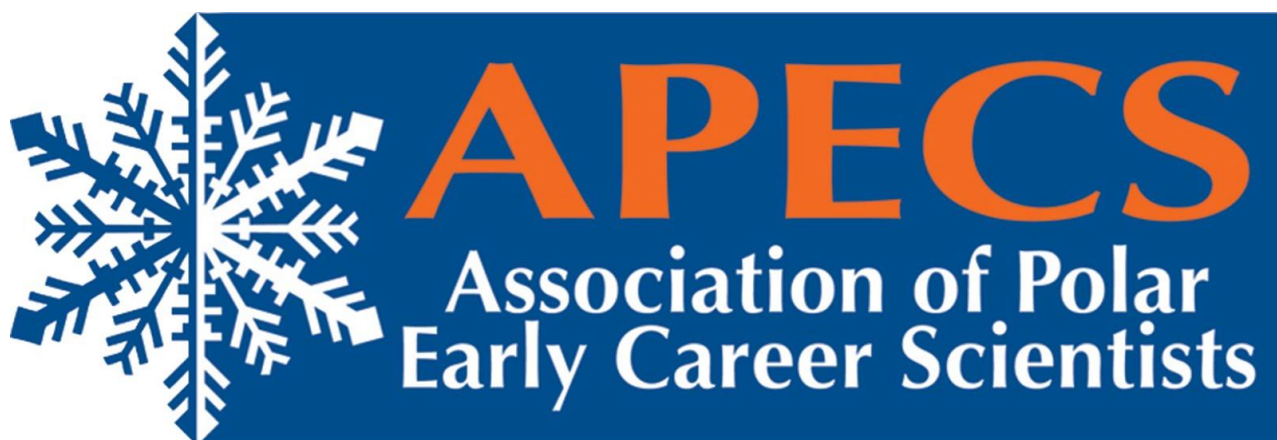# APECS 2015 Online International Conference:

New Perspectives in the Polar Sciences

CONFERENCE ABSTRACTS & PROGRAMME

SESSION ONE

SESSION: CULTURAL, POLICY, EDUCATION & HISTORY

Antarctica in Advertising: Media Representations of the South
Presenter: Hanne Nielsen
Institute of Marine and Antarctic Studies (IMAS), University of Tasmania, Australia

Abstract: Antarctica has been represented in many different ways over the past 100 years: from a place for heroes, to an ultimate wilderness, to a poster child for climate change. This polar environment is not just changing physically, but also in terms of the ways we imagine the place. Using the humanities as a lens to examine Antarctica offers a new perspective, one that unveils the human elements that drive much of our interaction with the southern continent. Most people will never actually go to Antarctica, so their experience is mediated by cultural production such as films, diaries, and advertisements. This study takes advertisements as an example, examining the imagery and themes present in a range of print examples, in order to track the various versions of Antarctica that have appeared in popular culture. These themes act as a mirror of our own values and priorities back home, helping to explain why we have looked south at various points in time. Adverts recycle ideas that are already in common cultural circulation, making them an ideal medium through which to examine representations of Antarctica. The cultural frame through which we view Antarctica is often taken for granted. In fact, it is a frame that helps to shape our values, inform our representations, and ultimately has a direct impact on the ways we interact with the place.

SESSION: GEOLOGY, ENVIRONMENT & TERRESTRIAL CRYOSPHERE

Spatial and temporal variations of total mercury in Antarctic snow along the transect from Zhongshan Station to Dome A
Presenter: Chuanjin Li
State Key Lab of Cryospheric Sciences, Chinese Academy of Sciences, China

Abstract: In this study, the concentrations of total mercury (THg) and ions deposited in the surface snow and snow pits in the eastern Antarctic along the 29th inland route of the Chinese National Antarctic Research Expedition were analysed. The THg concentrations in the surface snow ranged from 0.22 to 8.29 ng/L and elevated concentrations were detected in the inland regions of higher altitudes (30004000m). The spatial distribution of the THg in the snow pits showed greater inland concentrations with mean concentrations of B0.21.33 ng/L. The THg concentrations in the coastal snow pit (29-A) showed higher concentrations in the summer snow layers than in the winter snow layers. The THg records from the two inland snow pits (29-K and 29-L) spanned decades and indicated elevated THg concentrations between the late 1970s and early 1980s and during the mid-1990s. The temporal variations of THg in the Antarctic snow layers were consistent with anthropogenic emissions around the world. In addition, the Pinatubo volcanic eruption was the primary contributor to the 1992 THg peak that was observed in the inland snow pits.

Chuanjin Li[1], Shichang Kang[1], et al.

[1]**State Key Lab of Cryospheric Sciences, Chinese Academy of Sciences, China**

GNSS (Global Navigation Satellite System) research on Livingston Island, Antarctica
Presenter: Asparuh Kamburov
University of Mining and Geology, Bulgaria

Abstract: This presentation focuses on results from the first Bulgarian geodetic research, performed with high accuracy Global Navigation Satellite System (GNSS) methods at the Bulgarian Antarctic Station on Livingston Island, Antarctica. The studies have three major objectives: estimation of the influence of 24th Solar Maximum on GNSS positioning in polar regions; regional geodynamic processes verification; study of the ice melting on Livingston Island. All tasks are performed using post-processed static (daily and fast) and kinematic GNSS methods. Various configurations of dual-frequency GPS/GLONASS receivers are used. The major results that were achieved are: estimation of the ionospheric influence on GNSS signals, generation of ionospheric VTEC maps, 3-D modelling of the melted away „Sea lion" glacier, study of the ice dynamics of the „Perunika" glacier, establishment of a permanent geodetic network.

Persistent organic pollutants' release from a glacier in the context of changing melt and snowfall
Presenter: Krystyna Koziol
Gdansk University of Technology, Poland

Abstract: Glaciers act as global reservoirs of organic matter and secondary sources of pollutants to downstream environments. The short- and long-term dynamics of the organic pollutant release is likely influenced by variations in melt and atmospheric supply with snow. In this study, we investigate the short-term dynamics of the concentrations and fluxes of polychlorinated biphenyl (PCBs) and polyaromatic hydrocarbons (PAHs) in a proglacial river of the Foxfonna glacier, Svalbard, during the ablation season of 2012. This information is then linked to the observations of melt and snowfall on the glacier surface, in order to explore the impact of these factors on the glacial release of pollutants. The observed changes are linked to the potential pollution sources and glacial dynamics, to ascertain the potential causes for pollutant release during different parts of the vegetation season in the Arctic.

Krystyna Koziol[1] , Katarzyna Kozak[1], Zaneta Polkowska[1]
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SESSION: OCEANOGRAPHY & SEA ICE

The Polar Regions: Ideal Test Beds for Data Assimilation
Presenter: François Massonnet
Université Catholique de Louvain, Belgium and Catalan Institute for Climate Sciences, Spain

Abstract: Data assimilation is, originally, an elegant solution to the central problem of state estimation in meteorology. It has naturally extended to climate sciences in recent years, and is mostly relevant where and when observations are sparse. Therefore, the polar regions are great test beds for applying these techniques, especially in view of the dramatic past and projected changes at these latitudes. We present three promising applications of data assimilations at the poles. (1) We first propose a multi-decadal reconstruction of Antarctic sea ice thickness. Such a reconstruction has not been possible from

observations only due to the high heterogeneity of records. A global increase in sea ice volume is found since the 1980s, but with high regional variability. These changes are interpreted in the context of the observed slight areal expansion of the Antarctic sea ice cover. (2) We then focus on the question of seasonal Arctic sea ice prediction, and suggest that the current generation of climate models would strongly benefit from a realistic initialization of their sea ice cover if they are to deliver reliable forecasts a season ahead. (3) Finally, we propose an original method for the calibration of sea ice model parameters based on the theory of data assimilation. Our method provides credible and automatic alternatives to the time-consuming process of manual tuning.

SESSION: TERRESTRIAL & MARINE BIOLOGY

Vegetation Extraction in Antarctica Using Remote Sensing
Presenter: Chayanika Devi
National Center For Antarctica And Ocean Research, Goa, India

Abstract: The objectives of the paper is to review research conducted over the past decade on application of multi-temporal remote sensing for monitoring changes of Antarctica region. The expedition is placed on the results from the National Center for Antarctica and Ocean Research and Ministry Of Earth Science, India interactions program and Polar remote sensing techniques. The various case studies demonstrate that ground-level sensors on stationary or moving track platforms and wide-swath imaging sensors on polar orbiting satellites are particularly useful for capturing remote sensing data at sufficient frequency to study Antarctica vegetation analysis. Less frequent imaging with high spatial resolution instruments on aircraft and lower orbiting satellites enable more detailed analyses of vegetation and calibration/validation of coarser resolution observations. The image World view-2 was analyzed by considering an ordinal classification of the NDVI to account for the cumulative effect of differences of near-infrared spectral resolutions, the temperature anomalies, and atmospheric conditions. An increasing trend of the median values in the low, intermediate and high NDVI classes is clearly marked while accounting for variations attributed to cross-sensor radiometry and atmospheric disturbances.

Chayanika Devi [1]   **Shridhar Jawak Digambar**[1] **Alvarinho J. Luis**[1]
[1] **National Center For Antarctica And Ocean Research, Goa, India**

Boreal Shrub Growth Response to Fertilization, Herbivory and Climate near Kluane Lake, Yukon
Presenter: Meagan Grabowski
University of British Columbia, Canada

Abstract: Proliferation of tall shrubs has been well documented across the circumpolar Arctic and alpine tundra, and strongly linked to warming temperatures. However, less is known about changes in forest structure dynamics below tree-line. Recent studies have linked ecological responses of tundra ecosystems to interactions between global change drivers and dynamics of herbivory pressure. In the last 40 years, the Kluane region in southwest Yukon has seen both an increase in temperature and changing fluctuations in snowshoe hare (*Lepus americanus*) populations, and at the same time has

been under continued monitoring and experimental manipulations since 1973. Shrubs are a key component of the boreal ecosystem and food web. I propose to present preliminary results from the dendrochronological record of three boreal shrub species (*Betula glandulosa*, *Salix glauca*, and *Shepherdia canadensis*) to estimate the relative importance of three factors controlling shrub growth: 1) a 1988-1994 NPK fertilization experiment, 2) hare herbivory, and 3) growing season temperatures. By understanding the response of plants to climate change, we can better predict coming changes in the structure of boreal habitat of culturally integral species such as snowshoe hares. In the Yukon Territory there is a community of trappers whose livelihoods depend on sustained numbers of animals. If climate change is altering the boreal food web by changing the dynamics of predator and prey, than understanding why is key. This research furthers knowledge on integral plant-herbivore interactions, plant community dynamics and future disturbance regimes.

M.Grabowski[1], C.J. Krebs[1]
[1]Department of Zoology, University of British Columbia, Vancouver, Canada

Effects of iron and light co-limitation on Southern Ocean phytoplankton
Presenter: Raissa Philibert
Stellenbosch University, Stellenbosch, South Africa

Abstract: The ocean, particularly the Southern Ocean, which accounts for about 4% of global carbon fluxes, plays a crucial role in controlling the concentration of CO_2 in the atmosphere and consequently, the Earth's climate. Given their importance for carbon cycling, it is important to understand how phytoplankton growth is controlled by factors such as light and nutrient (including trace metals) availability. In this study conducted in January 2015 on board SA Agulhas II, the role of iron and light co-limitation for phytoplankton growth was investigated through two incubation experiments at 46˚ 00' S, 08˚ 00' E and at 65˚ 00' S, 00˚ 00' W. The impact of iron addition was tested at three different light levels against control incubations without artificial iron addition. The two experiments were conducted for 5 - 6 days, respectively, at controlled seawater temperature. Photo-physiological measurements (Fv/Fm) were taken every 24 hours. Samples for phytoplankton growth (in terms of size fractionated chlorophyll and particulate organic carbon) were collected every 48 hours. Samples to track changes in the macronutrient and iron uptake were also collected, as well as samples to study the molecular adaptation strategies of the Southern Ocean phytoplankton in collaboration with the Genomics Group at Norwegian University of Science and Technology. In both experiments, phytoplankton growth was at its maximum for the high iron, high light treatment. However, at 46˚ S, the high light was more effective at promoting phytoplankton growth and photosynthetic efficiency than the added iron. In contrast, at 65˚ S, iron addition had a larger impact on the chlorophyll concentrations and photo-physiology than light availability. The differences between the two bioassays are considered to evaluate the effects of increased light (to mimic shallow mixed layer as predicted for future climate change scenarios) and iron limitation on phytoplankton growth and carbon export.

Raissa Philibert[1], Natasha Van Horsten[1,2], Thato Mtshali[2], Alakendra Roychoudhury[1], and Susanne Fietz[1]

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Insights into trophic ecology of the Antarctic silverfish *(Pleuragramma antarctica)* **in Antarctic coastal ecosystems**
Presenter: Erica Carlig
ISMAR-CNR U.O.S. Genoa and University of Siena, Italy

Abstract: The analysis of the Antarctic silverfish (*Pleuragramma antarctica*), the most abundant fish in coastal regions of Antarctica, is crucial for our understanding of the status of the High-Antarctic coastal system. Among notothenioids, *P. antarctica* is the only known holo-pelagic fish, living all stages of development throughout the water column. It is the prevalent plankton-feeder of the intermediate trophic level and it plays a pivotal role in the trophic web being the link between the plankton and the community of top predators. The early life cycle of this species is closely linked to the sea ice cover, so it appears particularly vulnerable to the ongoing climate change, with possible implications for the entire food web. Present work is developed as part of a Ph. Doctoral program in Polar Sciences at the University of Siena (Italy) and contributes to the PNRA project RAISE (Integrate Research on Antarctic Silverfish Ecology in the Ross Sea) lead by M. Vacchi, in a wide context of international collaboration. The study is based on the analysis of stomach contents and other biological parameters (morphometric parameters and condition indexes) of 168 samples. Fish were caught during 4 surveys conducted within international collaborative projects in different sectors of the Southern Ocean: 83 fish were collected in the Ross Sea in 2004 and 2008, during New Zealand surveys conducted by the RV Tangaroa; 62 by the T/RV Unitaka Maru in the coastal waters of Adélie Land, near the French station Dumont D'Urville, during the CEAMARC survey in 2008; and 23 were sampled in the Weddell Sea during the German survey Polarstern XVIII/4 in 2012. The studied specimens include post-larval, juvenile and adult stages of development, with standard lengths ranging between 7.9 and 19.4 cm and estimate ages between 2 and 8 years. The aim of the study is to improve present knowledge on the ecology of the Antarctic silverfish by highlighting possible differences in diet and condition across the schools of fish examined.

Carlig, Erica[1,2]; Di Blasi, Davide[1]; Ghigliotti, Laura[3]
[1] **ISMAR-CNR U.O.S. Genoa**
[2] **University of Siena**
[3] **DISTAV-University of Genoa**

SESSION: CULTURAL, POLICY, EDUCATION & HISTORY

Web conferences: interaction with Antarctic researchers from anywhere
Presenter: Adriana Keiko Nishida
Universidade Federal do ABC, Brazil, and Universidade Aberta do Brasil, Brazil

Abstract: The Antarctic Ecosystem has a great influence on all of the planet environments. Several surveys have been conducted in this ecosystem for several years; however, people who are not scientists do not know this subject deeply. The public opinion is an essential factor for the results of the research conducted and can generate actions in defence of the environment, in education, in new research etc. Thus, the popularization of Antarctic Science has an important role to the scientific community. This article presents the use of a multimodal web conferencing and multimedia system for the live broadcast of lectures given by Antarctic researchers in three separate events (XII International Polar Week and II Career Development Workshop in Canoas - RS, III APECS -Brasil Symposium in Arraial do Cabo - RJ and I Universidade Federal do ABC (UFABC) Polar Week - National Week of Science and Technology in Santo André - SP). For the transmission of events to a large audience, the multimodal and multimedia conferencing were used. This allows real-time communication by voice, text and video, sharing files, applications, desktop etc. The first and the second events were followed for local audience (live), people from different parts of Brazil and the world like United States, Spain and Portugal, totalling forty thousand people, including the participation of schools attending the web conferences transmission. The web conferences performed in the third event were followed just for online audience, it had the average duration of one hour and the mean audience was four participants, who were able to interact with researchers, asking questions and comments, making the event more dynamic. These systems are interesting alternatives for the popularization of Antarctic Science, because it was possible to reach a local audience and people around the world were able to follow the lectures of events.

Adriana Keiko Nishida[1,2] , Francyne Elias-Piera[3], Silvia Dotta[1], Erli Schneider Costa[3,4,5]
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[3] APECS-Brasil
[4] Universidade Estadual do Rio Grande do Sul
[5] Universidade Federal do Rio de Janeiro

SESSION: GUEST SPEAKER

How do you mix biology and ice ages in the Antarctic?
Prof. Pete Convey
British Antarctic Survey, Cambridge, UK

Abstract: Life on land in Antarctica is still surprisingly poorly known in detail. It is clear that most currently ice-free ground in Antarctica would have been covered and scoured by glacial advances at the Last Glacial Maximum or previous maxima. However, the availability of new baseline survey data, combined with modern molecular biological analyses, have made it clear that long-term persistence and regional isolation typify Antarctica's terrestrial biota. This biota is dominated by cryptogams,

micro-arthropods and other micro-invertebrates, all of which show strong evidence of long-term presence in Antarctica. As well as creating a new paradigm in which to consider the evolution and adaptation of Antarctic terrestrial biota, this opens important new cross-disciplinary linkages in the fields of understanding the geological and glaciological history of the continent itself, and of the climatic and oceanographic processes that can both lead to isolation and support colonisation. This new and more complex understanding of Antarctic biogeography also provides important practical challenges for management and conservation in the region, as required under the Antarctic Treaty System.

SESSION TWO

SESSION: GUEST SPEAKER

Volcanoes and reconstructing the Antarctic Ice Sheet – the myth of an irreversible step-change in thermal regime
Prof. John Smellie
University of Leicester, UK

Abstract: The Antarctic Ice Sheet (AIS) is the world's largest ice mass. Through its impact on global albedo, thermohaline circulation and acting as a heat sink, it is a major influence on climate. Understanding how it has evolved through geological time, therefore, is important for understanding the evolution of global climate. One particularly important aspect of AIS evolution is the timing and nature of the change in basal thermal regime of the largest ice mass, in East Antarctica. What is unknown is when it transformed from a warm, wet-based highly dynamic ice sheet to the cold, frigid and stable ice sheet that we see today. A highly polarized controversy has arisen that states that the change occurred in a single rapid step, either at 14 Ma or as recently as 2.5 Ma. After several decades of intensive research using traditional geological investigations of onshore and offshore glacial sediments, the controversy is unresolved. However, Antarctica is also the world's largest & longest-lived glaciovolcanic province. Although it is counterintuitive that volcanic ('hot') rocks can inform us about past ice sheets, we now know that every subglacial volcanic eruption preserves an astonishingly accurate 'snapshot' of the ice coeval with those eruptions, and the study of volcanism under ice (glaciovolcanism) is one of the fastest growing new areas of geological science. Recent glaciovolcanic studies have addressed the thermal regime controversy and a solution may now be in sight: that the East Antarctic Ice Sheet (EAIS) did not undergo a single step change after all. In fact it was (and remains) a polythermal ice sheet, composed of a geographically and temporally varying patchwork of warm- and cold-based ice. Whilst the EAIS has become progressively colder and presumably more stable with time, such an ice sheet will be very hard to model and predict successfully.

SESSION: TERRESTRIAL & MARINE BIOLOGY

Walrus and bearded seals go with the floe
Presenter: Olivia Lee
University of Alaska, Fairbanks, USA

Abstract: Sea ice plays an important role for ice-obligate Arctic species such as walrus and bearded

seals particularly during spring when it is an important platform for moulting, and nursing young. Due to the difficulty in observing marine mammals during this period it is difficult to monitor animal behaviour and sea ice use during the spring migration when animals migrate to summer foraging grounds. Through a collaborative research partnership with Alaska native subsistence hunters, we used a combination of remote sensing sea ice data and local hunter observations to track spring migratory behaviour of walrus and bearded seals. Hunter observations provided insight into the timing of animal migrations, animal behaviour and local-scale sea ice conditions related to hunters' access to habitat. Satellite data supplemented local-scale observations and we allowed us to quantify favourable regional-scale sea ice conditions affecting bearded seal and walrus movements north. The shared hunter, walrus and beaded seal use of sea-ice is important for future resource management planning that should consider the impacts of changes in sea ice conditions and potential increases in shipping through Bering Strait.

Olivia Lee[1], Hajo Eicken[1]
[1]University of Alaska Fairbanks

Ecology of arrow worms in the Arctic – are they really the "tigers of the plankton"?
Presenter: Jordan Grigor
Takuvik Joint International Laboratory, Université Laval (Canada) - CNRS (France) and Québec-Océan, Université Laval, Québec, Canada

Abstract: Organisms living in seasonal environments schedule their activities to annual cycles in prey availability and predation risk. These cycles may be particularly pronounced in pelagic ecosystems of the Arctic, where seasonality in irradiance and thus primary production is strong. Whilst the annual activities of several herbivorous zooplankters are now relatively well-documented, much less is known about the strategies of omnivores and carnivores, including chaetognaths. Also known as arrow worms, these gelatinous animals are numerous in high-latitude seas, where they may be important prey for the early life stages of some fish. Some have considered chaetognaths as strict predators, based on a few laboratory studies observing ferocious feeding on copepods, and features of their anatomy such as hooks and teeth. Many others report that net-caught specimens only rarely contain prey in their guts, and sometimes contain algae or detritus, raising critical questions on their true feeding behaviours and ecological role. Here we document the life histories of three Arctic chaetognaths: *Parasagitta elegans, Eukrohnia hamata* and *Pseudosagitta maxima*, based on a year-round sampling campaign in the Canadian high-Arctic. We focus on diet, distribution, and on the timing of key life cycle events such as reproduction and growth. *P. elegans* and *E. hamata* are shown to be the most abundant chaetognaths above 200 m and 500 m respectively, reaching maximum body lengths ~42 mm, whereas *P. maxima* individuals, typically residing at bathypelagic depths may grow much larger. Whilst both *P. elegans* and *E. hamata* reproduced between spring and summer, *E. hamata* also reproduced during winter. We discuss the potential role of an oil-filled body organ that occurs only in *E. hamata* individuals. Finally, in contrast to the accepted paradigm that chaetognaths are stringent carnivores, we present additional evidence for detritivory and omnivory as additional feeding modes in Arctic species.

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Spatial distribution of the macrobenthos at the Mackellar Inlet, King George Island: Explanations integrating the systematic and trophic grouping approaches
Presenter: Bernabé Moreno
Cientifica del Sur University, Lima, Peru

Abstract: The Admiralty Bay – King George Island is one of the most sampled sites within the WAP, and its macrobenthic communities have been subject to several studies. Its structure has usually been evaluated under a systematic approach; yet, this scope doesn't always reveal the processes that can be occurring in the area under study. Instead, the use of a functional trophic group classification can provide the suitable means to associate them with the environmental parameters and their dynamics. In the present study, the macrobenthos composition of Mackellar Inlet was analyzed at 11 sampling stations across the glacio-marine fjord during the austral summer of 2013 using the integration of both approaches. The Functional Trophic Groups consisted on the junction of 5 life-traits components: 1) Feeding mode, 2) Source and 3) Type of food, 4) Motility, & 5) Habitat. Species α–diversity was higher from the outer to the inner sections of the fjord. Depositivores were the most abundant followed by detritus- and filter-feeders. In the stations were the deposit-feeders didn't dominate (those more distanced from the Domeyko glacier) filter-feeders and predators did. Polychaetes were the most abundant systematic group, followed by the amphipods and bivalves. The sampled stations ranged between 10 and 55 m. deep. According to the LinkTree & RegressionTree routines, depth didn't seem to be the most important variable. Instead of it, Oxygen and Temperature were the main factors to differentiate the assemblages. Also, it was hypothesized that the currents patterns would be influencing through the oscillations of the above mentioned variables, and previous research supports this. The present study shows that the use of a functional approach could be useful when applying it to different spatiotemporal scales studies, allowing a better understanding on how the communities might change due to variations of the environmental parameters.

Bernabé Moreno[1], Pacherres, Cesar O[1]., & Indacochea, Aldo[1].
[1]**Cientifica del Sur University, Lima, Peru**

Automatic zooplankton species identification for the greater North Water Polynya region
Presenter: Moritz S. Schmid
Takuvik Joint International Laboratory, Université Laval (Canada) - CNRS (France) and Québec-Océan, Université Laval, Québec, Canada

Abstract: Zooplankton are a key element in Arctic marine food webs. Linking the primary producers with higher trophic levels (fish, marine mammals, seabirds). Traditional methods used to capture zooplankton (i.e. nets) integrate or roughly stratify the water column, and do not provide the necessary spatial resolution for studying the dynamics of the fine-scale vertical distribution of zooplankton taxa with the phytoplankton and associated environmental parameters. The lack of resolution from traditional zooplankton samplers can be overcome with the "Lightframe On-sight Key species Investigation" (LOKI) system, a camera system capable of in-situ optical imaging of zooplankton species. Moreover, the statistical analysis of imaged zooplankton has many advantages over traditional analysis of zooplankton samples, such as the analysis of all imaged particles instead of sub-sampling and a known error of the model, ultimately making results more reliable and transparent. These results can then cater towards ecosystem models and potentially decrease their uncertainty. Here, we present a machine learning model, based on LOKI imagery, which allows for an automatic identification of zooplankton species and their developmental stages in northern Baffin Bay, the North Water Polynya and adjacent ecosystems, although such a model can easily be extended. Three different model validations including a direct comparison to the biological sample show that the automatic identification model with a prediction success of over 80% has the necessary accuracy to answer ecological questions. We conclude by giving a first insight into the coupling between the vertical fine scale distribution of important mesozooplankton species with the vertical distribution of chlorophyll a based on data collected during the 2013 ArcticNet cruise onboard the CCGS Amundsen.

Moritz S. Schmid[1], Cyril Aubry[1], Jordan Grigor[1], Kevin Gonthier[2] and Louis Fortier[1]
[1] Takuvik Joint International Laboratory (U. Laval, Canada & CNRS, France) and Québec-Océan, Département de Biologie, Université Laval
[2] Département de Biologie, Université Laval

Forecasting the habitat suitability of high risk invasive species in the Canadian Arctic
Presenter: Jesica Goldsmit
Université du Québec à Rimouski, Institut des sciences de la mer de Rimouski (UQAR/ISMER), Quebec, Canada

Abstract: An increase in Arctic shipping activity, resulting from global warming and resource exploitation, is expected to increase the risk of aquatic invasive species (AIS) introductions in the region. We examined at a Canadian Arctic regional scale the predicted potential spatial distributions (habitat modelling) for a subset of higher risk AIS for current and projected environmental conditions under climate change scenarios. Results of habitat modelling under current environmental conditions showed that the Hudson Bay and Beaufort Sea regions provide suitable habitat for species such as the red king crab (*Paralithodes camtschaticus*), the soft shell clam (*Mya arenaria*) and the periwinkle

(*Littotina littorea*). Results of projected habitat modelling under future scenarios showed an increase of habitat suitability for these last species, together with new suitable habitat for species such as the green crab (*Carcinus* maenas), the Japanese skeleton shrimp (*Caprella mutica*), the bay barnacle (*Amphibalanus improvisus*), the coffin box bryozoan (*Membranipora membranacea*) and the orange sheath tunicate (*Botrylloides violaceus*). All species showed a positive pole-ward shift through the future. This approach will aid in the identification of present and future high-risk areas and AIS in response to a changing climate.

Jesica Goldsmit[1], Kimberly Howland[2], Guillem Chust[3], Ernesto Villarino[3], George Liu[4], Jennifer Lukovich[4], David Barber[4] and Philippe Archambault[1]

[1]Université du Québec à Rimouski, Institut des sciences de la mer de Rimouski (UQAR/ISMER), Quebec, Canada
[2]Fisheries and Oceans Canada, Freshwater Institute, Winnipeg, Canada
[3]AZTI-Tecnalia, Marine Research Division, Sukarrieta, Spain
[4]University of Manitoba, Faculty of Environment, Earth, and Resources, Winnipeg, Canada

SESSION: CULTURAL, POLICY, EDUCATION & HISTORY

From Winds to Sea Ice: A Historical Perspective on Global Climate
Presenter: Julianne Yip
McGill University, Quebec, Canada

Abstract: In 1922, meteorologist WG Kendrew wrote: "between the Tropics and the Poles the weather is so variable…that it is difficult to form a conception of the climate unless it be the idea of something very changeable.'" (Kendrew 1922). As Kendrew's comments indicate, assumptions that we take for granted today about climate—as a global and interrelated thermodynamic system—was neither given nor self-evident less than a century ago. In fact, the idea of a global climate is a relatively recent achievement (Edwards 2010). In this presentation, I draw on Paul Edwards' (2010) historical account to illustrate how climate as a single, global unit came into being and suggest implications of this idea for cultural anthropology today. In particular, I examine major conceptual developments in the history of climate science, including: 1) the creation of a physical framework; 2) the invention of computational techniques and technologies; and 3) the invention of global circulation models. To add to Edwards' argument, I argue that these innovations gave rise to an understanding of the planet as a system of interrelated geophysical components, which prepared the grounds for the entry of Arctic sea ice into scientific investigations of global climate. After outlining the emergence of global climate as an object of scientific investigation, I discuss how this idea puts into perspective key anthropological concepts, including 'culture,' 'scale,' and 'global/local' divides. This presentation grew out of fieldwork at the University of Washington's Polar Science Center (PSC) in Seattle, WA where I have started to follow a project entitled "Extreme summer melt: Assessing the habitability and physical structure of rotting first-year Arctic sea ice." The lead Principal Investigator of this project is Dr. Karen Junge, along with Co-Principal Investigators Dr. Monica Orellana and Dr. Bonnie Light. Dr. Carie Frantz is the Postdoc supported by this project.

Brazilian initiative to psychological interventions in Antarctica
Presenter: Paola Barros-Delben
Universidade Federal de Santa Catarina, Brazil

Abstract: The Brazilian Antarctic Program (PROANTAR) conducts scientific missions annually, providing logistical support to an expedition member attending the most extreme environment in the world. However, the psychological work recommended by SCAR, is limited to screening a group that furnishes the Comandante Ferraz Station, who are the military which remain for a period of one year in Admiralty Bay. This work aims to recognize advances in the field of Polar Psychology, the panorama of the interventions in the international scene and the possible directions of Brazilian investments in attention to the psychological health of the participants of the expeditions. In this qualitative study, we analyzed 23 articles published between 2009 and 2013, applied interviews and questionnaires in 15 male subjects aged between 26 and 54 years. The results of the reports indicate, in Brazil, manifestation of clinical demands, as ideation and suicide cases, symptoms of depression and anxiety, cognitive impairments and changes in the circadian cycle, emerging as the most significant. In other countries the SOAP, a psychological assessment battery to check expedition members, is used by default, considering aspects of the personality and socio-demographic data of candidates, seeks to recognize predispositions and susceptibilies of individuals. There are several works from the collection of biological information, such as analysis of vitamin D and cortisol levels, related to depressive symptoms and stress, respectively. Investigations of the biological rhythm changes and their effects on emotional, behavioural and cognitive characteristics are common, with experiments that reduce the impacts of excess or shortage of sunlight. The findings are capable of preventive actions or interventions that tend to reduce the generated damages or aggravation in the missions to Antarctica so that the resources required to Brazil are minimal. The health care and security proposed to expedition members and psychological scientific research in PROANTAR complies with the Brazilian policy include emerging areas of research in Antarctica.

Paola Barros-Delben[1], Lucas Sousa Sombrio[1], Roberto Moraes Cruz[1]
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Exploration of Utility and Expansion of Indigenous Knowledge within the Seasonal Ice Zone Observing Network (SIZONet) Local Observation Program Database: Pilot in Barrow, Alaska of the North Slope Borough
Presenter: Irene Holak
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Abstract: My master's project aimed to bring scientists, schools, and Indigenous communities together on exchanging knowledge using a model of an online database to promote integration of Indigenous knowledge into local, rural classrooms. The master's project was created in part to augment and enhance the goals of the local observation database associated with a collaborative local observing network called Seasonal Ice Zone Observing Network (SIZONet) program, which was used as the exchange of TEK and SEK example. The focus of the SIZONet Local Observation program is on potential hazards of the ice environment and weather affecting the vulnerability of Native communities. The SIZONet Local Observation program is in its tenth year of monitoring along the Alaskan Indigenous Iñupiat and Yu'pik coastal communities. The SIZONet Local Observation program database (SIZONet database) holds traditional knowledge of the ice environment, weather, and subsistence-related activities since 2006 (Apangalook et al. 2013). This database continues to capture local observations by local observers participating in the program. Thus, this master's project set out to explore: 1) the use of the SIZONet database as a resource to the community and its greater utility within the NSBSD through interviews and feedback; 2) existing knowledge in the database on terms drawn from three Western concepts of food security (food availability, feasibility of accessing food, and utilization of food) through a database analysis; 3) using the framework from the SIZONet database and content for a pilot project with Eben Hopson Middle School and Barrow High School involving a student-lead, place-based sea ice observation database (SIOD) using the Microsoft Excel platform. To increase resource value of the program's database, volunteer female and male community members of Barrow were interviewed to provide feedback and suggestion while improving female gender knowledge and perspectives on food knowledge.

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To the Extremes! A Teacher Research Experience Program in the Polar Regions
Presenter: Sarah Bartholow

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Abstract: PolarTREC–Teachers and Researchers Exploring and Collaborating, a teacher professional development program, began with the International Polar Year in 2004 and continues today in the United States. In 2007, the National Science Foundation designated PolarTREC as potentially transformative, meaning that the "research results often do not fit within established models or theories and may initially be unexpected or difficult to interpret; their transformative nature and utility might not be recognized until years later." PolarTREC brings U.S. K--12 educators and polar researchers together through an innovative teacher research experience model. Teachers spend three to six weeks in remote arctic and Antarctic field camps. Since 2007, over 100 teachers have been placed in field experiences throughout the Arctic and Antarctic and with half of them participating in field experiences in Antarctica. During their experience, teachers become research team members filling a variety of roles on the team. They also fulfil a unique role of public outreach officer, conducting live presentations about their field site and research as well as journaling, answering questions, and posting photos. Evaluation data collected over the past eight years on program participants shows that PolarTREC has clearly achieved it goals and strongly suggests programs that link teachers and researchers can have the potential to transform the nature of science education. By giving teachers the content knowledge, pedagogical tools, confidence, understanding of science in the broader society, and experiences with scientific inquiry, participating teachers are using authentic scientific research in their classrooms. Not surprisingly this has also led to increases in student interest and knowledge about the Polar Regions. In this presentation, we will highlight the best practices of teacher research experiences as well as discuss why it is vital to have teachers and researchers work together to communicate science to the broader public.