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Siberian Environmental Change Network - a new and developing network for Detecting, Predicting and Responding to Rapid Environmental Change in Siberia and its societal consequences

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Introduction

Understanding the scale and pace of change in the Arctic is universally recognised as vital in order to minimise the negative effects of that change upon the environment and the people, including Indigenous people, who live there.

That need is especially important in the Russian Arctic, and in particular across Siberia which makes up the largest single land mass of inter-connected Arctic, sub-Arctic and related ecological systems. Rapid environmental change in this region is already having significant environmental, social and economic consequences. Northern Siberia is already experiencing mean temperature increases beyond those agreed as limits in Paris.

However, although research activities of Russian scientists address these challenges, the activities are largely diverse, unconnected and uncoordinated. Consequently, visibility of these activities is relatively low on the Global horizon and synergies of working together are often missed.

Furthermore, international interest in environmental processes and activities within Siberia cannot find a single point of entry into relevant information and identifying partners is difficult. Therefore, it is absolutely relevant to consolidate activities and mobilise appropriate experience within Siberia to build capacity for understanding environmental change and its societal relevance within the Russian Federation and globally. The first and foremost university in Siberia, TSU, will provide the hub of the network.

This reviewed article tries to outline important new steps that Siberian researchers are taking, in partnership with international colleagues, to record, predict and respond to these changes.

Discussion

In 2016 a network of Siberian Institutions and international experts met in Tomsk, Siberia, to inaugurate the "Siberian Environmental Change Network" (SecNET) (www.secnet.online/home-eng.html) to contribute to resolving the above issues. SecNET is led by Tomsk State University, Russia, in partnership with INTERACT, University of the Arctic, USA NEON and the Canadian Mountain Network. Participants include researchers from Barnaul, Yakutsk, Krasnoyarsk, Surgut, Salekhard and beyond, altogether 11 Siberian Universities, Institutes and research Centres.

The scientific agenda of SecNet is to meet the challenges of: - the changing regional climate; - water shortages; - the risks of biodiversity degradation; - developing ecologically sustainable land use, and - improving economic, social and cultural quality of life.

SecNET's aims are:-

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- To link world-class international and Russian institutes researching Siberia
- To link multiple disciplines and approaches
- To provide a "one-stop-shop" for information on Siberia
- To communicate knowledge to educators, researchers, policy-makers and the public

Topics represented include natural resources, history/archaeology, geosciences, climatology, hydrology, glaciology, permafrost, snow, biodiversity, ecology, and biogeochemistry. Approaches include review, observation (ground and remote sensing), environmental and ecological manipulation, modelling and networking. The latest approach is realizing as well in communication activities, which include workshops arranging.

The third international workshop of the Siberian Environmental Change Network (SecNet) was held at Salekhard on September 26st to September 30th 2018 in collaboration with the International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT). It was the third in an international series focusing on environmental issues and sustainability of the North. Previous meetings focused on networking research institutions within Siberia and launching SecNet, and improving dialogue among researchers, local people and decision makers. The societal consequences of changes in the Siberian environment and its resources are likely to have implications for the global community as well as for local residents because, for example, because of the significant land-surface – atmosphere interactions that occur there. The third workshop therefore focused on international networking in environmental research and monitoring over large geographical areas but with an emphasis on the relevance of results to Siberia, and the contributions science in Siberia could make to global activities.

The main aims of the third workshop were:

1. To intensify the cooperation among environmental research infrastructures and research and monitoring networks in the pan-Arctic region, including Siberia, to maintain science-based sustainable development of the territory and to enhance Science Diplomacy;

2. To derive synergy among major international organizations to achieve an holistic understanding of complex northern terrestrial environmental changes;

3. To learn from the dialogue between organizations and infrastructures:

a) best practices of co-designing long-term trans-disciplinary research and data-management, particularly their societally relevant aspects;

b) how to identify the relevant knowledge and skills to develop and promote environmental change adaptation strategies for decision makers of different levels;

c) how to make networks sustainable and more effective by increasing awareness of them among researchers and institutions, particularly in Siberia.

The meeting was sponsored internationally: It was kindly supported by the Science and Innovation Network of the British Embassy in Moscow, Tomsk State University and the EU-funded INTERACT. Also, the meeting was generously hosted by the Science and Innovation Network of the Yamal-Nenets Autonomous District. Participants included specifically invited Russian and Foreign researchers, working or planning to work in Siberia, representatives of major relevant institutions and networks, decision makers and local peoples. Altogether, more than 50 people participated, and number appropriate to stimulate discussions among all participants. However, the workshop's subject caused wide interest thematically and geographically and we had to restrict the number of participants. The participants from Russia (38) represented the vast geography of Siberia and its wide range of bioclimatic zones, from the arid areas of the Steppes to the Arctic tundra. Foreign participants came from the UK, the USA, Iceland, Finland, Czech Republic, Poland, and Portugal.

The participants represented nationally and internationally important institutions and networks. Some of the organizations and participants presented their networks and research as a background to discussions on the elaboration of the SecNET portfolio of activities and future collaborations and networking.

Early career researchers attended from Russian institutions including Tomsk State University, A. Trofimuk Institute of Petroleum Geology and Geophysics, Novosibirsk, the Institute of Monitoring of Climatic and Ecological Systems, Tomsk, and the Salekhard Arctic Research Centre

The Workshop's topics represented at the meeting included governance and networking, technology/ methodology for field research and data management, natural resources, biodiversity, ecology and paleoecology, glaciology, climatology, anthropology and social sciences, medicine, and education.

The Workshop's programme consisted of welcome addresses, introductions to the meeting, round-table introductions by the participants, overview of specific aims and methods of working, plenary reports and plenary discussions, and breakout groups to draft the outline and contents of an overall workshop resolution. The workshop was closed with suggestions for future actions and events. Some parallel discussions with Yamal Government officials were organized. The hosts kindly arranged performances and excursions to experience Yamal culture, local environmental surroundings and history. Full details of the research programme could be represented by articles, included in this issue, but to summarize, there were sessions as follows:-

1. There were a few panel discussions where different groups of participants had an opportunity to ask questions and make contributions to some important issues, both research and managerial: Interactions between Arctic and Southern networks/initiatives; Increasing relevance of networks to traditional land use and other types of sustainable northern territories development; Roles of networks in education and popular science; Interacting with decision makers/funding agencies.

2. After presenting in plenaries, the groups were mixed to form two multidisciplinary groups. Each of these groups discussed the same questions: early career scientists mobility, publication policy, visibility and the way of better using the growing number of diverse networks (a list of 170 was presented!). Each group presented its findings in plenary.

3. There was a discussion about SecNET organizational and management issues. Also, an agreement for a fourth workshop in the SecNET meeting series was reached enthusiastically.

4. A field visit to the Labytnangi Ecological Research Station was arranged. The Labytnangi Ecological Research Station (now it is called the "Arctic Research Station") is the only academic institution in the huge region of Yamal. Holding meetings in different regions and visiting different stations to learn about the specific infrastructure and specific programs, the ways of operating the stations and any possible limitations, is an important part of SecNET's (the organizer of the workshop) scientific policy. Such experiences significantly aid the development and implementation of best practices for running research stations and their programs, leads to better collaboration and greater understanding of research challenges, and in an international context, contributes to Science Diplomacy.

Conclusion

A variety of outcomes were achieved, both tangible and intangible, and at different geographical scales. However, some outcomes are still being developed and the long-term legacy cannot yet be assessed although it will be significant for local sustainable development, environmental protection and international collaboration and Science Diplomacy.

Some immediate workshop results can be described here**:**

I. Strategic agreements between different players were achieved in the following areas: a) to organise a joint, complex international research expedition from the mouth of the Ob River along the coast of the Kara Sea; b) to renew and coordinate joint observations of representative glaciers in the Polar Ural and Altai Mountains.

It is important to emphasise that some of these preliminary agreements were based on the long-term cooperation of institutes and groups of people and also are the results of joint SecNET activity with strong contributions from foreign partners during the last years.

II. SecNET infrastructure development through the establishing a new joint research site and through including the research stations of not currently a formal participants of the Network.

III. Joint research and educational activity which were described for the future period.

Within the Workshop, networking was very successful.

Although there were many examples, some of the more tangible ones were: -

1. SecNET and INTERACT (and Sheffield University) had an invitation from the Vice-Governer of the Yamal-Nenets Government to participate and to make a contribution to the International Circumpolar Mass-Media Forum which represented Science Diplomacy.

2. The new international group of UK and Russian scientists in the DIMA group made new contacts and also planned to seek funding from INTERACT to develop their research.

3. Contact was made between the European Long-term Ecosystem Research Network and SecNET.

The meeting was very successful in many respects. Already, networking has been improved, new collaborative projects have been formulated, infrastructure development has been promised, visibility and outreach have been achieved (possibly massively and globally in terms of the BBC involvement) and Science Diplomacy has been further developed.

The Workshop concluded with practical recommendations, including the need for fundamental baseline monitoring of environmental change across the region; the value of sharing monitoring protocols across the Arctic to ensure consistency; the need for more stations and research sites in key areas; and recognising the value of closer international cooperation, by implementing practical steps to encourage international researchers to partner with local researchers.

The greatest outcome of this and former meetings will be future collaborative science development, a greater international understanding of local environment issues, their societal importance and the improved dialog among researchers, local peoples and decision makers. On again, participants at the workshop enthusiastically resolved to continue to develop collaborations within Siberia and beyond.

Acknowledgements

Thanks to generous support from the Tomsk State University Competitiveness Improvement Programme, the Science and Innovation Network of the British Embassy, Moscow, and in-kind support from INTERACT, this important work has started!

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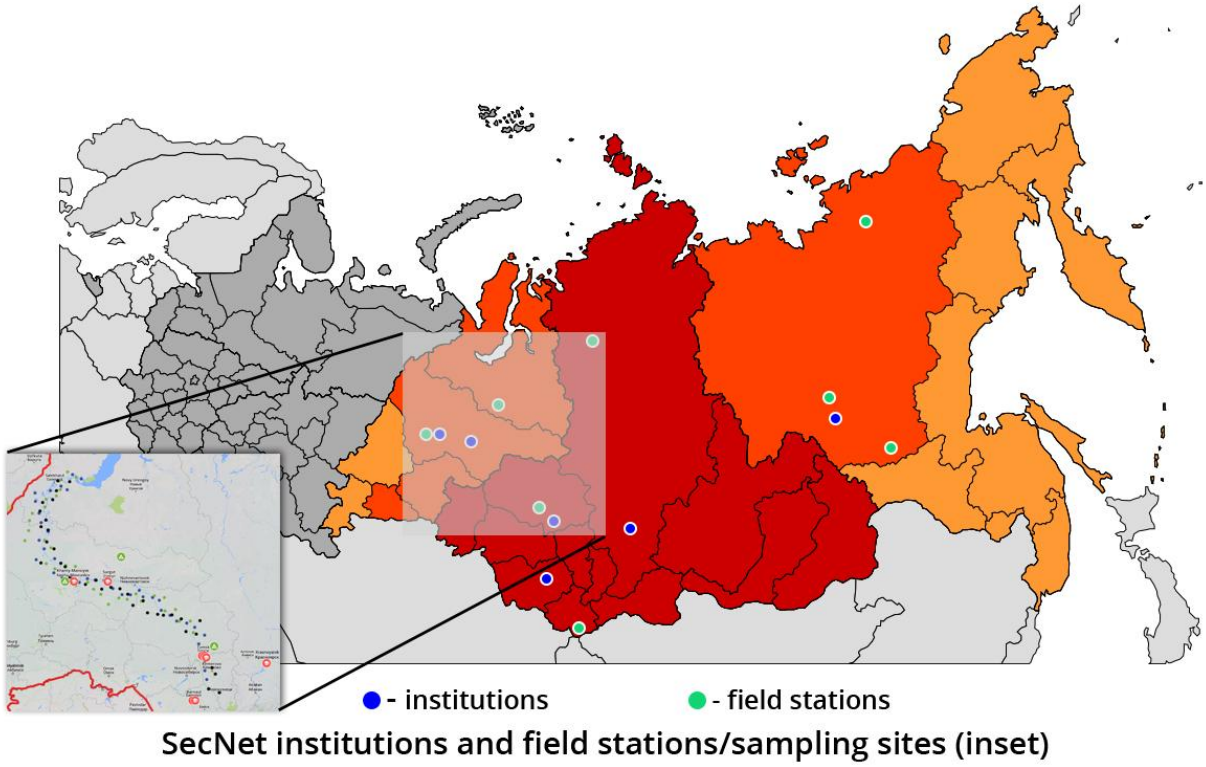

Figure 1. Map of Siberia showing scale of the landmass. The background is the autonomous regions of Siberia on which are shown SecNET Institutions and field stations as well as additional INTERACT research stations. The insert shows long-term sampling sites along the River Ob megatransect.

Annex I

List of the Institutions-participants

Russian Universities

1. Tomsk State University;
2. Tyumen State University (e.g. The Institute of Ecology and Rational Use of Natural Resources);
3. Altay State University in Barnaul;
4. Surgut State University in Surgut, Tyumen Region (e.g. The R&D Institute of Northern Ecology);
5. Yugra State University in Khanty-Mansiysk,
6. Saint Petersburg State University (for the first time in the series of workshops).

Russian Institutions belonging to the Siberian and Ural Branches of the Russian Academy of Sciences:

7. Institute of Monitoring of Climatic and Ecological Systems, Tomsk;
8. Institute of Water and Environmental Problems, Barnaul;
9. Institute of Ecology of Plants and Animals, Ekaterinburg;
10. Institute of the Earth's Cryosphere, Tyumen;
11. A.M. Obukhov Institute of Atmospheric Physics, Moscow;
12. A. Trofimuk Institute of Petroleum Geology and Geophysics, Novosibirsk;
13. Institute of Sociology RAS, Moscow,
14. Hermitage Museum of St. Petersburg (anthropology),
15. Yamal-Nenets Autonomous District Government - Science and innovation Department and the Department of International Affairs,
16. Arctic Research Centre of the Yamal Nenets Autonomous District in Salekhard and Nadym.

Foreign Universities and institutions

18. UK Natural Environment Research Council Arctic Office,
19. NERC Centre for Ecology and Hydrology, Edinburgh,
20. Sheffield University,
21. BBC News media-holding company, (scientific editorial board)
22. Natural History Network, Bristol – all from UK;
23. Oulu University, Finland,
24. Polar Biology Centre of the University of South Bohemia, Czech Republic,
25. Institute of Geography, Polish Academy of Science, Poland,
26. Lisbon University, Portugal,
27. University of Colorado, Boulder and the Institute of Alpine and Arctic Research, USA.

Indigenous and Local Peoples

28. Association of Indigenous People “Ilebets”,
29. Association of the Indigenous Minority of the North “Yamal – to the future generations”,
30. World Reindeer Herders Association.

Major networks

31. International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT),
32. Siberian Environmental Change Network (SecNET),
33. University of the Arctic (UArctic),
34. Battelle -National Ecological Observatory Network, (NEON) USA,
35. European Long-term Ecosystem Research Network (eLTER),
36. T-MOSAiC (IASC),
37. Conservation of Arctic Flora and Fauna (CAFF),
38. Herbivory Network,
39. WinterNet,
40. DIMA.

WinterNet and DIMA are UK-led networks and DIMA is supported by the Science and Innovation Network of the British Embassy so this meeting networked to some extent UK initiatives.