

# **Anthropogenic Heat Islands in the Arctic – Windows to the Future of the Regional Climates, Ecosystems and Societies (HIARC)**

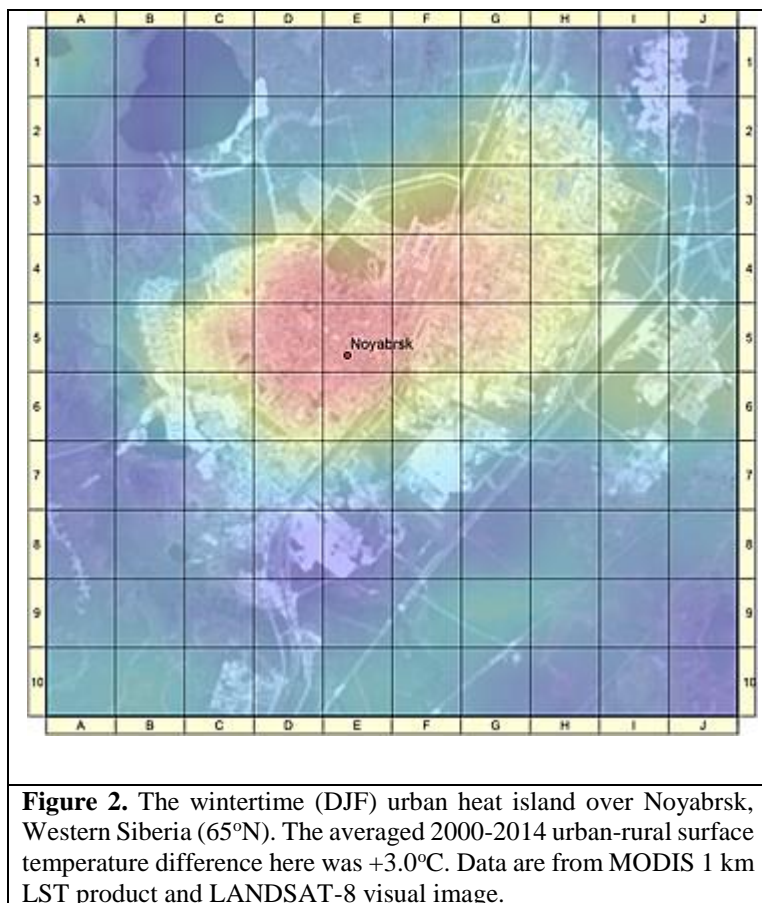
The First Report to the Belmont Forum Secretariat  
October, 10, 2015



**Figure 1.** The HIARC consortium agreement signed during the 1<sup>st</sup> HIARC meeting in Sankt-Petersburg, June, 29-30, 2015. Project participants (from the left side): Victoria Miles (NERSC, Norway); Martin Miles (INSTAAR, USA); Igor Esau (NERSC, Norway); Pavel Konstantinov (MSU, Russia); Anna Kurchatova (IEC, Russia); Mikhail Varentsov (MSU, Russia).

**Introduction.** The 1<sup>st</sup> HIARC meeting took place in the Nansen International Environmental and Remote Sensing Centre in Sankt-Petersburg (Russia) 29-30 June 2015 (Fig. 1). The project participants presented their current studies and research approaches. Following up these presentations, a synergy dialog has been initiated to develop in details the first year implementation plan and to agree the critical ethical and property right positions. The working materials and publications from the project are linked to the web site <http://hiarc.nersc.no>

The project participants continued their work on the project topics after the proposal submission. Thus, the some preliminary results were available for discussion already at the 1<sup>st</sup> HIARC meeting. This report provides an overview of the results available by October, 1<sup>st</sup>, 2015.



**Arctic urban heat islands.** The key feature of the HIARC project is its attention to the impact of the Arctic anthropogenic heat pollution. Regionwise, this heat pollution is the result of the Arctic amplification of the global warming. The local heat pollution in the urbanized areas is significantly larger even on the background of this amplified warming. The urban heat islands over 28 urban areas in Northern West Siberia was obtained using MODIS 1 km land surface temperature product covering 2000-2014. In addition, the field observations from deployed temperature sensors in Murmansk, Appatity and Norilsk cities were processed and analyzed (see the attached poster).

## Attachments.

1. Poster M. Varentsov et al. Investigation of urban heat island effect of Norilsk and Apatity cities in Russian Arctic with usage experimental measurements and remote sensing

## Dissemination and outreach materials.

### Presentations

- Esau, I., 2015: Paradox of the surface air cooling in response to the global warming: A role of the stably stratified PBL and free atmosphere temperature inversions, *The 2015 IGU Regional Conference "Geography, culture and society for our future earth"*, 17-21 August, Moscow, Russia
- Konstantinov, P., A. Baklanov, M. Varentsov, I. Repina, S. Shuvalov, T. Samsonov, M. Grischenko, A. Todosieva, M. Vedischev, 2015: Urban Heat Island research in Arctic region, *The 2015 IGU Regional Conference "Geography, culture and society for our future earth"*, 17-21 August, Moscow, Russia
- Chernokulsky, A., Esau, I., Bulygina, O., Mokhov, I., Semenov, V., 2015: Interannual variability of cloudiness from the end of the 19th century in the Atlantic Arctic, *The 2015 IGU Regional Conference "Geography, culture and society for our future earth"*, 17-21 August, Moscow, Russia
- Esau I. and V. Miles, 2015: High-resolution NDVI trends around urban areas of Northern West Siberia, *Arctic, Subarctic: mosaic, contrast, variability of the Cryosphere*, Tyumen, Russian Federation, July 02 – 05

- Renev E.P., V.N. Timofeev, S.A. Petrov, O.A. Simonov, A.M. Subbotin, 2015: The Use of Arctic's Biological Resources in the Agriculture of the Tyumen Region, *Arctic, Subarctic: mosaic, contrast, variability of the Cryosphere*, Tyumen, Russian Federation, July 02 – 05
- S.A. Petrov, 2015: Factors of an Environment – a Basic Part in Geomedical Researches of the Arctic Zone of the Russian Federation, *Arctic, Subarctic: mosaic, contrast, variability of the Cryosphere*, Tyumen, Russian Federation, July 02 – 05
- T.A. Fisher, S.A. Petrov, O.N. Pyak, 2015: Variability in the Life Support System of the Indigenous Population in Arctic, *Arctic, Subarctic: mosaic, contrast, variability of the Cryosphere*, Tyumen, Russian Federation, July 02 – 05
- R.Yu. Fedorov, T.A. Fisher, S.A. Petrov, 2015: Sociocultural and Psychoimmune Aspects of Adaptation Mobility of Forest Nenets Children, *Arctic, Subarctic: mosaic, contrast, variability of the Cryosphere*, Tyumen, Russian Federation, July 02 – 05

### **Publications**

- Konstantinov, P.; Grishchenko, M. & Varentsov, M. 2015: Mapping of Arctic Cities Urban Heat Island Based on the Composition of Field Meteorological Measurements and Satellite-Derived Imagery (Example of Apatity, Kola Peninsula) *Issledovania Zemli iz Kosmosa*, 3, 27-33
- Esau, I. & Chernokulsky, A. 2015: Convective Cloud Fields in the Atlantic Sector of the Arctic: Satellite and Ground-Based Observations, *Issledovania Zemli iz Kosmosa*, 49-63

### **Project websites**

The main project web site <http://hiarc.nerisc.no>