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**THE ARCTIC REGIONAL SECURITY:
A SCIENTOMETRIC ANALYSIS OF INFORMATION ARRAYS
IN DATABASES WEB OF SCIENCE AND SCHOLAR SIBIRICA**

Rykova V.V.

The article traces main trends of the scientific research development on security in the Arctic region using the international database Web of Science by Thomson Reuters Co and the regional database Scholar Sibirica generated by the State Public Scientific Technological Library of the Siberian Branch of the Russian Academy of Sciences. Using a scientometric analysis and analytical tools of DBs, the author shows countries, institutions and organizations that study this problem, as well as funds financing them; names productive periodicals and authors with high publication activity; presents monographs and dissertation studies of recent years; reveals the main research areas. In conclusion, the author notes that the study of the safety at the Arctic territories is an urgent problem for the entire world society, not only for the northern countries; the above-mentioned DBs should be regarded as an information base for further study of the Arctic security.

Objective – *to carry on a scientometric analysis of information arrays (IA) devoted to studying the Arctic region security.*

Methods: *scientometric analysis.*

Results: *countries, institutions and organizations that study this problem are represented, as well as funds financing them; productive periodicals and authors with high publication activity are designated; monographs and dissertation studies of recent years are shown; the main research fields are revealed.*

Practical implications: *the study should be used as an information base for further research of scientists and specialists on various aspects of the Arctic region security.*

***Keywords:** security; Arctic; research information support; DB Web of Sciences; DB Scholar Sibirica; scientometric analysis.*

БЕЗОПАСНОСТЬ АРКТИЧЕСКОГО РЕГИОНА: НАУКОМЕТРИЧЕСКИЙ АНАЛИЗ ИНФОРМАЦИОННЫХ МАССИВОВ МЕЖДУНАРОДНОЙ И РЕГИОНАЛЬНОЙ БАЗ ДАННЫХ

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В статье прослежены тренды развития научных исследований по теме «Безопасность Арктического региона» с использованием баз данных – международной Web of Science (компании Thomson Reuters) и региональной Научная Сибирика (собственной генерации Государственной публичной научно-технической библиотеки Сибирского отделения Российской академии наук). В базах данных с использованием булевых операторов и ключевых слов выявлены документальные массивы по теме, проведен их сравнительный наукометрический анализ. Аналитические сервисы баз данных позволили назвать страны, учреждения и организации, занимающиеся изучением данной проблемы, а также финансирующие их фонды. Определены наиболее продуктивные периодические издания и авторы с высокой публикационной активностью. Представлены научные мероприятия, проводимые по теме, монографии и диссертационные исследования последних лет. Показана тематическая структура информационных массивов. Отмечено, что изучение безопасности арктических территорий является актуальной проблемой всего мирового сообщества, а не только северных стран. Вышеназванные базы данных могут служить информационной основой дальнейших исследований различных аспектов безопасности Арктического региона.

***Цель** – проведение наукометрического анализа информационных массивов, посвященных изучению безопасности Арктического региона.*

Методы: наукометрический анализ.

Результаты: представлены страны, учреждения и организации, которые изучают эту проблему, а также фонды, финансирующие их; обозначены продуктивные периодические издания и авторы с высокой публикационной активностью; показаны монографии и диссертационные исследования последних лет; выявлены основные направления исследований.

Область применения результатов: исследование могут служить информационной основой дальнейших исследований ученых и специалистов по различным аспектам безопасности Арктического региона.

Ключевые слова: безопасность; Арктика; БД Web of Sciences; БД Научная Сибирика; наукометрический анализ.

Introduction

The Arctic has recently attracted the close attention of politicians, scientists, and experts as an important geostrategic region with significant reserves of natural resources, as well as a transport corridor that provides trade links between Europe and Asia. The imperfection of the legal framework has led to aggravation of territorial disputes in the region. Russia has adopted the State Program “Socio-economic development of the Arctic zone of the Russian Federation” until 2025 according with the Intergovernmental Panel on Climate Change recommendations, which provides creation of supporting regions in the Arctic for the territory of complex development, technological investigations and the resource base efficient use in the Russian Arctic zone and the Arctic ocean continental shelf. Decree of the President of the Russian Federation on 05.03.2020 No. 164 “On the State Policy Bases of the Russian Federation in the Arctic for the Period until 2035” defines foundations of the state policy of the Russian Federation Arctic regions [1]. In this regard, security issues in the Arctic are highlighted.

The article objective is to carry on a scientometric analysis of information arrays (IA) devoted to studying the Arctic region security.

Materials and methods

To analyze researches on the security in the Arctic region two databases (DBs) were applied:

– Web of Science (WoS), the global scientific citation database of Thomson Reuters;

– Scientific Siberia, a regional database generated by the State Public Scientific and Technological Library of the Siberian Branch of the Russian Academy of Sciences (SPSL SB RAS), included a large thematic section “Problems of the North” that concentrates and systematizes bibliographic data on studying the complicated problems in the Arctic zone countries [2].

IAs have been selected of the mentioned above DBs using keywords and Boolean operators. The volume of IAs for the period 1990-2019 compiled over 900 documents in WoS, and more than 1,300 documents in Scholar Sibirica on February, 2020.

The specialists of the Department of Scientific Bibliography have long tradition of scientometric analysis of documents flow in different research fields [3,4].

A scientometric analysis of IAs of the international DB WoS by Thomson Reuters and a regional DB Scholar Sibirica of SPSL SB RAS’ own generation includes:

- 1) revealing trends of scientific research development on the Arctic safety,
- 2) representing the countries and institutions involved in the problem study, as well as organizations funding the researches,
- 3) nominating the productive periodicals on the issue,
- 4) identifying authors with high publication activity,
- 5) pointing out importance of monographs and dissertations for recent years,
- 6) designating research topics.

Study results

The dynamics of IAs over a 30-year period is shown in the diagram (Fig. 1), where the growth in the publications amount is clearly

visible, documents' number increase is especially noticeable the last decade. Editions of 2019 are still being transferred to the collections of the State Public Scientific Technological Library SB RAS, therefore the total number of documents in the DB Scholar Sibirica is expected to be significantly larger over the past few years. The interest of scientists and specialists to this problem is explained by the geopolitical competition of the polar states and the interest of non-Arctic states to develop the Arctic natural resources.

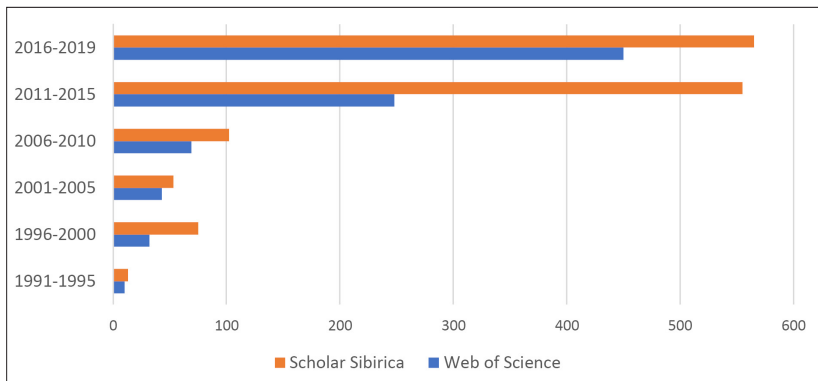


Fig. 1. IAs dynamics of DBs Web of Science and Scholar Sibirica

The documents distribution by language in DBs Web of Science and Scholar Sibirica is presented in Table. 1.

Table 1.

The linguistic structure of IAs in DB Web of Science and Scholar Sibirica

Language	Web of Science		Scholar Sibirica	
	Record number	%	Record number	%
English	856	93	47	3
Russian	45	5	1318	96
Chinese	5	0,5	-	-
German	4	0,5	-	-
Others	10	1	13	1

In the language structure of WoS, the main language of publications is English (93% of documents), works in Russian amounted to 5% (23

documents), articles in Chinese and German together did not exceed 1% of IA. Another picture is observed in DB Scholar Sibirica, where Russian-language materials prevail accounting for 96% of IA, while English-language publications are few, their share does not exceed 3%.

The analytical tools of DB WoS allow users to identify the participation of the scientific community representatives from different states, affiliations of scientists and specialists, funds financing research on a particular problem. In studying the Arctic security the first five positions are taken by “northern” countries: Canada, USA, Russia, Norway and Finland. As all these states have domains beyond the Arctic Circle, which resources development is a priority the last decade, they pay close attention to the aforementioned problem. A significant contribution to research the Arctic security issues is also made by scientists from Germany, Great Britain, China, Sweden and Denmark.

Among the organizations funding the Arctic safety investigations are the National Science Foundation of the USA, the Natural Sciences and Engineering Research Council of Canada, ArcticNet (a Network of Centers of Excellence in Canada, which brings together scientists and specialists in the field of health, natural and social sciences), and scientific foundations of Russia and China.

The Arctic security researchers are affiliated with different organizations. A significant contribution to the Arctic security study is made by employees of the Russian Academy of Sciences institutions, as well as teachers and specialists from U.S. universities in Alaska (University of Alaska System, University of Alaska Fairbanks), Norway (University of Tromsø, Norwegian University of Science and Technology), Canada (McGill University, Memorial University of Newfoundland, Laval University, University of Ottawa), Finland (University of Lapland). Obviously, the publications share in WoS by Russian authors will increase, because, firstly, Russian journals are actively working to include scientific citation in the world’s largest databases, and secondly, Russian authors more often are published in leading world English-language publications.

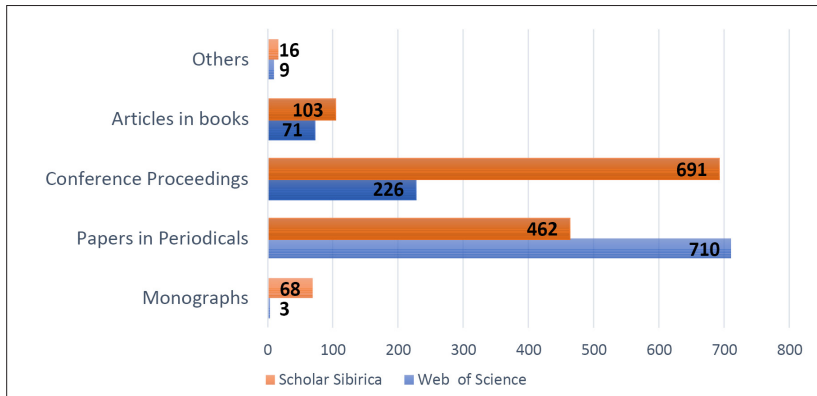
The IA type-specific structure of DBs WoS and Scholar Sibirica is not the same, Table 2 presents quantitative indicators of publications’

typical composition, Fig. 2 demonstrates the ratio of different types of documents in DBs.

Table 2.

The distribution of document types in DBs

Document type	Web of Science		Scholar Sibirica	
	Record number	%	Record number	%
Papers in periodicals	710	77	462	34
Conference proceedings	226	24	691	51
Monographs	3	0	68	5
Works in scientific collections	71	8	103	7
Others	9	1	16	1

**Fig. 2.** The ratio of document types in DBs WoS and Scholar Sibirica

Articles in periodicals and conference proceedings dominate in the typical structure of documents (respectively 77% and 24% in WoS, 34% and 51% in Scholar Sibirica). Journals reflect the results of scientific research most quickly, Table 3 shows the Top-5 periodical titles on the number of articles devoted to studying the Far North region security problems.

Conference proceedings are no less important for the scholar community than periodicals, because there is an active exchange of information, discussion of topical issues, discussions on pressing issues during scientific meetings of various ranks. Most forums are held on an ongoing basis, together they form a half of IAs in DB Scholar Sibirica and a

quarter one – in WoS (Table 2), the following of them should be noted: *Conference on Ocean, Offshore and Arctic Engineering; Ocean IEEE conference; Problems of emergency situations prevention and liquidation in the Arctic region; Ensuring security during the implementation of large economic and infrastructure projects in the Arctic. Problems and solutions; Theory and practice of integrated marine research in the interests of the economy and security of the Russian North; Arctic: international cooperation, ecology and safety, innovative technologies and logistics, legal regulation, history and modernity*, and others.

Table 3.

Top 5 productive periodicals on the subject in DBs WoS and Scholar Sibirica

БД	Web of Science		Scholar Sibirica	
	№	Edition title, country	Paper amount	Paper amount
1	International Journal of Circumpolar Health (USA)	31	Geopolitics and Security (Russia)	35
2	Polar Records (UK)	22	National interests: priorities and security (Russia)	30
3	Arctic (Canada)	21	Arctic: ecology and safety (Russia)	26
4	Marine Intellectual Technologies (Russia)	12	Arctic News (Russia)	21
5	Marine Policy (UK)	12	Arctic and the North (Russia)	11

A small group of monographic publications is the most important component of IAs, as they summarize the results of multiyear research by teams of scientists. The evidence of a significant amount of materials on the studied topic is editing over 20 monographs the last 4 years (2016–2019). As already noted, the books of the 2019 edition are not yet fully indexed in DBs, therefore their list included in the table is not complete. The monographs published in 2019 are devoted to the Arctic Council role at the northern affairs (Nord, 2019), the contested energy frontiers (Tynkkynen et al., 2019), security provision in the Russian Arctic zone (Ivchenko & Shamатов, 2019).

The dissertation theses on various aspects of Arctic safety, demonstrates the growing interest of scientists in the aforementioned problems. Table 5 includes only titles of dissertation works defended in Rus-

sia last years and entered DB Scholar Sibirica, since DB WoS doesn't represent such materials.

Table 5.

Dissertation works on the Arctic security defended in Russia for 2016–2019

Year	Author	Title
2016	Masloboev A.V.	Research and development of models and methods for information support of regional security management (a case of Murmansk Region)
2016	Timofeev P.A.	Scientific and methodological support to assess the hydrometeorological safety in the Arctic zone of the Russian Federation under the conditions of fuzzy information
2017	Kravchuk A.A	The main threats to the national security in the Arctic of the Russian Federation and forming the state policy to neutralize them
2018	Sboychakova A.V.	The Arctic Council role in shaping the environmental security policy in the Arctic
2018	Sergeeva V.V.	The system development of the population socio-economic security in the Arctic zone of the Republic of Sakha (Yakutia)
2019	Sun Xuwen	Problems and prospects of Russian-Chinese cooperation in the Arctic development
2019	Volodin D.A.	Canadian policy in the field of defense and international security (1990s-2010s)

Among the authors with high publication activity (Scholar Sibirica), it is necessary to name employees of institutions of the Kola Scientific Center of the Russian Academy of Sciences, who are the authors of numerous monographs that address the security problems of the Arctic zone: A. V. Masloboev (Institute of Informatics and Mathematical modeling of technological), V. S. Selin, T. P. Skuf'ina, M. V. Ul'chenko (G.P. Luzin Institute of Economic Problems) and others.

The most productive authors of DB WoS are J.D. Ford (University of Leeds, UK) and A.A. Dudarev (Northwest Public Health Research Centre, Russia) engaged in studying save life of Arctic aboriginal communities and F. Khan (Memorial University of Newfoundland, Canada) dealing with safe navigation and drilling in the Arctic ocean).

Thematically, IAs of databases are structured identically, which indicates the general direction of research by scientists and specialists from different countries, which are aimed to solve the following problems:

- geopolitics, national security and international relations,
- safe navigation along the Northern Sea Route,
- geotechnical safety of activity on regional natural and mineral resources exploitation,
- life safety of the population in the Arctic zone including the indigenous people of the North,
- environmental safety of the Arctic and sub-Arctic territories.

Conclusion

Summarizing the analysis results, it should be noted that studying the Arctic territories security is an urgent problem for the entire world community, and not only for the northern countries. The amount of information on the topic is steadily growing. Using a scientometric analysis and analytical tools of DBs, the author shows countries, institutions and organizations that study this problem, as well as funds financing them; names productive periodicals and authors with high publication activity; presents monographs and dissertation studies of recent years; reveals the main research areas.

Search filters and the systematization of documents in both DCs makes it easy to find relevant documents on a topic that can form the basis for further research, as bibliographic materials can be obtained from any computer. Full texts of publications from WoS are possible either for a fee, or on a license agreement (except for Open Access publications). Regional Arctic safety materials from DB Scholar Sibirica of SPSL SB RAS are free, available on the library website www.spsl.nsc.ru (options “Catalogs and Databases” → “Bibliographic Databases” → “Scholar Sibirica”), where all e-documents are provided with hyperlinks from a bibliographic record to a paper full, publications with DOI provide a link to the publisher’s website or to the work itself. All printed documents are stored in the library, they can be obtained by the interlibrary loan or in the reading rooms of the library. Besides, a user can order a full-text cope of any document on the library homepage (option “On-line order of e-article”).

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