Science diplomacy as a tool for reducing conflict in the Arctic

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Abstract. The article considers the phenomenon of science diplomacy as a new form of cooperation between States to solve global problems in the Arctic region. Nowadays, the Arctic space is one of the potential geopolitical platforms where the world's leading powers focus their special attention and create national strategies for developing the region. Despite the fact that there are currently no open interstate conflicts in the Arctic, there are certain tensions in the region that can provoke a global conflict. Science diplomacy is considered as a tool for reducing the level of conflict in the Arctic. A special place in this research is given to the definition of conflict and its dynamics in the region. The article is based on a quantitative study of the relationship between the use of scientific and diplomatic practices and the level of conflict in the Arctic. The methods of this study are event analysis and content analysis, which made it possible to conduct covariance and correlation analysis of variables. The result of the work was the construction of models of the relationship between science diplomacy and conflict in the Arctic region. The study concluded that the use of scientific and diplomatic practices in the Arctic contributes to reducing the level of conflict in the region.

1. Introduction
The impact of climate change on the melting of Arctic ice is now widely debated both in the media and in the scientific literature. In connection with the expected warming in the last decade, the number of subjects of international relations who are interested in using the transport capabilities of the Arctic and developing its resources has sharply increased.

Due to global climate change, most of the Arctic Ocean is freed from seasonal ice in the summer, which makes its waters more accessible for shipping, exploration, and development of mineral resources and fishing. With climate change in the region, the conditions for the development of the Arctic shelf and the extraction of resources become more favorable and cost-effective. The current warming in the Arctic leads to an increase in the interest of a number of states and large international companies. At the plenary meeting of the forum “The Arctic - the Territory of Dialogue”, which was held on April 9–10, 2019 in St. Petersburg, the heads of state repeatedly touched on the issue of increasing temperature and decreasing sea ice in the Arctic, which confirms the importance of the ongoing climate changes [1].

The most active countries in the region are those with Arctic territories – Russia, the United States, Norway, Denmark, and Norway. According to the UN Convention, only these States have the right to develop the shelf and use the wealth of the Northern region at their discretion. However, this arrangement of things does not suit non-Arctic States, most of which believe that the resources of the Arctic should not belong exclusively to the “Arctic five”, but should be the universal world heritage.
The world's interest in the Arctic is confirmed by the presence of polar strategies in countries directly related to the Arctic, as well as in near-Arctic and even non-Arctic States such as China, Japan and South Korea. These strategies usually focus on the economic and environmental aspects.

Despite the fact that there are currently no open interstate conflicts in the Arctic, there is still tension in the region. Over the past 2-3 years, statements about the growth of tension in the Arctic region have been made repeatedly. So, at a meeting of the Board of the military Department in August 2018 in Sochi, the Russian defense Ministry, General of the army S. K. Shoigu, stated that the Arctic “has become an object of territorial resource and military-strategic interests of a number of States”, which, in turn, may lead to an increase in the conflict potential in the region [2]. In October of the same year, the Russian Embassy was alerted by the UK's build-up of its military presence near Russia's Northern borders. The mission then stated that such a build-up of military forces would increase tensions in the region [3].

A report by U.S. Director of national intelligence D. Coats in May 2017 noted “we assess that risk of competition over access to sea routes and resources”, which leads to competition and increased tensions [7]. At the forum “Arctic-territory of dialogue” in 2019, J. Fryer, Bloomberg's senior Executive editor for global business and Finance and moderator of the platform at the plenary session, also noted that the Arctic is becoming a “point of intersection of military interests” [1], which indicates a conflict between the powers. The information agenda in relation to the region increasingly carries elements of tension, which leads to the development of conflict in the Arctic policy. In this regard, the role of diplomacy as a way of interaction between States is increasing.

2. Theoretical foundations

In the XXI century, as a result of the development of the theory of public diplomacy, new subspecies and dimensions of it began to appear. The concept of science diplomacy is relatively young and reflects the merging of two different spheres of human activity – science and diplomacy. Currently, most researchers consider science diplomacy, as a tool for developing multilateral and bilateral relations between countries. The American diplomat N. Fedoroff understands science diplomacy as “the use of scientific collaboration among nations to address the common problems facing 21-st century humanity and to build constructive international partnerships” [4]. Senior adviser to the American Association for the promotion of science, N. Neurater, defines science diplomacy as “an intentional effort to engage with other countries where the relationship is not good otherwise” [5]. V. Turekyan, who headed the American Association for the advancement of science (AAAS) and has been a adviser to the US Secretary of state for science and technology since 2015, believes that science diplomacy is “the use and application of science cooperation to help build bridges and enhance relationships between and amongst societies, with a particular interest in working in areas where there might not be other mechanisms for engagement at an official level” [9].

Science diplomacy can rightfully be considered the most modern type of diplomacy, not only because of its “age”, but also because of its ability to respond to modern challenges and state requests. The Agreement on Enhancing international Arctic scientific cooperation signed by the foreign Ministers of eight Arctic countries, as well as the governments of Greenland and the Faroe Islands on May 11, 2017 at the Arctic Council Ministerial meeting in Fairbanks proved the global importance of science diplomacy in the Arctic [7].

The concept of “science diplomacy” has three dimensions: “science in diplomacy”, “diplomacy for science” and “science for diplomacy” [8]. To achieve a clearer understanding of science diplomacy (hereinafter referred to as SD), Weber's model of ideal types can be used to make limited generalization possible. M. Weber clarified that the ideal type implies a logical abstraction of certain features of a social phenomenon. In this case, the ideal type of SD should be considered not as a universal type, but as a heuristic type, which in the future can be compared with other recognized cases of science diplomacy. Thus, the ideal type of SD is “maintaining mechanisms for effective interaction between countries through joint scientific and technical projects when political relations are strained or limited” [9]. Based on the definition of its dimensions, the research will refer to the
conclusion of agreements on scientific and technical cooperation and their implementation, the creation of interstate scientific networks through universities, the development and implementation of joint research projects, the holding of international scientific forums, etc.

Scientific and diplomatic practices, according to the SD definition, are designed to regulate relations between States through peaceful scientific interaction. Thus, the tension or conflict in the Arctic, which is mentioned by the heads of state, can be reduced through the use of these practices and the probability of a conflict will be minimal. In particular, conflict is commonly understood as “a type of social interaction that involves individuals, groups, and organizations”. However, conflict is also defined as “a social relationship between two or more parties whose goals are actually or presumably incompatible” [10]. Important to the signs of conflict made by R. Dahrendorf. It is connected with the understanding that the sign of an open fierce struggle is not necessarily interpreted as a necessary condition for the existence of a conflict. According to R. Dahrendorf, social conflict in the modern world has many faces and has various forms of manifestation: wars, demonstrations, strikes with violence, terrorism, “showdowns” between shadow and mafia structures, etc. [10].

If we apply the theory of the ideal type of M. Weber, then the conflict as such can be considered as an open armed confrontation. All other cases can be attributed to a conflict situation, which is also a tension. In the case of the Arctic, we can indeed say that there is no armed conflict in the region, but we cannot say that there is no conflict in it. An increase in the number and quality of conflict situations or tensions, if we consider these concepts as a latent phase of the conflict, can eventually lead to an escalation of the conflict. Concerning to this study and within the defined definitions, escalation will constitute an armed conflict in the Arctic.

Thus, the main task of this study will be to determine the impact of scientific and diplomatic practices on the level of conflict in the Arctic region. To determine the impact of SD on the level of conflict, a hypothesis should be formulated: when the level of science diplomacy in the Arctic increases, the level of conflict in the region decreases, and vice versa. To confirm or disprove this hypothesis, a quantitative study is necessary. So, in this work, covariance and correlation analyses will be used.

The competition and confrontation of political actors in this study will be directly related to the Arctic region, where the interests of many States implementing national Arctic strategies collide. The object of the conflict of interests is the Arctic. The subject of conflicts in the region can be the extraction of hydrocarbon resources, access to transport routes, and the military presence of a number of States in the Arctic.

3. Methodology
In order to prove whether the development of scientific and diplomatic practices affects the level of conflict in the Arctic region, it is necessary to conduct a quantitative study. This article is based on event and content analysis, which can be used to determine the relationship between two variables: conflict and SD.

In our study of the relationship between science diplomacy and conflict, we took the time period from January 1, 2017 to December 31, 2019. It was in May 2017 that the “Agreement on Enhancing international Arctic scientific cooperation” was signed [7]. The regulation of scientific and diplomatic activities has proved the importance of science diplomacy in the Arctic at the international level. Despite the fact that this period is relatively short, in our opinion, the study of this time period will be enough to determine the overall dynamics of conflict situations in the region.

To analyze the relationship between conflict and science diplomacy in the Arctic, we used event analysis, which originated as a method of political science research in the 60s of the XX century. As part of the study, the information base was provided by data from Russian news agencies selected according to the citation rating principle. Currently, the top three most cited news agencies in Russia, according to Medialogia, include: TASS, RIA Novosti and Interfax. In the first place, according to the rating, is RIA Novosti (156122.1 CI in the media), followed by TASS (150394.2 CI in the media), and Interfax closes the top three (65346.8 CI in the media) [12].
Then each output event was encoded. For this study, it was decided to conduct manual encoding based on binary code. This encoding has a simplified appearance, but, meanwhile, allows you to preserve the relationship between variables and conduct correct ranking and giving “weight”.

The basis on which the encoding of conflict situations was based was the typology of conflicts by the degree of intensity of the famous American conflictologist D. Dan. The author suggested the following forms of conflict: skirmishes (minor troubles that do not pose a serious threat); clashes (a series of ongoing skirmishes associated with the expansion of the range of causes that cause the conflict, a decrease in the desire to cooperate with the other party, etc.); crises (constant and unavoidable clashes, resulting in a so-called stalemate, when the opponents finally interrupt the relationship) [13].

Based on this classification and using a binary code, conflict situations in the Arctic region can be encoded as follows: if the conflict led to a break in relations (a state of “crisis”), we put “1” as an indicator of compliance with the class. In this case, the “collisions” and “skirmishes” columns are set to “0” as an indicator of non-compliance with the class. If the conflict did not cause a break in relations, but was large enough and carried elements of damage or other major disputes, then “1” is put in the column “collisions”. Accordingly, the “skirmishes” and “crisis” columns put “0” as an indicator of class mismatch. Finally, if the conflict was minor or simply carried elements of tension, then the “skirmishes” column puts “1” as an indicator of class compliance. The “crisis” and “collisions” columns are assigned “0”, respectively.

“Crisis” can be defined as a situation of open armed conflict, which corresponds to the ideal type, and therefore is a “real” conflict-escalation. The code “000” is entered to indicate a zero value, a situation where there is no conflict. As a result, the encoding based on The D. Dan classification and binary code will look like this: 100 - Armed conflict (crisis); 010 – collision; 001 – skirmish; 000 - the absence of conflict situations.

The result is an ordinal-categorical scale. In the future, it will be possible to assign a “weight” to each of the events while maintaining the structure of relations between them: so 100 > 010 > 001 > 000 according to the degree of intensity of the conflict. In the future, in order to calculate the “weight”, we will place the output codes on an interval scale from “0” to “1”, where “0” is a situation of no conflict and has the code “000”, and “1” is a crisis situation and has the code “100”. So, having four variables on the scale, we have three intervals between them. To save the relationship between variables, enter a constant interval that will serve as a standard measure: divide one (the maximum value of the conflict) by three (the number of intervals). In this case, the code “010” will be located at 0.33333, and the code “001” at 0.66667. This method allows you to distinguish between conflicts and maintain an objective relationship between them. Conflict’s and science diplomacy’s dynamics

The next step for further analysis was to assign each event from the “General event summary” tables a code and a “weight” according to the D. Dan classification.

Conditionally, these events can be divided into two categories out of four, since not one of the conflicts is not a “crisis” and does not contain an open confrontation with the use of weapons, and also does not represent a situation of complete absence of conflict (which follows from the definition). Such categories are the category of “confrontation” and “skirmishes”. To differentiate between conflicts, it is best to go from less to more. Thus, the category of “skirmishes” can be attributed primarily to statements that indicate the presence of conflict situations, but in themselves they are not. After assigning codes to the events that make up the tension, then the previously derived “weights” are assigned, which allows us to plot the dynamics of conflict situations for the period from January 1, 2017 to December 31, 2019.

This figure will look like this: each month of each year will be assigned a “weight” in accordance with the conflicts that took place in a particular month. If there was no conflict situation in any of the months, then this month will be assigned a “weight” of “0.1”. This “weight” is given because it is incorrect to state that there is no conflict at all. Some of the situations were not included in the “General summary” of the content analysis report. The existence of other news agencies could simply not be reported. If there were several events, their “weights” will simply be added together. So, the
months will be represented along the x-axis, and the values of the weights will be represented along the y-axis.

![The dynamics of conflict](image)

**Figure 1.** The dynamics of conflict in the Arctic for 2017-2019

According to a similar scheme, a dynamics chart was developed for the development of science diplomacy in the Arctic for the studied period: an information base was formed on the basis of event and content analysis, each of the events was assigned a “weight”.

However, at the beginning, it is necessary to determine which manifestations of science diplomacy should be understood as the maximum and minimum value. Turning again to the ideal type of science diplomacy, we can define the maximum point as any event that supports communication and cooperation between States through direct international cooperation in joint scientific programs and projects when their relations are strained or limited. The point of minimum, by analogy with conflict, can be considered the absence of scientific and diplomatic activities. Using the previously derived binary-based encoding, any event that matches the ideal type will be encoded as “100” and have a “weight” of “1”. The absence of scientific and diplomatic practices will correspond to the code “000” and have a zero value, being a reference point.

Each of the selected events did not belong to the ideal type of science diplomacy, but had a unique type of interaction between States: the conclusion of scientific and technical agreements between States in the Arctic based on the results of various forums and conferences. Since there are no classifications for the degree of intensity of science diplomacy, we proposed to introduce a conditional classification of science diplomacy. Logic build the following: identifying the ideal type of science diplomacy as a maximum with the value “weight” “1” and its absence as “0”, introduce two more manifestations of SD: very close to the ideal type of SD and similar in meaning to the absence of SD. These events are encoded in the same way as conflicts: 100 - Ideal type; 010 - close to the ideal type of SD case; 001 – close to the absence of SD case; 000 - the lack of SD.

Thus, all the previous events represent an international dialogue on scientific and technical cooperation in the Arctic region. These events, based on our own definition, are closer to determining the ideal type of SD, but not to the lack of SD practices. Therefore, these manifestations of science diplomacy will be assigned the code “010” and “weight” in “0.66667”.

Those months where no events related to SD practices were detected will be assigned a “weight” of “0.1”. This “weight” will be assigned based on the fact that we can not say that there is a complete lack of science diplomacy in the Arctic, since they could not get into the “General event summary” or be not reflected in news agencies. In this case, we get the following figure of the dynamics of SD in the Arctic:
4. Correlation of science diplomacy and conflict

Science diplomacy, based on its definition, contributes to strengthening ties between States and mutually beneficial long-term cooperation by strengthening international scientific ties and scientific cooperation in various fields. However, it was previously revealed that the Arctic has a conflict potential. Conflict situations in the region are almost cyclical. The value of variables, according to the analysis, have the points of minimum (when the “weight” of conflict situations is almost zero) and maximum (when they have a “weight” close to one). In this case, the question arises about the nature of this cycle and the reason for the existence of minimum and maximum points that have a sufficiently large gap between values.

To evaluate the relations between variables, let's start with a simpler way to measure properties — covariance. Theoretical covariance “is a mathematical expectation of the product of deviations of variables from their distribution centers” [14].

In the case of detection of covariance, it is sufficient to “overlap” the figures of conflict and SD that were deduced earlier in the study. Since initially the values in the figures were subjected to the centering procedure, then in the final figure the values of conflict and science diplomacy in the Arctic will fluctuate around one center – “0” and the covariance will be more obvious. Covariance of conflict and SD in the Arctic will look like this:
Based on figure 3, we can see that the covariance of SD and conflict is negative. In other words, where the values of conflict are at their maximum points, the values of SD are minimal and vice versa. This tells us that the interaction of these indicators is multidirectional. The maximum points of the “scales” do not intersect, the “waves” follow, for the most part, one after another, which gives us the opportunity to assume a direct relationship between the level of conflict and SD. The only exception is September 2019, when the activity of the Arctic policy of the States was high in both directions. We can also say that the prolonged absence of SD practices in 2018 could lead to the fact that the “weight” of the conflict value at the end of the same year was the highest for the period from 2017 to 2018 – 1.3. The peaks of conflict and SD occur in September 2019: the approximate values are 1.7.

According to the correlation analysis, the relationship between the levels of conflict and SD in the Arctic is “– 0.3”. This value has a minus sign, which tells us about the inverse, but strong enough relationship. The “R” square according to the correlation analysis is 0.09, which means that this model explains the relationship between the level of conflict and SD by 9%. If we analyze each of the studied years separately, we can see a very interesting picture. The fact is that the correlation indicator for the period from 2017 to 2019 is approximately one indicator “0.3”. However, the study of the first half of 2019 shows that the relationship between the level of conflict and SD has increased significantly and is equal to 0.7, and the model explains the relationship by 49%. Thus, it can be argued that the role of SD in the region is becoming increasingly important, and the development of scientific and diplomatic activities can reduce the level of conflict in the Arctic. The high level of conflict at the end of 2018, possibly caused by a prolonged period of absence of SD practices, also confirms this assumption.

5. Conclusion

Definitely, we cannot say that the level of conflict in the Arctic region is affected only by SD. Correlation analysis is primarily intended to show the “strength” of the relationship between variables. The presence of a correlation will not mean that there is a direct cause-and-effect relationship. In fact, the picture may be more complex and show the relationship not only between two variables, but also a third one that is not included in the analysis. Meanwhile, the model proposed in the study is consistent and shows the existing relationship between the levels of conflict and SD in the Arctic.

The practice of SD in the Arctic, despite not very high indicators, is currently developing. Various international scientific forums and conferences are held on a regular basis, such as “Arctic frontiers”, “Arctic – the territory of dialogue”, “Arctic: present and future”, “Euroarctic”, etc. The Russian side organizes various summer schools that study the features of the Arctic region, the life of indigenous peoples of the North, and ecosystems. Thus, in July 2017, an international summer school and a summer school for University students of the Association of leading universities of the Asia-Pacific region were held at the Far Eastern Federal University in YANAO, polar sea voyages are conducted annually by the floating Arctic University. Government bodies and the scientific community of various countries jointly study the issues of climate change in the region, the preservation of a fragile ecosystem and the development of traditional farms of indigenous peoples.

The conflict that currently exists in the Arctic region can be reduced precisely through the use of SD methods. The hypothesis stated in that paper was confirmed in this study. Covariance and correlation analysis have shown that when the level of SD practices increases, the level of conflict in the Arctic region decreases, and vice versa. If the model is not unconditional, it allows us to give a reasoned answer to the question why we need to use SD practices in the Arctic. Further development of SD in the region will allow solving truly important problems that affect the entire international community through peaceful scientific interaction and cooperation. Scientific cooperation of States in the Arctic region will prevent the development of an armed conflict in the Arctic, which may lead to the beginning of the Third world war. Negligent attitude to existing problems in the Arctic can contribute to the emergence of a real conflict in the region, which is why it is so important to respond to existing challenges in a timely manner and effectively resolve disputes at the negotiating table. It is the development of scientific activities in the region that should become a means that will be able to reduce conflict and tension in the region. Science diplomacy is promising in its own development.
over time, it can acquire new forms that will be able to respond to new challenges and threats to the sustainable development of mankind.

It is the development of scientific activity in the region that should become a means that will be able to reduce conflict and tension in the region. Science diplomacy is promising in its own development, over time it can take on all new forms that will be able to respond to new challenges and threats to the sustainable development of mankind.

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