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## Study and Development of the Northern Sea Route: Analysis of the Document Corpus of “Scientific Sibirica” Database \*

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**Abstract.** The article traces main trends in research progress on the topic “Study and development of the Northern Sea Route” using the bibliographic database “Scientific Sibirica” generated by the State Public Scientific Technological Library of the Siberian Branch of the Russian Academy of Sciences. A document corpus on the topic was identified using key words and subject heading, the scientometric analysis was carried out. The paper shows the temporal, linguistic, type-specific and thematic structures of the document corpus. It presents the most productive periodicals, authors with high publication activity, scientific events held on the topic. It’s noted that the Northern Sea Route development is an urgent problem of the entire world community, not only of the northern countries. The above-mentioned database can serve as an information basis for further research on various aspects of the Northern Sea Route development. The purpose is to analyze the document corpus devoted to studying the Northern Sea Route retrieved from the database “Scientific Sibirica”. The method is scientometric analysis. The results are the following: the dynamics and structure of the information array are presented, productive periodicals and authors with high publication activity and main research topics are identified. The study can serve as an information basis for further research on various aspects of the Northern Sea Route development by scientists and specialists.

**Keywords:** Northern Sea Route, scientometric analysis, “Scientific Sibirica”, research information support

### Introduction

Decree of the President of the Russian Federation dated March 5, 2020 No. 164 “On the fundamentals of the state policy of the Russian Federation in the Arctic for the period up to 2035” defines the goals, objectives and mechanisms for implementing state policy in the Arctic regions to ensure the national interests of the country<sup>1</sup>. The document highlights the role of the Northern Sea Route as a tool for the socio-economic development of the Arctic zone. The incident with the container ship Ever Given, which ran aground and blocked the Suez Canal, demonstrated the need to develop logistics routes in the Arctic not only for the Nordic countries, but for the entire world community. The aim of this work is to scientometrically analyse a corpus of documents (CD) devoted to multidimensional studies of the Northern Sea Route (NSR).

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<sup>1</sup> Ukaz Prezidenta RF ot 5 marta 2020 g. N 164 "Ob Osnovakh gosudarstvennoy politiki Rossiyskoy Federatsii v Arktike na period do 2035 goda" [Decree of the President of the Russian Federation of March 5, 2020 N 164 "On the Fundamentals of the State Policy of the Russian Federation in the Arctic for the period up to 2035"]. URL: <https://www.garant.ru/products/ipo/prime/doc/73606526/> (accessed 01 August 2021).

### *Materials and methods*

For the identification of the corpus of documents, the bibliographic database (DB) “Scientific Sibirica” was used, generated by the employees of the State Public Scientific and Technological Library of the Siberian Branch of the Russian Academy of Sciences (SPSTL SB RAS) for information support of scientific research [1], the documents of which are structured according to the thematic rubricator. Using keywords and Boolean operators, we have formulated a search query and identified a corpus of documents related to the study of NSR. As of August 2021, its volume amounted to more than 1200 documents for the period 1990–2020.

### *Scientometric analysis of the corpus*

The dynamics of the document corpus over a 30-year period is presented in the diagram (Fig. 1), which clearly demonstrates the growth in the volume of publications, especially in the last two decades. It should be noted that the publications of the 2020 edition are still being received by the library, so the volume of documents of the last decade will increase. Papers of the 2021 are excluded from the analysis, since they are only partially indexed in the database.

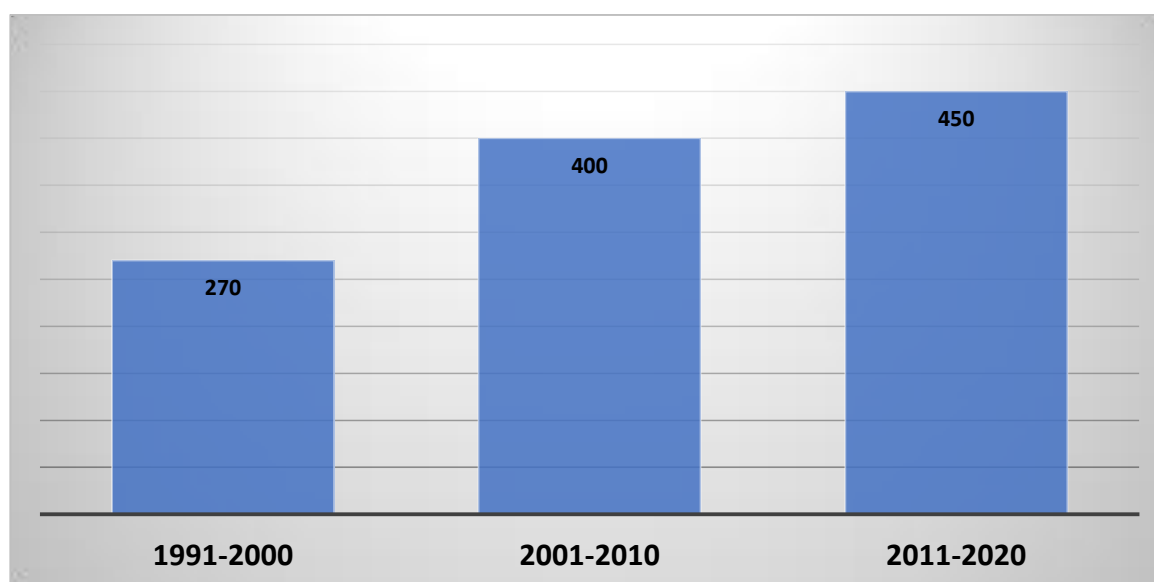


Fig. 1. Dynamics of the document corpus.

The language structure of the CD (Fig. 2) of the database is homogeneous, almost 86% (1042 documents) are Russian-language works, the rest of the materials are published mainly in English (151 records), there are works in German, but they are few in number (16 papers). Such a structure is explained by the sources of the database formation: the bulk of publications are included in the CD according to the results of national literature legal deposit survey, the receiver of which is the State Public Scientific and Technological Library of the Siberian Branch of the Russian Academy of Sciences. Works in foreign languages were either selected from remote databases, or entered the library collection through international book exchange or were published in Russian editions in a foreign language.

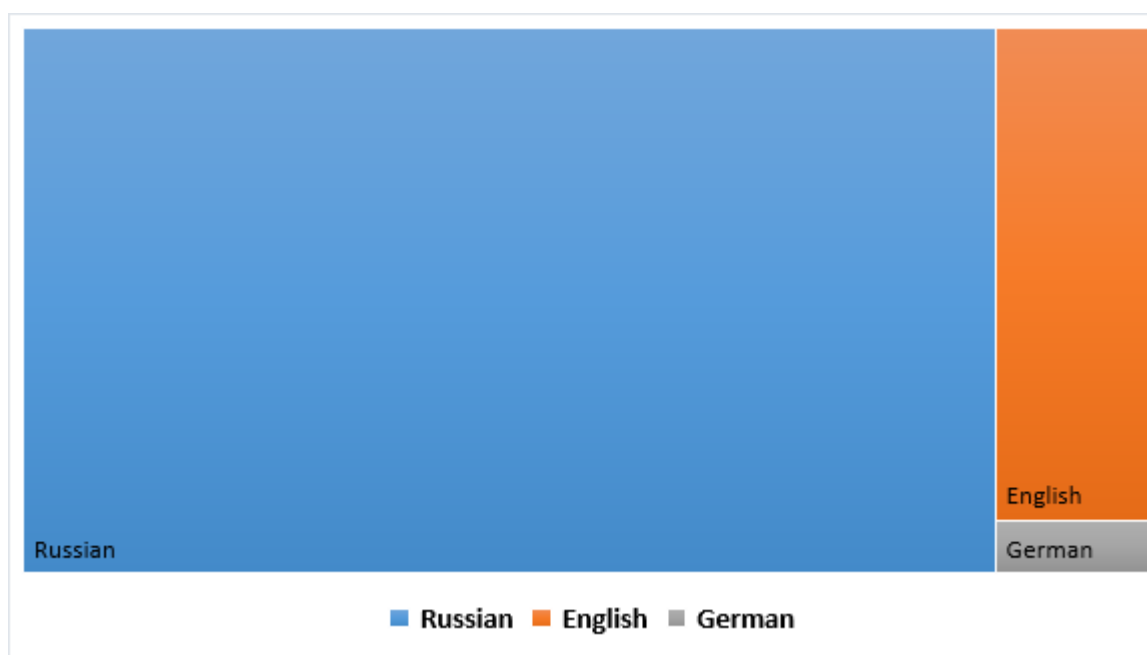


Fig. 2. Language structure of the document corpus.

The type-species structure of the CD from the “Scientific Sibirica” database is shown in Fig. 3, where articles from periodicals and continuing publications predominate, accounting for more than 48% of the records. Scientific journals, being the most efficient source of information, bring the latest results of scientific research to the audience. The most productive periodicals on the topic are the following: *Arctic and North*; *Arctic: Ecology and Economy*; *The Arctic Herald*; *Maritime fleet*; *Problems of the Arctic and Antarctic*; *Sever i rynek: formirovanie ekonomicheskogo poryadka*; *Transport of the Russian Federation*; *Transport Business of Russia*.

A significant share of information is published in conference proceedings (29%), where scientists and specialists directly exchange opinions and discuss issues of interest. Even during the pandemic, the activity of scientific events does not decrease: many of them are held virtually. It should be noted that the results of research on the study of the NSR can be found in all conferences, the topics of which are related to the study of the Arctic and the North. There are several events of various levels dedicated exclusively to the study of the NSR: *The Arctic and the Northern Sea Route: a regional scientific-practical conference “Influence of the Northern Sea Route on the socio-economic development of the Russian North” (Tiksi, 2000)*; *75 years since the beginning of the systematic study and development of the Northern Sea Route: International scientific and practical conference within the framework of IPY 2007/08 events (St. Petersburg, 2008)*; *The strategy of Russian maritime activities and the economics of environmental management in the Arctic: Arctic-2012: All-Russian marine scientific and practical conference (Murmansk, 2012)*; *Scientific and technical support for research and development of the shelf of the Arctic Ocean: All-Russian scientific and technical conference (Novosibirsk, 2010, 2012)*; *Northern Sea Route: development of Arctic communications in the global economy “Arctic–2015”: All-Russian maritime scientific and practical conference (Murmansk, 2015)* and others.

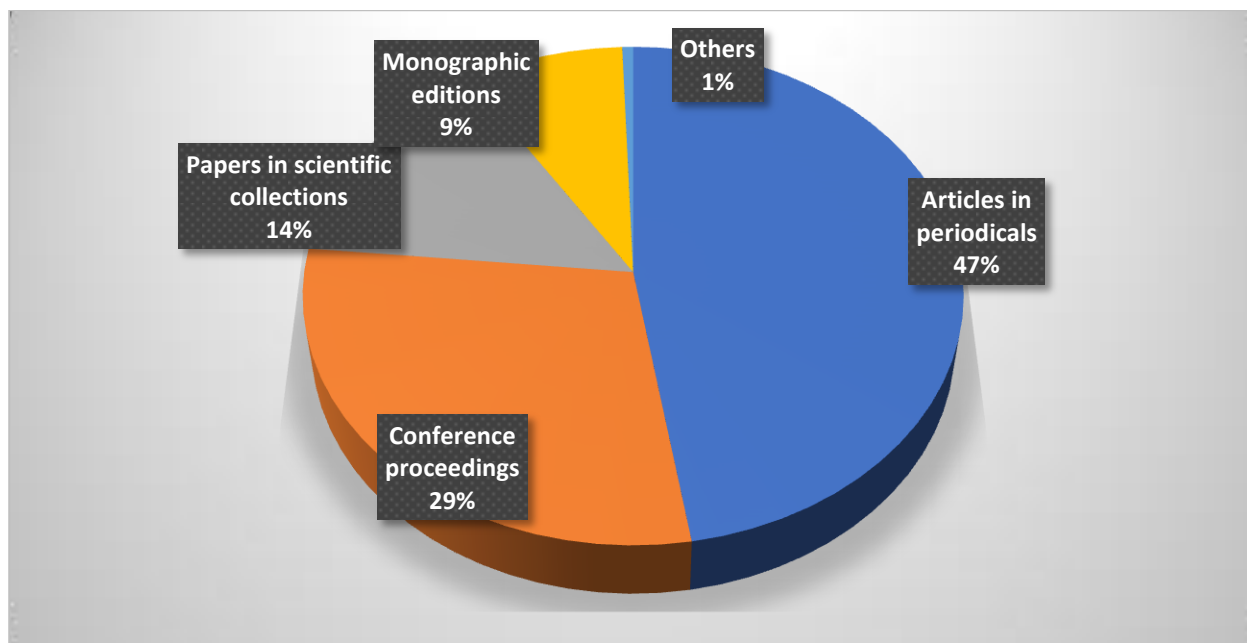


Fig. 3. Type-species structure of the document corpus on the topic.

Works published in collections of scientific papers account for 14%, thematic issues covering the study of the Northern Sea Route are among them: *the Northern Sea Route: State, Problems, Prospects* (St. Petersburg, 2007); *Transport and Logistics in the Arctic. Northern Sea Route: Course — Far East* (Moscow, 2016); *Problems of the Development of the Marine Fleet* (St. Petersburg, 1999–2011).

The share of monographic publications is significant (9%). This type of documents deserves special attention, since it summarizes years of authors’ research. This group includes various types of publications, such as scientific monographs, abstracts of dissertations, popular science publications, textbooks, bibliographic indexes, memoirs, albums, brochures.

Table 1

Types of monographic editions of the studied corpus of documents

No.	Publication type	Example
1	Scientific monographs	Bogdanov A.I. et al. <i>Problemy Severnogo morskogo puti</i> [Problems of the Northern Sea Route]. Moscow, Nauka Publ., 2006, 581 p. Doiban V.A., Batskikh Yu.M., Luzin G.P. <i>Severnyy morskoy put' i rynochnaya ekonomika: novye vozmozhnosti dlya razvitiya</i> [The Northern Sea Route and the Market Economy: New Opportunities for Development]. Apatity, 1995, 139 p. Johannessen O.M. et al. <i>Distantcionnoe zondirovanie morskikh l'dov na Severnom morskom puti: izuchenie i primenenie</i> [Remote Sensing of Sea Ice on the Northern Sea Route: Study and Application]. Saint Petersburg, Nauka Publ., 2007, 437 p.
2	Abstracts of dissertations	Bunik I.V. <i>Mezhdunarodno-pravovye osnovaniya regulirovaniya Rossiey sudokhodstva po Severnomu morskomu puti: avtoref. diss. kand. jurid. nauk</i> [International Legal Grounds for Russian Regulation of Shipping along the Northern Sea Route: Dr. Jur. Sci. Diss. Abs.]. Moscow, 2007, 25 p. Olkhovik E.O. <i>Teoreticheskie osnovy i metodologiya issledovaniya vodnykh putey dlya organizatsii morskikh transportnykh potokov Severnogo morskogo puti: avtoref. dis. dokt. tekhn. nauk</i> [Theoretical Foundations and Methodology for the Study of Waterways for the Organization of Maritime Transport Flows of the Northern Sea Route: Dr. Tech. Sci. Diss. Abs.]. Saint Petersburg, 2020, 42 p. Kiselev V.S. <i>Organizatsiya raboty lineynykh ledokolov na trassakh Severnogo morskogo puti na osnove imitatsionnogo modelirovaniya: avtoref. diss. kand. tekhn. nauk</i>

		[Organization of the Work of Linear Icebreakers on the Routes of the Northern Sea Route based on Simulation Modeling: Cand. Tech. Sci. Diss. Abs.]. Saint Petersburg, 2020, 22 p.
3	Scientific and popular publications	Popov S. V. <i>Avtografy na kartakh</i> [Autographs on Maps]. Arkhangelsk, Severo-Zapadnoe Publ., 1990, 238 p. Burkov G.D. <i>My prishli k tebe, polyus! (K 35-letiyu pokhoda atomnogo ledokola "Arktika" na Severnyy polyus)</i> [We Came to You, Pole! (To the 35th Anniversary of the Voyage of the Nuclear Icebreaker "Arktika" to the North Pole)]. Saint Petersburg, AANII Publ., 2012, 220 p.
4	Memoirs	Lid J. <i>Sibir' — strannaya nostal'giya : avtobiografiya</i> [Siberia is a Strange Nostalgia: an Autobiography]. Moscow, Ves Mir Publ., 2009, 302 p. (Annotation: A Norwegian businessman about his participation in the development of Siberia and the Northern Sea Route). Miroshnichenko P.G. <i>Veteran Arktiki ledokol "Ermak"</i> [Veteran of the Arctic Icebreaker "Ermak"]. Norilsk, APEX Publ., 2013, 207 p.
5	Training manuals	Lepustin I.Yu., Lukin P.D., Martyshenkov V.E., Sabadash A.I. <i>Sovremennyye tendentsii i perspektivy razvitiya avtomaticheskikh sistem upravleniya atomnykh ledokolov: ucheb. posobie</i> [Modern Trends and Prospects for the Development of Automatic Control Systems for Nuclear Icebreakers: Textbook]. Saint Petersburg, GUMRF Publ., 2019, 436 p. Romanovskiy V.V., Malyshev V.A., Sorokin Yu.V. <i>Grebnye elektricheskie ustanovki ledokolov i sudov ledovogo plavaniya: ucheb. posobie</i> [Rowing Electrical Installations of Icebreakers and Ice-Going Ships: Textbook]. Saint Petersburg, GUMRF Publ., 2019, 400 p.
6	Bibliographical index	Lieberman A. A. <i>Sovetskoe obshchestvo v vospominaniyakh i dnevnikakh. T. 6. Kul'tura. Nauka. Prosveshchenie</i> [Soviet Society in Memoirs and Diaries. Vol. 6. Culture. Science. Enlightenment]. Moscow, Indrik Publ., 2006, 603 p. (Annotation: Research in the Arctic and the development of the Northern Sea Route, p. 212–235).
7	Albums	Emelina M. A. <i>Ledokol "Krasin": istoriya v fotografiyakh</i> [Icebreaker "Krasin": History in Photographs]. Moscow, Paulsen Publ., 2016, 168 p.
8	Brochures	Kryukov V., Moe A., Shmat V. <i>West Siberian oil and the northern sea route: current situation and future potential</i> . Norway, 1996, 23 p. Selin V.S. <i>Organizatsiya deyatelnosti i ekonomicheskaya otsenka gruzopotokov v zapadnom sektore Severnogo morskogo puti</i> [Organization of Activities and Economic Assessment of Cargo Flows in the Western Sector of the Northern Sea Route]. Apatity, KSC RAS Publ., 2000, 42 p.

“Other” (1%) includes deposited manuscripts, maps, photo albums, preprints, reviews.

Among the authors with the highest publication activity on the topic, we should mention V.S. Selin and A.V. Istomin, Doctors of Economics, — employees of the Luzin Institute for Economic Studies of the Kola Science Centre, Russian Academy of Sciences, engaged in the study of the economy of the NSR [2, 3]; Doctor of Historical Sciences Yu.F. Lukin, a professor of the Northern (Arctic) Federal University, covering the geopolitical problems of the development of the Arctic in general and the NSR in particular [4, 5]; Doctor of Historical Sciences S.I. Boyakov (Yakutsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences) and Candidate of Historical Sciences A.E. Goncharov (Reshetnev Siberian State University of Science and Technology), whose works are devoted to the history of the NSR development [6, 7].

The most frequently cited works were identified using the Russian Science Citation Index (eLibrary), among which the collective monograph by E.P. Bashmakova with co-authors on the forecast of NSR cargo flows [8], as well as the book by S.I. Boyakova on the development of the NSR [6], which were cited in the publications of other researchers 79 and 58 times, respectively.

Fig. 4 shows the thematic structuring of the corpus of documents. It can be seen from the diagram that most of the publications relate to the study of the technical aspects of the NSR development. In recent decades, economic issues have come to the fore; historians traditionally pay great attention to researchers in the Arctic, including the NSR. Fewer publications are devoted to the problems of navigation support and transport infrastructure of the NSR. Works about the climatic-geographical and ecological block along the NSR route are not numerous, but they are given considerable attention in the information sources covering the study of the Arctic and the Arctic Ocean.

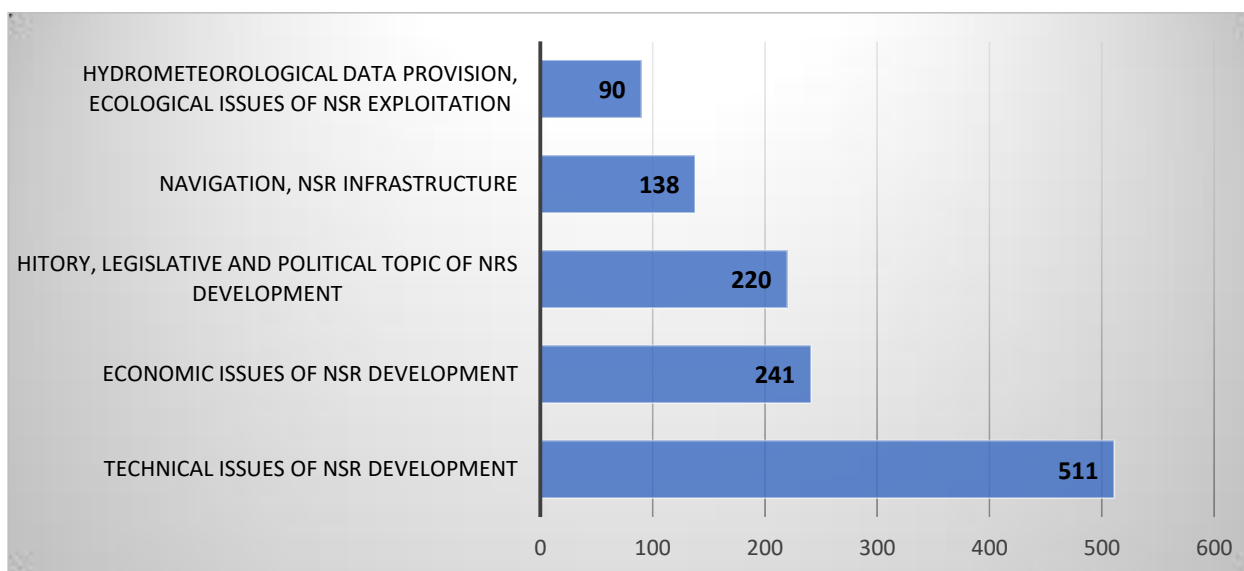


Fig. 4. Thematic structure of the corpus of documents on the topic.

### Conclusion

The article has presented a scientometric analysis of the corpus of documents from the database “Scientific Sibirica”, devoted to the research of the NSR: temporal, linguistic, species-type and thematic structures of the corpus are presented; the most productive periodicals, thematic collections of scientific papers and conferences are named; special emphasis is placed on the analysis of monographic publications, authors with high publication activity on the topic and frequently cited works are identified. It should be noted that the bibliographic database “Scientific Sibirica” is free for Internet users on the library website ([www.spsl.nsc.ru](http://www.spsl.nsc.ru)), in the options “Catalogs and databases” — “Bibliographic databases” — “Scientific Sibirica”. Recently, when generating a database, a digital identifier of the DOI object and (or) a hyperlink to the full text of an electronic publication are indicated, so users can get the information they are interested in from any computer.

The results of the scientometric analysis can be useful for specialists in the field of study and development of the Northern Sea Route to optimize and coordinate research with leading experts and research centers, as well as representatives of grant-giving organizations when making decisions on research funding.

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