

СЕКЦИЯ 12. АРКТИКА И ЕЕ ОСВОЕНИЕ
(доклады на английском и немецком языках)

References

1. Sperry, Armstrong (1957). All About the Arctic and Antarctic. Random House. LCCN 57007518.
2. Shamil Midkhatovich Yenikeeff and Timothy Fenton Krysiak, The Battle for the Next Energy Frontier: The Russian Polar Expedition and the Future of Arctic Hydrocarbons, by Oxford Energy Comment, Oxford Institute for Energy Studies, August 2007
3. Konyshev, Valery & Sergunin, Alexander: The Arctic at the Crossroads of Geopolitical Interests Russian Politics and Law, 2012, Vol.50, No.2, pp. 34–54
4. Konyshev, Valery & Sergunin, Alexander. The Arctic at the crossroads of geopolitical interests // Russian Politics and Law, 2012. Vol. 50, № 2. P. 34-54
5. Konyshev, Valery & Sergunin, Alexander. Russia in search of its Arctic strategy: between hard and soft power? Polar Journal, April 2014.
6. Konyshev, Valery & Sergunin, Alexander: Russia's Policies on the Territorial Disputes in the Arctic Journal of International Relations and Foreign Policy, March 2014, Vol. 2, No. 1, pp. 55–83.

GLOBAL WARMING AND THE ARCTIC
D.V. Chekmenyova

Scientific advisor associate professor G.P. Pozdeeva

National Research Tomsk Polytechnic University, Tomsk, Russia

Since the Arctic region is most sensitive environment to global warming, Arctic climatic changes often are considered as the indicator of this process.

Climate changes of the Arctic include temperature rise, reduction of the sea ice area and thickness, melting of the Greenland ice sheet. It is expected that the Arctic Ocean will begin to clear completely from ice cover from the summer to 2100. It is for the first time when ice cover reduction forecasts vary significantly and the following dates are specified: 2060-2080, 2030 and even 2016. Experts also warn about a danger of release of large methane volumes, due to permafrost thaw consisting of methane hydrate. The Arctic climate changes are regularly observed and generalized by IPCC Fourth Assessment Report and Arctic Climate Impact Assessment. U.S. National Oceanic and Atmospheric Administration update regularly Arctic Report Card. Specifically, reduction of the polar ice area is fixed. This indicator minimum was recorded in September, 2012 [1].

Table

*Annual Arctic ice minimum within the period of monitoring since 2000
(fixed annually in the middle of September)*

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Yearly ice minimum/ mln. Sq. km.	6.0	6.6	5.6	6.0	5.8	5.3	5.8	4.2	4.6	5.1	4.6	4.3	3.4	5.1	5.0	4.4

Scientists are studying possible causative factors of Arctic global warming, such as direct changes related to greenhouse effect as well as indirect changes: unusual winds, temperature rise or water circulation change (for example, increase of warm fresh water inflow into the Arctic Ocean from the rivers). According to the Intergovernmental Panel

on Climate Change “daily maximum and minimum temperatures evidence that warming in the Arctic was as huge as in any other part of the world”. Reduction of the ice sea area in the Arctic leads to solar energy decrease reflected back in space, thereby accelerating reduction. Investigations have demonstrated that the recent warming in Polar Regions was due to cumulative effect of human influence; warming as a result of radioactive effects of greenhouse gases is only partially compensated by cooling through ozone layer depletion. Reliable measurements of the sea ice edge began with the advent of the artificial Earth satellites in the late 70-ies. Prior to satellites research of the region was generally carried out via vessels, buoys and planes. Ice cover reduction involves considerable annual variations. Some of these changes can be connected with such effects as the Arctic oscillation related to global warming; some changes basically are casual “weather noise” [2].

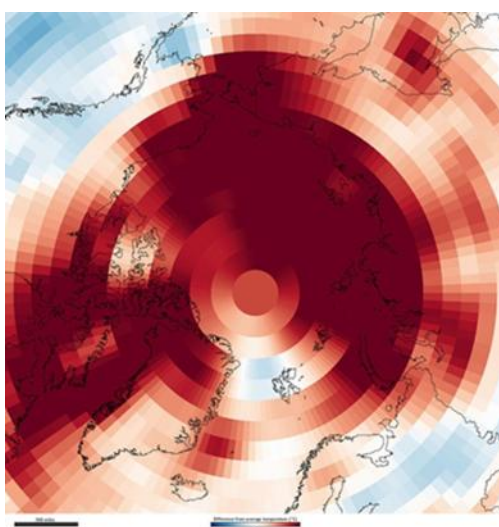


Fig. Red indicates the average annual air temperature rise more than by 3 °C from 1981 to 2010.

According to scientists forecasts, snow ice coverage and the permafrost zone will decrease, the amount of precipitation will increase averagely which is explained by more intensive ocean surface evaporation. However, in some regions amount of precipitation will become even less. Approximately the taiga zone will dislocate shift 100-200 km northwardly. Totally the Arctic climate will become warmer and more humid, gales will strengthen, and the ocean ice area will decrease. The live world of the Arctic is sensitive to climate warming. Southern types of vegetation extent are noticeable already. Further some long-standing Arctic vegetation types can be completely replaced by south ones. The timberline is moving ahead northwardly, forests and polar desert areas will be replaced by tundra vegetation. The only protection mechanism against global warming is the Kyoto Protocol by now [4].

The Kyoto Protocol is the first joint effort of the Earth states for climate control; it obliges the states to implement energy-efficient technologies and demands these technologies transfer to developing countries. However, this protocol cannot be recognized as the ultimate solution of the problem; despite greenhouse gases emissions compliance, warming will be delayed only for the period up to 6 years. Consequently, the Kyoto protocol specifications will be reconsidered and specified relatively soon [4].

СЕКЦИЯ 12. АРКТИКА И ЕЕ ОСВОЕНИЕ
(доклады на английском и немецком языках)

During investigating the issue, I have found quite an informative paper of the scientist A.V. Egoshin. Accordingly, one of the most likely scenarios determining consequences of global climatic changes, so-called a greenhouse disaster (the author of this theory is our scientist A.V. Karnaukhov).

Without using scientific terms, this theory's essence can be explained as follows: the Earth temperature will rise owing to carbon dioxide increase in the Earth atmosphere (Carbon dioxide quantity is enough great to some extent as a result of carbonate rocks decomposition).

Rapid temperature rise will cause intensive methane intake from the thawing permafrost. Given that methane is stronger greenhouse gas by 21 times, than CO₂; the Earth temperature increase will be catastrophic. If global warming follows according to the Venus scenario (consisting of 98% CO₂, the Venus temperature has increased by 400 degrees, and its temperature is about 500°C), temperature of atmospheric boundary layer of the Earth can reach 150 degrees. Even 50 °C temperature rise will adversely affect human civilization, and 150 °C temperature rise will cause death of almost all living organisms on the Earth. It should be noted that according to A.V. Karnaukhov's forecasts, temperature will increase 150 °C only in 6000 years. However, real forecasts confirm such a temperature rise in 300 years [3].

References

1. Climate change of the Arctic [Electronic resource] <https://ru.wikipedia.org/>, reference date 28.05.16 (In Russian).
2. Global warming: facts, hypothesis, comments [Electronic resource] <http://www.ecoteco.ru/library/magazine/4/ecology/globalnoe-poteplenie-fakty-gipotezy-komentarii/> free, reference date 28.05.16 (In Russian).
3. Kyoto Protocol [Electronic resource] <http://files.school-collection.edu.ru/dlrstore/f8215646-c95a-9368-af09-0abe72c6c78c/1012528A.htm> free, reference date 28.05.16 (In Russian).
4. Science and life: threatening warming [Electronic resource] <http://www.nkj.ru/archive/articles/828/> free, reference date 28.05.16 (In Russian).

**MEDICAL SERVICE IN THE ARCTIC CONDITIONS: CHALLENGES
AND PERSPECTIVES**

P.A. Dubovnikov

Scientific advisor associate professor I.A. Matveenko

National Research Tomsk Polytechnic University, Tomsk, Russia

Arctic medicine is an area of medical science that deals with functioning of the human body and its diseases in the Arctic extreme conditions in order to develop the most effective and practically acceptable measures and methods of prevention, diagnosis and treatment. Arctic medicine summarizes the achievements of various branches of theoretical and clinical medicine, including human physiology and ecology of the North.

The main objectives of the Arctic medicine are: to reveal the inner mechanisms of human body adaptation when exposed to extreme factors of the North, especially the cold and violations of photoperiod; identify the characteristics of the diseases course of organs and systems; develop methods for their treatment.