

Greenland Research

Research from, in, and about Greenland, 2015-2024



AARHUS UNIVERSITY



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2015-2024

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Foreword

Who conducts research in Greenland? What do they research? Where do they conduct their research? And with which partners? These are questions we at Arctic Hub have been asked countless times since we began our work in 2021.

It will come as no surprise to anyone that Greenland is an epicenter for research. However, Arctic Hub, and many others, have long lacked a systematic and comprehensive overview of research activity from, in, and about Greenland.

This report is our attempt to answer these questions. It provides a quantitative, data-driven mapping of research activity in the period 2015-2024 and can serve as a common knowledge base. We are proud to present this work, while also recognizing the complexity of the research landscape and the methodological choices that inevitably shape the patterns we see in this report.

The report provides an overview of research output, academic priorities, international collaboration patterns, and the geographical distribution of research activities in Greenland. It confirms the great international interest in conducting research in Greenland, including which countries conduct the most research in Greenland and where in the country most

research activity takes place. In addition, significant differences are revealed between research from Greenland and research on Greenland, both in terms of disciplines, subject areas, and topics. We also see which countries and subject areas have the most local partners.

This is valuable knowledge that can inform the dialogue on how research can best benefit Greenland. However, it is important for us to emphasize that the report does not claim to provide a complete picture. It is the beginning of an ongoing knowledge gathering process that can be developed and updated in the coming years. Already, the report's conclusions raise a lot of new questions. The report does not take a position on which research policy priorities should be pursued. Instead, its purpose is to create a common starting point for dialogue and further debate on the role, direction, and anchoring of research in Greenland.

Arctic Hub's work is based on the fundamental understanding that knowledge is most valuable when it is shared and activated – and this report is a contribution to precisely that.

Arctic Hub makes knowledge accessible.

Output

The aim of academic research is to increase our knowledge about the world, whether it is concerned with people, things, or abstract ideas. We know that research has led to substantial breakthroughs in our understanding of humans, nature, technology and a long list of other topics - but it is incredibly hard to know when exactly we take every step towards knowing something new.

This is why we measure research outputs in the shape of publications. Each document represents the distilled new knowledge that a group of researchers have gained from studying a little piece of the world. And when we count such documents over time or across topics, we learn how foci shift, and where new advances happen.

Greenland is a special case in research terms. While there are few researchers employed directly by institutions in Greenland, researchers from around the globe are deeply invested in researching Greenland, from a multitude of perspectives. The analyses in this report are all concerned with how much research is being conducted by researchers from and in Greenland, and also around the globe.

Publications in this report are found in the bibliographic database OpenAlex, which continues data from Microsoft Academic Graph.

We include all articles published in journals, that are either affiliated to an address in Greenland, or mention Greenland (including significant placenames) in the title, abstract or keywords.

The full documentation of how we find research publications, and what we count, can be found in the methods.

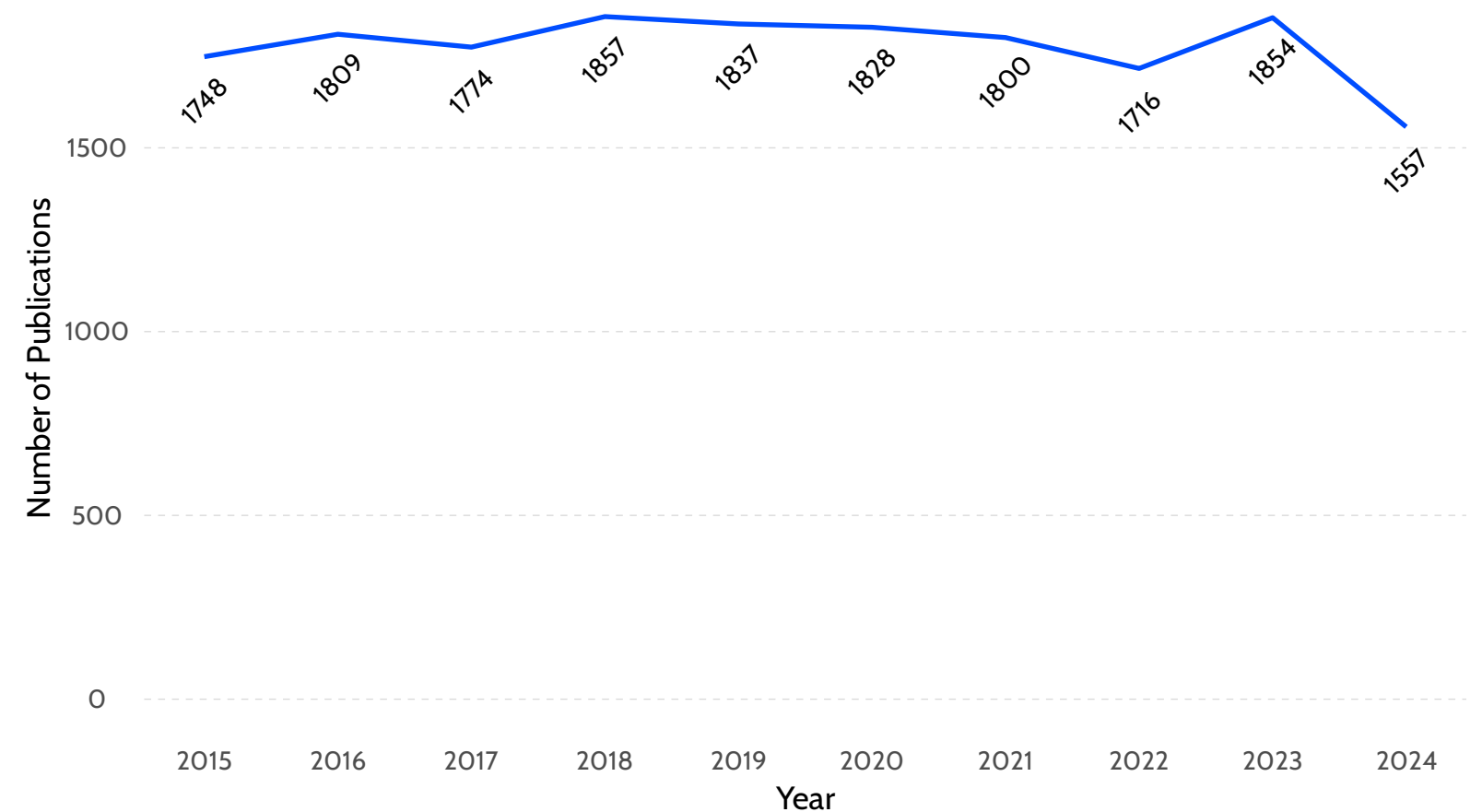


Fig. 1. Publications from or about Greenland, 2015-2024

Figure 1 provides a baseline to compare other analyses to, as this figure shows the total number of publications every year from 2015-2024 that fit our criteria.

In the period 2015-2017 the average annual number of publications was 1,777, related to Greenland. In 2022-2024, this dropped to 1,709 on average, corresponding to a 3.8% drop in publications.

This type of data is always sensitive to changes in the database from which they are retrieved, and the world experienced unusual fluctuations in publishing trends during the COVID-19 pandemic. Both of these factors can influence publication counts.

Some caution should be advised around specifically the 2024 dip, as delays in

indexing could potentially explain some of this dip. However, comparing to the global production in the same period, the same type of publication output has grown by 8.6%. Taking this into consideration, the drop in publications from or about Greenland corresponds to a relative drop of 11.4%. It is therefore less likely that the dip is caused by a database issue.

There are many potential explanations for such a drop, and bibliometric data alone can not provide definitive answers about the causes. It can however help raise some important questions that might help us discover some of the underlying reasons.

In the following analyses, we will expand on this by taking apart numbers above and splitting them into research areas and countries of origin.

Areas

“Areas” refers to research areas, a collective term used to describe the macro-level (“Disciplines”) and meso-level (“Fields”). In this section, we break down the overall publication output in these areas, showing the difference in priority.

Classifying large amounts of scientific publications is ambiguous, and several classification systems exist. In this case, we use the system built into OpenAlex, in which disciplines contain fields, which contain sub-fields, and then topics. Disciplines cover the absolutely broadest scientific areas, the life sciences, health sciences, social sciences (including arts and humanities in this system), and the physical sciences. Fields more closely resemble how a scientist might speak of their research area, e.g. oceanography. Topics are standardisations of the keywords present in an article.

Each publication typically has more than one topic, and if topics come from more than one field or discipline, articles can occasionally also be assigned more than one field or discipline.

At each level, we count the weighted area assignment, so the total weights across publications always sum up to the total number of publications. This gives us a clear image of the distribution of fields and disciplines.

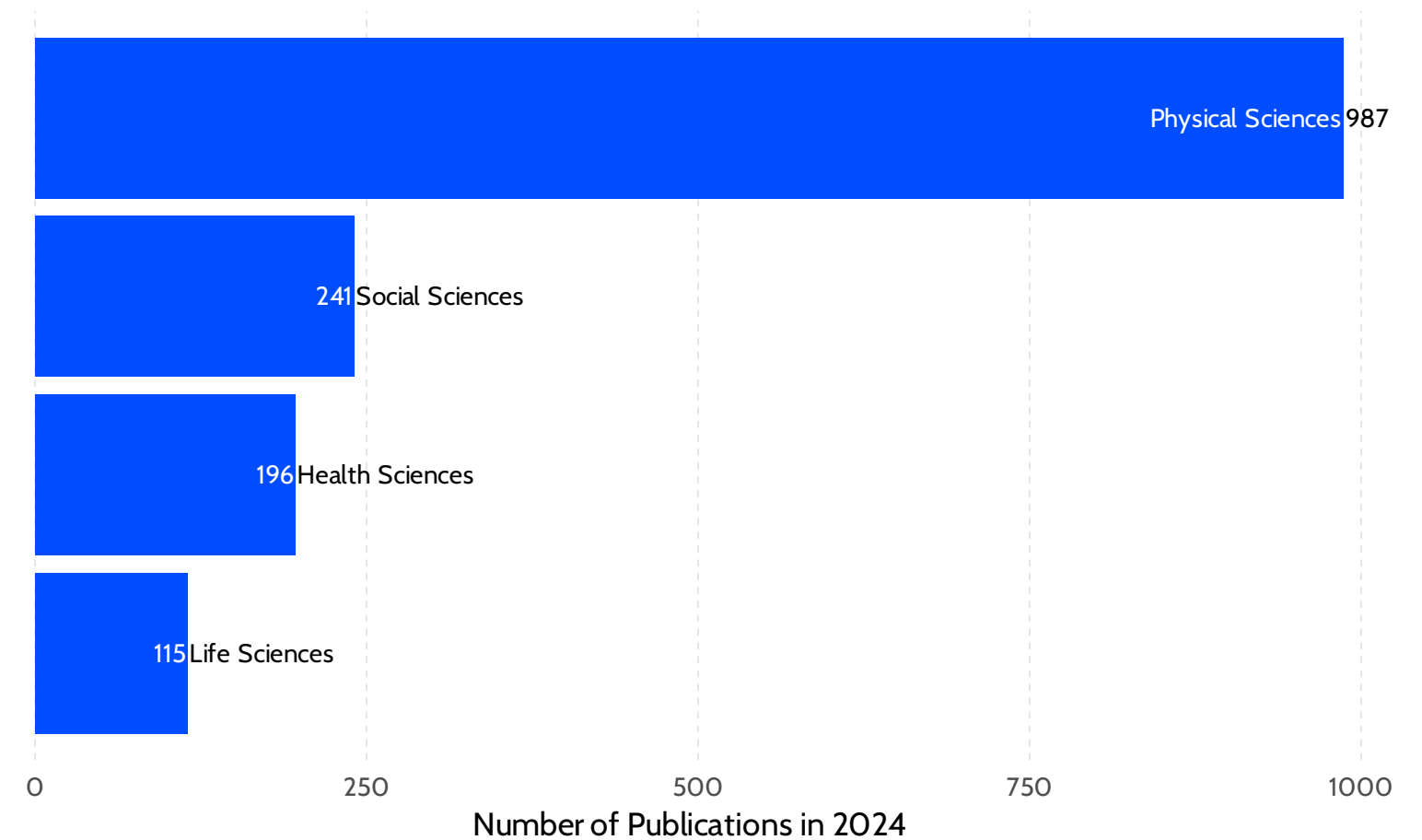


Fig. 2. Disciplines, 2024

In the most recently reported year, physical sciences clearly account for a much larger share of research than the other disciplines: 987 publications out of 1,539, or 64%.

To see this proportion in a meaningful contrast, we can compare it to the country that proportionally collaborates closest with Greenland, namely Denmark. Here, physical sciences only account for 30% of all research.

Conversely, health sciences cover 13% of the research output in Greenland, compared to 36% in Denmark.

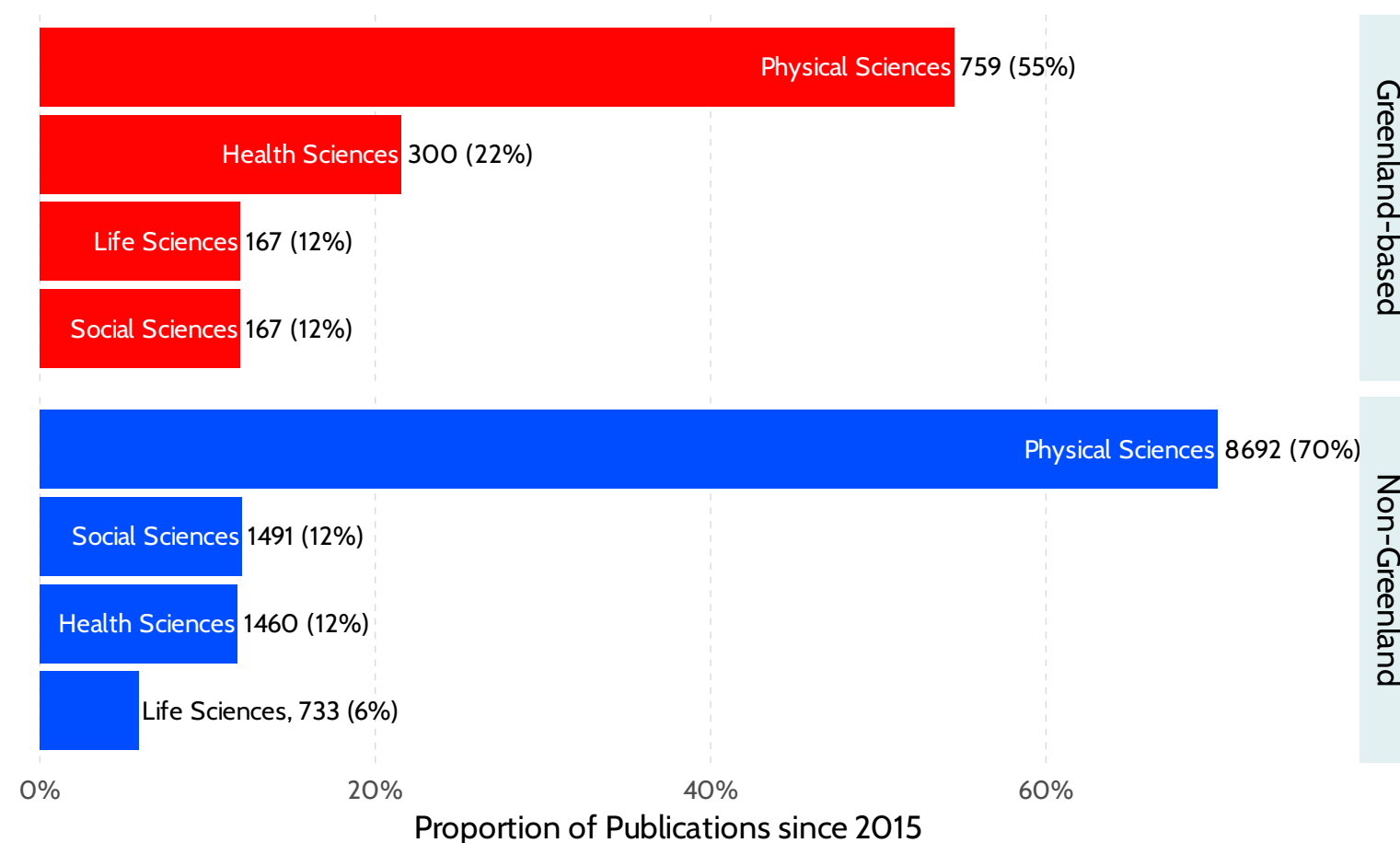


Fig. 3. Disciplinary differences, 2015-2024

The above figure aims at illustrating disciplinary differences between the research that is created with an affiliation to Greenland (red bars) and the research that is done in or about Greenland, but without including a co-author with a Greenlandic address.

Please note that the horizontal axis shows the proportion of publications, whereas the numbers on the bars show the actual number of publications. This illustrates two things: how much larger a role the physical sciences play for international research (70% compared to 55% for nationally anchored research); and how much research is being done internationally, without involving researchers located in Greenland.

The balance between disciplines varies somewhat between the two groups as well, where health research makes up 22% in Greenland but only 12% in the international group, life sciences make up 12% in Greenland and 6% internationally, and social sciences make up approximately 12% in both groups.

The research focus in research about Greenland is systematically different between groups that do and do not have representation of Greenland-based researchers.

For context, only 10.1% of all Greenland research publications had a Greenland-based co-author during the period.

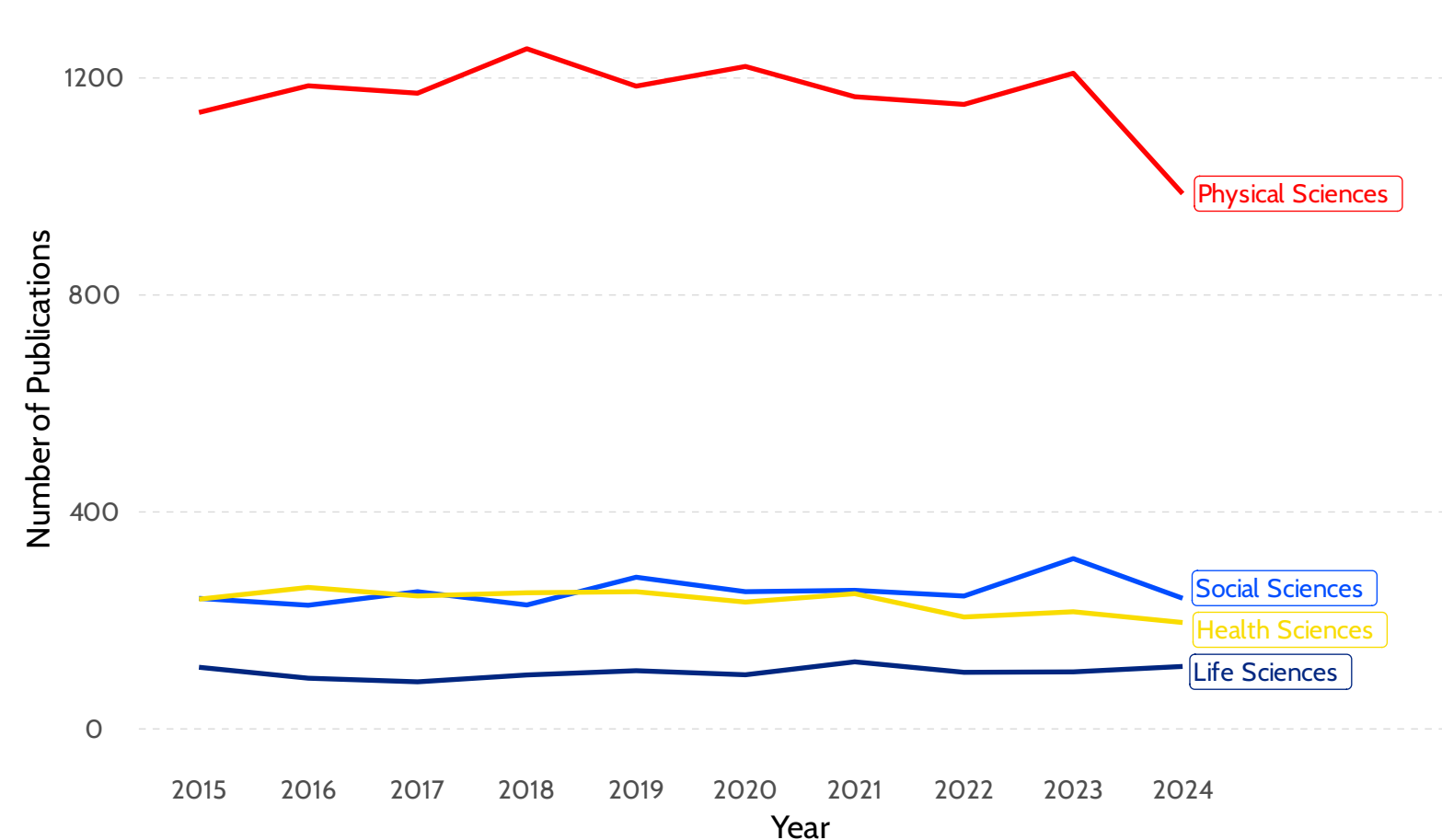


Fig. 4. Disciplinary trends, 2015-2024

There have not been major changes in the relative balance between disciplines over time, except for the final year, 2024, where the physical sciences experience a substantial dip.

Bibliometric trends in publication typically fluctuate somewhat over time, and dips in singular years are not unusual. However, the dip in 2024 is larger than what could typically be expected as a standard fluctuation. It is not possible to directly explain the reason for this change, but there are a few likely factors that contribute together: in 2022-2023, research productivity increased globally as a result of COVID-19, and subsequently, there was a dip in 2024. The peaks in 2023 for physical sciences and social sciences could indicate this kind of effect. The database effect mentioned

in figure 2 is more likely here (and in the following), as area assignments rely on more than inclusion in the database, but also algorithmic classification, which is likely delayed more than inclusion - this is a common finding and calls for a careful interpretation of specifically the 2024 trend. As the dip doesn't occur in the health and life sciences, this is not likely to be the full explanation though. In the chapter on collaboration we discuss how changes in research output from the USA could contribute to this dip as well.

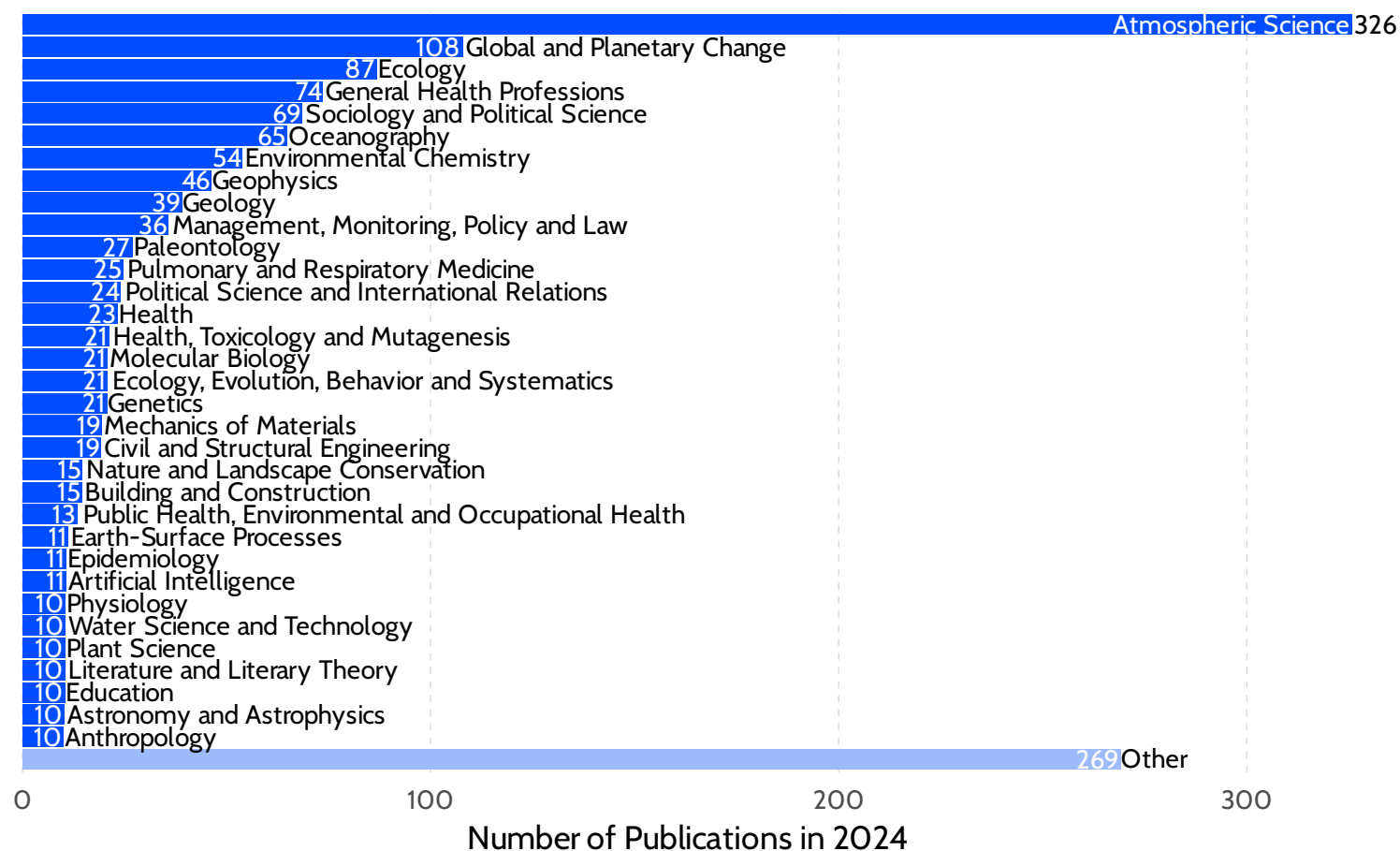


Fig. 5. Scientific fields, 2024

Dividing disciplines into scientific fields, using the classification built into Open-Alex (specifically, we use the “sub field”), reveals more detail. Also here, relatively few fields account for the majority of publications. The fields 'atmospheric science', 'global and planetary change', and 'ecology', account for 34% of all publications. In comparison, the same three fields make up 4% of research from Denmark, and only 2% out of the global output in the same period.

This very clearly demonstrates the importance of and high interest in studying Greenland and Greenlandic conditions in specific fields of science - but the distribution of other research fields showcases how the research that is immediately closer to the Greenlandic population (e.g. health professions, sociology, and health) receives proportionally low attention. Those three examples cover only 11% of all research outputs.

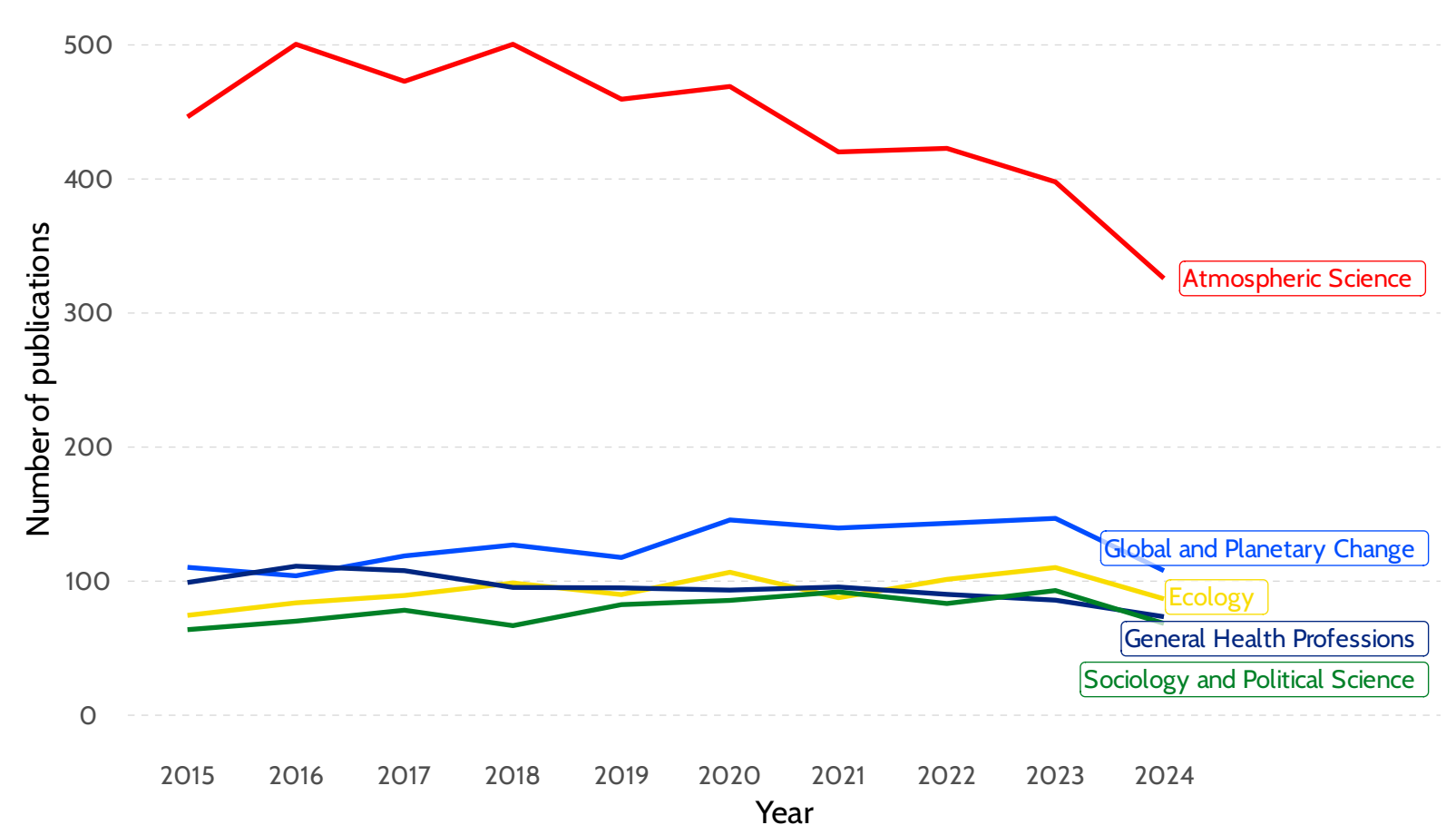


Fig. 6. Field trends, five largest fields, 2015-2024

Mirroring the disciplinary trends, we see a clear decline in the largest field (covering more than half of physical sciences alone). The detailed view gives us a better understanding of what is happening though; global and planetary change research has been steadily increasing during the period, until 2024, whereas earth and atmospheric science has been declining since 2018. Both fields experience a large drop in 2024.

From visual inspection, the other fields appear mostly stable. However, comparing the last three years (2022-2024) to the first three years (2015-2017), global and planetary change grows by 19% on average, ecology by 20%, and sociology and political science by 15%. General health professions drop by almost 22%, even more than atmospheric science (19%).

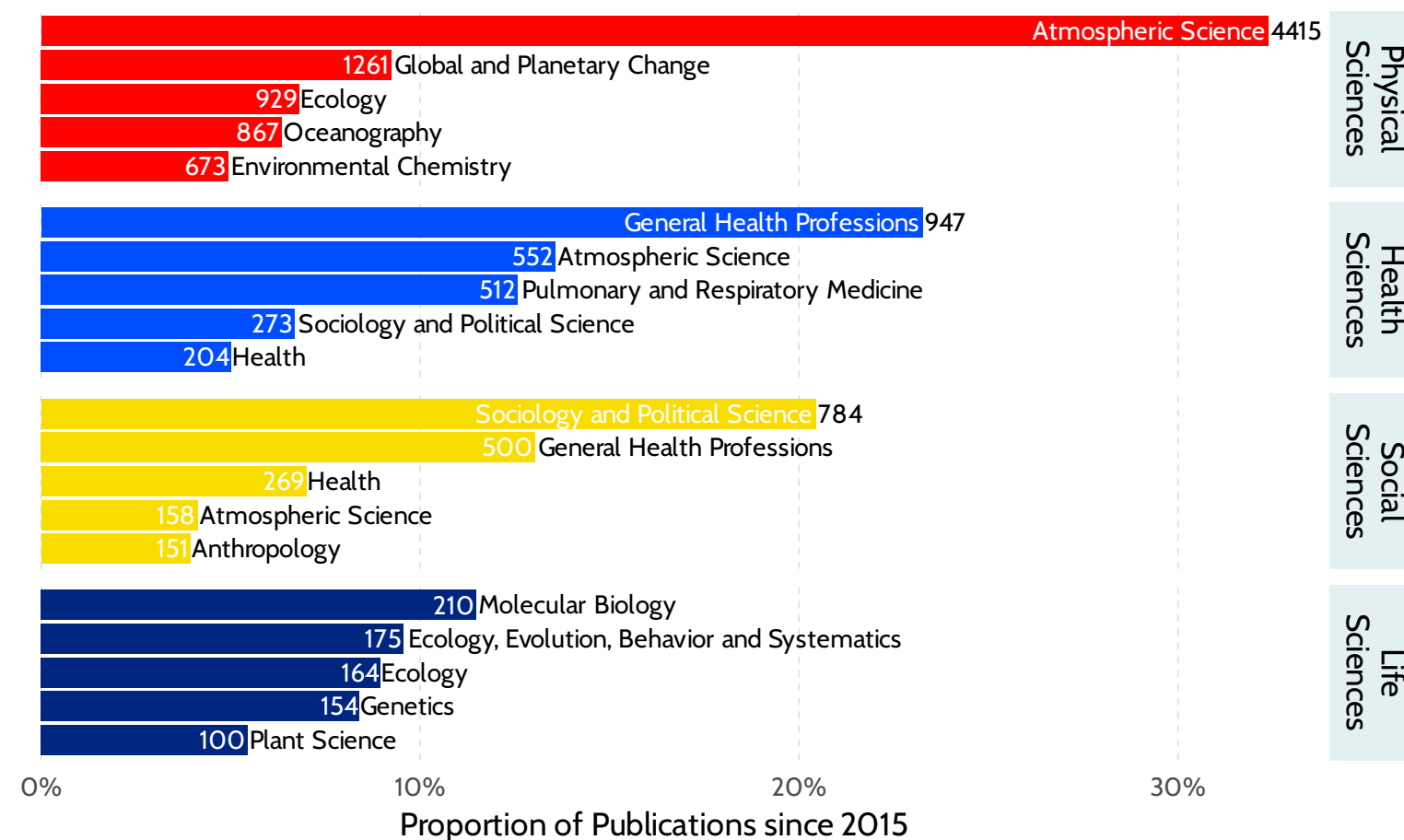


Fig. 7. Scientific fields per discipline, 2015-2024

Breaking down the individual disciplines in their scientific fields reveals clear differences in how concentrated each field is. Note that the horizontal axis shows the proportion of publications per field within that discipline. I.e. atmospheric science makes up 32% of all the publications in physical sciences.

The overlap in fields is caused by some publications being placed in more than one field, e.g. if it has an interdisciplinary approach or topic.

That means “Health” publications in the social sciences are still primarily social scientific, but also have an element of health science.

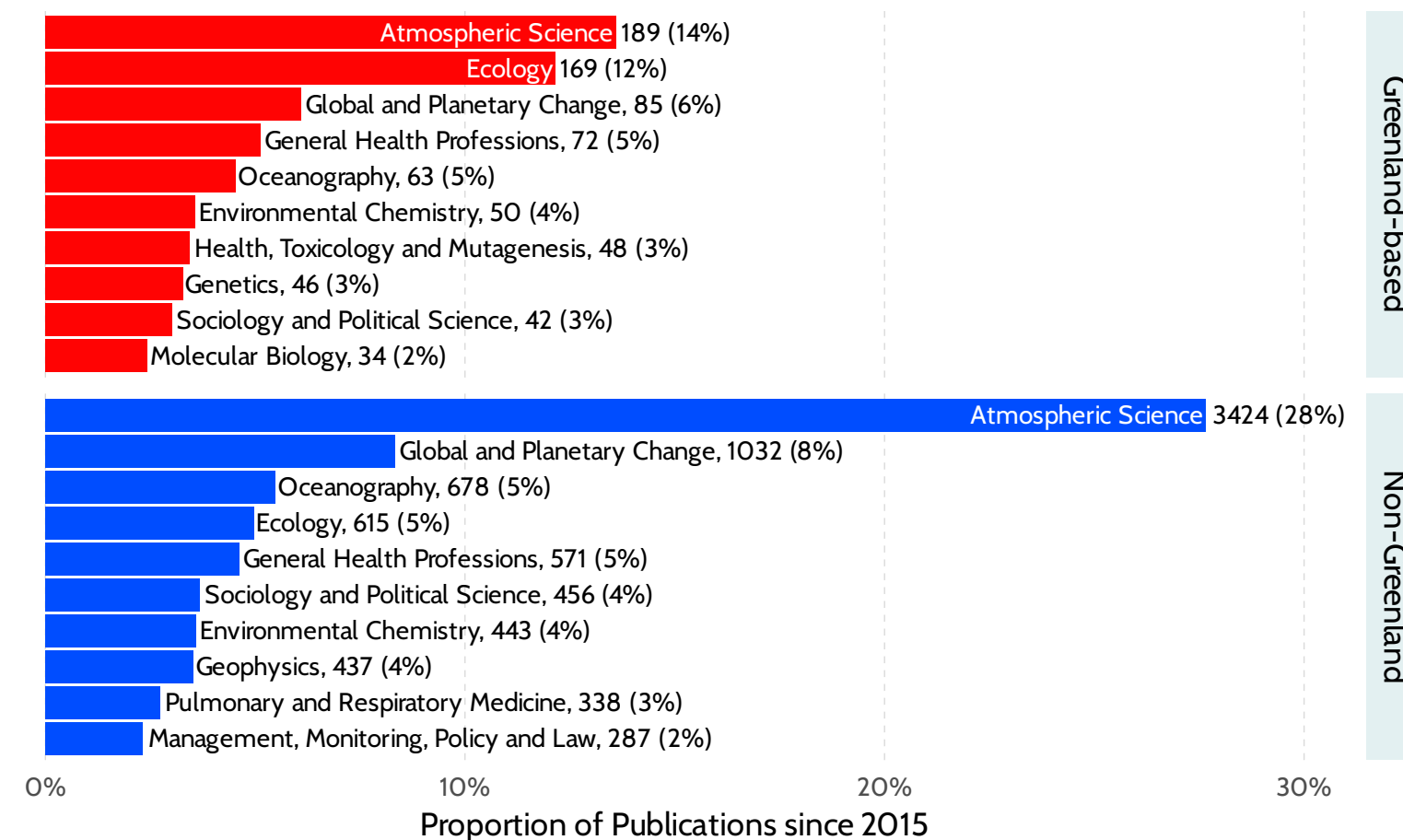


Fig. 8. Field differences, 2015-2024

Mirroring figure 3, figure 8 shows the distribution of scientific fields when there is at least one co-author affiliated to a Greenlandic institution vs. when there isn't one. This gives us some additional details to the difference between the two sets of research outputs, where especially health areas play a much bigger role nationally. We also get additional detail on the physical sciences, where ecology plays a much bigger role for Greenland-based researchers (12%) than internationally (5%), whereas atmospheric science is much smaller nationally (14%) than internationally (28%).

These numbers are clear indications that external and internal research interests differ significantly.

Topics

Analysing topics is somewhat more complicated than disciplines and fields - a scientific publication often touches on many topics, to varying degrees, and it is not always obvious what the main topic is from the title, keywords or summary.

In this report we use the topic labels that OpenAlex algorithmically assigns to publications. The main motivation for doing so is to ensure a reproducible approach, where the reader in principle can create the same analysis as presented here. This is not a perfect approach, especially at the level of the individual paper, but when aggregating topics across large groups of publications, they still allow us to study the patterns and directions of research about Greenland.

Each publication in our analysis can have more than one topic, and not all publications are assigned a topic. This means that a proportion of the counted publications above are unknown, in terms of topics. In 2024, less than 2% did not have at least one topic.

Although topic labels are far more specific than field and discipline classifications, they still cover considerable variance. As an example, the label "Arctic and Russian Policy Studies" is not specifically focused on Russia, and it is not given that the publications concerned with Greenland touch on that aspect of the topic label.

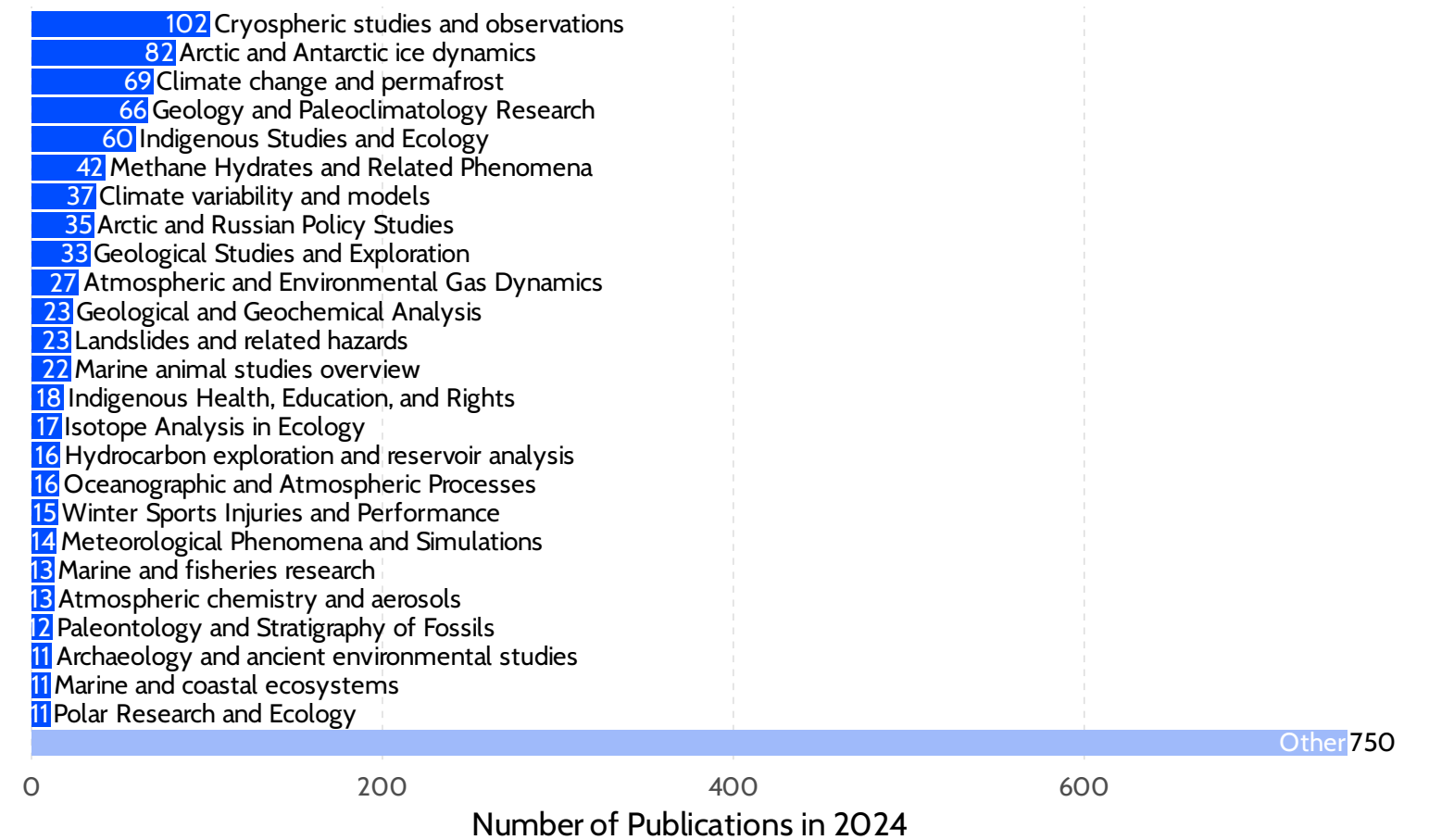


Fig. 9. Topics, 2024

The topic breakdown reveals more clearly that the most common areas of research in 2024 were related to the Greenland ice sheet, e.g. studying climate change and/or ice cores.

The detailed view also clarifies how many of the most common topics are related to the Greenland environment, whether the underground, the ocean or the ice. Studies concerning demographic or social aspects of life in Greenland, such as fishery research, indigenous studies, indigenous health, or winter sports injuries (covering e.g. skiing accidents) are less prevalent in comparison.

The "Other" bar covers a long tail of topics with ten or less publications - 820 different - the majority with just one or two. It is not possible or meaningful to show these here.

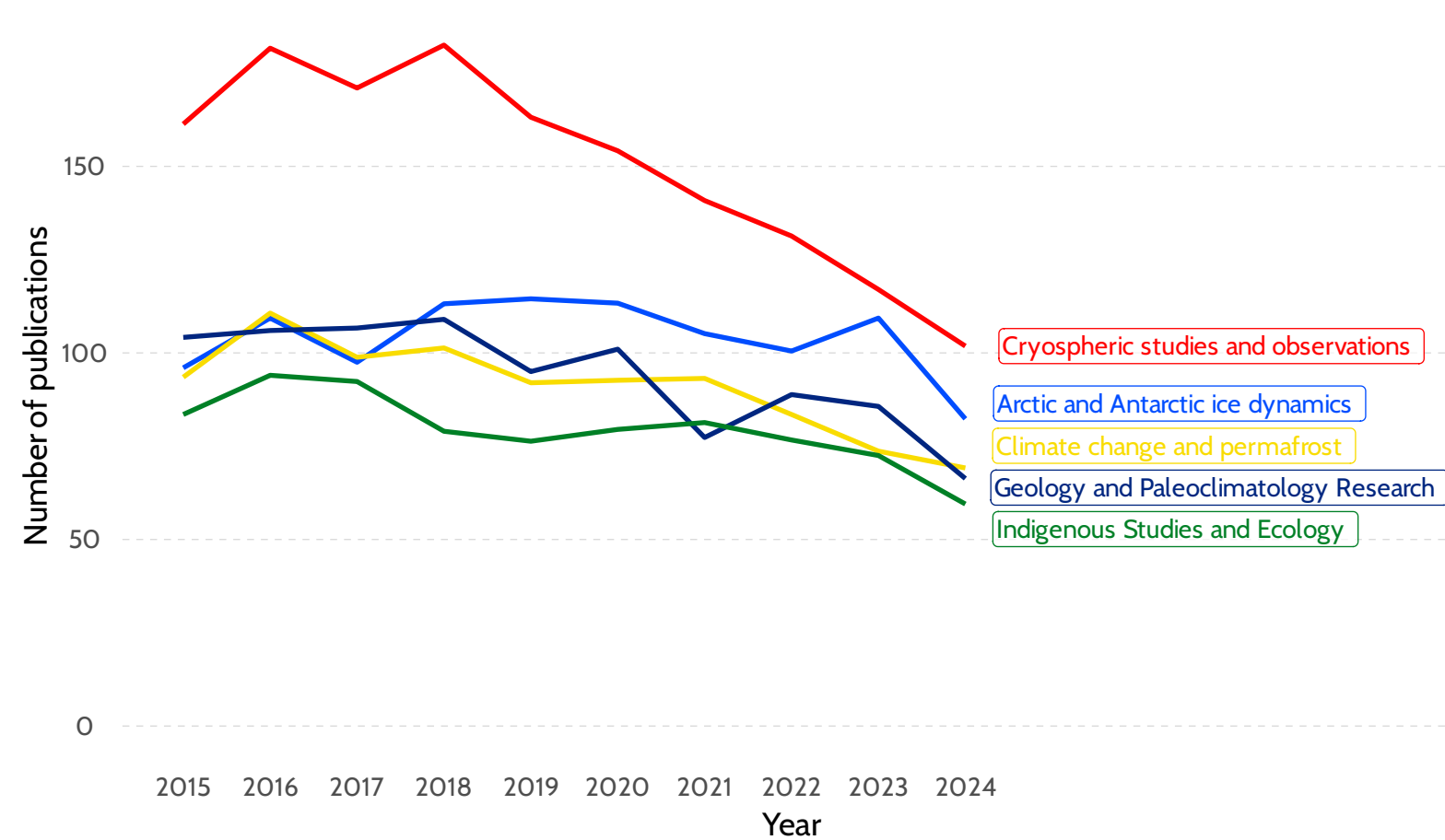


Fig. 10. Topic trends, 2015-2024

The topic trends confirms what previous area trends indicated - there has been a stark decline studies related to the ice sheet, dropping between 24% (geology and paleoclimatology) and 32% (cryspheric studies) from the first three years to the last three years.

The figure shows the five largest fields, as including additional fields would make visual inspection very difficult.

If we look at the overall data, the largest increases in publication activity, among the 20 largest topics, can be found in climate change models, increasing by 43%, arctic and russian policy studies (increasing by 13%) and marine animal studies, with increases of 122% and 41% in two different topics. Both of these topics are small in absolute numbers, so changes should be interpreted carefully.

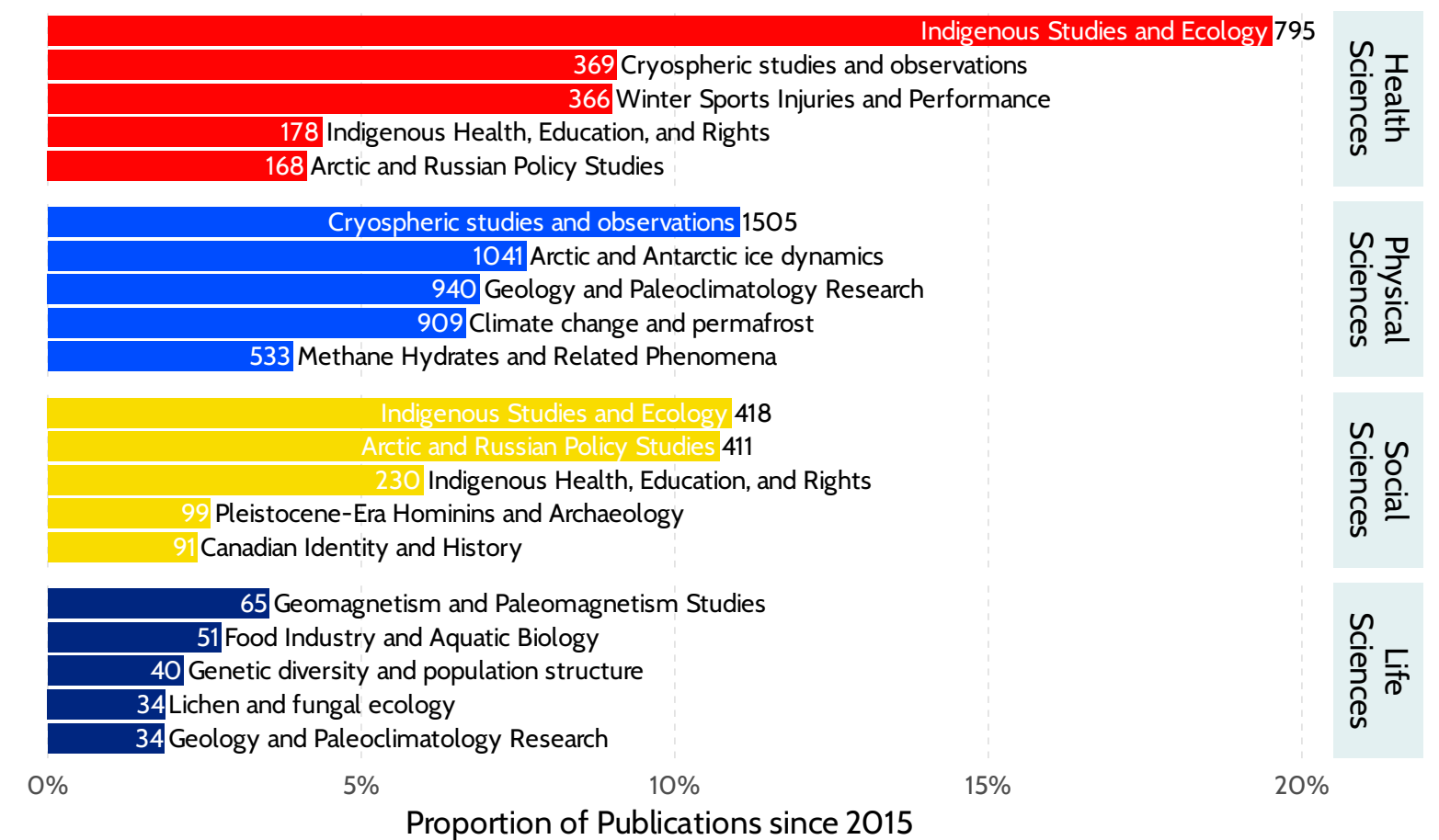


Fig. 11. Topics per discipline, 2015-2024

The figure illustrates the proportion of topics broken down by disciplines. The horizontal axis shows proportion of publications related to a topic within each discipline.

The topic with most related publications within health sciences is indigenous studies and ecology with 42% of publications being related to this topic. Within physical sciences the topic with the highest proportion of related publications is Cryospheric studies and observation with 31%.

In the social sciences the two topics with the biggest proportion of related publications are indigenous studies and ecology with 33% and arctic and russian policy studies with 33%. Within life sciences the topic with the biggest proportion of related publications is geomagnetism and paleomagnetism studies.

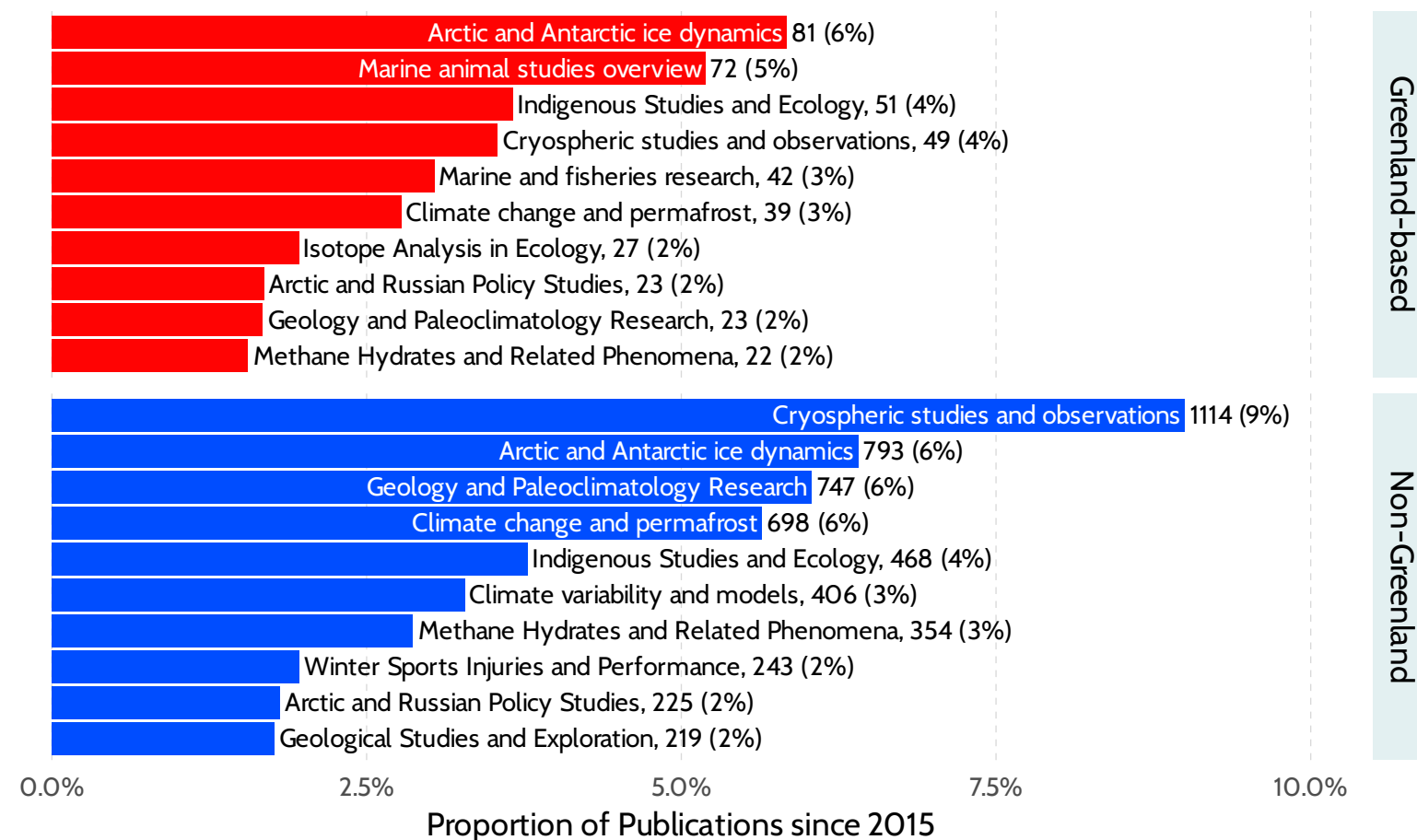


Fig. 12. Topic differences, 2015-2024

The figure shows topic share by Greenlandic and foreign affiliation. The horizontal axis shows proportion of publications since 2015 related to a topic within each group. This figure illustrates how some topics have a higher proportion of publications related to them amongst publications with Greenland-based co-authors than those without. 17% of the publications with at least one Greenland-based co-author are related to marine animal studies (we manually combine several topics). Also marine and fisheries research is more important to Greenland-based researchers, covering 10% of their publications.

Some topics have a much higher proportion of related publications within those without Greenland-based co-authors. The topic 'cryospheric studies and observations' is the topic with most

publications related to it, amongst publications without Greenland-based co-authors, with 21% of the publications since 2015. 11% of publications with at least one Greenland-based co-author are related to this topic. The publication proportion related to geology and paleoclimatology research is 14% amongst publications without Greenland-based co-authors and 5% amongst publications with at least one Greenland-based co-author.

'Arctic and Antarctic ice dynamics' ranks high in both groups, as 19% of publications since 2015 with at least one Greenland-based co-author are related to this topic and 15% of publications without a Greenland-based co-author. 'Indigenous studies and ecology' is the only non-physical topic that ranks highly in both groups.

Partial conclusion:

Topics, fields, and disciplines

The analyses on topics, fields, and disciplines show a contrast between national Greenlandic research foci and international interests. Greenland is frequently a site for environmental and climate research, while Greenlandic researchers tend to also focus on health, culture, social life, and local wildlife.

It can be difficult to interpret the distribution of fields and topics without a comparison. As the closest collaborator on Greenlandic research, Denmark is a relevant contrast, that can shed some light on the distribution of research topics in Greenland. As is clear from these chapters, research on Greenland is structurally very different from Danish and global research portfolios. In 2024, almost two thirds of all Greenland-related publications belong to the physical sciences (64%), whereas health sciences and life sciences together account for only about 20%. In Denmark the pattern is nearly reversed, with health sciences being the single largest discipline.

The dominance of the physical sciences is driven by a small set of fields. Atmospheric science, global and planetary change, and ecology together account for about one third of all publications on Greenland since 2015, compared with only a few percent of the Danish or global outputs. This underlines Greenland's importance for research on climate, environment and the cryosphere.

In contrast, research in health and social sciences is relatively underrepresented. Fields that focus on, or are relevant for, everyday lives of Greenlanders - such as research into health, culture, and

demographics - represent a modest share of the output, around 10%. Taken together, these distributions indicate that knowledge production about Greenland is heavily skewed toward environmental and natural science, largely driven by research without representation from Greenland, with more limited attention to social and health-related issues.

Over time, the disciplinary balance has been relatively stable, but there are notable field-level shifts. Between 2015–2017 and 2022–2024, publication activity increases in global and planetary change and ecology (around 20% growth), while general health professions and atmospheric science decline by around 20%. The largest topical decreases are found in cryospheric studies and ice-sheet-related research, which fall by roughly one quarter to one third.

Topic patterns differ systematically between research "about Greenland" and research "with Greenland." Publications with at least one Greenland-based co-author place relatively more emphasis on ecology, marine animal and fisheries research, and Indigenous studies, while international research without Greenland-based partners focuses comparatively more on icesheet dynamics, cryosphere monitoring, and paleoclimatology.

Collaboration

Scientific knowledge about Greenland is rarely produced in isolation. Most of the publications analysed in this report are the result of collaborative work that connects researchers, institutions and countries. Collaboration matters because it shapes who has access to data and research sites, which questions are prioritised, and how results are interpreted and disseminated. Co-authorship relations therefore provide an important window onto questions of research capacity, influence and dependency: they indicate where expertise is located, who drives particular research agendas, and to what extent Greenlandic institutions are integrated into international networks.

In this chapter, we study collaboration through co-authorship patterns. We treat co-authorship as a proxy for research collaboration and examine it at several levels: between individual authors, institutions and countries, and between Greenlandic and non-Greenlandic partners.

This analysis is particularly important in light of the research area differences between publications authored with and without Greenlandic participation, that are illustrated in the previous chapters.

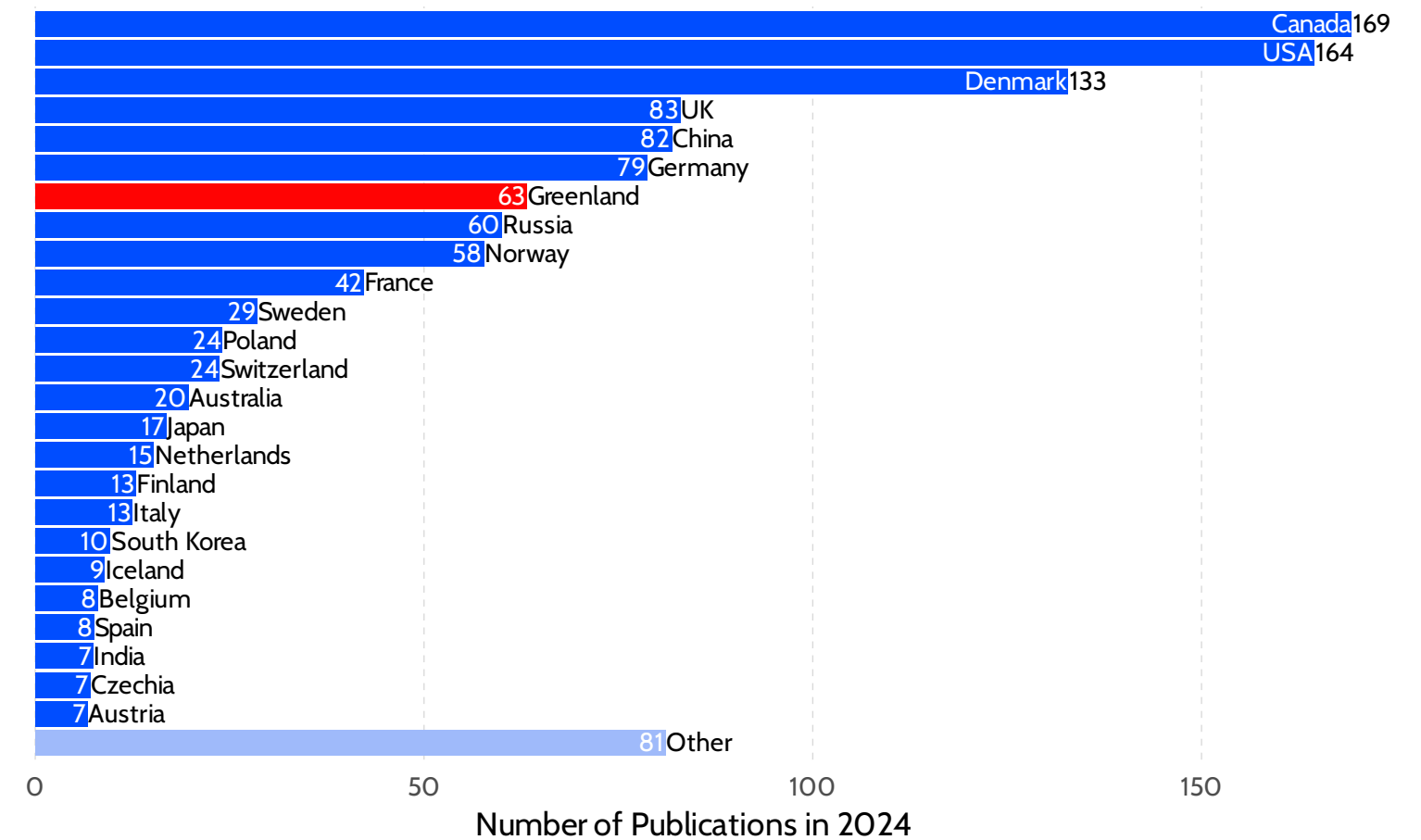


Fig. 13. National distribution, 2024

Figure 13 shows the proportional number of publications that each country contributed to. This means that a publication with authors from Canada, Denmark and Greenland will count as 1/3 for each country.

While Canada, USA, and Denmark clearly contribute more to research in and about Greenland, than any other nation, there is also a large variation in the proportion of the total research of these countries that relate to Greenland

If we count each publication as one instead, and compare to the full output of each country, the pattern is very clear:

Except for Greenland itself, only research from few countries is related to Greenland in more than 1/1,000 of their publications. This includes:

- Iceland (2.1%)
- Denmark (1.0%)
- Norway (0.7%)
- Canada (0.3%)
- Finland (0.2%)
- Sweden (0.2%)
- Switzerland (0.2%)

This is based on comparable publication types from 2024, affiliated to countries in figure 13.

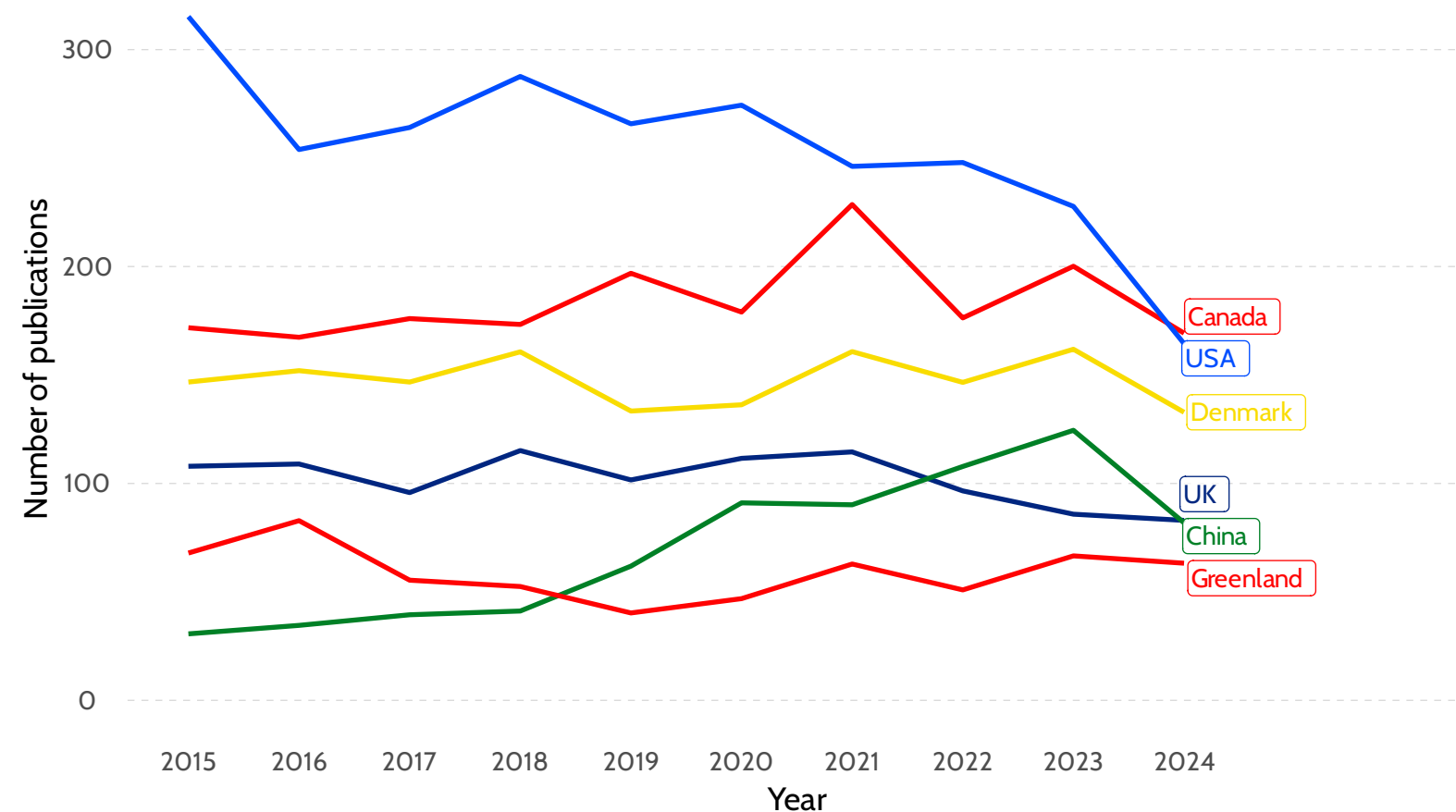


Fig. 14. National trend, 2015-2024

Figure 14 illustrates the development of the number of publications that the five most productive countries and Greenland have contributed to from 2015 to 2024. The vertical axis shows the number of publications.

The analysis shows general tendencies of the number of publications for each country being fairly constant with some smaller fluctuations. Canada shows a small rise of 6% from 2015 to 2024 and Denmark has a decline of 1%. The UK declines with 15% in the time period and Greenland declines with 12%.

However, the development of the numbers of publications contributed to by China and the USA show a different tendency than the rest of the countries. The number of publications contributed

to by China rises from 2015 to 2024 with an incline of 200%. The number of publications contributed to by the USA declines from 2015 to 2024 declining by 23%. Even though some of the other countries also see a decline this is a major decline, as the USA contributed to the most publications by far in 2015, but in 2024 they were surpassed by Canada.

As the USA were initially the most productive nation, we address this particular dip further in figures 19-20.

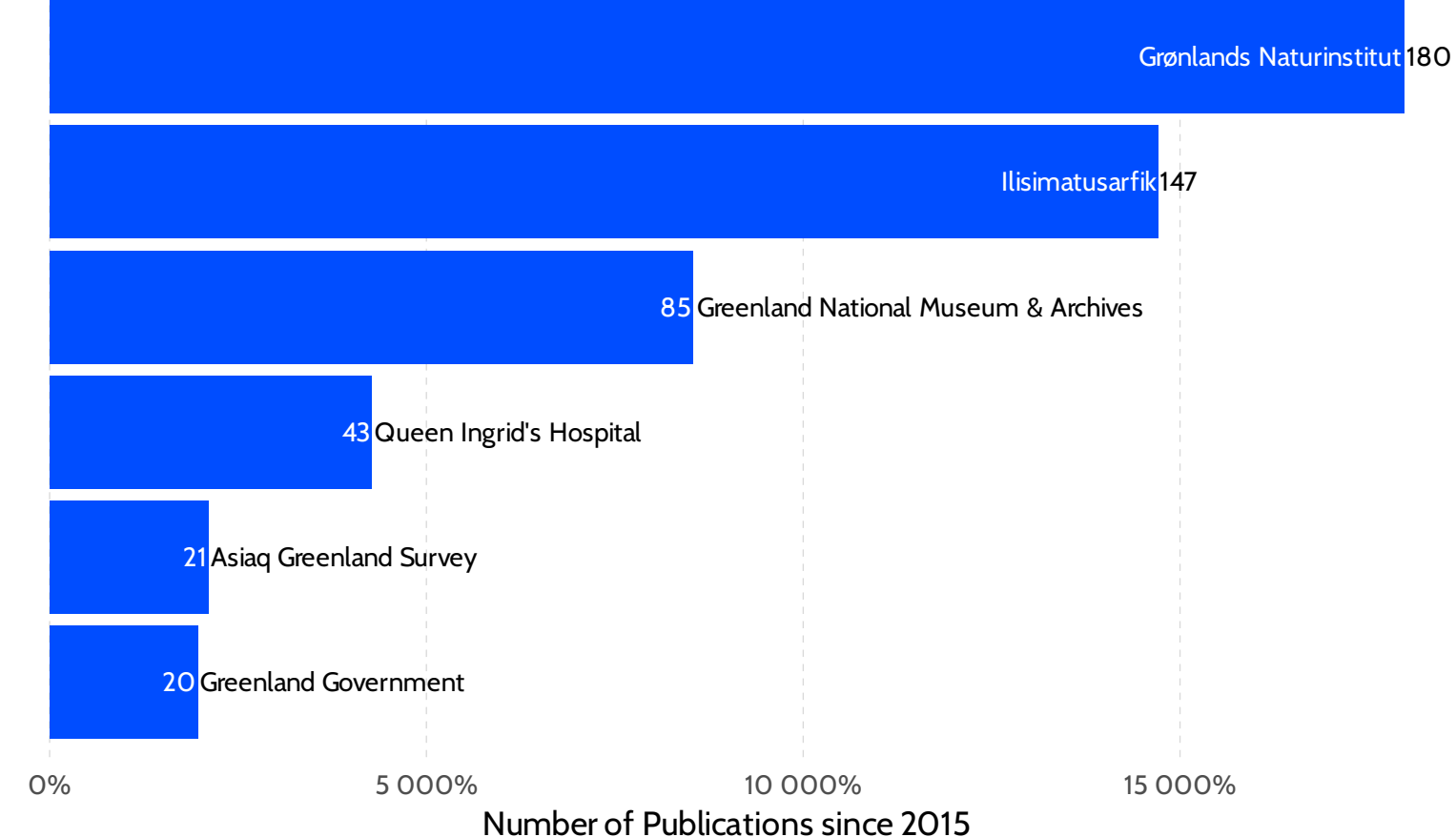


Fig. 15. Greenland Institutions, 2015-2024

Figure 15 illustrates the distribution of institutions the authors of a publication are affiliated with. The horizontal axis shows number of publications for each institution.

The figure addresses institutions in Greenland, and thus represent the affiliations of researchers who explicitly mention Greenland in their institutional address.

The figure shows that the largest institutions in terms of publications are Grønlands Naturinstitut with 180 publications since 2015 and Ilisimatusarfik with 147 publications since 2015. Greenland National Museum & Archives have 85 publications with authors affiliated with them, which makes them the institution with the third most

publications.

Queen Ingrid's Hospital has 43 publications, Asiaq Greenland Survey 21, and the Government of Greenland has 20.

Please note that we only count research articles in journals registered in OpenAlex throughout the report. Institutional insight will always be able to provide a more comprehensive and detailed view, whereas we here offer a comparative and overarching perspective.

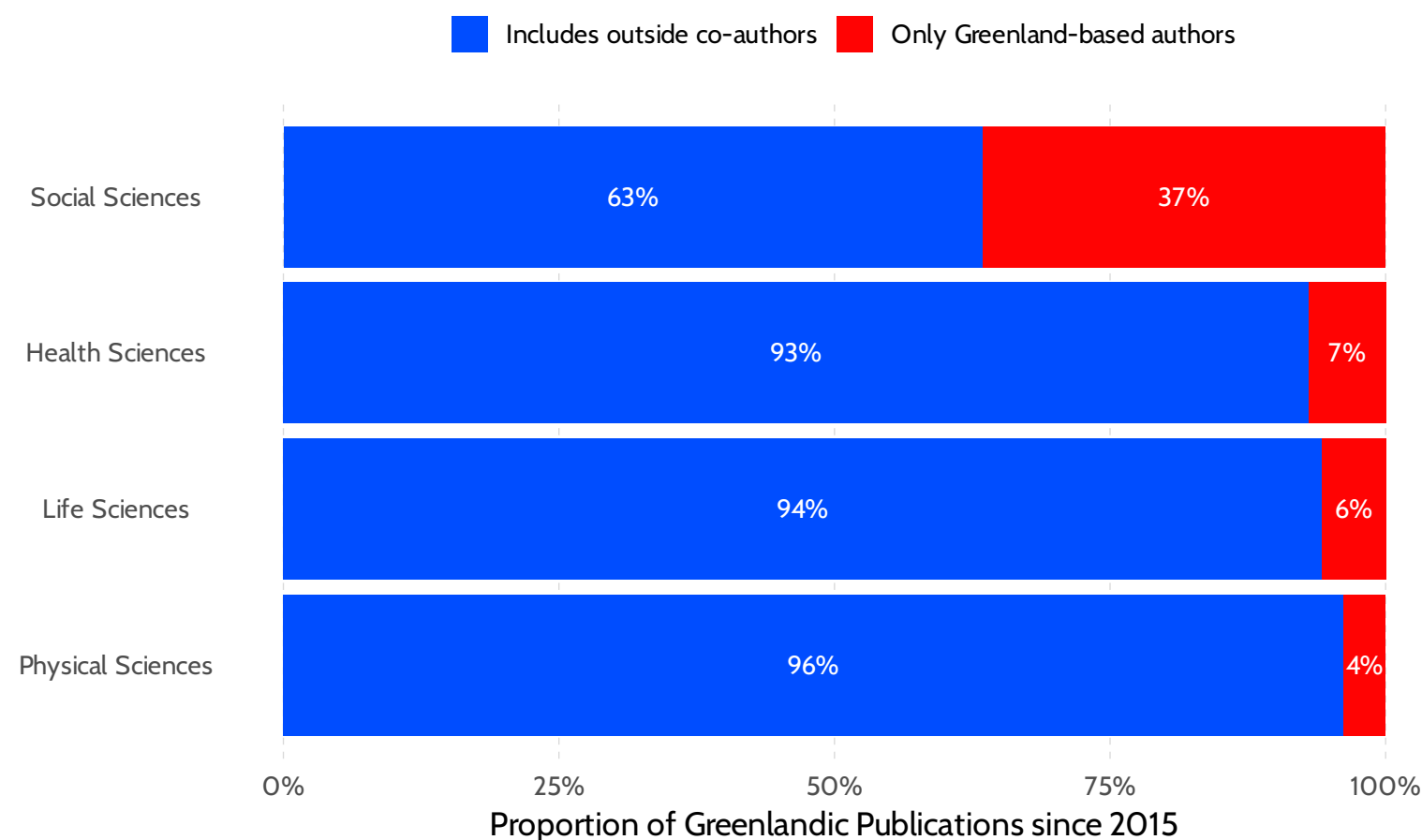


Fig. 16. Greenlandic partnership per discipline, 2015-2024

Figure 16 shows only publications with at least one Greenland-based co-author since 2015, with the blue proportion showing the share that has an international co-author, and the red proportion the share that is exclusively authored by researchers affiliated to a Greenlandic institution.

Here social sciences are the discipline with the highest proportion of publications made with exclusively Greenland-based co-authors with 37% of the publications in the social sciences having only Greenland-based co-authors and 63% having international co-authors.

In the other three disciplines, between 4-7% of publications only have Greenland-based co-authors and 93-96% of publications within each discipline have international co-authors.

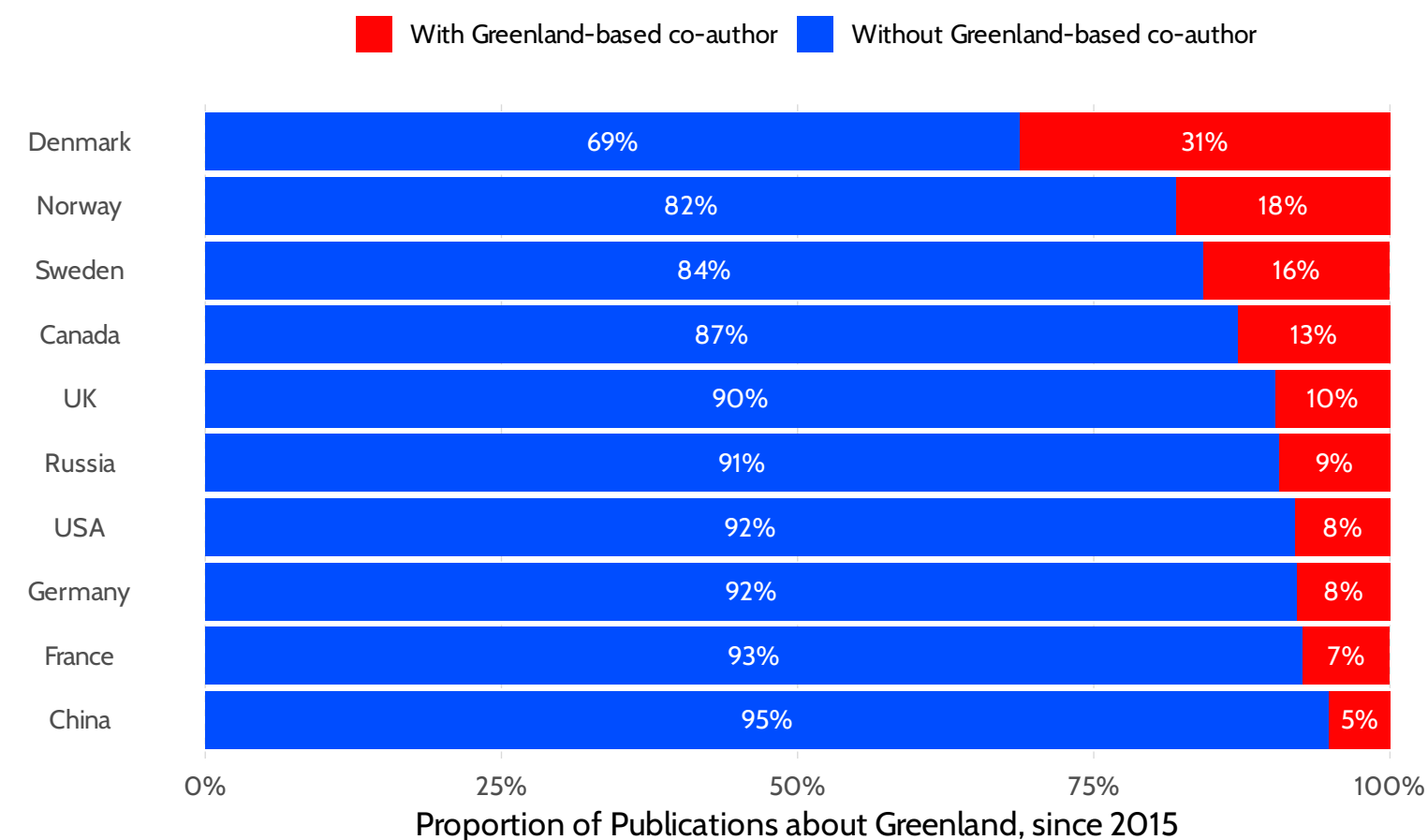


Fig. 17. Proportion foreign research on Greenland with Greenland-based co-author, 2015-2024

Figure 17 illustrates the proportion of publications about Greenland, since 2015, with at least one Greenland-based co-author and the proportion with no Greenland-based co-authors broken down by country.

Denmark is the country with the highest proportion of publications with at least one Greenland-based co-author as 31% of the publications have at least one Greenland-based co-author and 69% of the publications have none.

There is a general tendency of the proportion of publications with at least one Greenland-based co-author being low with the rest of the countries that contribute with publications as less than 20% of their publications have at least one Greenland-based co-author. China

has the lowest proportion of publications they contribute to with at least one Greenland-based co-author as 5% of the publications contributed to by China has at least one Greenland-based co-author.

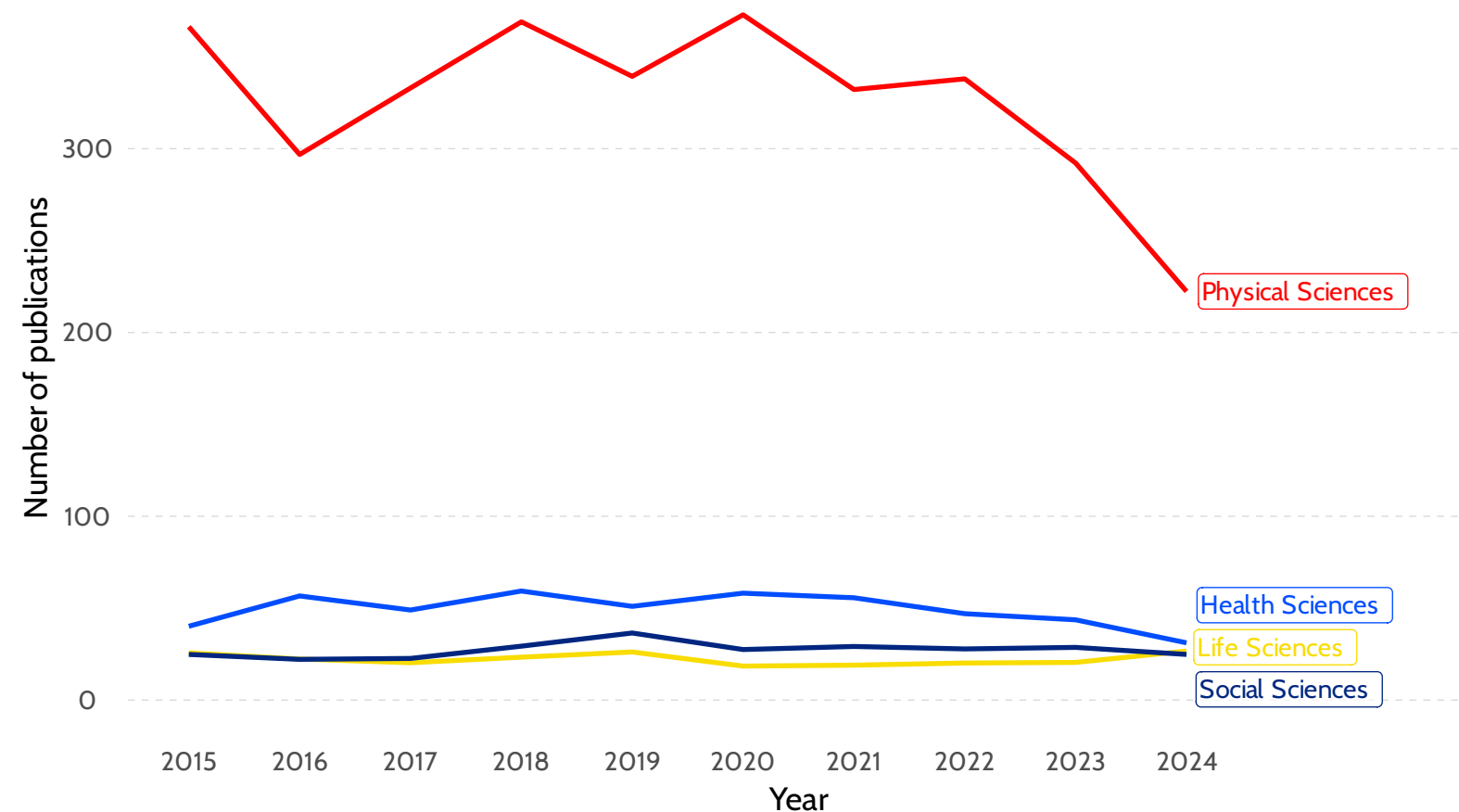


Fig. 18. US Trend in Disciplines, 2015-2024

As noted below Figure 14, the US research activities related to Greenland have significantly declined during the decade we are analysing here. In 2015, the USA produced about 50% more research on Greenland than Canada (in second place), but in 2024, the USA dropped below Canada in annual research output on Greenland. Therefore it is relevant to take a closer look at whether there are particular topics or disciplines that drive this change, or if it is across the board.

Figure 18 illustrates the trend in number of publications contributed to by the USA broken down by discipline. The vertical axis shows the number of publications. The trend in the physical sciences show a decline in publications especially from 2021 and onwards. The trend shows a decline from 2015 with 332 publications

to 284 in 2024 which is a decline of 14%. Health sciences decline from 48 publications to 41 publications, which is a decline of 16% percent. This high percentual change can partially be explained by the smaller numbers.

The social sciences see a small rise in publications from 23 in 2015 to 27 in 2024. The life sciences have a close to constant level of publications with 23 in 2015 to 22 in 2024.

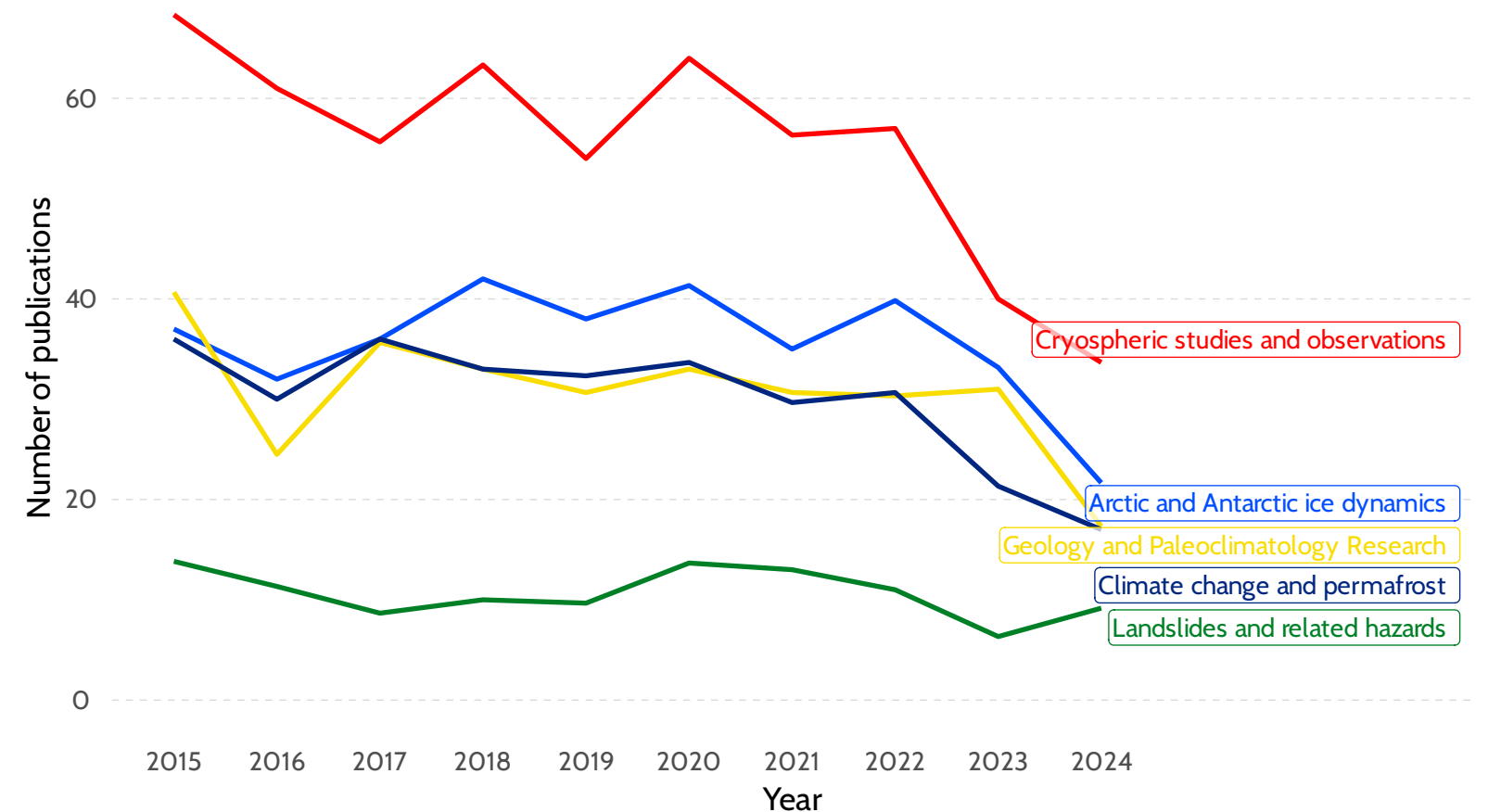


Fig. 19. US Trend in Topics, 2015-2024

Figure 19 shows the trend in number of publications contributed to by the USA broken down by topics within the physical sciences. The horizontal axis shows year, and the vertical axis shows number of publications related to each topic.

The figure shows a decline in publications related to all of the included topics, but looking at the percentual changes the decline has been the highest within publications related to cryospheric studies and observations (29%) and climate change and permafrost (32%). The decline is the most significant for cryospheric studies and observations in number of publications related to it as it declines from 62 to 44, but the percentual change is smaller than the change in publications related to climate change and permafrost as cryospheric

studies and observations has the highest number of publications related to it in 2015. The smallest percentual decline is in publications related to Arctic and Antarctic ice dynamics which drop by 9%.

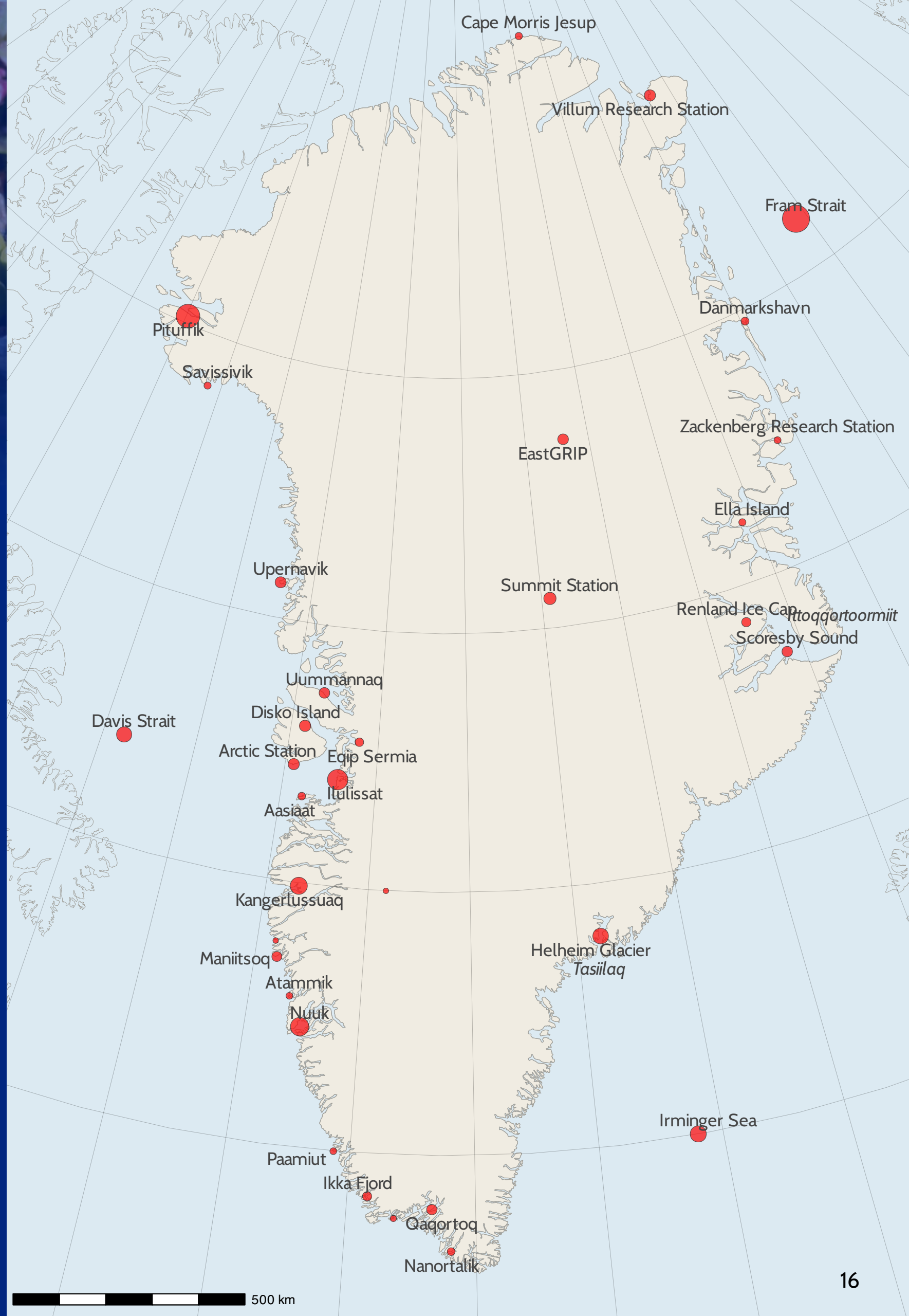


Geography

In the following pages, we show where in Greenland research is being conducted. This analysis uses mentions of places in either the title or abstract, which is a natural place to mention placenames that are important for the research. This means that e.g. surveys that are sent out across many villages or across all of Greenland are unlikely to be included, whereas an observational study in a specific community will be, as will research at a specific glacier or borehole, while general research on ice melt across Greenland will not be included.

In the map to the right, we have merged some placenames into the major local hub, as there would otherwise be too many names to read the map. Over the next pages, we present local maps of three areas where the concentration of research activities is merged. These areas are all located on the southern west coast, spanning from Nanortalik to Upernavik.

On the next page follows a list of examples of research done in some of the areas outside of the south-west coast area.





Research examples

Cape Morris Jesup

Research mentioning Cape Morris Jesup tends to be concerned with geographical mapping, e.g. of potential islands.

Danmarkshavn

Almost all research in Danmarkshavn is geological or meteorological, e.g. about local gneiss formations, sedimentary evolution or precipitation.

Davis Strait

Research on the Davis Strait is almost exclusively oceanographic, either concerned with water and heat flux, or marine animal studies.

EastGRIP

The East Greenland Ice-core Project is an ice core drilling site and research camp. Research mentioning it tends to be cryospheric studies e.g. concerned with ice flow, ice melt and stable water.

Ella Island

Research mentioning Ella Island examines Arctic animals e.g. microbiota and diet of muskox and community patterns of arctic marine vertebrates.

Fram Strait

Research on the Fram Strait tends to be concerned with topics such as water circulation, Arctic ice dynamics, marine and coastal ecosystems and paleoclimatology research.

Helheim Glacier

Almost all the research mentioning the Helheim Glacier is cryospheric studies concerning the Glacier e.g. glacier calving, glacier retreat and meltwater drainage.

Irminger Sea

Research mentioning the Irminger Sea tends to be about oceanographic and atmospheric processes, as well as climate variability and models. A large portion of the research is also about Arctic ice dynamics.

Pituffik

Research mentioning Pituffik (or Thule Airbase for older publications) often mentions either the Greenland Telescope, a radio telescope at Pituffik Airbase. Also high arctic studies of seismic activity and nuclear radiation are common.

Renland Ice Cap

Renland ice cap is an ice core drilling site and research mentioning this site often concerns the holocene, the history of the glacier and general research in the ice cap.

Scoresby Sound

Research mentioning the Scoresby Sound is almost exclusively environmental and climate research and research in marine animals e.g. research in narwhals and polar bears.

Summit station

Research mentioning the Summit Station tends to be research studying the atmosphere as well as cryospheric studies and observations. Some of the research is also about radio frequency.

Villum research station

The main part of the research mentioning the Villum research station is research concerning atmospheric chemistry and aerosols e.g. research in particle concentrations and sources of particle concentrations.

Zackenberg research station

Research mentioning the Zackenberg research station concerns topics such as plant and animal studies and Arctic permafrost.

Summary

Outside south-west Greenland, named research sites form a chain of arctic observatories focused overwhelmingly on climate, ice and oceans. Ice-core camps and glaciers (EastGRIP, Renland ice cap, Helheim Glacier, Summit Station) produce cryospheric and paleoclimate research, reconstructing past climates and tracking ice dynamics, melt and glacier retreat. Oceanic research (Davis Strait, Fram Strait, Irminger Sea, Scoresby Sound) report on heat, salt and sea-ice exchange, alongside marine ecosystems. Land-based stations and locations (Zackenberg, Villum, Danmarkshavn, Avannaata, Ella Island, Cape Morris Jesup, Pituffik) support long-term monitoring of permafrost, terrestrial and marine biodiversity, atmospheric chemistry, aerosols, radiation and geophysical processes, often using advanced instruments such as the Greenland Telescope. Taken together, these sites illustrate how arctic Greenland functions as a laboratory for understanding climate change, environmental variability and ecosystem responses.

Qeqqata-Sermersooq

Many of the studies in Qeqqata (northern share of the map) cover multiple locations per study. Some health studies include both Sisimiut and Kangerlussuaq explicitly, while ice sheet studies run from the official Ice Sheet K Transect location and westwards. In Sisimiut are a number of archaeological and cultural studies of the Saqqaq culture. The vast majority of studies in the area are concerned with climate change, ice melt, and the ice sheet.

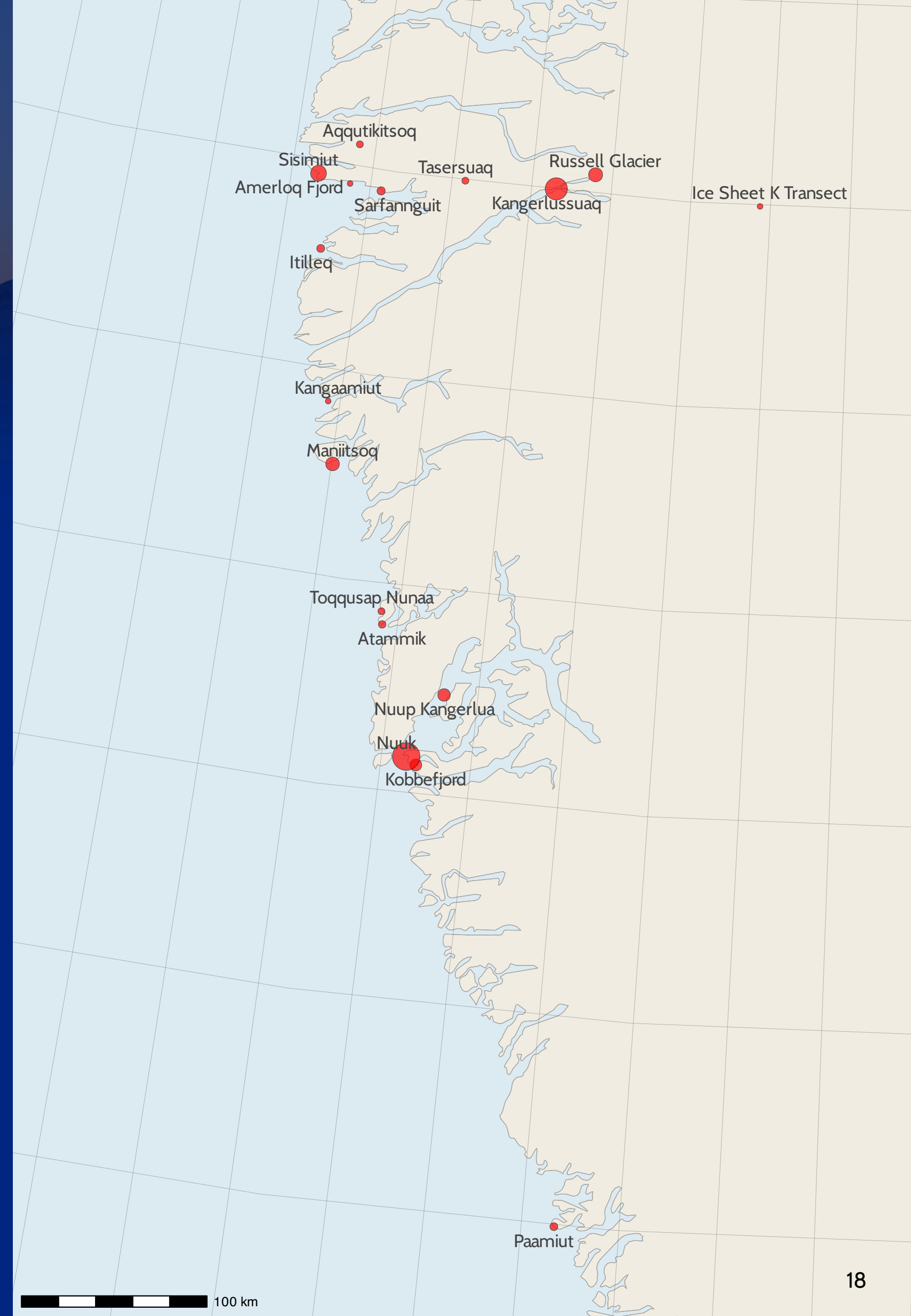
In Kangaamiut, snow crabs, porpoises and lichen have been studied, while further to the south, in Maniitsoq, the focus has been on caribou. Also radiation reports have been published here, and there are case reports of health and family life.

In Atammik and Toqqusap Nunaa, studies report on local feldspar deposits, extinct volcanoes and wildlife status.

In Kobbefjord, research focuses on ecosystem monitoring, recently on aquatic life, either on the microbial level, as seagrass, or its interaction with glacial melt. Studies often relate to climate change.

Nuuk, is the largest singular location in terms of mentions in publications, and is the only location with a high concentration of policy and political science studies, particularly around arctic security policy. Also “Indigenous Studies and Ecology” are common, which in this particular case includes both cultural studies, family life, health, history, and the interaction between human and nature (e.g. hunting).

Research in Paamiut is largely concerned with oceanic wildlife, including fishery research (cod and shrimp) and research on whale preservation. Some of this research links to studies further north, e.g. in Sisimiut.

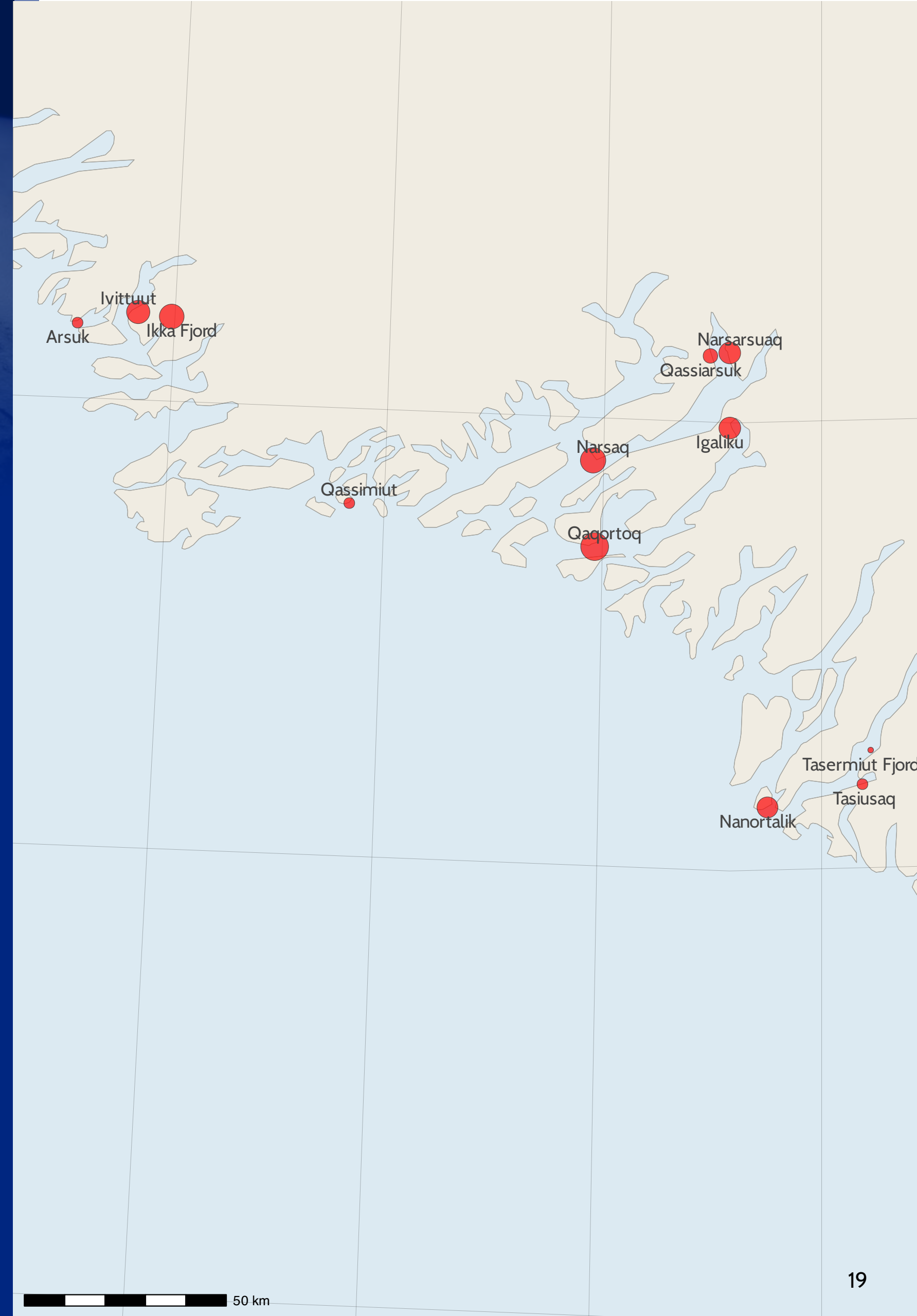


Kujalleq

In Ivittuut and Ikka Fjord, most studies are geological, with the research in Ikka Fjord specialising in the local Ikaite Tufa towers, a form of underwater geological structure. In Arsuk, geological surveys are combined with pollution (from mining industry) and climate research.

Moving south-west, research in Narsarsuaq is about glacier meltwater and geology, while Qassiarsuk is mentioned in studies on plant life. Igaliku figures primarily in paleoclimatic research in the holocene, particularly related to the local fjord, whereas research related to Narsaq is a combination of social science (tourism, education and labour market), geology, and radioactive surveys. Qaqortoq highly resembles Narsaq in terms of types of research being done.

Qassimiut is an important site for geological research of holocene and late quaternary history. Geological surveys are also the main research topic in Nanortalik, Tasiusaq, and Tasermiut. The latter is mostly concerned with findings of radioactive minerals.



Qeqertalik-Avannaata

Sermeq Kujalleq and Eqip Sermia are both large glaciers. Almost all research done here is related to glacial ice core drillings and glacial meltwater. Sermeq Kujalleq is also the greenlandic name of the Helheim Glacier and Kujalleq is a municipality in Southern Greenland, and there may be some misplaced publications (e.g. there is a small amount of social science research attributed to Kujalleq). Also Upernavik has mostly glacier-related research, particularly meltwater, but also some studies are related to fishery and hunting. Sermeq Kujalleq research also often mentions Ilulissat, as the location for glacial outflow. Other research here is concerned with fishery, but also arctic policy research often mentions the “Ilulissat Initiative” based on a 2008 declaration of the Arctic Council meeting in Ilulissat. Disko Bay research is related almost entirely to underwater geology research, but also some plankton and iceberg studies refer to this location.

Uummannaq is the only location mentioned for wind energy research.

Research in the Sullorsuaq is greatly concerned with tsunamis arising from calving glaciers, but also fishery.

Climate change, especially in the anthropocene, is the main topic of research on Disko Island. The three locations “Disko Island”, “Qeqertarsuaq”, and “Arctic Station” are here actually the same unit. Arctic Station is located just one kilometre outside Qeqertarsuaq, and virtually all research on Disko Island is conducted here. The research station is owned by Copenhagen University and focuses mostly on climate research.

Research in Aasiaat is limited, and reflects a mix of whale preservation and youth research.



Conclusions

Throughout this report we have presented in numbers and text what characterises research in, about, and from Greenland. The aim of this has been to present a comprehensive overview of the most important distributions and trends - based on bibliometric data - to provide data and information documenting “where we are coming from”, supporting a potential debate on “where do we want to go”. That debate does not belong in this report. However, we have chosen to pinpoint some of the major trends and observations that could open up questions in a debate.

Stable volume, relative decline

The annual number of publications from, in, and about Greenland has been broadly stable at around 1,700-1,800 journal articles per year. However, while global publication output increased by about 9% between 2015-2017 and 2022-2024, Greenland-related output decreased slightly, corresponding to a decline of around 11%.

Highly specialised profile

Greenland occupies a distinctive position in global science as a natural laboratory for climate and environmental research. Physical sciences, especially atmospheric science; global and planetary change;

and ecology, account for a very large fraction of the total Greenland-related output, far above what is observed in national or global portfolios. This points to strong international research interest in Greenland’s environment and cryosphere.

Limited but important health and social research

Health sciences and social sciences represent a smaller share of the overall output, even though they are central for understanding and improving the living conditions of the Greenlandic population. Where such research does exist, it often focuses on Indigenous health, social conditions and policy, indicating important, but still relatively narrow, knowledge bases.

Greenland as research object versus research actor

A large share of the publications about Greenland do not involve authors with Greenlandic affiliations. Greenlandic institutions, particularly the Greenland Institute of Natural Resources; Ilisimatusarfik; and the National Museum & Archives, contribute meaningfully, but most international publications on Greenland are still produced without direct Greenland-based co-authorship. Denmark shows the highest proportion

of co-authored work with Greenlandic partners; in most other countries, such collaboration remains limited.

Shifting international collaboration patterns

The USA, Canada and Denmark are the three most important contributing countries, but their trajectories differ. Canadian output grows slightly, Danish output is roughly stable, while the USA shows a marked decline in Greenland-related publications, particularly within the physical sciences and cryosphere topics. In contrast, China’s contribution increases strongly over the period. These shifts may reflect broader geopolitical and funding developments in Arctic and climate research.

Geographical concentration of research sites

Field-based research is heavily concentrated along the south-west coast (from Nanortalik to Upernavik) and around a small number of specialised research sites (e.g. EastGRIP, Summit Station, Zackenberg). Other regions and smaller communities appear less frequently as explicit research locations, particularly in the social and health sciences, suggesting uneven spatial coverage of on-the-ground studies.

Implications for future Greenland research policy

These results suggest that Greenland is of global importance within environmental research, while simultaneously highlighting that research on health, social and cultural issues, and on some regions and communities, remains comparatively sparse.

The unique geography and resources of Greenland attract considerable international attention. This could represent opportunities for deeper international collaboration and increased visibility and reach of Greenlandic research. It may, however, also motivate some concerns about the degree to which Greenland is represented in research on Greenland, and the ability to influence such research.

On the other hand, research on health and social issues in Greenland is relatively sparse. While this is perhaps given by the small research system, there is also some evidence that these issues are also not highly prioritized in (internationally published) research from Greenland. Working towards promoting this work and seeking out avenues for increasing international collaboration within these areas could be worth pursuing.

Methodology

Patterns in external interest may also motivate discussion. It is perhaps not surprising that collaboration with Denmark is the strongest given the relationship between these countries. Furthermore, neighbors in Scandinavia and North America also represent relatively stable collaborators. However, patterns of decreasing American interest alongside rising Chinese interest should also be noted. Scientific collaboration alongside careful science diplomacy may be needed to manage and strengthen the position of research from Greenland in research on Greenland.

Taken as a whole, this points towards harnessing and managing international research interests and collaboration as a key subject for science policy in Greenland. This represents both challenges and opportunities, and given the asymmetries between a small Greenlandic research ecosystem and external research interests room for maneuverability may be limited. Navigating these is key to ensuring the potential of Greenlandic research.

1. Purpose and scope

The purpose of this report is to provide a systematic, quantitative overview of research from, in, and about Greenland for the period 2015-2024. We focus on peer-reviewed journal publications and ask three main questions:

1. How much research activity is connected to Greenland,
2. in which disciplines, fields and topics is this activity concentrated, and
3. how this research is distributed across countries, institutions, collaborations, and places in Greenland.

Throughout the report, “research from, in, and about Greenland” is defined operationally based on author affiliations and a long list of textual mentions of Greenland, Greenlanders, or specific places in Greenland. The analyses cover the publication years 2015-2024 and are restricted to journal outputs as indexed in the OpenAlex database.

Unless otherwise stated, all figures and tables in the report are based on this common underlying dataset.

2.1. Primary source: OpenAlex

All publication data are drawn from OpenAlex, an open bibliographic database that indexes scholarly work across disciplines. OpenAlex was chosen because it provides:

- global coverage across disciplines,
- structured metadata on affiliations, areas, and topics,
- a leading coverage of fields outside the natural and health sciences.

The data used in this report were retrieved via the OpenAlex API in mid-2025.

2.2. Query design

The starting point for constructing the corpus was a set of queries delimiting the retrieved data to articles (type) published in journals (source type). These criteria were combined with searches on topics, titles and abstracts, as reported in table 1.

2.3. Identifying Greenland-based publications

All publications where at least one author reports an address based in Greenland is counted as a “Greenland-based publication”. All other publications are

counted as “International” publications, or “non-Greenland” publications, depending on the context.

2.4. Identifying location-oriented publications

We used a list of official placenames containing both official and alternative names (e.g. English translations, or historic Danish names for cities, glaciers or straits). The majority of placenames are now Greenlandic, in particular administrative or natural placenames. Oceanic placenames are in English or Danish-English combinations (e.g. Scoresby Sound), and research stations are typically in English. We used the combination of placenames to search titles and abstracts of all included publications for occurrences, using simple REGEX.

Translated placenames were also used in the search strategy documented in table 1.

Publications that referred to the same place using different names (e.g. Sermeq Kujalleq is also called “Jakobshavn Isbræ” and “Ilulissat Glacier” in the literature) were all combined under the official label. All placenames were manually geolocated

using Google Maps. Some locations span large areas (e.g. the Greenland Ice Sheet K-transect); these locations are still located as pinpoints on our maps. The geolocations for these were found in authoritative sources, estimated as middle points or starting points (e.g. the K-transect of the ice sheet starts near Russell Glacier and has 10 measurement stations).

Query	<i>n</i>
title_and_abstract.search:aasiaat,default.search:aasiaat	10
title_and_abstract.search:ammassalik,default.search:ammassalik	23
title_and_abstract.search:aqqutikitsq,default.search:aqqutikitsq	2
title_and_abstract.search:arsuk,default.search:arsuk	1
title_and_abstract.search:atammik,default.search:atammik	2
title_and_abstract.search:avannaata,default.search:avannaata	21
title_and_abstract.search:bowdoin glacier,default.search:bowdoin glacier	39
title_and_abstract.search:brattahlid,default.search:brattahlid	0
title_and_abstract.search:cape morris jesup,default.search:cape morris jesup	6
title_and_abstract.search:daneborg,default.search:daneborg	2
title_and_abstract.search:danmarkshavn,default.search:danmarkshavn	11
title_and_abstract.search:davis strait,default.search:davis strait	227
title_and_abstract.search:denmark strait,default.search:denmark strait	271
title_and_abstract.search:disko bay,default.search:disko bay	119
title_and_abstract.search:disko island,default.search:disko island	66
title_and_abstract.search:diskobugt,default.search:diskobugt	0
title_and_abstract.search:egedesminde,default.search:egedesminde	1
title_and_abstract.search:egig line,default.search:egig line	4
title_and_abstract.search:ella island,default.search:ella island	180
title_and_abstract.search:ella ø,default.search:ella ø	5
title_and_abstract.search:eqip sermia,default.search:eqip sermia	19
title_and_abstract.search:fram strait,default.search:fram strait	952
title_and_abstract.search:frederikshåb,default.search:frederikshåb	1
title_and_abstract.search:godthåb,default.search:godthåb	9
title_and_abstract.search:greenland,default.search:greenland	15,960
title_and_abstract.search:greenlander,default.search:greenlander	214
title_and_abstract.search:greenlandic,default.search:greenlandic	1,101
title_and_abstract.search:helheim glacier,default.search:helheim glacier	133
title_and_abstract.search:holsteinsborg,default.search:holsteinsborg	4
title_and_abstract.search:ice sheet k transect,default.search:ice sheet k transect	23

Table 1: List of topic and placename queries, and the number of publications (*n*) found in OpenAlex. Continued on following pages.

Query	<i>n</i>
title_and_abstract.search:igaliku,default.search:igaliku	11
title_and_abstract.search:ikka fjord,default.search:ikka fjord	15
title_and_abstract.search:ilulissat,default.search:ilulissat	96
title_and_abstract.search:inglefield bredning,default.search:inglefield bredning	7
title_and_abstract.search:inglefield fjord,default.search:inglefield fjord	7
title_and_abstract.search:inuit,default.search:inuit	4,217
title_and_abstract.search:irminger sea,default.search:irminger sea	341
title_and_abstract.search:itilleq,default.search:itilleq	3
title_and_abstract.search:itinneq,default.search:itinneq	0
title_and_abstract.search:ivittuut,default.search:ivittuut	11
title_and_abstract.search:jakobshavn,default.search:jakobshavn	194
title_and_abstract.search:kalaallisut,default.search:kalaallisut	30
title_and_abstract.search:kalaallit,default.search:kalaallit	142
title_and_abstract.search:kalaaleq,default.search:kalaaleq	2
title_and_abstract.search:kangaamiut,default.search:kangaamiut	0
title_and_abstract.search:kangerlussuaq,default.search:kangerlussuaq	162
title_and_abstract.search:kobberfjord,default.search:kobberfjord	0
title_and_abstract.search:kujalleq,default.search:kujalleq	61
title_and_abstract.search:lake tasersuaq,default.search:lake tasersuaq	1
title_and_abstract.search:maniitsoq,default.search:maniitsoq	36
title_and_abstract.search:nanortalik,default.search:nanortalik	9
title_and_abstract.search:narsaq,default.search:narsaq	15
title_and_abstract.search:narsarsuaq,default.search:narsarsuaq	10
title_and_abstract.search:nuuk,default.search:nuuk	284
title_and_abstract.search:nuup kangerlua,default.search:nuup kangerlua	26
title_and_abstract.search:paamiut,default.search:paamiut	3
title_and_abstract.search:pituffik,default.search:pituffik	8
title_and_abstract.search:qaanaaq,default.search:qaanaaq	79
title_and_abstract.search:qaarsut,default.search:qaarsut	0
title_and_abstract.search:qaqortoq,default.search:qaqortoq	13
title_and_abstract.search:qasigiannuguit,default.search:qasigiannuguit	6
title_and_abstract.search:qassiarsuk,default.search:qassiarsuk	3
title_and_abstract.search:qassimiut,default.search:qassimiut	1

Query	<i>n</i>
title_and_abstract.search:qeqertarsuaq,default.search:qeqertarsuaq	25
title_and_abstract.search:renland ice cap,default.search:renland ice cap	19
title_and_abstract.search:russell glacier,default.search:russell glacier	55
title_and_abstract.search:sarfannguit,default.search:sarfannguit	4
title_and_abstract.search:savissivik,default.search:savissivik	5
title_and_abstract.search:scoresby sund,default.search:scoresby sund	27
title_and_abstract.search:scoresbysund,default.search:scoresbysund	10
title_and_abstract.search:sermeq,default.search:sermeq	45
title_and_abstract.search:siorapaluk,default.search:siorapaluk	7
title_and_abstract.search:sisimiut,default.search:sisimiut	59
title_and_abstract.search:søndre strømfjord,default.search:søndre strømfjord	8
title_and_abstract.search:station nord,default.search:station nord	425
title_and_abstract.search:store glacier,default.search:store glacier	417
title_and_abstract.search:summit station,default.search:summit station	545
title_and_abstract.search:tarajoq,default.search:tarajoq	0
title_and_abstract.search:tasermiut fjord,default.search:tasermiut fjord	1
title_and_abstract.search:tasiilaq,default.search:tasiilaq	32
title_and_abstract.search:tasiusaq,default.search:tasiusaq	1
title_and_abstract.search:thule,default.search:thule	549
title_and_abstract.search:upernavik,default.search:upernavik	61
title_and_abstract.search:uummannaq,default.search:uummannaq	51
title_and_abstract.search:vaigat sound,default.search:vaigat sound	2
title_and_abstract.search:wolstenholmfjord,default.search:wolstenholmfjord	0
title_and_abstract.search:zacharias isbræ,default.search:zacharias isbræ	0
title_and_abstract.search:zackenberg research station,default.search:zackenberg research station	6
title_and_abstract.search:Villum research station,default.search:Villum research station	50
title_and_abstract.search:arktisk station,default.search:arktisk station	1
title_and_abstract.search:arctic station,default.search:arctic station	2,266
title_and_abstract.search:summit station,default.search:summit station	545
title_and_abstract.search:eastgrip,default.search:eastgrip	53
title_and_abstract.search:sermilik,default.search:sermilik	50
authorships.countries:countries/gl	1,885
keywords.id:keywords/greenland-ice-sheet	3,336



Arctic Hub is the point of contact for anyone involved in research in Greenland

Based in Nuuk, Greenland, Arctic Hub serves as a central point of contact for Greenland's local and international research community. Established in 2020 through a partnership between the Greenlandic and Danish governments, we focus on building bridges between people, institutions, and countries engaged in Greenlandic research. Moreover, we contribute to ensuring that knowledge from research reaches the public.



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