

Definition of Arctic Spaces Based on Physical and Human Geographical Division*

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ABSTRACT

This study deals with the concept definition of the Arctic Circle. The Arctic is a polar region situated in the northernmost part of the Earth. The Arctic consists of the Arctic Ocean including the North Pole and northern parts of eight Arctic states, i.e. Russia, Canada, Norway, Alaska (United States), Greenland (Denmark), Iceland, Finland, and Sweden. Up to now there is no general agreement on official demarcation of the Arctic proper and her boundaries. Hence, there are multiple definitions of the Arctic Circle which bring about various descriptions of her adjoining land and sea areas. There exist various definitions of ‘the Arctic’ based on physical geographical characteristics or on political, administrative, social, cultural, and demographical considerations proposed by various institutions and organizations in Arctic countries. In contrast with the more easily defined boundaries of Antarctica, the southern boundaries of the Arctic vary on account of interests and purposes. This paper does not advocate any particular definition. Though complex and potentially ambiguous, defining the Arctic is a main example of the nature and challenges of classification and categorization systems. We tend to view labels as fixed and static, yet these definitions of the Arctic can be flexible, debatable, *mutatis mutandis*, and ever-changing.

Key words: Arctic Definition, Tundra, Permafrost, Human Geography, Physical Geography

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1. Introduction

In October 1987, Gorbachev put an end to the Cold War through the Murmansk speech and emphasized the establishment of the Arctic Peace Zone and the opening of the Arctic space.

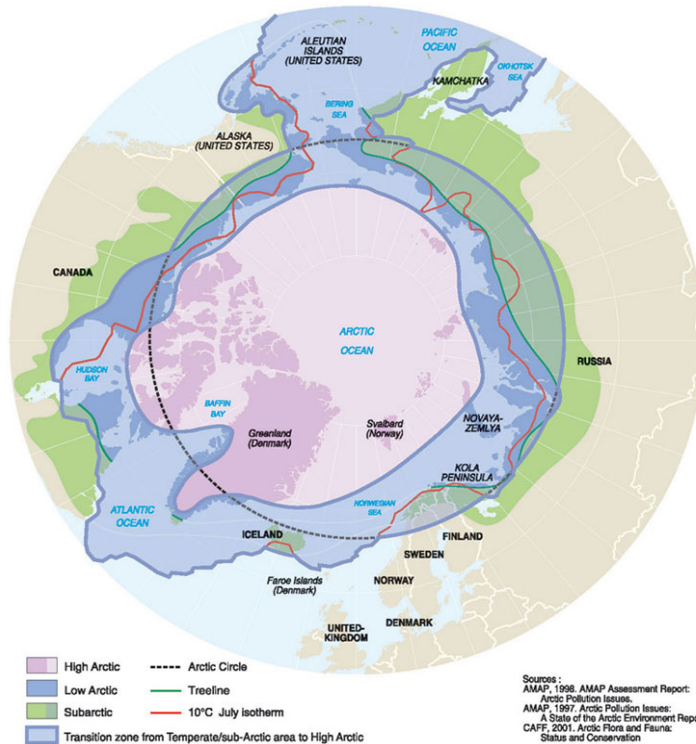
Since the dissolution of the Soviet Union in the 1990s, for the actual benefits, globalization and formation of regional trade blocs have been accelerated throughout the world. The Arctic region is no exception. As melting of sea ice due to global warming and climate change has facilitated human access, the Arctic space has become geopolitically and geoeconomically important. Indeed, not only Arctic countries but also non-Arctic countries have been competing for development and availability of the Arctic space.

Though all reports and articles related to the Arctic explain the concept and the partitions of the Arctic in their early parts, they describe differently for each of their research purposes. Formally, there is no unified conceptual definition of Arctic space yet. In this context, this paper attempts to analyze various concept definitions of the Arctic region. Therefore, Chapter 2 of this article summarizes widely used terminology of the Arctic. Chapter 3 analyzes the physical geographic boundaries of the Arctic, particularly astronomical and climatological descriptions, tree line, and the Arctic defined by the working groups of the Arctic Council. Chapter 4 analyzes the human geographical description of the Arctic in relation to politics, administration, economy, and social culture. The main point of this article concerns the southern boundary of the Arctic not the northern boundary.

2. Definition of Arctic Space Concept

The Arctic is located in the northernmost region of the Earth. In general, the Arctic contains vast polar ice caps and permafrost that are seasonally changing. The origin of the Arctic is derived from the Greek 'Arktikós (meaning bear)', which is due to the Arctic's location similar to that of the Bear constellation. Ancient Greek scholars have distinguished the world as Torrid, Temperate, and Frigid Zones. The Frigid Zone usually means an area over 60 degrees north latitude. Under the Frigid Zone, the Arctic is one of the unique regions in the global ecosystem. Not only Arctic natives but also zooplankton, phytoplankton, fish, marine animals, land animals and plants live under cold and extreme physical conditions.

Figure 1. Definition of Arctic Circle Concept



Source: GRID Arendal, A Centre Collaborating with UNEP, "Definition of the Arctic," http://www.grida.no/graphicslib/detail/definitions-of-the-arctic_12ba(Search date: January 15, 2014) ; https://www.google.co.kr/search?q=arctic+definition&newwindow=1&hl=ko&rlz=1T4MXGB_koKR572KR574&tbm=isch&tbo=u&source=univ&sa=X&ei=qNzBVIKANOwY8QWDxYKIDA&ved=0CEsQsAQ&biw=1920&bih=953#imgrc=Pviszu4QDyRyAM&imgdii=m3JCAbrYWcc7bM(Search date: June 10, 2020).

Internationally, the term 'the Arctic' is often ambiguously used for similar concepts such as 'North', 'high North', 'high Arctic', 'low Arctic', 'Subarctic', and 'Polar'. In May 2013, at the Kiruna Arctic Council meeting, China joined the Arctic Council as a permanent observer, declaring it to be a "Near Arctic" state despite being 900 miles away from the astronomically defined Arctic space.¹ The terms of the polar region include the Antarctic, and the terms of the Arctic and the Northern are not synonymous in the strict sense, but they are commonly used in international forums and policy reports of Arctic nations. The northern terminology mainly includes political concepts at the strategic level of the European Union and Arctic countries.²

1 Gwynn Guilford, "What is China's Arctic Game Plan?," *The Atlantic*, May 16, 2013.

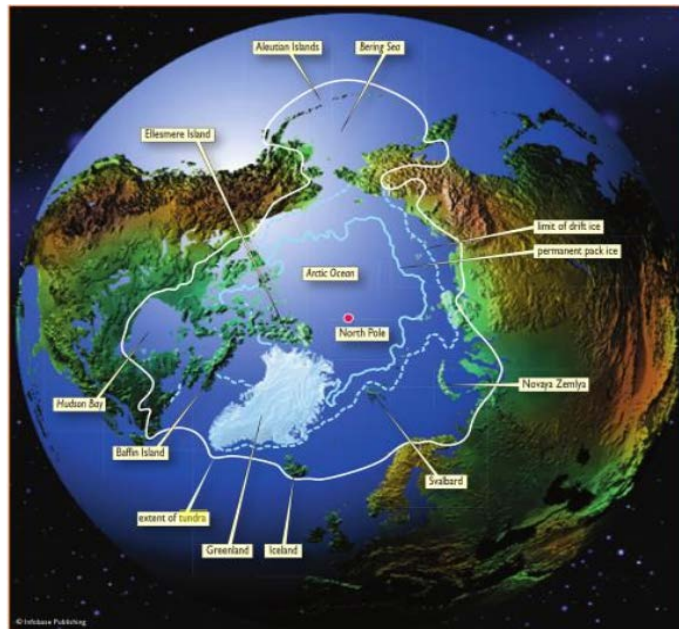
2 Elana Wilson Rowe, "Russia's Northern Policy: Balancing an 'Open' and 'Closed' North," *Russian Analytical Digest*, No.96, 12 May, 2011, p.2.

The notion of the high North has not been precisely defined, but the Norwegian Shipowners' Association defines it as an area containing the Arctic space by astronomical definition, the Barents region and the Barents Sea.³ In general, the concept of the high Arctic is the cold region of the Arctic. The high Arctic, the low Arctic, and the Subarctic are divided by the distance from the North Pole (Refer to Figure 1.).⁴

In general, the high Arctic forms a giant lowland like the desert where plants cannot grow in the northernmost part of the world, while the low Arctic has more flora and fauna than the high Arctic. The Polar desert of the high Arctic is located at 75 degrees north latitude. The annual rainfall in this region is only 10 inches. The Arctic tundra has an average temperature of minus 6-12 degrees Celsius and 50-60 white nights in the summer.

The Arctic boundary can be described with the seasonal boundary lines of drift ice and the persistent boundary lines of pack ice, but the lines are generally rising due to global warming and show high microscopic deviations (refer to Figure 2.). The drift ice line is located to north in the western Arctic region due to the North Atlantic Current, while it is found at the south of the Bering Sea and the Sea of Okhotsk in the Pacific Arctic region.

Figure 2. Arctic ice drift line and continuous drift ice boundary line



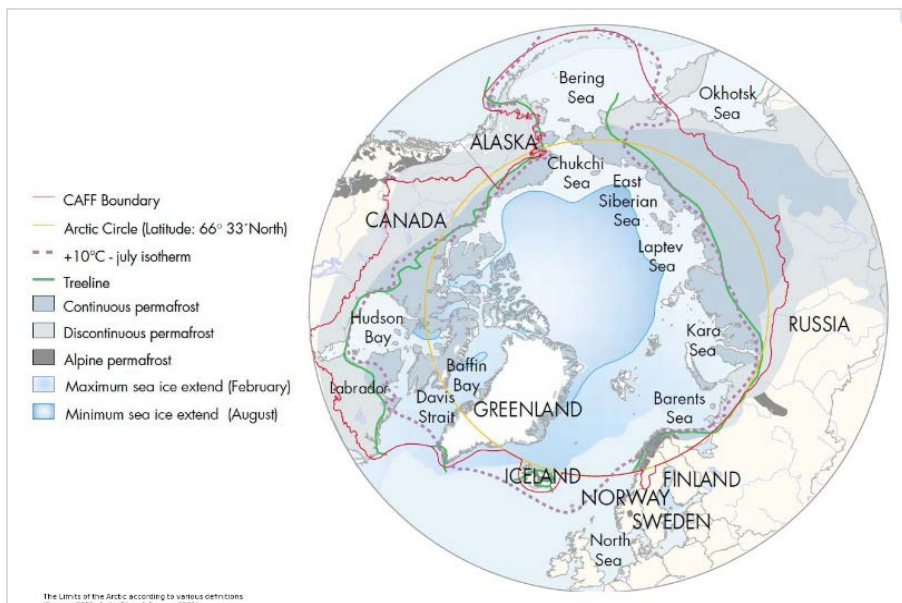
Source: Peter D. Moore, *Ecosystem Tundra* (New York: Infobase Publishing, 2008), p.3.

3 Norwegian Shipowner's Association, High North – High Stakes, Maritime Opportunities in the Arctic, p.3.

4 Ronald O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, CSR Report for Congress, Congress Research Service 7-5700, August 4, 2014. pp.4-5.

The terms related to the Arctic, including 'Frigid Zone', 'Arctic front', 'permafrost' and 'tundra', are often used. The Arctic front refers to the semi-permanent, semi-continuous weather front that occurs between the cold arctic base and the warm atmosphere of a polar cell. This front had a profound impact on cold waves and snowstorms in the northeastern United States in early 2014.⁵ The Frigid Zone is derived from ancient Greek scholars' classification of the world into three climatic zones (Torrid, Temperate, and Frigid Zones).

Figure 3. Frozen ground and summer / winter glaciers



Source: "Arctic Definition," library.arcticportal.org; CAFF Map No. 46
https://www.google.co.kr/search?q=arctic+definition&newwindow=1&hl=ko&rlz=1T4MXGB_koKR572KR574&tbm=isch&tbo=u&source=univ&sa=X&ei=qNzBVIKANoWY8QWDxYKIDA&ved=0CEsQsAQ&biw=1920&bih=953 (Search date: June 10, 2020).

Permafrost can be defined as a surface or sediment that has been constantly frozen with temperatures below 0°C for a minimum of two years. Typically, permafrost consists of the earth surface and 50-100 meters of the basement, but the depth of the permafrost ranges from a few meters to several hundred meters. The thickness of the permafrost is decreasing from north to south due to rising atmospheric temperatures. It also shows regional variation.⁶

The term tundra is derived from Sami or Finnish. Tundra is defined as a tree-free vegetation, mostly in the Arctic Circle in Eurasia and North America. In

⁵ Jenna Abate, "Not Your Average Chill: What Does 'Polar Vortex' Mean?," *Accu Weather*, January 24, 2014.
⁶ Umweltbundesamt, *Klimagefahr durch tauenden Permafrost?*, Dessau, 2006, p.2, and pp.4-5.

some non-Arctic regions, tundra is formed in mountainous regions and Africa. Tundra is not present in the Antarctic region.⁷

The Arctic can be regarded as a single space, but can be partitioned in various ways. While the definition of Antarctica is relatively simple and straightforward, the Arctic is difficult to define clearly due to the heterogeneity and complexity of physical and human geography (cultures, natives, languages, etc.). In fact, the definition of the Arctic region is different by Arctic countries and varies in articles by their research purposes. The Arctic space is also defined differently by the working groups of various Arctic Councils and by project situations and research purposes. In the definition of the Arctic, there is no question about the northern limit of the Arctic, the North Pole. However, the southern boundary of the Arctic can be fluidly transformed by changes in the physical environment such as climate, vegetation and permafrost, and changes in the human environment.

3. Classification of the Arctic Space by Nature

In general, there are three different ways (astronomical, climate geographical, topographical) for the physical geographic definition of the Arctic region:

3.1 Astronomical definition of the Arctic region

- From the Arctic Circle (north latitude 66 degrees 32 minutes 51 seconds or 66 degrees 34 minutes) to the North Pole
- Distance to the North Pole: 2,606 km (1,619 miles)
- 24-hour time zone
- The midnight sun (the sun is not going down) at around the summer solstice (around June 21), and the Polar night (no sunshine) at around the winter solstice (around December 21)
- The area in the Arctic Circle is about 21.2 million square kilometers (land area: about 10 million square kilometers, water area: about 11 million square kilometers), about four times of the size of the Mediterranean Sea.
- The Arctic Ocean, which forms a circular basin (area: approximately 14,056,000km²): It is composed of Baffin Bay, Barents Sea, Beaufort Sea, Chukchi Sea, East

⁷ See this book for the climate, topography, morphology, ecosystem, life forms, biodiversity, geological and biological history, inhabitants, values, and future of the tundra: Peter D. Moore, *Ecosystem Tundra* (New York: Infobase Publishing, 2008).

Siberian Sea, Greenland Sea, Hudson Bay, Hudson Straits, Kara Sea, Laptev Sea, White Sea, etc.; it is connected to the Pacific Ocean through the Bering Sea and linked to the Atlantic Ocean via the Greenland Sea and the Labrador Sea.⁸

- Iceland, the Canadian Labrador Sea, about two-thirds of Alaska, much of the Bering Sea and the Aleutian Islands are not included. (Iceland is not an Arctic country according to the astronomical and tree line definition, but an Arctic country by definition of isotherms. Iceland claims to be an Arctic country, having a small Grimsey Island at 66 degrees 33 minutes north latitude and 200 miles of exclusive economic zone)
- Astronomical definition does not take account of warm and cold ocean currents, so it cannot describe climatic and vegetative characteristics, or living of plants and animals.

3.2 Climate-geographical definition of the Arctic region

- The isothermic area with average temperatures below 10°C(50F) on July, the warmest month.
- The Arctic space, by this definition, has considerably reduced space in Finland, Sweden, Norway, and Alaska; while the Bering Sea, Alaska, and Aleutian Islands are included. Some of the oceans and lands in the northwestern part of the Arctic are excluded, and the oceans and lands in the northeastern part of the Arctic are included.
- It is theoretically useful because it can be applied to both the ocean and the land of the Arctic.

3.3 Geomorphological-ecological (tree line) definition of the Arctic region

- From the North Pole to the southern limit of the continuous permafrost, or from the North Pole to the tree line. This includes tundra, the permafrost, and the Arctic Ocean of Asia, North America, and Europe.
- The tree line boundary is the tundra region where the trees cannot grow because of the harsh environmental conditions. Sporadically, short and tangled shrubs and the "Krumholz" is growing because of wind.⁹
- The definition from the tree line has the advantage in recognizing the obstacles of plant growth, but has drawback that it is only useful in land.¹⁰

8 Vladimir Jares, "The Continental Shelf Beyond 200 Nautical Miles: The Work of the Commission on the Limits of the Continental Shelf and the Arctic," *Vanderbilt Journal of Transnational Law*, Vol.42, 2009, pp.1281-1282.

9 Volker Steinbach, *Erdöl und Erdgas der Arktis – Chancen und Herausforderungen*, Bundesanstalt für Geowissenschaft und Rohstoffe (BGR), Hannover 2010, p.2.

10 Andreas Umbreit, "What is the Definition of Arctic?," *Bradt Travel Guides*, March 28, 2014. <http://www.bradtguides.com/articles/definition-arctic/> (Search date: January 16, 2015).

The areas of the Arctic region according to the above three definitions obviously show some deviation. In addition, the working groups of the Arctic Council also define the Arctic space in various ways for the purposes and functions of the groups. The Arctic Monitoring and Assessment Program (AMAP), a working group of the Arctic Council, has set up an area for environmental monitoring under the Arctic Environmental Protection Strategy. AMAP defines the boundary of the Arctic based on compromises that include various Arctic definitions: “The terrestrial and marine areas north of the Arctic Circle (66°32'N), and north of 62°N in Asia and 60°N in North America, modified to include the marine areas north of the Aleutian chain, Hudson Bay, and parts of the North Atlantic Ocean including the Labrador Sea.” AMAP also included 10 key areas for efficient monitoring and research activities: Baffin Island, Western Greenland, Canadian Arctic Islands, Arctic islands, lower Mackenzie River and its Delta regions, Northern Alaska, North Slope Area, Chukotka (Chukchi) Peninsula, Lena River estuary, Taymyr Peninsula, Norilsk area, Novaya Zemlya island, Kara Sea, Pechora Sea, Kola Peninsula, Northern Finland-Scandinavia, Svalbard Island, Eastern Greenland Region etc. According to this definition, the area of the Arctic region is larger than Africa or Asia, reaching 33 million square kilometers.¹¹

The Conservation Arctic Flora and Fauna (CAFF), another working group of the Arctic Council located in Akureyri, Iceland, has defined the Arctic space in terms of biodiversity, especially conservation of living resource. This definition is almost same with the tree line definition and includes the entire area of Greenland, the Alaska coast, the Aleutian Islands, the northern Canada, the Russian Chukotka, and northern Kamchatka regions. The International Maritime Organization (IMO) also defines the Arctic region in the Polar Code, a safeguard to prevent the negative consequences of shipping activities in the Arctic (Figure 4). According to this definition, the boundary of the Arctic rises farther to the north at the Bering Sea of 60°N and at the warmer northwestern Arctic region with the North Atlantic Current.

As the Arctic Council concluded a Search and Rescue Treaty, at the Greenland Nuuk Talks in 2011, Emergency Prevention, Preparedness and Response (EPPR), which is a working group of the Arctic Council, established the legally binding boundary of the Arctic (Figure 5.).

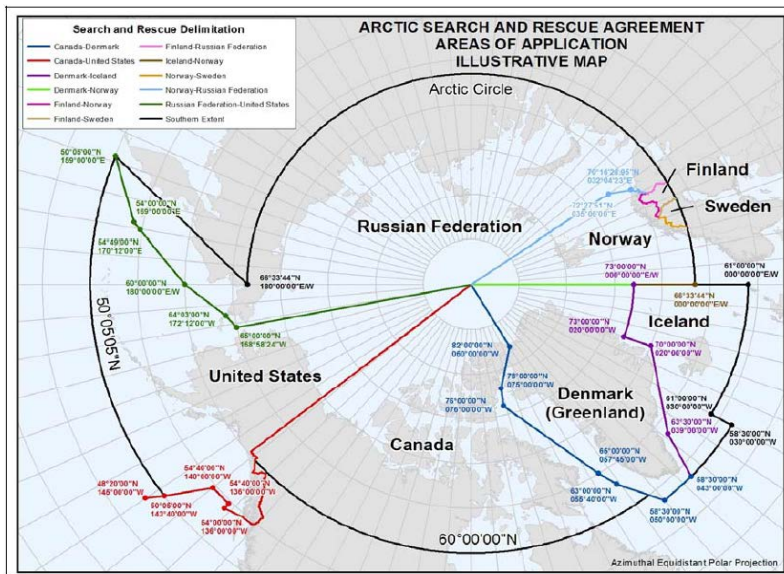
11 Olav Orheim, “Protecting the environment of the Arctic ecosystem,” *United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea*, 4th Meeting, 2-6 June, 2003, p.1.

Figure 4. Definition of the Arctic region according to IMO Polar Guideline



Source: FOEI, IFAW, WWF, Pacific Environment, “Development of a Mandatory Code for Ships Operating in Polar Water, Polar Code Boundaries for the Arctic and Antarctic,” *Sub-Committee on ship Design & Equipment 55th Session*, 14 January, 2011, p.2.

Figure 5. The boundary of the Arctic from EPPR



Source: EPPR, *Report from EPPR Workshop on Emergency, Prevention, Preparedness and Response (EPPR) in Kirkenes, Norway*, June 5–7, 2012, p.7.

As such, the physical geographical definition of the Arctic can be changed flexibly not only by changes in the ocean floor, wind, earthquake, glacier, climate, habitat environment of animals and plants but also by researchers. Indeed, the Arctic region can be defined individually or micro / macroscopically by the habitat environment of plants and animals, including birds, polar bears, whales, or fish.

4. Definition of Arctic Region from Humanities

The physical geographical definition of the Arctic region has many limitations in the political, economic, social, cultural and linguistic approaches, especially in data collection and analysis. To overcome these problems, the Arctic Human Development Report (AHDR), published in 2004, newly defines the Arctic region based on the Human Development Index developed by UNDP.¹²

4.1 Arctic region based on AHDR

The AHDR-based Arctic definition is based on socio-economic conditions and cultural characteristics associated with political and ecological processes. According to ADHR's Arctic definition, the entire Alaska and Danish Faroe Islands are considered as polar spaces. All of the Arctic economies, except Iceland, are made up of local economies that form part of the 'mother economic bloc' in the south, politically, economically and culturally. Most arctic economies have a subordinate form to 'mother economic bloc' in relation to transfer income.¹³

According to the definition of ADHR, there are about 3.36 million of native and non-native peoples living in the Arctic region. Arctic indigenous people constitute about 40 different ethnic groups and are estimated to be 400,000 people, 10% of the total population. There are 1.98 million people in the Russian Federation, accounting for more than half of all Arctic residents; followed by 659,000 in Alaska in the US; 380,000 in Norway; 264,000 in Sweden; 288,000 in Iceland; 130,000 in Canada; and 57,700 and 47,700 in Danish Greenland and the Faroe Islands, respectively.

12 The AHDR Task Force was created in November 2001, ratified at the Senior Arctic Officials of the Arctic Council, in response to the requests from the meeting of the Sustainable Development Working Group (SDWG) and from the Standing Committee of Parliamentarians of the Arctic Region (SCPAR).

13 Gorm Winther, "Introduction to the Project and the First Volume of The Political Economy of Northern Regional Development(POENOR)," Nordic Council, *The Political Economy of Northern Regional Development*, Nordic Council of Ministers, Copenhagen, 2010, pp.14-16.

4.2 Arctic region by administrative division

The Arctic is owned by eight countries: Russia, Canada, USA (Alaska), Norway, Denmark (Greenland and Faroe Islands), Iceland, Sweden and Finland. According to their divisions, the Arctic region includes 29 administrative regions.

Arctic regions include Alaska, Northern Canada (Yukon, Northwest, Nunavut region, Nunavik, Labrador), Danish Greenland and Faroe Islands, Iceland, northern Norway (Finnmark, Nordland, Troms, Svalbard), Sweden (Norrbotten, Vasterbotten), Finland (Lapland, Oulu), and the northern part of the Russian Federation (Republic of Karelia, Komi Republic, Arkhangelsk Oblast, Murmansk Oblast, Khanty-Mansi Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug, Taymyr (Dolgano-Nenets) Autonomous Okrug, Evenk Autonomous Okrug, Sakha Republic, Chukotka Autonomous Okrug, Magadan Oblast, Koryak Okrug).¹⁴

With the administrative reorganization of Russia, the autonomous regions of Taymyr (Dolgano-Nenets) and the Evenk Autonomous Okrug are included in Krasnoyarsk Krai, and Koryak Autonomous Okrug as well is incorporated in Kamchatka Krai.¹⁵ As a result, the administrative districts of the Arctic have been reduced to 28. Lands and islands located in the Arctic Ocean, indicated in the Decree of the Presidium of the Central Executive Committee of the USSR of April 15, 1926 "On the Declaration of the Territory of the USSR as Lands and Islands Located in the Arctic Ocean" and other acts of the USSR. In addition, on May 2, 2014, the Decree of the President of the Russian Federation No. 296 on the land territories of the Arctic zone of the Russian Federation was enacted.¹⁶

4.3 Arctic region by indigenous peoples

People have inhabited the Arctic for over twenty thousand years. Currently, there are approximately 4 million people living in the Arctic, of those roughly 500,000 are Fourth World peoples (the population of indigenous people

14 Gérard Duhaime and Andrée Caron, "Economic and Social Conditions of Arctic Regions," in: Glomsrød, Aslaksen (Ed.), *The Economy of the North 2008*, Oslo, 2009, p.11.

15 Han, Jong-Man, "83 Delegation of the Russian Federation: Focusing on 9 Delegation States," *Russian Regional Information* (Hankuk University of Foreign Studies, Russian Institute) No.1, 2010, p.27. On December 7, 2003, Taymyr Autonomous Okrug and Evenk Autonomous Okrug were incorporated to Krasnoyarsk Krai through local referenda. Koryak Autonomous Okrug was also merged with Kamchatka Oblast forming Kamchatka Krai through a referendum by local residents on October 23, 2005.

16 УКАЗ ПРЕЗИДЕНТА РОССИЙСКОЙ ФЕДЕРАЦИИ, О сухопутных территориях Арктической зоны Российской Федерации (В редакции указов Президента Российской Федерации от 27.06.2017 № 287, от 13.05.2019 № 220) (<http://pravo.gov.ru/>, Search date: April 15, 2020). Under this document, the Russian part of the Arctic incorporated the Murmansk and Arkhangelsk Regions; the Republic of Komi and Yakutia; the Krasnoyarsk Region; the Nenets, Chukotka, and Yamalo-Nenetsky Autonomous Okrug, the Belomorsk, Kemsy, and Loukhsky Districts of Karelia as well as "lands and islands located in the Arctic Ocean and certain uluses of Yakutia, which were declared USSR territory under a decree of the Presidium of the USSR Central Executive Committee dated 15 April 1926". <https://forumarctica.ru/en/news/putin-signs-decree-expanding-land-territories-of-russias-arctic-zone/> (Search date: April 16, 2020)

is about 500,000).¹⁷ These nations comprise varying percentages of the Arctic population; ranging from about 80% in Greenland, 50% in Canada, 20% in Alaska, 15% in Arctic Norway, to 3~4% in Arctic Russia (athropolis.com).¹⁸ The Greenland and Canadian Arctic regions have a high Aboriginal ratio, while most other Arctic residents are non-Aboriginal. There are no indigenous peoples in Iceland and the Danish Faroe Islands, and the percentage of indigenous peoples in the Scandinavian Arctic region is relatively small. The population of the Arctic native peoples is estimated to increase by 1.5% per year.¹⁹

The Sami people live in the Scandinavian Arctic region, and the Inuit are in Greenland, northern Canada and Alaska. There are many ethnic minorities in the Russian Arctic region such as the Nenets and the Chukchi. The Arctic minorities have diverse cultures and their own languages, and are engaged in hunting and fishing in the wide Arctic region through the long traditional lifestyle. The Aleut live in the Aleutian Islands; the northern Alaska Inuit, the Pacific Yupik, and the Central Alaska Yupik inhabit northern Alaska; and the Yupik are in St. Lawrence Island. The proportion of these native population is 13.1%.

In the Canadian Arctic region, Mackenzie Inuit, Copper Inuit, Caribou Inuit, Iglulik Inuit, Netsilik Inuit, Baffin Island Inuit, and Labrador Inuit live. The percentage of Inuit people is 49.8% in the Northwest of the Canadian Arctic region, 89.2% in Nunavik, and 84.5% in Nunavut. The Arctic Inuit, Northeast Greenland Inuit, West Greenland Inuit, East Greenland Inuit live in the Northwest region of Greenland. In Greenland, the percentage of Inuit is 88.6%. These Arctic indigenous people joined permanent members (six indigenous groups) from the beginning of the Arctic Council in 1996.

The six Aboriginal groups are the Arctic Athabaskan Council (AAC), the Aleut International Association (AIA), the Gwich'in Council International (GCI), the Inuit Circumpolar Council (ICC), the Russian Association of Indigenous Peoples of the North (RAIPON), and the Saami Council (SC). Arctic indigenous groups are striving to protect their rights and interests, and to preserve diverse cultures and languages through negotiations with the Arctic Council or central and local governments, but they result in different outcomes depending on the political, economic, and socio-cultural contexts of individual Arctic states.

17 In this paper 4.1 para. 2 described as the number of indigenous residents is 400,000. This is based on the data released in 2010, and this count is different from the data released in 2012. This seems to result from the researchers' standards of aggregation.

18 Heidi Bruce, "Arctic Fourth World Nations in a Geopolitical Dance," *Fourth World Journal*, Summer 2012, p.10. 'The 'Fourth World Peoples' is a concept corresponding to the First World of the Western bloc of democratic-industrial states, the Second World of the Communist Party, and the Third World of non-aligned nations.

19 D. Bogoyavlenskiy, and A. Siggner, "Arctic Demography," in: Emmerson, N., Larsen, J. N., Young, O. R.(Eds.), *Arctic Human Development Report*, Steffanson Arctic Institute, Akureyri, Iceland, 2004, p.14.

4.4 Arctic space with legal effect by the scientific cooperation agreement

The eight Arctic governments signed the ‘Agreement on Enhancing International Arctic Scientific Cooperation’ on May 11, 2017 in Fairbanks, Alaska; the Agreement entered into force on May 23, 2018. The Agreement facilitates access by scientists of the eight Arctic governments to Arctic areas that each government has identified, including entry and exit of persons, equipment, and materials; access to research infrastructure and facilities; and access to data.²⁰

Figure 6. A Legally Binding Arctic Scientific Cooperation Agreement



Source: “A Legally Binding Arctic Scientific Cooperation Agreement”, IASC, <https://iasc.info/ASA> (Search date: June 5, 2020).

20 “A Legally Binding Arctic Scientific Cooperation Agreement”, IASC, <https://iasc.info/ASA> (Search date: June 5, 2020).

The Agreement applies to these areas, as described in Annex 1 of the Agreement:

- This and more information on the Agreement is provided by the US Arctic Research Commission.
- The text of the Agreement is available via the Arctic Council. Note that while the Agreement is legally binding for the Arctic signatory states, Article 17 also includes cooperation with non-Parties.
- A press release about the Agreement coming into force is available via the Arctic Council.
- A "Report on Understanding the Bottlenecks in Cross-Border Research" is now available via the University of the Arctic, in cooperation with IASC and IASSA.

5. Conclusion

As has been discussed, the definition of the Arctic region widely varies between researchers and research institutes. In this article, we have analyzed the concept of the Arctic region in terms of nature and humanities.

In the future, the definition of the Arctic region will be developed as a modelled ('*ceteris paribus*') concept definition or an adaptable ('*mutatis mutandis*') compartmental analysis according to the purpose of individual research. However, it is clear that the southern limit of the Arctic region can be flexible, influenced by changes in physical phenomena (climate, vegetation, etc.) and human phenomena (such as the population flows of indigenous people, administrative reorganization, etc.). Changes in the human environment, the identity of the Arctic Federation subjects, as well as the efficient use and management of the Arctic, for example, the Russian Arctic Federation subjects (only in some regions of the Arctic Circle), certain regions of the Republic of Karelia, Republic of Yakutiya, Krasnoyarsk kray, Arkhangelsk Oblast are incorporated into the Arctic space. Russia's incorporation into some parts of the Arctic's southern regions has formed a 'macro-arctic zone' that aims to become more efficient with the NSR's management of the Arctic. The Russian government has recently announced measures to extend the space concept of the NSR to Kamchatka kray.

The physical definition of the Arctic Circle is changing due to factors such as global climate change. Therefore, the traditional physical definition needs to be modified to accommodate the present point of view, while it is imperative to further develop the human definition of the Arctic Circle.

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