Final category: 2. Environmental protection, including climate change

21

Circum-Arctic Organic Pollution Issues - New challenges in a changing Arctic

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Theme

2. Environmental protection, including climate change

Abstract text

For several decades now, persistent organic pollutants (POPs) have been investigated and monitored in Arctic environments. The early studies on POPs in the Arctic atmosphere revealed long-range atmospheric transport (LRAT) as one major transport pathways into the Arctic. This, in combination with effective bioaccumulation of these lipophilic contaminants, explains for many POPs the very high concentration levels (still) found in Arctic top predators.

In recent years, highly sensitive trace analytical methods allowed the reliable identification and quantification of a largely increasing number of contaminants of emerging concern in the Arctic environment. These new research on contaminants of emerging Arctic concern (CEACs, including microplastics = MP) revealed that not only LRTAP is an important pathway for anthropogenic contaminants into polar environments. Also, potential local contamination source and the combination of marine, atmospheric, and ice-associated Long-range transport and local sources needs to be considered for a complete regional environmental pollutant associated risk assessment.

The session on “Circum-Arctic organic pollution issues” invites experts and scholars to present their research findings on all aspects of organic pollution in an Arctic context. We are expecting contributions on levels, distribution, fate, toxicity, and modelling (fate and risks). Especially early carrier scientists in organic environmental pollution research are invited to contribute.

Session format

2. Oral and poster presentations

Open or Closed Session Open

42

Voices from the frontline: Climate change, wildfires, and adaptation in the Russian Arctic (Arctic Voices)

Ivan Villaverde Canosa[1], Dr Daria Burnasheva[2]

[1]University of Leeds, Leeds, United Kingdom. [2]Arctic State Institute of Culture and Arts, Yakutsk, Russian Federation

Theme

2. Environmental protection, including climate change

Abstract text

Wildfires are becoming a growing problem across the Russian Arctic due to the effects of climate change. The number of fire events, emissions, and the total area burned have considerably increased within the last decade, driven by climate-related changes in fire weather and danger conditions. Many of the resultant impacts are significant, including disrupting food systems, damaging critical infrastructure, and affecting human health and well-being. This session will build upon the wildfire problem in Arctic Russia and focus on satellite observations, data products and tools, case studies, and systematic tracking techniques to illustrate how the climate is changing and the impacts it is having on wildfires, and how people manage change and what factors affect this. Specifically, the session will aim to (i) characterise spatio-temporal changes in fire activity; (ii) understand how climatic and non-climatic factors affect vulnerability and resilience dynamics to changing wildfires among Indigenous and local communities; (iii) and identify and examine how people and policy-makers are managing changing wildfire activity in a northern context. The session will actively involve Indigenous peoples and promote Indigenous and local knowledge and cultural values as central to efforts to understand and respond to climate change. By doing so, this session expects to raise awareness on the risks posed by climate change in the Russian Arctic; promote and champion Indigenous and local community issues; change attitudes on the need for climate action; and inform global decision making on opportunities for adapting to climate change in Indigenous and local communities.

Session format

2. Oral and poster presentations

Open or Closed Session

Open

46

The Protection of Marine Mammals in the Arctic Ocean, under an international law perspective

Manon Seyssaut

Université de Montréal, Montréal, Canada

Theme

2. Environmental protection, including climate change

Abstract text

The session will focus on legal issues of Marine Mammals Protection in the Ocean Arctic. Global warming and the development of anthropogenic activities in the Arctic Ocean contribute to influencing the Marine Mammals living conditions. The focus is on migratory species, crossing several maritime zones provided by the Law of the Sea Convention, leading to higher vulnerability. The session aims at presenting the current context and new legal challenges for the Marine Mammals protection. Furthermore, the session will consist of a comparative assessment of international legal instruments, ending with an open discussion on solutions.

Session format

1. Oral presentations only

Open or Closed Session

Open

Final category: 2.1. Climate change and the Arctic Environment

6

Developing co-operation between UArctic universities in biodiversity education

Elina Oksanen

University of Eastern Finland, Joensuu, Finland

Theme

2.1. Climate change and the Arctic Environment

Abstract text

Biodiversity is a prerequisite for the well-being of the planet and people, as well as for sustainable development. Globally, biodiversity is declining at an alarming rate due to the unsustainable use of natural resources, climate change, the fragmentation of ecosystems, the spread of invasive species, the destruction of habitats and other human activities. Arctic areas, however, are exposed to rapid warming leading to major changes in ecosystems composition, loss of Arctic species and spreading of new plant, insect and animal species from south. Change in biodiversity can have profound impact on indigenous people and societies in the north. Biodiversity should be part of all decision-making in society and have great impact for example on policy making, on economics, on culture and on land-use planning. In order to be able to take biodiversity into account comprehensively, education and diverse co-operation in educational planning are needed.

The aim of this session is to present the current state of biodiversity-related education in UArctic network, and discuss further possibilities for developing courses suitable biology, environmental science, agriculture, forestry and geography students. The areas of strength of different universities are discussed and blind spots in the education of biodiversity are identified.

Example of biodiversity education network is presented from Finland, where The University of Eastern Finland, the University of Helsinki, the University of Oulu, the University of Turku and the University of Jyväskylä have launched a joint project to develop a nationwide biodiversity education network.

Session format

4. Round table discussion

Open or Closed Session

Open

15

Permafrost degradation, cryogenic processes activation: impact on environment and infrastructure in the Arctic

Alexey Maslakov, Irina Streletskaya

Lomonosov Moscow State University, Moscow, Russian Federation

Theme

2.1. Climate change and the Arctic Environment

Abstract text

Permafrost degradation is a common trend in the Arctic caused by rapid climatic changes in the past decades. This process has multiple impacts on both untouched environments and engineering objects in the Arctic. The focus of the session is consideration of the consequences of permafrost temperature increasing, active layer thickening, and consecutive exogenous processes activation. The aims of the section are a) demonstration of current changes in permafrost environments; b) definition of the general hazards for the Arctic infrastructure associated with frozen soils thaw; c) revealing effective solutions for mitigation of the negative impact from permafrost degradation.

Session format

2. Oral and poster presentations

Open or Closed Session

Open

16

Soil carbon under changing environment

Anna Bobrik, Pavel Krasilnikov

Department of Soil Science, Lomonosov Moscow State University, Moscow, Russian Federation

Theme

2.1. Climate change and the Arctic Environment

Abstract text

Soil organic matter in permafrost-affected soils plays an important role in the global carbon dynamics, because under climate change it can lead to the release of significant amounts of greenhouse gases. And of course additional information about carbon storage and chemistry is required to provide a more comprehensive understanding of the dynamics of soil carbon in high-latitude regions. Particular attention to the carbon cycle in the unique and vulnerable ecosystems of the Arctic will be paid in the context of the development of the project of the Ministry of Education and Science of Russia to create a network of carbon polygons, which will ultimately contribute to decarbonization in the country. Although environmental changes are expected to lead to an increase in greenhouse gas fluxes between soils and the atmosphere, the factors regulating the decomposition of organic matter in the active layer and melting of permafrost have not been sufficiently studied. Our session aims to discuss the transformation of organic matter of permafrost-affected soils, caused by climate change and anthropogenic action in Arctic region, as well as greenhouse gas emissions.

Session format

2. Oral and poster presentations

Open or Closed Session

Open

53

Urban Climate and Air Quality in Arctic Cities. Research and Education

Pavel Konstantinov

Lomonosov Moscow State University, Moscow, Russian Federation

Theme

2.1. Climate change and the Arctic Environment

Abstract text

The Arctic has rapidly urbanized in recent decades with 2 million people currently living in more than a hundred cities north of 65°N. These cities have a harsh but sensitive climate and warming here is the principle driver of destructive thawing, water leakages, air pollution and other detrimental environmental impacts. High quality and density urban meteorological datasets are required to monitor thawing processes in urban soils, properly assess and project climatic trends in human comfort, air quality and weather extremes.

This session is designed to link together urban climate and urban air quality research activities in Western and Eastern Arctic and establish commun educational programs related to this topic.

We welcome studies that use theory, observations, model experiments to understand the nature of urban climate and air quality in high latitudes. We will be also happy to accept reports, ideas and projects of topic-related educational events in Arctic region.

Session format

2. Oral and poster presentations

Open or Closed Session

Open

54

Keepers of the Shy Place: How St. Paul Island, Alaska, protects its ecosystem against the threat of marine debris pollution

Veronica Padula[1], Lauren Divine[1], Herminia Din[2]

[1]Aleut Community of St. Paul Island Tribal Government, St. Paul Island, USA. [2]University of Alaska Anchorage, Anchorage, USA

Theme

2.1. Climate change and the Arctic Environment

Abstract text

Marine debris is ubiquitous across the global ocean and is an increasing threat to human health, economies, habitats, and wildlife. In the United States, action plans to address marine debris issues are being developed at local to national scales. Marine debris is not a new problem in Alaska, as it has been observed there since at least the 1970s (Protection of the Arctic Marine Environment, 2019). Coastal communities in Alaska often do not create the marine debris impacting their ecosystems, some of which originates far from their communities. However, they often bear the brunt of the marine debris issue and are left with the responsibility of cleaning it up. Additionally, they are not often included in the marine debris conversation, although they witness the impacts of marine debris on their homes and livelihoods firsthand. Thus, the detrimental effects of marine debris are not only an ecological problem, but an issue of environmental justice.

Here we present how the community of St. Paul Island, Alaska, located in the central Bering Sea, has taken actions to tackle the marine debris issue to protect their homeland and move towards finding environmental justice. These actions include local ordinances to reduce pollution, marine debris cleanups, collaboration with local industries to prevent pollution, education and outreach, art activism and participation in marine debris action planning for the state of Alaska. Collectively, these efforts truly show how community members are the “Keepers of the Shy Place,” and continue to protect St. Paul Island.

Session format

2. Oral and poster presentations

Open or Closed Session

Closed

59

Arctic research on land-atmosphere-ocean interactions and feedback in a frame of PEEX, iCUPE, AASCO, CRiceS collaboration

Hanna Lappalainen[1,2], Risto Makkonen[3], Tuukka Petäjä[1], Alexander Mahura[1]

[1]University of Helsinki, Helsinki, Finland. [2]. [3]Finnish Meteorological Institute, Helsinki, Finland

Theme

2.1. Climate change and the Arctic Environment

Abstract text

The Arctic change impact to the Northern and Arctic societies is based on from the net effects of various feedback mechanisms connecting the biosphere, atmosphere and human activities. Joint Pan-Eurasian Experiment (PEEX) Program, AASCO Arctic Science Collaboration - project, Integrative and Comprehensive Understanding on Polar Environments (iCUPE) -project and EU Horizon2020 Climate Relevant interactions and feedbacks: the key role of sea ice and Snow in the polar and global climate system (CRiceS)- project session is focused in the better understanding of the feedbacks, processes and the interaction between Arctic land – ocean interface and calls for presentations on the Arctic Ocean sciences and terrestrial sciences a cross Pan-Arctic domain and a cross Arctic and high latitude domain. The aim of the session is to facilitate the Arctic research collaboration in a frame of these activities and address education and the development of Arctic research infrastructures including data availability and the climate modelling tools in as crucial assets this area .

Session format

1. Oral presentations only

Open or Closed Session

Open

60

River hydrogeochemestry and terrestrial flux of Polar regions under climate change

Sergey Chalov[1,2], Nikolay Kasimov[1], Vsevolod Moreido[3], Michal Habel[4], Jerker Jarsjo[5]

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Theme

2.1. Climate change and the Arctic Environment

Abstract text

Northern rivers transport huge quantities of water and constituents from the continents to the Arctic Ocean. Snow and ice melt in Polar regions are associated with dramatic changes in the hydrological regime and significantly enhance erosional processes. Such changes are the most important driver of the hydrological cycle of Polar rivers and dominate the fluxes of dissolved and particulate substances from land to the Arctic Ocean. Additionally, changes in water runoff influence floodplain-channel interactions, chemical delivery from catchment and lead to changes in terrestrial flux. This session aims to present studies which are devoted to mass transport phenomena in Polar regions such as continental erosion, sediment transport and water quality which are associated with changing climatic conditions and permafrost thaw. The scientists dealing with terrestrial flux and sediment transport of Polar regions are welcome to contribute to this session.

Session format

2. Oral and poster presentations

Open or Closed Session

Open

64

Climate change impacts on Arctic animals

Mikhail Soloviev

Lomonosov Moscow State University, Moscow, Russian Federation

Theme

2.1. Climate change and the Arctic Environment

Abstract text

The session will has its focus on an issue of climate change impacts on Arctic animals which currently represents one of the most intensely developing fields of the Arctic research. This session aims to characterize changes in distribution, abundance, phenology and reproductive performance of Arctic birds and mammals at different spatial scales. Several core papers are expected to present the most important findings. Regional scale will utilize data collected in 1990-2019 in the course of intensive shorebird monitoring on the Taimyr Peninsula, Siberia. On the continental scale long-term changes in the abundance and reproductive performance of Arctic birds and mammals will be analyzed using data from “The International Breeding Conditions Survey on Arctic Birds” (http://www.arcticbirds.net/), accumulated since 1989 in the database established in the Lomonosov Moscow State University, Russia. Other case studies of now evident interest can include results of the research on predators and their prey in the western Russian Arctic as well as results of long-term monitoring research in other northern countries. It is anticipated that presentations at the session will characterize the most important growth areas of climate-related animal research.

Session format

2. Oral and poster presentations

Open or Closed Session

Open

69

Alien species in the Arctic: penetration, distribution, invasive activity.

Aleksandr Egorov, Ekaterina Milyutina

St. Petersburg University, St. Petersburg, Russian Federation

Theme

2.1. Climate change and the Arctic Environment

Abstract text

The harsh conditions of the Arctic have an adverse effect on the distribution of plants and animals, primarily alien species. However, climate change towards warming and increased anthropogenic impact on Arctic ecosystems has recently led to the penetration of more alien species into them. A number of them show invasive activity. Invasive processes that occur south of the Arctic - in boreal forests, are also important for identifying potentially invasive species and understanding the mechanisms of their penetration into the Arctic. Therefore, materials on alien species in the Arctic and boreal forests are welcome.

Session format

2. Oral and poster presentations

Open or Closed Session

Open

Final category: 2.2. Prevention of emergencies

25

Climate change and the Arctic permafrost long-term monitoring system

Zhanna Petukhova

Fedorovsky Polar State University, Norilsk, Russian Federation

Theme

2.2. Prevention of emergencies

Abstract text

Large-scale climate change in the Arctic is already having a great impact on economic activity, largely due to the impact on the long-term status of the permafrost. Nowadays, the permafrost degradation is becoming a factor to be taken into account in building, industrial and environmental safety. An effective geotechnical monitoring network for perennial permafrost should be re-established to assess the impact of climate change on permafrost soils in the Arctic.

Session format

2. Oral and poster presentations

Open or Closed Session

Open

32

“Disaster and vulnerability: urban, rural, indigenous, and remote communities in the Arctic and subarctic zone”

John Tiefenbacher[1], Viacheslav Lipatov[2]

[1]Texas State University, San Marcos, USA. [2]Financial University under the Government of the Russian Federation, Moscow, Russian Federation

Theme

2.2. Prevention of emergencies

Abstract text

Disasters are not simply byproducts of exposures to extreme forces but are often determined by the biological and/or social characteristics of a population. Age, income, race, ethnicity, gender, religious affiliation, disability, and other features of people may magnify the impacts of hazards. Such vulnerabilities make some more likely to suffer than others who are equally exposed. Vulnerabilities may complicate evacuation, sheltering, rescue, provisioning, and recovery in times of disaster. This session includes research endeavoring to understand the vulnerabilities of Arctic and subarctic populations in urban, rural, indigenous, and remote communities that complicate emergency and disaster management. The session focuses on studies conducted within any region or any setting within the Arctic and subarctic zone. It emphasizes the changing patterns and dimensions of disaster risk due to environmental changes produced by global warming. The session also includes natural and associated human-induced disasters connected with cold conditions: boreal forest wildfires, ice jam-caused flooding, extreme cold and blizzards, complex ice conditions, and melting permafrost.

Session format

1. Oral presentations only

Open or Closed Session

Open

39

Legal provision of environmental safety of floating nuclear power plants in the Arctic

David Baramidze

Udmurt State University, Izhevsk, Russian Federation

Theme

2.2. Prevention of emergencies

Abstract text

Long-term projects to develop remote Arctic regions of Russia and the world will require a developed energy infrastructure. Floating nuclear power plants (hereinafter - FNPP) can be used to meet the demand for electricity. Russia has the only nuclear installation located in Chukotka, and it is planned to build several more facilities. Taking into account the natural and climatic features of the Arctic, its vulnerability to anthropogenic loads, the task of ensuring the environmental safety of such complex nuclear facilities in Arctic conditions is on the agenda. International legislation practically does not contain a special legal and institutional framework for FNPP. For example, what should be understood by such an object? Does a floating nuclear power plant belong to the "nuclear installation" defined by the 1977 Vienna Convention on Civil Liability for Nuclear Damage? The use of FNPP outside the framework of international legal regulation can lead to intractable problems of non-compliance with international standards for ensuring nuclear and environmental safety, as well as the fundamental principles of preventing transboundary impacts. The answer is seen in the development and adoption of the foundations of international legal regulation of FNPP in the Arctic region based on regional international agreements of the Arctic Council and the elaboration of uniform standards for the environmental safety of such facilities.

Session format

2. Oral and poster presentations

Open or Closed Session

Open