioinnovation in Polar Regions"(BIOSPOLAR) will analyse the legal conditions for academic and commercial use of the genetic resources from the polar areas. Legal regulation of the use of genetic material from the polar areas is undergoing political discussions with the potential outcome of amending the legal regulations. At the same time realising the value of Genetic material requires legal protection and regulation. Since international and regional regulations are under development, there is a need for analysis of potential effects of different regulatory models on commercial actors to be fed into the ongoing political discussions to promote academic exploration and commercial exploitation of the genetic resources.

The project BIOSPOLAR therefore, looks into three empirical questions and combine them with discussions on the future of Law in this area: What is the current regulation of bioprospecting and bioinnovation in the polar regions? What is the situation regarding patent application and academic publication covering genetic resources from the polar regions. What are perceptions concerning regulation amongst a selection of companies applying for patents to inventions covering this material? The answers to these three questions will be used in the de lege ferenda discussions on how the regulation in these areas should best promote research and development.

These advices in how future regulations can be developed will be based on the empirical findings in WP 1-3 and will be draing from theory of Law. The overall aim to which the project aims at contributing is to maintain Norway as a leading policy-developing nation for the polar regions.

*Prosjekt abstract

Presentation title: The annual variability of living benthic foraminifera in the Amundsen Sea Embayment, western Antarctica

Institution: UiT

Speaker: Patrycja Jernas

Project title: Circumpolar Deep Water upwelling and West Antarctic Ice Sheet stability

The West Antarctic Ice Sheet (WAIS) is considered the most unstable part of the Antarctic Ice Sheet. As the WAIS is mostly grounded below sea level, its stability is of great concern. A collapse of large parts of the WAIS would result in a significant global sea-level rise. At present, the WAIS shows dramatic ice loss in its Amundsen Sea sector, especially in Pine Island Bay. Pine Island Glacier (PIG) is characterised by fast flow, major thinning and rapid grounding-line retreat. Its mass loss over recent decades is generally attributed to melting caused by the inflow of warm Circumpolar Deep Water (CDW). Future melting of PIG may result in a sea level tipping point, because it could trigger widespread collapse of the WAIS, especially when considering ongoing climate change.

The research project "Circumpolar Deep Water upwelling and West Antarctic Ice Sheet stability" aimed to establish proxies (integration of foraminifera assemblages, sediment properties and oceanographic data) for modern environmental conditions by analysing seafloor surface sediments along a transect from the glacier proximal setting to the middle-outer shelf in the eastern Amundsen Sea Embayment. These proxies will then be applied on sediment records spanning the Holocene for reconstructing spatial and temporal variations of CDW upwelling and ice-ocean interactions during the past c. 23,000 years.

We will present results from the analyses of ten short marine sediment cores (multi and box cores) collected during expeditions JR179 (2008) and ANT-XXVI/3 (2010) along a transect from inner Pine Island Bay to the middle-outer shelf part of the Abbot Palaeo-Ice Stream Trough. The sediment cores were investigated for distribution patterns of planktonic and benthic foraminifera. Overall, our research is the first systematic study of living benthic foraminiferal assemblages from the Amundsen Sea. Due to the logistic difficulties in connection with extremely harsh climate conditions (e.g. fast sea ice cover), this region is rarely studied despite of its great scientific importance. Thus, our results provide new knowledge that shall find application in many research fields as e.g. Antarctic ecology, paleoceanography or reconstruction of the glacial activity. Moreover, we investigated material from two different years (austral summers 2008 and 2010), thus, allowing us to infer inter-annual changes in living benthic foraminifera assemblages in relation to the variability in inter-annual sea-ice cover. Our findings are based on the correlation of living benthic foraminifera assemblages with in situ environmental conditions. When applied to the past records, this knowledge can be a very successful tool for the interpretation of the past environmental changes.

Presentation title: Ice shelves in a warming world: The Filchner-Ronne Ice Shelf system

Institution: UNI Research – NORCE Climate

Speaker: Svein Østerhus

Project title: Long-term observing system for the oceanic regime of Filchner-Ronne Ice Shelf, Antarctica

Abstract:

Antarctic ice shelves are thinning dramatically, and we are facing a **potential collapse of the West Antarctic Ice Sheet**. At the same time, we observe a **warming and freshening of Antarctic Bottom Water (AABW)** that is spreading throughout the world's oceans. The contribution of these changes to **global sea level rise** - the first through an added volume of freshwater and the second through thermal expansion - is of major concern in a world where much of the population lives in low-lying areas.

Despite their importance, we lack basic knowledge about many of the processes governing ice shelf melt and AABW formation, and these gaps in our understanding – listed amongst **the most pressing questions in southern polar research** by the Scientific Committee on Antarctic Research (SCAR) - are reflected in the large uncertainty in future sea level predictions.

IPCC declare in its latest report (2013): ***“Abrupt and irreversible ice loss from a potential instability of marine-based sectors of the Antarctic Ice Sheet in response to climate forcing is possible, but current evidence and understanding is insufficient to make a quantitative assessment.”***

Research Council of Norway documents on polar research policy for 2014-23 **“Norsk forskningsinnsats i Antarktis 2013-2022”**, and the **Norwegian Government long-term strategy for research** (Meld. St. 7 (2014–2015)), addressing the same questions.

This presentation we will address these questions. This we will do by presenting results from our ongoing and recent project and discuss a possible increased ocean induced melting of the Filchner-Ronne Ice Shelf.

The **Filchner-Ronne Ice Shelf in Antarctica**, the by volume largest ice shelf on earth, **might soon experience wholesale changes with potential dramatic consequences for the stability of the West Antarctic Ice Sheet (WAIS)**. We have the longest existing time series, and operate three long-term observatories delivering new unique observations from the oceanic regime of Filchner-Ronne Ice Shelf, Antarctica.

Presentation title: Linkages between Antarctic and tropical climate change through the global atmospheric circulation*

Institution: UNI Research

Speaker: Thomas Toniazzo

Project title: Counteracting effect of future Antarctic sea-ice loss on projected increases of summer Monsoon rainfall

Abstract:

The potential for an influence of future Antarctic sea-ice loss on the spatio-temporal distribution of rainfall in the South-West Asian Monsoon is investigated. Two main hypothesis drive this proposal. The first is that the adjustment of the Hadley circulation to changes in extratropical heat fluxes results in a tendency for tropical precipitation to be located further south, towards the Equator, in boreal summer. The second is that the general tendency for a southward displacement of tropical precipitation in boreal summer affects rainfall over India. The planned modelling and analysis work is structured around these hypotheses. We will investigate how mid-latitude storms in the southern Hemisphere respond to a poleward retreat of the sea-ice edge; how changes in mid-latitude storm activity affect the Hadley circulation; how such an adjustment impacts the meridional distribution of zonal-mean rainfall; and finally how the zonal-mean signal is reflected in Monsoon rainfall.

The first stage in the project will be an analysis of existing model simulations. We will then perform sensitivity tests with different models to isolate the effect of Antarctic sea-ice. Finally, in two separate work-packages we will analyse the mid-latitude and tropical dynamics of the response, and test the findings by means of additional experiments with idealised model configurations. Throughout the project, a strong emphasis will be placed on collaborative research and in particular on both formal and research training with the Indian partners.

*Projekt abstract

Presentation title: Mass balance of the Antarctic ice sheet from remote sensing*

Institution: NPI

Speaker: Geir Moholdt

Project title: Radar altimetry for ice mass balance - impact of melting and refreezing in the snowpack

Abstract:

Earth observation from space is the only reliable method to determine accurate ice-mass changes and contribution to sea level rise at a global scale. Satellite SAR altimeters like CryoSat-2 are one of the most promising tools for this purpose, but precise applications over glaciers and ice sheets are hampered by variable penetration and backscatter in snow and ice, particularly during the transition from a cold winter snowpack to a melt-affected summer snowpack. This project will use an unique set of detailed ground-truth data, collected in the areas with densest CryoSat-2 data coverage, to calibrate and validate CryoSat-2 data locally over a full seasonal cycle. The synthesized results will be used to derive optimum techniques for elevation-change estimation over glaciers and ice sheets in different climatic regimes. Finally, we will apply the techniques to determine regional ice-mass changes in Svalbard and Dronning Maud Land, and their recent contribution to sea-level change.

*Prosjekt abstract

Presentation title: Changing coastal Dronning Maud Land*

Institution: NPI

Speaker: Kenichi Matsuoka

Project title: Mass balance, dynamics, and climate of the central Dronning Maud Land coast, East Antarctica

Abstract:

East Antarctica has been believed to be much more stable than the rapidly changing West Antarctica, but recent studies have questioned this conventional belief. The largely-unknown Dronning Maud Land (DML) coast in East Antarctica has a chain of small ice shelves that have distinct environmental settings, suggesting that individual regions have different responses to the ongoing climate change. The project will combine satellite remote sensing, geophysical field measurements and ice cores to investigate mass balance, dynamics, and climate of an interconnected system of the grounded features (ice rises) and the Nivlisen and Lazarev Ice Shelves near India's Maitri Station in the central DML. This region is out of practical logistics coverage from Troll Station. Collaboration with India and use of their station bring the unique opportunity for Norway to transfer our experiences developed in other DML regions to this unexplored region. The project will start in January 2016 and take four years to complete. Major activities include two larger India-Norway joint field campaigns each in the 2016-17 and 17-18 Antarctic seasons and smaller India-only field campaigns in the 2017-18 and following seasons. All of these field activities will be made from Maitri Station relying on Indian logistics with Norwegian support as well, and provide excellent training opportunities for early-career scientists in India and Norway. The project will organize a summer school in early 2017 for postdoctoral fellows and graduate students. These networking activities will facilitate the long-term collaboration between the two nations.

*Prosjekt abstract

Presentation title: Preliminary reconstruction of ice sheet surface variations since the Pliocene in Dronning Maud Land, East Antarctica

Institution: NGU

Speaker: Ola Fredin

Project title: Measuring & Modeling Antarctic Geomorphology and Ice Change in Dronning Maud Land in Dronning Maud Land

Abstract:

MAGIC-DML is an international collaboration focused on reconstructing the long-term pattern and timing of vertical changes in ice-surface elevation across key transects of Dronning Maud Land (DML) in the East Antarctic Ice Sheet (EAIS), as the basis for constraining numerical models of ice sheet behavior. Field sites are nunataks (mountains that extend above current and former ice levels and that can be used as 'dipsticks' to reconstruct changes in ice elevation), and past ice elevation is determined by field mapping combined with cosmogenic nuclide (CN) dating of glacial landforms. Reconstructing and predicting the response of the Antarctic Ice Sheet to climate change is a major challenge facing the Earth Science community. Numerical models of ice sheet behavior are a central component of research addressing this challenge, and these models are tested and improved by comparing model predictions of past ice extent to the geologic record. However, there are critical gaps in the geologic record of the pattern and timing of vertical changes in the EAIS in an ~ 250,000 km² area of DML. By identifying, measuring and modeling ice elevation change patterns along two coast-to-inland transects and one inland transect we will test the following hypotheses for western DML:

- the ice sheet has experienced long-term reductions in ice-surface elevation since the Pliocene.
- the ice sheet last retreated from its maximum after 25 ka, at which time the ice surface was hundreds of meters higher near the coast, but no higher and perhaps lower at the inland end of our transects.
- the pattern and timing of maximum ice surface elevations derived from geological evidence provide new constraints that improve numerical model reconstructions of ice sheet behavior.

Presentation and project title: Antarctic ionospheric and space weather research at Troll station
Institution: UiO*
Speaker: Wojciech J. Miloch

Abstract:

In polar regions, the ionosphere, which is the partially ionized part of the atmosphere, is directly coupled to the Earth's magnetosphere. This is a very dynamic coupling, which strongly depends on the activity of the Sun, solar wind, and interplanetary magnetic field. This interaction is a key element in the understanding of space weather, which has an increasingly important impact on human activities on Earth and in space, including, but not limited to, communication and satellite-based navigation.

In particular, close to the magnetic poles, the particles that are accelerated in the magnetosphere to larger energies can penetrate down to the ionosphere and collide with the atmosphere's molecular and atomic species, giving rise to the spectacular aurorae borealis (Northern Lights) in the Northern hemisphere and aurorae australis (Southern Lights) in the Southern hemisphere. The resulting space weather effects include scintillations of transionospheric radio signals, decreasing the accuracy of Global Navigation Satellite Systems (GNSS).

Studying the ionosphere in the polar regions is of paramount importance to understand the global ionosphere-magnetosphere system, and determine the space weather effects in those regions. With the lack of observations over the Southern hemisphere, there is a need of establishing a wider network of instruments in Antarctica. In this project we will establish the ionospheric research station at Troll to provide optical and scintillation/TEC measurements of the ionosphere in Queen Maud Land, Antarctica. We will study in particular the global space weather effects caused by aurora during increased geomagnetic activity and assess the reliability and accuracy of GNSS. It is the first step in establishing a comprehensive long-term ionospheric research at in establishing a comprehensive long-term ionospheric research at the Troll Norwegian station in Antarctica by using the ground-based infrastructure.

Presentation and project title: From swarming behaviour to trophic interactions: forecasting dynamics of Antarctic krill in ecosystem hotspots using behaviour-based models*

Institution: IMR

Speaker: Thor Alexander Klevjer

Abstract:

Understanding the formation, maintenance and distribution of krill aggregations in relation to the environment is essential to comprehension of many Antarctic marine ecosystems, their function and their sensitivity to climate change and human impacts. This is particularly important as the currently expanding fishery (in terms of catches) is increasingly geographically confined to local hotspots. This project aims i) to build firmer ecological and mechanistic explanations for the distribution and dynamic patterns of krill swarms in ecosystem hotspots and ii) to use the acquired knowledge to develop a predictive behavioural-based theoretical framework of krill aggregative behaviour and distribution. Our multidisciplinary project will merge insights from advanced research in collective behaviour, behavioural ecology, marine ecology, oceanography, hydrodynamic modelling and acoustics to increase the biological and ecological understanding of the effects of environmental fluctuations and fisheries on an important aspect of krill ecology. The strength and novelty of our approach resides in the development of models of krill optimal distribution and swarming behaviour, by combining observations using state-of-the-art acoustic technology with hydrodynamic models and models of krill behaviour. Since our approach integrates historical survey and fisheries information, continuous acoustic monitoring from stationary platforms and oceanography models to a simulation-based behavioural framework, we expect to acquire important insights about ecological processes at both small and larger spatial and temporal scales. Such insights and predictive tools are essential for a sound implementation of the Feedback Management system for Antarctic krill, which is currently being developed under the auspices of the Commission for the Conservation of Antarctic Living Resources (CCAMLR).

*Prosjekt abstract

Presentation and project title: Topographic barriers controlling warm water inflow and Antarctic ice shelf melting

Institution: UiB

Speaker: Elin Darelius

Abstract:

TOBACO aims to increase our understanding of the oceanic heat flux towards the Antarctic ice shelf cavities; specifically, the flow of warm water past i) the shelf break and ii) the ice shelf front, two features that represents a major change in water depth and thus a barrier to ocean currents. The focus is on flow into and through a trough crosscutting the continental shelf from the shelf break to the ice front and beyond. Results from TOBACO will reduce the uncertainties in future predictions of ice shelf melting and sea level rise.

The physics of the flow was investigated in large-scale laboratory experiments using advanced flow visualization techniques and highly idealized topographies (access to laboratory facilities was assured through an EU Hydralab+ grant), and preliminary results from these experiments will be presented. The experiments will be combined with idealized, process-oriented numerical simulations and the knowledge obtained from the idealized activities will be brought on to the real world; as the results will be combined with and compared to field observations and regional modelling.

TOBACO will synthesize the data legacy from ongoing NFR-funded projects with concurrent records from international collaborators - France, Germany and Sweden - in two climatically important locations where the processes studied in the laboratory are central: the opening of the Filchner Trough in the Weddell Sea and the Getz ice shelf front in the Amundsen Sea.

Presentation and project title: Political Philosophy Looks to Antarctica: Sovereignty, Resource Rights and Legitimacy in the Antarctic Treaty System*

Institution: UiO

Speaker. Maria Alejandra Mancilla

Abstract:

Global pressure over natural resources in Antarctica will mount in the coming decades. Three pressing factors might motivate states to claim exclusive rights to Antarctica: climate change, dwindling natural resources in occupied territories, and the fact that, by virtue of Article IV of the Antarctic Treaty, the question of sovereignty in the White Continent remains unresolved. We are thus at a unique point in history to influence the ethical dimensions of the decisions that may govern Antarctica in the future.

So far, most analyses of Antarctic politics have taken a descriptive and matter-of-fact approach, while political philosophy has been blind to Antarctica as a case study. In this project, we use these blindspots as a point of departure. Our primary objective is to bring political philosophy to bear on analyses of Antarctic politics more generally, and of the Antarctic Treaty System more specifically, by focusing on two topics. First, we seek to carry out a normative analysis of claims over territory and natural resources in Antarctica, and to develop a systematic normative framework with which to morally assess these claims. Second, we seek to carry out a normative analysis of the political legitimacy of the Antarctic Treaty System, and to develop a systematic normative framework with which to morally assess it. A secondary objective is to take Antarctica as a site wherefrom to rethink some issues that have been neglected in these areas of normative political theory. Political philosophy looks to Antarctica, then, in two ways: by applying its key concepts and theories to it, and by relying upon it as a source for critically re-evaluating key concepts and theories of territorial rights and rights over natural resources, on the one hand, and political legitimacy, on the other. Having clarity on what is morally at stake in Antarctic politics, we claim, is crucial for peaceful cooperative policy-making and knowledge-based management in the last continent.

*Prosjekt abstract

Presentation and project title: Past behaviour of the Southern Ocean`s atmosphere and cryosphere*

Institution: UiB

Speaker: Jostein Bakke

Abstract:

The Southern Hemisphere`s westerly winds play a vital role in regulating Earth`s climate by shielding Antarctic ice from low-latitude heat, driving global ocean circulation and storing vast amounts of CO₂. Both strength and position of this globally significant atmospheric pattern are rapidly shifting in the face of ongoing warming. A string of recent studies links these developments to dramatic changes in temperature, precipitation, sea-ice extent and cryosphere stability unfolding throughout the Southern Ocean region. Critically, a lack of baseline information restricts our ability to understand the causes and patterns of these shifts and represent them in the future projections that underpin climate policies. This project proposes to address this pressing knowledge gap by using the past as a reference for the future. To achieve this goal, we will utilize the sensitivity of glaciers to atmospheric climate change and the potential of glacier-fed lake sediments to record this signal through time. We seek to integrate emerging sedimentological, geochemical and glacier modelling tools in a new methodological framework to reconstruct changes in glacier extent, temperature and precipitation on human-relevant timescales. We will apply this cross-disciplinary approach to Holocene sediments from the poorly investigated Kerguelen Archipelago, well-situated in the core southern westerly wind belt. This project takes full advantage of the expertise of world-class international collaborators, the reputation of the applicant institute as a leading climate science centre and the experience of the principal investigator in polar paleoclimate research. Once completed, this project will I) enhance our understanding of the patterns and drivers of Antarctic atmospheric climate change and its interactions with the cryosphere - key priorities of the international Antarctic science community and II) expand the potential of glacier-fed lake sediments as prime paleoclimate archives.

*Prosjekt abstract

Fornavn	Etternavn	Institusjon	Poster tittel
Alison	Cleary	Norsk Polarinstitut	Genetic Selection in Antarctic fur Seals - Effects of Prey and Sealing
Arnaud	Tarroux	Norsk Institutt for Naturforskning	Scaling up seabird ecological research in Antarctica: Continent-wide distribution, connectivity, and synchrony among distant breeding sites.
Arnaud	Tarroux	Norsk Institutt for Naturforskning	Antarctic seabirds' hunt for krill in the dynamic Southern Ocean: flexibility is the key!
Ralf	Rautenberger	Uni. De Magallanes (Chile) og NIBIO	Physiological responses of marine macroalgae to an ocean warming event at the western Antarctic Peninsula in summer 2013
Lisa	Orme	Norsk Polarinstitut	Ocean-atmosphere interactions in the Southern Ocean during the Holocene
Ane K.	Engvik	Norges geologiske undersøkelse	Changing the mountains - fluid-rock interactions in deep crust
Ane K.	Engvik	Norges geologiske undersøkelse	Earth history - new impressions from Dronning Maud Land during NARE 17/18
Per Inge	Myhre	Norsk Polarinstitut	Field observations from NARE Geologi 17/18
Synnøve	Elvevold	Norsk Polarinstitut	Examine mountains with microscope: results from a study of gneisses from Hochlinfjella, Dronning Maud Land
Tamer	Abu-Alam	Norsk Polarinstitut	A new seamless, digital uniform geological GIS database for Dronning Maud Land, Antarctica: progress report
Elisabeth	Isaksson	Norsk Polarinstitut	Beyond EPICA-Oldest Ice; Drill site evaluation at Dome F
Katrin	Lindbäck	Norsk Polarinstitut	MADICE - Mass balance, dynamics, and climate of the central Dronning Maud Land coast, East Antarctica
Kenny	Matsuoka	Norsk Polarinstitut	The Subglacial Recovery Lake: New Insights from Airborne Radar Data
Kenny	Matsuoka	Norsk Polarinstitut	Current Status and past Evolution of Blåskimen Island, Dronning Maud Land

Elin	Darelius	Universitetet i Bergen	Warm water and ice shelf melting in the Amundsen Sea
Svein	Østerhus	Uni Research Klima, Bjerknessenteret	Long-term observing system for the oceanic regime of the Filchner-Ronne Ice Shelf, Antarctica
Tore	Hattermann	Akvaplan NIVA, AWI	Fine-scale modeling of ice shelf-ocean interaction with FVCOM
Jan Sverre	Laberg	UiT - Norges arktiske universitet	International Ocean Discovery Program (IODP) Expedition 374: Ross Sea West Antarctic Ice Sheet History
Øyvind	Stokke	UiT - Norges arktiske universitet	Sovereignty, Resource Rights and Legitimacy in the Antarctic Treaty System
Rune	Storvold	Norut	Use of drones and artificial intelligence in penguin surveys
Kenny	Matsuoka	Norsk Polarinstitut	"Quantarctica 3: a cross-platform, full-featured open GIS for Antarctic Research
Christina A.	Pedersen	Norsk Polarinstitut	Vilkår for aktivitet på Forskningsstasjonen Troll

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