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Geopolitical significance of the Arctic Zone for Russia

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Abstract. The Arctic is of high significance for the economy, politics, ecology and technological development not only of the countries that have Arctic territories, but of the whole world as well. As long as the Arctic remained one of the most inaccessible places on the planet, scientific theories about its geopolitical and economic significance were perceived as pure abstraction. But the climate warming, melting of the Arctic ice and the development of technologies has led to the fact that all these natural resources have become accessible. Those states that develop the Arctic resources most effectively will get greater economic and hence political power. This actualizes the presented paper. The object of the research is the Arctic Zone of the Russian Federation. The purpose of the research is to reveal various aspects of the geopolitical significance of the Arctic Zone of the Russian Federation. In order to achieve this, the following interrelated problems have been solved: scientific criteria for the identification of the Arctic Zone have been presented; basic characteristics of the Arctic have been determined; economic, political and technological aspects of the Arctic geopolitical importance for the Russia have been identified and analyzed; some innovative features of management of the Arctic Zone have been determined.

1. Introduction

The Arctic has recently become an object of the research in many scientific works. It is explained by its high significance for economy, politics, ecology, technological development not only of the countries that have Arctic territories, but of the whole world.

Noting the Arctic's exceptional role in the ensuring the progressive development of the Russian Federation in the 21st century, the President of the Russian Federation V.V. Putin emphasized: “Almost all aspects of national security are concentrated here – military-political, economic, technological, environmental, and resource ones” [1]. In the President's message to the Federal Assembly in March 2018 he also noted the special importance of the Arctic in the fate of the country and defined its development vector for many decades to come [2].

The Arctic Zone of the Russian Federation (AZRF) is of particular interest for research activities. This is a macroregion with a fundamentally new approach to management.

The choice of the Arctic Zone of the Russian Federation as an object of our research is explained by the importance of this macro-region for the national economy. This special role has developed



under the impact of several key aspects that determine the state and prospects of the development of the Russian Arctic.

As long as the Arctic remained one of the most inaccessible places on the planet, scientific theories about its geopolitical and economic significance were perceived as pure abstraction. What is the use of the fact that only in the Russian Arctic Zone the cost of explored and firmly predictable reserves of natural resources is 15 trillion US dollars, if their mining operations are either impossible or commercially unprofitable because of the existing technological level? But the climate warming, melting of the Arctic ice and the development of technologies has led to the fact that all these natural resources have become not just accessible, but merchantable today. In the future, extraction costs will only go down.

The potential of new transarctic shipping routes is also growing. The Arctic ice melting and the development of technologies leads to the fact that the Northern Sea Route connecting the Western and Eastern Hemispheres is becoming more secure and merchantable.

The possibility of the Arctic's natural resources development will inevitably lead to the redistribution of economic goods between countries. The states that most effectively develop the Arctic's resources, will get greater economic, and hence political power. The presented considerations actualize our research.

The goal of the research is to identify various aspects of geopolitical significance of the Arctic Zone of the Russian Federation.

In order to succeed it is necessary to solve several interrelated problems:

- present scientific criteria for the identification of the Arctic Zone;
- determine basic characteristics of the Arctic Zone of the Russian Federation;
- reveal and analyze economic, political and technological aspects of the geopolitical importance of the Arctic for the Russian Federation;
- identify innovative features of the management of the Arctic Zone of the Russian Federation.

2. Methods

The research methodology is associated with the problems to be solved.

So, to solve the first problem and identify the Arctic Zone, we have analyzed astronomical, geophysical, climatic, physical-geographical, administrative-territorial, bioclimatic criteria, as well as a criterion of difficult living conditions of the population.

Astronomical and geophysical criteria were based on the fact that territories located north of a certain latitude are in the Arctic Zone. According to the climatic criterion, the boundary is drawn on the July isotherm with certain temperature. The physical and geographical criterion is based on the structure of landscapes and the nature of vegetation cover. The borders of the Arctic Zone in accordance with the administrative-territorial criterion are carried out taking into account the administrative borders of constituent entities and municipal units of the Russian Federation. The bioclimatic criterion is based on special climatic factors impact on the population. The criterion of difficult conditions of population's vital activity, taking into account natural, economic and technological factors is closely related to the bioclimatic criterion.

To solve the second problem, the diverse material has been analyzed. It made possible to determine a number of basic characteristics of the Arctic Zone of the Russian Federation.

The characteristics were determined based on the analysis of a large amount of scientific literature. We have paid attention to the following criteria: firstly, special climatic conditions; secondly, territorial and geographical features of industrial centers distribution; thirdly, characteristic features of the economy; fourthly, the population density; fifthly, the ratio of urban to rural population; sixthly, features of cities; seventhly, the development of industrial and social infrastructure; eighthly, self-sufficiency of economic activity and the population's life support; environmental features of the territory.

To solve the third problem, the information concerning economic, political and technological aspects of the geopolitical significance of the Arctic of the Russian Federation's has been summarized.

The Arctic was considered firstly, as the potential resource of the Russian Federation; secondly, as Russia's integrator into the world economic space, thirdly, as a basis for the country's sustainable economic development; fourthly, as a determinant of the transition of the world economy to a new technological structure; fifthly, as a zone of strategic interests of the economic security of the Russian Federation; sixthly, as a zone of strategic interests of our country's military-political security; seventhly, as an object of developed states' international influence.

To solve the fourth problem, the authors have analyzed some innovative managing features of the Arctic Zone of the Russian Federation.

We have presented the existing concepts of territorial management from the standpoint of the development of the region and the positions of the cluster's development. Then we have substantiated that the management of the Arctic Zone of the Russian Federation is based on a fundamentally different concept that has not previously been implemented in the Russian Federation.

In the process of the research, the authors have used their own achievements, as well as Russian and foreign researchers' materials concerning this subject.

3. Results and discussion

3.1. Criteria for the Arctic Zone identifying

There are several scientific criteria for the Arctic Zone identifying:

- astronomical and geophysical criteria – according to the Arctic Circle (66°33'44" north latitude);
- climatic criterion – according to the July isotherm + 10° C, i.e. including the entire tundra zone, thereby combining the Arctic geographical zone and a part of the Subarctic geographical one;
- physical and geographical criterion – in accordance with the structure of landscapes and the nature of plant cover; the Arctic's southern border coincides with the southern border of natural zones: subzones of the forest-tundra and northern light taiga, i.e. including the entire Subarctic;
- administrative-territorial criterion – along the administrative boundaries of the constituent entities of the federation and municipal units;
- bioclimatic criteria – the identifying of the Arctic Zone as a part of an absolutely uncomfortable area according to physical, geographical and bioclimatic characteristics;
- criterion of difficult living conditions of the population – a comprehensive approach taking into account natural, economic and technological factors.

When identifying the Arctic Zone of the Russian Federation, all these criteria have been comprehensively used. As a result, it included the following territories: Murmansk Region, Nenets, Chukotka and Yamal-Nenets Autonomous Areas, as well as a number of municipal units and separate territories of the Arkhangelsk Region, the Republic of Komi, Krasnoyarsk Territory and the Sakha Republic (Yakutia) (Figure 1).



Figure 1. The Arctic Zone of the Russian Federation (based on the materials from the Internet portal "Taimyr Telegraph" [3]).

3.2. Basic characteristics of the Arctic Zone

The Arctic Zone is the least developed and settled part of the Earth. The analysis of numerous scientific works, as well as the authors' research gave us an opportunity to reveal the following conditions that have formed in almost all Arctic territories:

- extreme climatic conditions, including lack of oxygen due to high latitudes; long winter; low air temperature; permafrost; permanent ice cover or drifting ice in the Arctic seas [4-6];
- remoteness from main industrial centers, focal nature of industrial and economic development of territories [7-10];
- territorial economics focused on natural resources extraction [11-13];
- low population density: with the exception of the Murmansk region and some other territories, the population density is less than 1 person per sq. km. [14-16];
- population is predominantly urban [17-19];
- cities do not have large population; most of them have the status of single-industry towns [20-23];
- in most territories there is no industrial and social infrastructure: railways and motor roads, ground Internet, etc. [24-27]
- high resource consumption and the dependence of economic activity and the population's life support on the supplies of fuel, food and essential commodities from other Russian regions [28-30];
- low stability and low self-cleaning ability of ecological systems that determine the biological balance and climate of the Earth, and their dependence even on small anthropogenic impacts [31-33].

As long as nearly all territories of the Arctic Zone of the Russian Federation have these characteristics, they can be considered basic. Basic characteristics keep a check on the development of not only Russia's Arctic, but also all Arctic territories of other countries.

3.3. The significance of the Arctic Zone of the Russian Federation for the development of Russia

The most important geopolitical significance of the Arctic Zone of the Russian Federation in the 21st century for the economic, political and technological development of Russia is predetermined by the following aspects.

Firstly, the Arctic is a depository with truly unlimited natural resources, both in volume and in the content of mineral products (Figure 2).

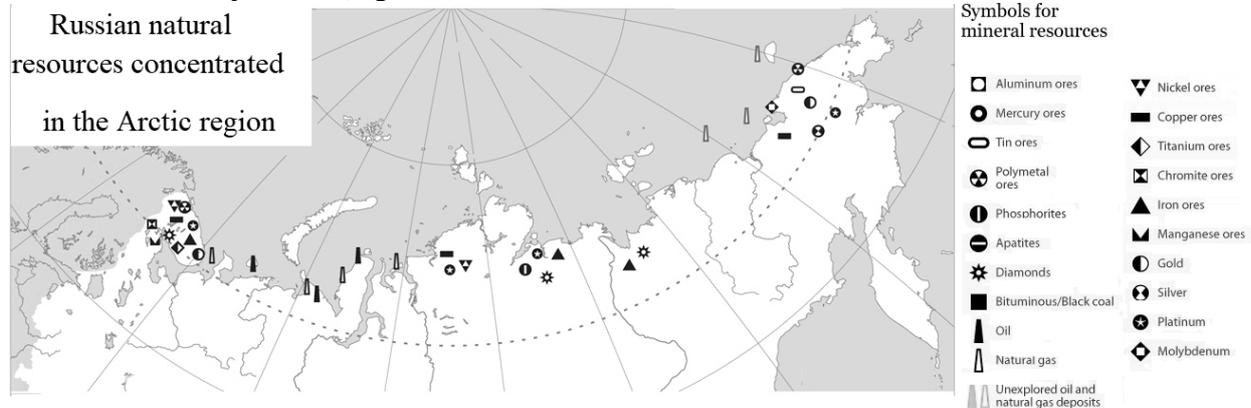


Figure 2. Natural resources of the Arctic Zone of the Russian Federation (based on materials of sputniknews.com [34]).

The Arctic continental shelf is of particular value [35]. The total reserves of fuel and energy resources of Arctic Zone of the Russian Federation exceeds 1.6 trillion. tons, while the continental shelf contains about a quarter of all shelf hydrocarbon reserves in the world [36]. Within the continental land of the Russian Arctic there are unique reserves and prognostic resources of copper-nickel ores, tin, platinumoids, agrochemical ores, rare metals and rare earth elements, significant deposits of gold, diamonds, tungsten, mercury, ferrous metals, optical raw materials and semi-precious stones. These natural resources can provide any country with resources during 21st – 22nd centuries. In addition, the Arctic region has already generated 22% of total export receivables of the Russian Federation [37].

Secondly, the Northern sea route linking the Western and Eastern hemisphere and passing through the ports of the Russian Arctic, favors the development of international economic ties, develops integration of Russia into the world economy, enhancing the competitiveness of the Russian Federation.

Thirdly, the successful and systematic development of natural resources in the territory of Russian Arctic provides the possibility of implementing a systematic and comprehensive sustainable economic development. The development of the Arctic resources will allow the Russian Federation to balance its economic development over a period of the 21st century. Features of mining operations in conditions of constant low temperatures will require the development of technologies for construction of platforms for oil and gas extraction, gas condensate and equipment for their storage, processing, liquefaction and transportation. It will give impetus to the development of petrochemical, metallurgical, machine-building industries, organizations in the scope of R&D, etc. The development of the Northern sea route gives the second wind to the shipbuilding industry, as it requires the construction of a significant amount of technically sophisticated ships (including nuclear ice breakers). New ports and cargo terminals will be built as well. As a result the production infrastructure, the lack of which is one of the key problems of the Arctic will be developed [38-39].

Fourthly, the development of the Arctic spaces and its natural resources is one of the main determinants of the world economy transition to a new technological way. On the one hand, the development the Arctic encourages the development of new technologies that is a driving force of scientific and technological progress. On the other hand, the transition to the sixth technological way is impossible without the resources of the Arctic Zone [40-41].

Fifthly, the Arctic acts as a zone of strategic interests of the economic security of the Russian Federation. According to some scientists' opinions, natural resources will remain the basis for economic development of states [42-45]. The share of the Arctic resources in the overall economic potential of the countries of the Arctic region will increase and reach the amount 40% by the middle of

the 21st century [45]. Thus, the economies of developed countries, including Russia, will depend on the Arctic natural resources.

Sixthly, the Arctic acts as a zone of strategic interests of the military-political security of Russia. Because of its enormous wealth and geographic location the Arctic can act as a possible cause of third world war.

It is obvious that the militarization of the Arctic region, initiated by NATO, will not help to achieve a peaceful disposal of a question concerning separation of the Arctic's mineral wealth. Negotiations concerning the Arctic issue are usually private. In the interests of each of pretending parties it would be appropriate to make the negotiation process more transparent and public, by holding international forums and meetings for the purpose of comparison arguments and evidence submitted by the parties. This approach would significantly expedite the solutions of territorial questions and minimize the likelihood of conflicts.

Seventhly, the Arctic is an object of international influence of the developed states of the planet and the application point of their political, military, economic force, influence and authority. First of all, it concerns the United States of America, the Russian Federation, the countries of the European Union, Canada, each of which has its own vision regarding the Arctic's fate, the division of its raw stock and deposits [46].

Thus, it seems that it will not be possible to retain a dominant position either in the economy or as a military superpower without developing the resources in the Arctic Zone of the Russian Federation in the 21st century. Therefore, there is a risk of Russia's collapse, loss of its territory control, loss of its national sovereignty and independence.

Therefore, the development of the Arctic should be the foreground task for the Russian Federation. On account of foregoing basic characteristics and taking into account the importance for Russia, no other territory needs effective management but the Arctic.

3.4. Innovative features of the Arctic Zone of the Russian Federation

The analysis of international, Russian and Soviet management experience makes it possible to reveal the novelty in principle of the Arctic Zone of the Russian Federation as an object of management. Management of the Arctic Zone of the Russian Federation will be based on a fundamentally new spatial principle. The Russian Arctic will be a unified macro object. Its management will be carried out through the system of supporting zones established in each Arctic region.

The economic and technological development of the Russian Arctic will be based on a single plan, regardless of the administrative-territorial division and the branch characteristic of production objects and infrastructure. The analysis of numerous research shows that in this case perfectly innovative spatial principle of territorial management is realized. For the first time in Russian practice of management, they have departed from both sectoral and regional principles of management [47-48]. Cluster management principle that has deserved consideration of many researchers recently is not used either [49-51].

It can be said with certainty that in the Arctic Zone of the Russian Federation the spatial management principle, which was previously considered as a theoretical paradigm, was included in the practice of Russian territories management.

4. Conclusion

The research made possible to draw the following conclusions:

1. The identifying of the Russian Arctic astronomical, geophysical, climatic, physical and geographical, administrative-territorial, bioclimatic criteria and have been comprehensively used. The criterion of difficult living conditions of the population has been comprehensively used as well.
2. The basic characteristics of the Arctic Zone are that it is the least developed and inhabited part of the Russian Federation. Basic characteristics constrain the development of the Russian Arctic.

3. Practically all aspects of national security such as military-political, economic, technological, environmental, resource and others are concentrated in the Arctic Zone. Therefore, the development of the Arctic should be the foreground task for the Russian Federation.

4. The management of the Arctic Zone of the Russian Federation will be based on a fundamentally new spatial principle. It consists in the fact that management will be carried out comprehensively throughout of the Russian Arctic Zone, regardless of the administrative-territorial division, industry practices, and formed industrial clusters.

The management will be carried out through the system of supporting zones established in each Arctic region. The practical implementation of this management principle should be based on clearly defined regulatory rules that take into account the Arctic's specifics and the declared goals of its development. A law "On the development of the Arctic Zone of the Russian Federation" establishing the possibilities for ensuring the integrated socio-economic development of the Russian Arctic should be adopted. The discussion of this law has been ongoing in Russia since 2016, but it has not been adopted yet.

On account of foregoing basic characteristics and taking into account the importance for Russia, no other territory needs effective management but the Arctic.

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References

- [1] Putin V V 2014 *Concerning the implementation of the state policy of the Russian Federation in the Arctic in the interests of national security in the Arctic on April 22, 2014* (<http://www.kremlin.ru/events/president/news/20845>) (Accesed 17 October 2019)
- [2] Putin V V 2018 *The President's message to the Federal Assembly: the President's message to the Federal Assembly Assembly dated March 01, 2018* (http://www.consultant.ru/document/cons_doc_LAW_291976/) (Accesed 17 October 2019)
- [3] Internet portal "Taimyr Telegraph" (<http://www.ttelegraf.ru/news/55859-biznesmenyi-severa-predlagayut-perenesti-sroki-podklyucheniya-kkt-predprinimateley-rabotayuschih-v-a>) (Accesed 17 October 2019)
- [4] Larsen J N and Fondahl G 2014 *Arctic Human Development Report: Regional Processes and Global Linkages* (Copenhagen: TemaNord)
- [5] Skripnuk D F and Samylovskaya E A 2018 Human Activity and the Global Temperature of the Planet. *IOP Conf. Series: Earth and Environmental Science* **180** (1)
- [6] Black R, Adger W N, Arnell N W, Dercon S, Ged-des A, and Thomas D 2011 The effect of environmental change on human migration. *Glob. Environ. Change* **21** (1) pp 3-11
- [7] Andrew R 2015 *Socio-economic drivers of change in the Arctic: AMAP technical report* (Oslo: Arctic Monitoring and Assessment Program)
- [8] Baranov S, Skufina T and Samarina V 2018 Regional Environment for Gross Domestic Product Formation (The Case of Russia Northern Regions) *Adv. Sci. Lett.* **24** (9) pp 6335-38
- [9] Dale B 2002 An institutional approach to local restructuring: the case of four Norwegian mining towns *Eur. Urban Reg. Stud.* **9** (1) pp 5-20
- [10] Gill A and Sevigny D 2015 Sustainable Northern Development: The Case for an Arctic Development Bank. *CIGI Papers*, **54**
- [11] Brigt D, Larsen I B and Skorstad B 2017 *The Will to Drill – Mining in Arctic Communities*. (Luxemburg: Springer – Springer Polar Sciences)
- [12] Hamilton L C, Saito K, Loring P A, Lammers R B and Huntington H P 2016 Climigration? Population and climate change in Arctic Alaska Climigration? *Popul. Environ.* **38** (2) pp 115-33
- [13] Rodrik D 2008 Industrial policy: don't ask why, ask how *Mid. East Devel. Jour.* **8** pp 1-29

- [14] Silin A N 2015 Long Distance Commuting in Oil and Gas Produktion Industry in the Northwestern Siberia: So-cijljgical Analisis of Change *Mediterr. Jour. of Soc.l Scien.* **6** (3) 5 pp 199-206
- [15] Skufina T, Baranov S, Samarina V and Samarin A 2019 Natural resources as a factor of socio-economic development of the Arctic territories: theoretical components of the research problem. *IOP Conf. Series: Earth and Environmental Science* **302** (1)
- [16] Samarina V, Samarin A, Skufina T, Tereshina M 2019 The analysis of population density in russia's northern regions *19th International Multidisciplinary Scientific GeoConference SGEM 2019* **19** pp 757-764
- [17] Suopajarvi L, Poelzer G A, Ejdemo T, Klyuchnikova E and Korchak E 2016 Social sustainability in northern mining communities: A study of the European North and Northwest Russia *Resour. Polic.* **47** pp 61-68
- [18] Zamaraeva Ju S 2014 What are global transformations experienced by the indigenous peoples of the North? *Journal of Siberian Federal University. Series: Humanities* **10** (7) pp 1705-18
- [19] Berman M and Howe L 2012 Remoteness, Transportation Infrastructure and Urban-Rural Population Movements in the Arctic *Proc. Int. Conf. Urbanisation of the Arctic* pp 108-22
- [20] Anas A and Xiong K 2005 The formation and growth of specialized cities: efficiency without developers or Malthusian traps *Reg. Sci. Urban Econ.* **35** pp 445-70
- [21] Gill A M 2002 Respecting context in Northern resource town planning: the case of Tumbler Ridge. *Western Geography* **12** pp 113-29
- [22] Niels E, Larsen J N and Nilsson A 2004 *Arctic human development report* (Akureyri, Iceland: Stefansson Arctic Institute)
- [23] Ushakov D and Chich-Jen S 2018 Global Economy Urbanization and Urban Economy Globalization: Forms, Factors, Results. In: *E-Planning and Collaboration: Concepts, Methodologies, Tools, and Applications*. USA: IGI Global
- [24] Wood P and Taylo C 2004 Big ideas for a small town: the huddersfield creative town initiative. *Local Economy* **19** (4) pp 380-95
- [25] Kikkas K and Romashkina E 2018 Potential Opportunities for the Arctic Transport Space *IOP Conf. Series: Earth and Environmental Science* **180** (1)
- [26] Anshelm S, Haikola J 2018 ritiken av 2013 års mineralstrategi och framväxten av ett alternativ. *Svensk gruvpolitik i omvandling Aktörer, kontroverser, möjliga världar* **9** pp 55-75
- [27] Ejdemo T 2013 Mineral development and regional employment effects in northern Sweden: a scenario-based assessment *Mineral Economics* **25** (2-3) pp 55-63
- [28] Tötzer T and Gigler U 2005. Managing urban dynamics in old industrial cities: Lessons learned on revitalising inner-city industrial sites in six European case studies. *Amsterdam: 45th Congress of the European Regional Science Association - Land Use and Water Management in a Sustainable Network Society*
- [29] Bjornland H and Thorsrud L 2014 *What is the effect of an oil price decrease on the Norwegian economy* (Oslo: Norges Bank)
- [30] Skufina T, Baranov S and Samarina V 2018 Differentiation of Socio-Economical Environment as Factors of Regional Development (The Case Study of Murmansk Region, Russia). *Advanced Science Letters* **24** (9) pp 6329-31
- [31] Andrew R 2014. Socio-economic drivers of change in the Arctic. *AMAP technical report no. 9*. Oslo: Arctic Monitoring and Assessment Program
- [32] Kryukova EM, Vetrova EA, Maloletko A N, Kaurova O V Dusenko S V 2014 Social-economic problems of Russian mono-towns. *Asian Social Science* **11** (1) pp 258-67.
- [33] Dauvalter V A and Kashulin N A 2018 Assessment of the ecological state of the Arctic freshwater system based on concentrations of heavy metals in the bottom sediments. *Geochemistry International* **56** (8) pp 842-56
- [34] Jyväsjarvi J, Marttila H, Rossi P M, Ala-Aho P, Olofsson B, Nisell J 2015 Climate-induced

- warming imposes a threat to north European spring ecosystems *Glob. Change Biol.* **21** pp 4561-69
- [35] Natural resource in the Arctic (<https://sputniknews.com/infographics/20100628159604153/>) (Accessed 17 October 2019)
- [36] Höök M, Bardi U, Feng L and Pang X 2010 Development of oil formation theories and their importance for peak oil *Mar. Petroleum Geol.* **27** (9) pp 1995-2004
- [37] Bardi U 2009 Peak oil: The four stages of a new idea. *Energy* **34** (3) pp 323-26
- [38] Korchak E A, Serova N A, Emelyanova E E, Yakovchuk A A 2019 Human Capital of the Arctic: Problems and Development *Prospects IOP Conf. Series: Earth and Environmental Science* **302**
- [39] Keskitalo E, Carina H 2004 The Arctic as an international region – but for whom. In: *Arctic governance: Northern institute of environmental and minority law* Rovaniemi: University of Lapland pp 2-26
- [40] Samarina V P, Skufina T P and Baranov S V 2016 The place of Russia among the largest world exporters *Actual Problems of Economics* **1** (175) pp 33-43
- [41] Anshelm J, Haikola S 2018 Depoliticization, repoliticization, and environmental concerns: Swedish mining politics as an instance of environmental politicization *ACME: An International E-Journal for Critical Geographies* **17** (2) pp 561-596
- [42] Suopajarvi L, Ejdemo T, Klyuchnikova E, Korchak E, Nygaard V 2017 Social impacts of the “glocal” mining business: case studies from Northern Europe *Mineral Economics* **30** (1) pp 31-39
- [43] Poelzer G A, Ejdemo T 2018 Too Good to be True?: The Expectations and Reality of Mine Development in Pajala, Sweden *Arctic Review on Law and Politics* **9** pp 3-24
- [44] Sim P 2013 Natural Resources and Economic Growth: The Conditional Curse *International Journal of Economic Policy Studies* **8** (1) pp 113-45
- [45] Stevens P and Dietsche E 2008 Resource curse: An analysis of causes, experiences and possible ways forward. *Energy Policy* **36** (1) pp 56-65
- [46] Sabathil G A 2010 European vision for addressing global security threats *European View* **9** (1) 65-69
- [47] Sinha U K 2018. Arctic: A Paradox and Antithesis. *Science and Geopolitics of The White World* ed P Goel, R Ravindra and S Chattopadhyay (Springer, Cham)
- [48] Alien K and Yuill D 2007 *European Regional Incentives. A Survey of Regional Incentives in the Countries of the European Community and Sweden* (Glasgow: European Regional Policy Monitoring Unit)
- [49] Afonichkina E A and Afonichkin A I 2018 Synergies of the Economic Development of the Arctic Cluster System *IOP Conf Series Earth and Environmental Science* **180** (1)
- [50] Boschma R, Balland P-A and Vaan de M 2014 *The formation of economic networks: a proximity approach. Regional Development and Proximity Relations* (Cheltenham, UK and Northampton, MA, USA: Edward Elgar).
- [51] Didenko N I and Cherenkov V I 2018 Economic and geopolitical aspects of developing the Northern Sea Route *IOP Conf. Series: Earth and Environmental Science* (Institute of Phys. Publishing Press) **180**(1) 012012