Integrating Activities for Advanced Communities

D5.1- Report on the Significance of the Agreement on Enhancing International Arctic Scientific Cooperation for Research in the Arctic

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Author: Pjotr Elshout, Griffith Couser, Eva Horovcakova, Renuka Badhe

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PP	Restricted to other programme participants (including the Commission Services)	
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CO	Confidential, only for members of the Consortium (including the Commission Services)	

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Publishable Executive Summary

In an effort to promote international Arctic science and ease some of the challenges experienced by the international Arctic scientific community regarding transnational access, the Arctic Eight (Canada, the United States, Denmark, Norway, Finland, Sweden, Iceland and Russia) signed the Agreement on Enhancing International Arctic Scientific Cooperation (in this paper called: 'the Agreement') in May 2018.

This paper summarises the awareness and knowledge of the Agreement amongst the representatives of Members of the International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT) and identifies bottlenecks and recommendations based on input from respondents of two surveys circulated in 2021 and 2022 amongst representatives of INTERACT Members.

According to these surveys, the awareness of the Agreement amongst the INTERACT Network and wider Arctic research community could be improved to promote international scientific Arctic collaboration. Respondents of both surveys note that disseminating the Agreement at relevant conferences, informative (national) websites, research stations and during the application processes of obtaining permits for Arctic research may ease challenges experienced when conducting international Arctic science, or traveling to research infrastructure in Arctic countries.

1. Introduction and background

The significance of Arctic science

Many climate tipping points lie within the Arctic Circle. The Arctic Ocean plays a significant role in regulating ocean currents and the global climate; numerous Indigenous Peoples and local communities call the Arctic region home; many unique species of flora and fauna exist nowhere else. Understanding the delicate balance of climate, human, and nature, requires sustained scientific study. Scientists from Arctic countries and beyond have a long-standing tradition of international scientific collaboration within the Arctic region. Research stations in the Arctic are visited by scientists from non-Arctic regions, there are international research campaigns organised to combine efforts and scientific expertise (such as the MOSAiC campaign), and research stations often house international staff. Maintaining effective Arctic science, cross-border and international logistics are crucial to ensure that staff, equipment, samples and any other necessity for conducting science is brought to (and taken from) Arctic sites of scientific relevance.

The Agreement on Enhancing International Arctic Scientific Cooperation

In an effort to promote international Arctic science and ease some of the challenges experienced by the international Arctic scientific community regarding transnational access, the Arctic Eight (Canada, the United States, Denmark, Norway, Finland, Sweden, Iceland and Russia) signed the Agreement on Enhancing International Arctic Scientific Cooperation (in this paper called: 'the Agreement') in May 2018. All countries have different regulations for providing permits to conduct scientific research, for importing and exporting samples, and for granting visas to scientific staff. This paper shows that many individual scientists and larger national scientific organisations experience challenges in understanding which permit, visa, and other necessities are obligatory for cross-border travelling to conduct scientific research.

The Agreement states that the Arctic Eight aim to increase access to their countries' Arctic research facilities for international scientists and research staff and to ease challenges experienced when importing and exporting scientific equipment transnationally, within the bounds of national laws. Arctic Council member states are encouraged to provide such assistance to scientists from further afield as well.

International developments disrupting the implementation of the Agreement

Since the signing and entering into force of the Agreement, there have been two major international disruptions for the Arctic research community that have affected their access to the Arctic significantly. The first disruption was the global COVID-19 pandemic which limited access to research stations severely as most transnational travelling was highly restricted or banned. The second major disruption was when many Arctic actors enabling and conducting scientific research froze cooperation with Arctic science institutes affiliated with Russian stakeholders due to the Russian invasion of Ukraine. This effectively made the Russian Arctic inaccessible to the Western polar research community and made the European and American Arctic inaccessible to scientists employed by Russian institutes.

The goal of this work is to better understand the practical impact of the Agreement on providing transnational access to the Arctic science community, while taking into account the effects of the COVID-19 pandemic and the geo-political disruption between Russia and other Arctic countries. This paper collected input from the Arctic scientific community on behalf of the International Network for Terrestrial Research and Monitoring (INTERACT) project, focusing on awareness of the Agreement and general challenges and problems associated with transnational access in the Arctic. Based on the data gathered using surveys amongst the Arctic research community, several recommendations on the implementation of the Agreement and transnational access in the Arctic for international scientists have been provided.

The International Network for Terrestrial Research and Monitoring

INTERACT III is a four-year project aimed to sustain a broad network of Arctic, Alpine and boreal research stations in the Northern hemisphere, by providing assistance with transnational access in person[1], remotely[2], and virtually[3] to participating research stations. INTERACT is funded by the EU Horizon 2020 funding program.

The INTERACT network consists of 74 research stations based within either the Arctic circle, or in adjacent high alpine and boreal areas. INTERACT also operates the Station Manager Forum, which is a forum where station managers of research stations can share their best practices, experiences and latest updates regarding operating research stations.

[1] In-person access means scientists or suporting staff travels in-person to the designated research site.

[2] Remote access means that scientists can ask for services being conducted by local research staff without having to travel to the designated research site. A scientitst could for example request certain samples to be taken by supporting local staff.

[3] Virtual access means having access to the databases of research stations online.

A Non-Binding Illustrative map of the regions included in the Agreement on Enhancing International Arctic Scientific Cooperation. Source: U.S. Department of State, OES/OPA, April 12, 2019

2. Methodology

The paper is based on both quantitative and qualitative data gathered from two surveys that were circulated amongst Arctic scientists, research station managers and staff, research infrastructure operators and representatives of research organisations. The surveys were used as a tool to efficiently collect data that could be generalised and disseminated in this paper.

Aim of the surveys

The main aim of the surveys on which this paper is based on was to identify what the depth of the knowledge the Arctic research community had of the Agreement and which challenges are experienced by the international Arctic research community when using transnational access. Two surveys were circulated amongst polar scientists, research station managers, technical staff at research stations, directors of polar research programmes and administrative staff involved at Arctic and Alpine research stations that participate in INTERACT III. The questions of the survey have been developed by the Association of Polar Early Career Scientists with assistance from INTERACT coordinators and the Secretariat of the European Polar Board.

Details about the questions of the surveys and data gathered from the surveys

The surveys have eight sections, which consist of open questions, single-choice questions and multiple-choice questions (see Annex 1 for Survey 1 and Annex 3 for Survey 2). The questions in both surveys are largely similar, but not entirely. The second survey was aimed to reflect the situation of international access after the invasion of Ukraine and the ban on working with Russian affiliated institutes and individuals, hence several questions were adjusted and added.

The collected survey data is a mix of quantitative and qualitative data, and questions fall into three broad categories: categorical questions, degree/extent questions, and short-answer questions. However, a qualitative element is present in some questions: short-answer questions allow respondents to identify elements which may not have been possible to anticipate in the survey design, and form short lists of factors to bolster the quantitative data in turn.

The data in the surveys referenced in this paper is anonymised. In the graphs used in this paper, the answers are shown as percentages. Survey results from Survey 1 and Survey 2 are compared when possible. Survey 2 had less respondents (see section below) and several questions differed from Survey 1 to reflect new global developments that strained international traveling. The aggregated and anonymised data of both surveys can be found in Annex 2 (Survey 1) and Annex 4 (Survey 2).

Details about the conducting of the surveys and the respondents

EU Horizon projects have annual General Assemblies, in which a large part of the consortium of the project gathers to discuss the progress of the work within the project. The first survey was conducted in-person using either a paper or an online version (as preferred by the respondents) for those present in November 2021, at the INTERACT General Assembly in Kilpisjärvi, Finland. The online survey was also available for respondents who were not able to attend in person. The first survey was answered by 40 respondents (out of a maximum possible of 90 INTERACT research stations, as in 2021 Russian partners were still involved in INTERACT and thus the INTERACT

consortium was larger than it currently is). 2 reminders were sent to the INTERACT research stations to maximise response rates. The 40 respondents were from 12 countries, conducting research in 8 Arctic countries (see Figure 1 in the Results section of this paper).

The second survey was conducted in February 2022 fully online and was answered by 22 persons. The second survey had fewer respondents than the first survey, presumably because it was conducted fully online and not during an in-person meeting, and because Russian participation in INTERACT had been suspended, reducing the pool of potential respondents.

Presentation of the data of the surveys in this paper

The data from both surveys in this paper is presented in the *Results Chapter.* This chapter is divided according to the eight sections the surveys are comprised of. Each section has one or two Figure(s) representing all the data from that particular section of both surveys. Where possible, identical questions between the two surveys are combined in these Figures. All relevant figures in each section are presented on one page, so it can be shown independently of the report text.

Survey participants

Most respondents indicated to work in the Arctic regions. Some however, were answered to survey questions that they work at research stations in the Alpine regions, as the INTERACT network also consists of several research stations in Central Europe. Since within the INTERACT network there is exchange of knowledge, best practices, and data regarding the Arctic and adjacent Alpine and boreal regions regarding glaciers, biodiversity and other related sciences, the respondents from these regions have been included in the data this paper is based on.

In the Agreement, Article 17 (1) it is specified that signatories of the Agreement also may enhance and facilitate cooperation with non-signatories with regard to Arctic science. With this understanding, participants from non-Arctic Council member states were able to contribute to the surveys on an equal basis, given their hypothetical treatment as equal to researchers hailing from Arctic Council member states. Thus, responses from all nationalities are included together.

Participants' research experience was high. Few respondents were considered to be "early career", and many occupied senior positions within their respective organisations, which necessitate a deep understanding of arranging and conducting Arctic research. This bias towards mid- to late career researchers could be considered a data gap, and work remains to be done to understand variability in access and use of infrastructure as compared to experience level.

3. Results

In this chapter, the results of both surveys will be discussed per section. The graphs in blue are based on the data from the first survey, the graphs in orange are based on the data from the second survey.

3.1.Section 1: Participant details

Information about the respondents of Survey 1 (Section 1)

Survey 1 was filled in by 40 representatives of research stations in seven of the eight Arctic Council member states. It also included representatives working in European mountainous regions (such as Austria, Scotland, and Poland) and other regions such as the Faroe Islands. Most respondents were based on Svalbard, followed by Canada and Russia (see Figure 1, Graph 1).

The respondents were station managers, technical or logistical staff, educators, administrators, scientific staff and a director (see Figure 1, Graph 2).

Survey 2 has been filled in by 22 respondents, which is less than Survey 1. This can be explained that Survey 2 was solely conducted online as there was no in-person opportunity, and the consortium had become smaller with the suspension of its Russian members due to new regulations for EU funded research projects[4]. Figure 1, Graph 3 shows that most respondents of Survey 2 visited research stations in either Europe or Russia. Please note that several respondents answered the survey based on their past experiences, before the suspension from the European Commission of working with Russia on research and innovation. Figure 1, Graph 4 shows the research stations they work at, which include the United States and Greenland. Similar to Survey 1, most respondents of Survey 2 are affiliated to research stations on Svalbard.

[4] Commission suspends cooperation with Russia on research and innovation (https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1544).

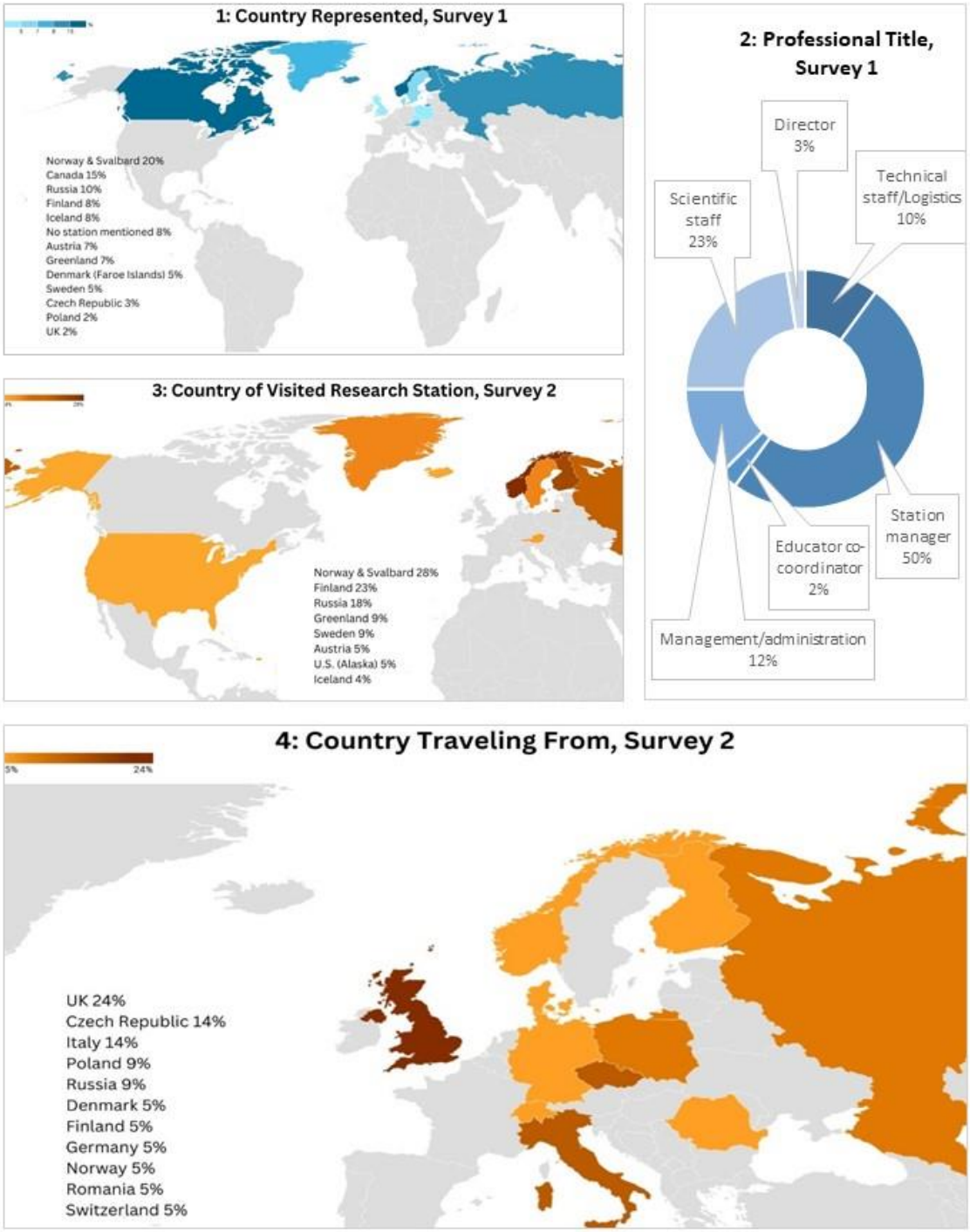


***Figure 1**: Demographic information about respondents of survey 1 and survey 2*
In Figure 1 the participant details of Survey 1 and Survey 2 regarding the Agreement are shown. Graph 1 and Graph 2 show the represented countries and professional titles of the respondents of Survey 1. Graph 3 and Graph 4 show the represented countries and research stations of the respondents of Survey 2.

3.2.Section 2: Knowledge of the Agreement and National Points of Contact (NPCs)

Section 2 of the survey aims to understand the knowledge of respondents regarding the Agreement. It enquires if respondents were aware of the Agreement, the contributions of their institutes to the Agreement and if respondents were aware of the National Points of Contact (NPCs) given in the Agreement. Each of the Arctic Eight countries has a NPC that can be contacted when issues arise when transnational access users use the Agreement, or when there are other questions about the Agreement. The following results show that most respondents of both Survey 1 and 2 are unaware of the Agreement and relevant NPCs.

Figure 2, Graph 1 shows the knowledge respondents to both Survey 1 (in blue) and Survey 2 (in orange) have of the Agreement. It shows that most respondents have very little or no knowledge of the Agreement. In Survey 1, few of the respondents note to have knowledge of the Agreement, while amongst the respondents of Survey 2 no respondents note to have thorough knowledge of the Agreement.

In Survey 1, it is noted (Figure 2, Graph 2) that the institutes represented by the respondents of Survey 1 mostly have either not contributed to the Agreement, or are not aware of any contributions. However, some of the respondents were positive their institutions had contributed to the development of the agreement. Survey 1 also shows that most respondents are not aware who the relevant NPC is (Figure 2, Graph 3) and have had no contact with an NPC (Figure 2, Graph 4).

In an effort to understand more about the findability of NPCs, respondents of the survey were requested to search their relevant NPC online, for which they were given two minutes. This was done to understand if NCP contact details could easily be found online. Over half of the respondents were able to find their NPCs within the given two minutes (see Figure 2, Graph 5).

Figure 2, Graph 6 shows that the respondents of Survey 2 do not know if there is a NPC in the country they work in.

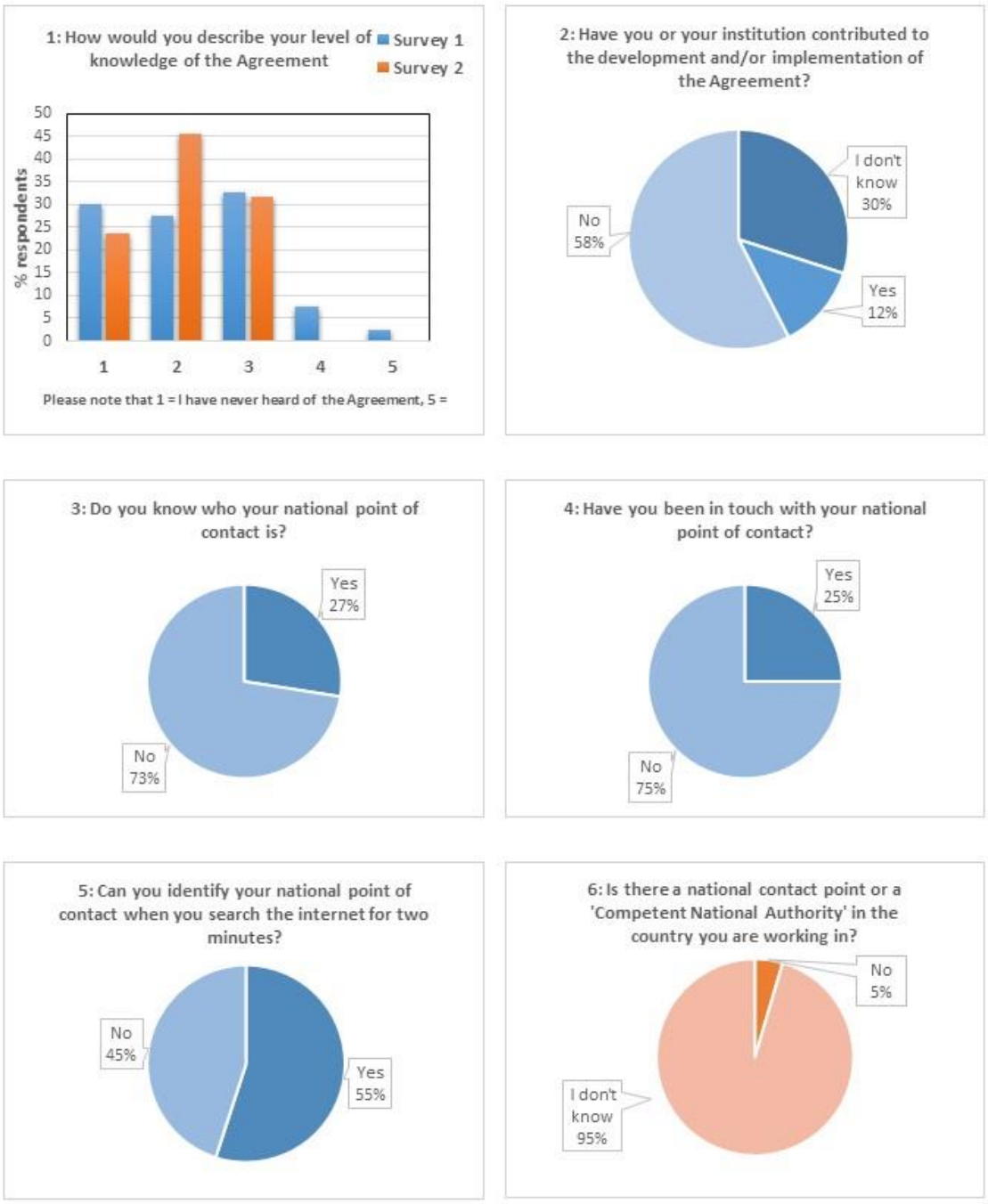


***Figure 2**: Knowledge of the Agreement and National Points of Contact (NPCs)*
In Figure 2, the knowledge of the Agreement and National Points of Contacts (NPCs) by Arctic transnational access users is shown in several graphs. Graph 1 shows the awareness of the Agreement of the respondents of Survey 1 (in blue) and Survey 2 (in orange). Graph 2 shows the known contributions of institutes of respondents of Survey 1 to the Agreement. Graph 3, 4 and 5 show the knowledge of respondents of Survey 1 of NPCs. Graph 6 shows the awareness of relevant NPCs amongst respondents of Survey 2.

3.3.Section 3: Awareness of Reporting Mechanisms and the Agreement

The Agreement has a designated reporting mechanism for any issues, challenges and problems associated with transnational access in the Arctic Eight countries. The following results showcase the knowledge and effectiveness of this reporting mechanism amongst the respondents and show that most respondents are not acquainted with reporting mechanisms of the Agreement.

Figure 3, Graph 1 shows that many respondents of both surveys were not aware of the reporting mechanism of the Agreement. Figure 3, Graph 2 shows that in case respondents would use the reporting mechanism, they would prefer to be further engaged in case there are any follow up actions. As most of the respondents in both surveys indicated not to be aware of the reporting mechanism, Figure 3, Graph 3 shows that most respondents do not know if the actual reporting mechanism is sufficient.

Figure 3, Graph 4 shows that most of the respondents have not guided other researchers through the reporting mechanism of the Agreement. According to Figure 3, Graph 5, several research stations have their own reporting mechanisms to report any issues regarding transnational access in the Arctic region for their visitors and staff. Figure 3, Graph 6 shows that most respondents of Survey 2 noted to be unaware of the reporting mechanisms in the Agreement.

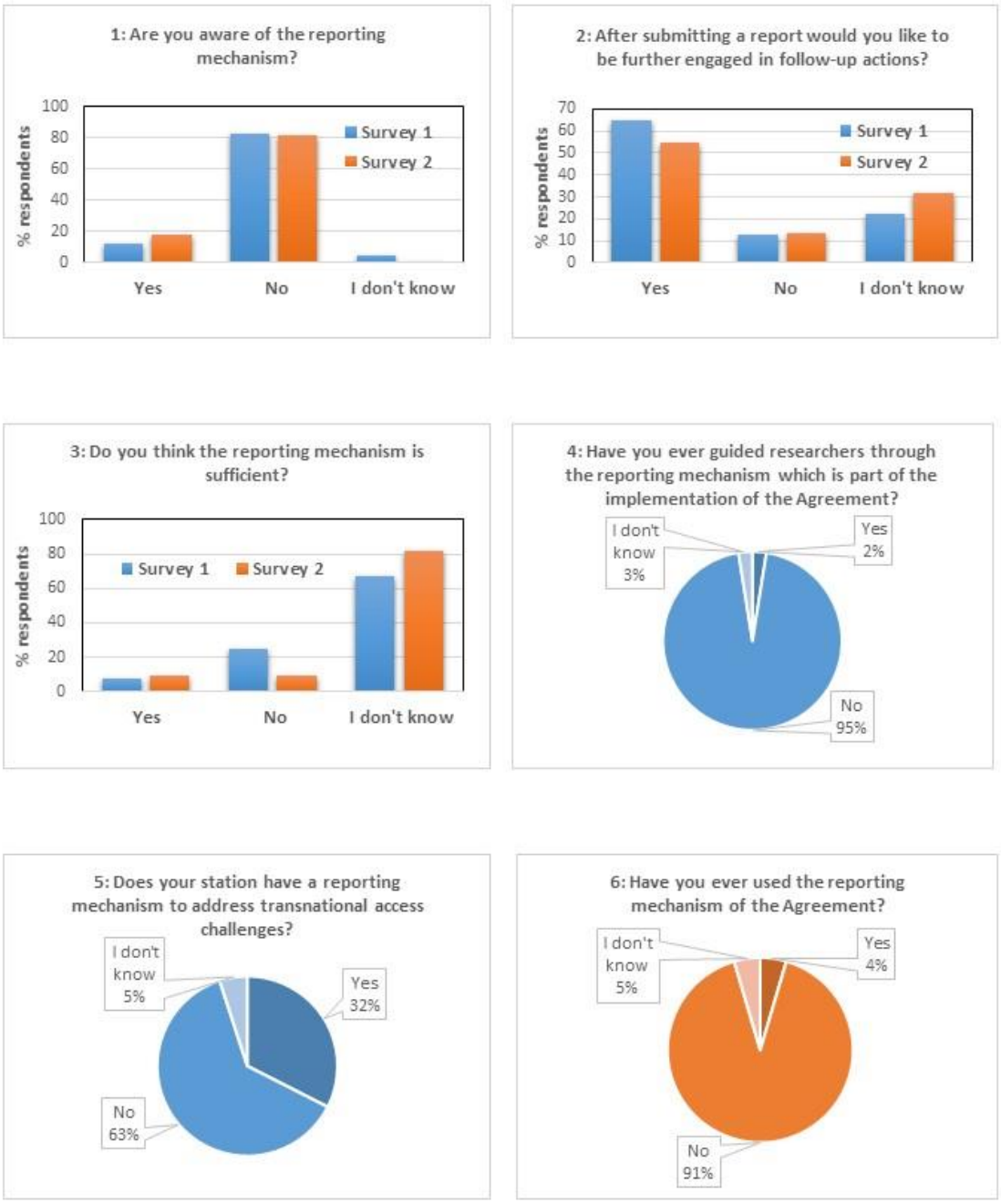
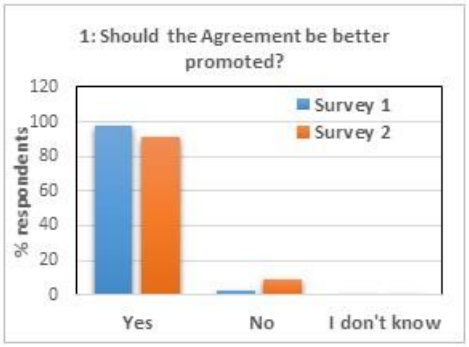
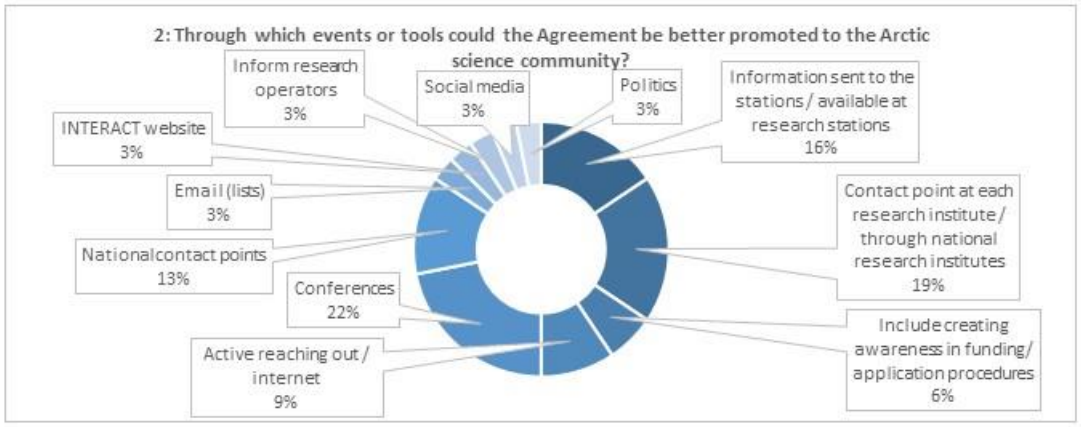


Figure 3: *Knowledge of the Reporting Mechanism of the Agreement*
Figure 3 shows the respondents knowledge and usage of the reporting mechanism of the Agreement. Graph 1, 2 and 3 show if respondents of Survey 1 and Survey 2 know about the reporting mechanism and if it is regarded as sufficient. Graph 4 and 5 show respondents of Survey 1 if they have assisted other researchers with using the reporting mechanism and if their affiliated research stations have their own reporting mechanisms to address transitional access challenges. Graph 6 shows if respondents of Survey 2 have ever used the reporting mechanism of the Agreement.

3.4.Section 4: Promotion of the Agreement and potential improvements

In Section 4 respondents were asked if according to them the Agreement should be better promoted amongst transnational access users. Figure 4, Graph 1 shows that respondents almost unanimously believe the Agreement should be better promoted. The respondents of both surveys offered several ideas on how to promote the Agreement by respondents of both surveys (see Figure 4, Graph 2 and 3). The Agreement could be promoted at conferences by for example organising sessions on the Agreement. Other opportunities to promote the Agreement was to organise webinars, ensure that NPCs are more visible, disseminate the Agreement through relevant mail lists and highlight the Agreement during the application processes for grants and access.





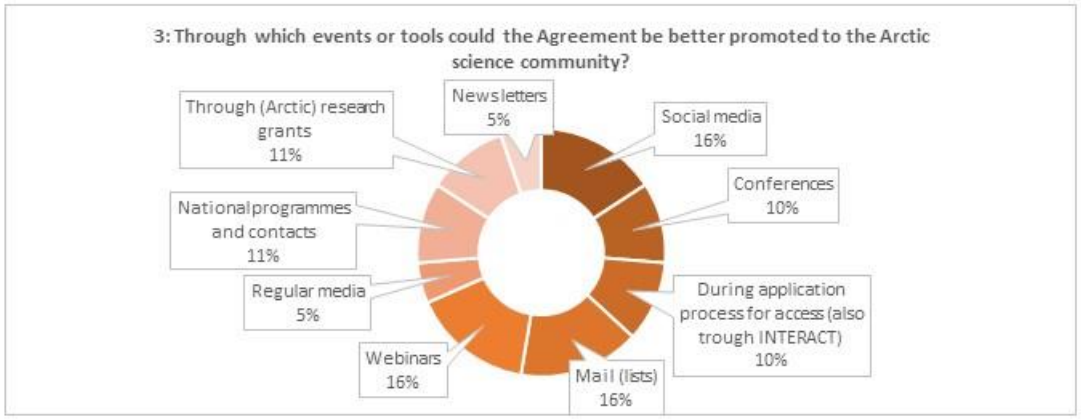


Figure 4: *Potential Improvements for Promotion of the Agreement*
Figure 4 indicates if respondents of Survey 1 and 2 think the Agreement should be better promoted (Graph 1) and if so, how the Agreement could be better promoted (Graph 2 from Survey 1, and Graph 3 from Survey 2).

3.5.Section 5: International Logistics and Data Sharing

To reach research sites, scientists and research staff often need to cross borders. Usually, they need to take equipment back and forth to research destinations, and send samples back to their research institutes. To successfully travel internationally with equipment and send samples back, visas and permits are often required when crossing borders. Section 5 shows the challenges and issues experienced by the respondents of Survey 1 and Survey 2 when conducting international travelling.

Respondents of both surveys state there may be challenges experienced with transnational access of staff, equipment, samples to and from research infrastructure (see Figure 5, graph 1, 2, 3 and 4). Respondents note that cross-border movement of people is mostly considered as a minor challenge compared to importing and exporting equipment and samples. Especially moving samples cross-border can be regarded as a challenge (see Figure 5, Graph 3).

In Survey 1 it was noted by respondents that especially taking equipment through customs can pose challenges (see Figure 5, Graph 5). Especially batteries may be regarded as suspicious, and cause delay in bringing and taking equipment to and from research destinations. Other challenges experiences according to respondents of Survey 1 were importing and exporting samples, COVID-19 travel restrictions and acquiring the right visas. Respondents of Survey 2 (see Figure 5, Graph 6) noted that national regulations of importing and exporting samples posed most issues, highlighting Russian, Italian, UK and EU regulations. Respondents also shared concerns regarding the costs of accessing infrastructure, which can be challenging (please see below). For more concerns indicated by respondents, see Annex II (for Survey 1) and Annex IV (for Survey IV).

Respondent in Survey 1:
'We have sent permitted samples out of the country which were not delivered as asked.'

Respondent in Survey 1:
'*Access to Russia and the Russian Arctic, import and export of equipment and instrumentation and sample export is often very difficult and requires undergoing a complex permission process that is often not transparent to foreign researchers. The success heavily depends on the engagement and experience of Russian partners who are responsible for providing all documents. Regulations often change and are sometimes hard to comply with.*'

Several respondents also note issues experienced due to Western sanctions on Russia:

Respondent in Survey 1:
'Sanctions against Russia have caused that we have no access to equipment.'

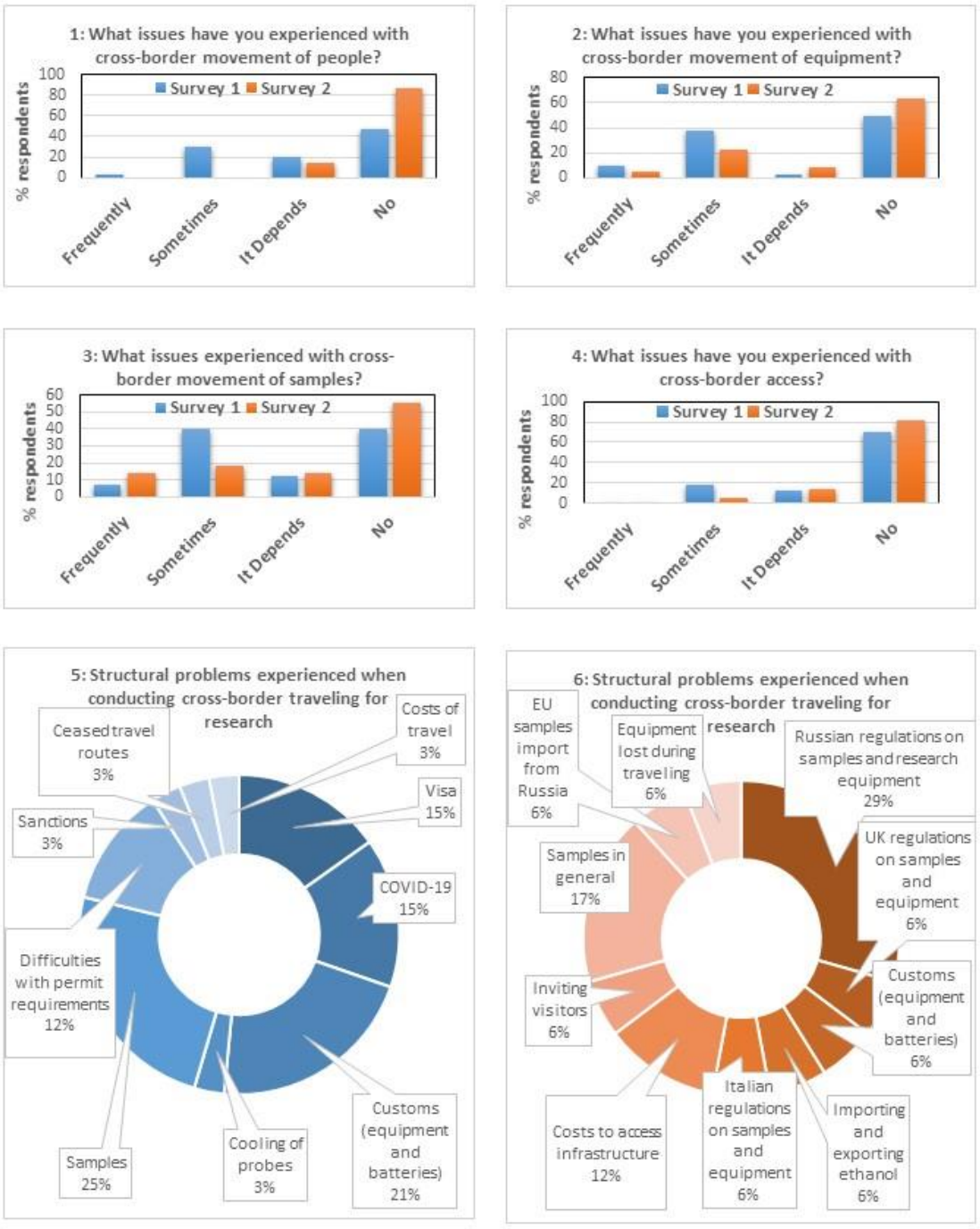


Figure 5: *International Logistics and Data Sharing*
Figure 5 shows bottlenecks and challenges experienced by respondents of Survey 1 and Survey 2 when travelling cross-border to- and from the Arctic region. Figure 5, Graph 1, 2, 3 and 5 show if respondents of both surveys experience issues when travelling cross-border regarding movement of people, equipment, samples and access to research facilities. Figure 5, Graph 5 shows structural problems experienced when travelling cross-border by respondents of Survey 1, while Figure 5, Graph 6 shows structural problems experienced when travelling cross-border by respondents of Survey 2.

3.6.Section 6: Knowledge about Required Permits

Finding the right permits to conduct scientific research in the Arctic can be a challenge. Each country has different requirements for permits, and sometimes the requirements are not per country, but vary from region to region and thus may differ within countries, such as Canada. The questions in Section 6 of the surveys are aiming to understand if scientists and transnational access users are able to find the right entries to apply for the proper permits needed for their research.

In Figure 6, Graph 1 respondents of both surveys note that they do not know if the Agreement has helped to reduce barriers, such as acquiring the right permits. Figure 6 shows that respondents of both surveys seem to have some knowledge of permits themselves (Figure 6, Graph 2), but are less certain that their colleagues have enough expertise to know which permits are needed for their research (Figure 6, Graph 3).

Respondents to Survey 1 and 2 note to use INTERACT extensively to identify the correct permits, while local research institutes and National Points of Contact are also used for the provision of information regarding scientific permits in the Arctic region (see Figure 6, Graph 5). To keep track of any changes in local regulations and the granting of permits, most respondents contact national and local authorities and follow the general news and search the internet (see Figure 6, Graph 6 and Graph 8).

Several respondents highlight the complexity of applying for permits in Canada due to the multiple levels of governance (national, international and Indigenous lands), which can pose a challenge for international scientists. According to a respondent, applying for permits ‘takes place at multiple levels (national, international, on Indigenous lands and on private lands)’. Other respondents noted the sanctions imposed on Russia cause challenges for international scientific cooperation.

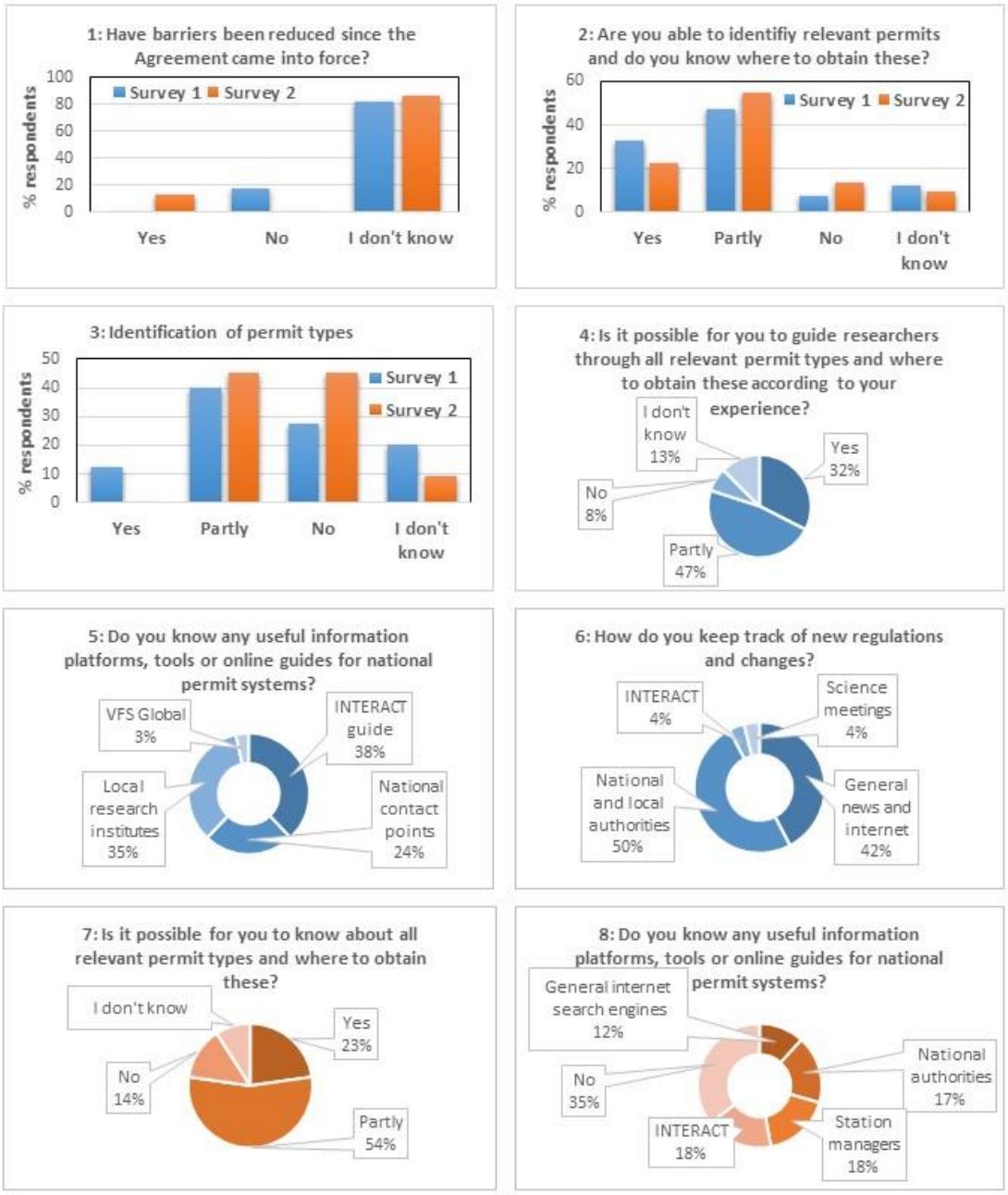


Figure 6: *Knowledge of Required Permits*
Figure 6 shows the knowledge of respondents of both surveys regarding required permits for Arctic research. The Agreement aims to reduce barriers in Arctic science and ease challenges of obtaining permits. Graph 1 shows if respondents believe the Agreement has reduced barriers. Graph 2 and 3 inquire the knowledge of respondents of Survey 1 and Survey 2. Graph 4, 5 and 6 show how respondents of Survey 1 assist other scientists and research station staff on how to find the right permits, where to find the right information and how to keep up-to-date with new regulations. Graph 7 and 8 show the knowledge of respondents of Survey 2 regarding permits and where to find the right information.

3.7.Section 7: Data Management and Shared Logistics at Research Facilities

Section 7 aims to understand if the Arctic research community has access to data from research stations to potentially further improve their own research and not duplicate efforts. To manage data and access to data, some research stations have a 'data management plan', which is an outline with regulations and rules on how to manage data at a particular research station. This could for example state who owns the data gathered at the research station (the scientist, or the station, or both) and any other matters that could be deemed sensitive. Figure 7.1, Graph 1 shows that of the respondents of Survey 1, over half of the respondents note that there are data management plans in place at their (visited) research stations. Respondents of Survey 2 note to not be aware if their research stations have or have not data management plans in place. Figure 7.1, Graph 2 shows that most respondents from both surveys note that their research stations provide open access to their data. Despite broad open access, in Figure 7.1, Graph 3 it is shown that sometimes scientists experience challenges when requesting relevant data.

Acknowledgement of Data and Access to Data
Figure 7.1, Graph 5 shows that respondents of Survey 1 mostly receive acknowledgement for provided data in publications (this may be acknowledgement to associated research stations).

INTERACT operates a data portal for free virtual access that shares data from INTERACT stations. According to the responses of Survey 2, more than half is aware of the portal (Figure 7.2, Graph 7), but most respondents have not used the portal yet (Figure 7.2, Graph 8). The respondents of Survey 1 indicate that most of their research stations provide free and open access to data collected by the station or associate researchers (Figure 7.1, Graph 4).

Respondents of both surveys were asked what they consider main issues in relation to facilitating access to scientific information and data. Figure 7.1, Graph 6 shows that the lack of standardisation of data is considered a prominent issue. Also the lack of free access to data, no access to data at research station sites and no clarity about who has ownership of data were repeatedly mentioned. Respondents of Survey 2 also noted the lack of standardising data, the issue of knowing where to find information about data, the availability of data, the question of who covers the costs for providing access, building long term relations and physical access.

Shared Logistics

Respondents of both surveys were asked what logistics are shared at their associated research stations. Table 1 and Table 2 show what percentage of research stations respondents work at share particular kinds of logistics, such as laboratory equipment, staff services and data. From these Tables, it is clear that heavy machinery is hardly shared, while safety equipment, laboratory equipment and staff services are more widely shared.

Table 1: Shared logitics at research stations, Survey 1

What kind of "shared logistics" was available at your research station? (Survey 1)	
Laboratory equipment	73%
Platforms for installing instrumentation/sensors	63%
Safety equipment	70%
IT infrastructure	68%
Chemicals	48%
Staff services	83%
Vessels/Vehicles for local transport	73%
Field equipment	70%
Data	60%
Storage facilities	70%
Heavy machinery	3%

Table 2: Shared logistics at research stations, Survey 2

What kind of "shared logistics" was available for your research station? (Survey 2)	
Laboratory equipment	50%
Safety equipment	68%
IT infrastructure	55%
Vessels / vehicles for transport	36%
Data	36%
Chemicals	36%
Staff services	50%
Field equipment	68%
Storage facilities	27%
Platform for installing sensors	23%
Staff services	50%
Heavy machinery	0%

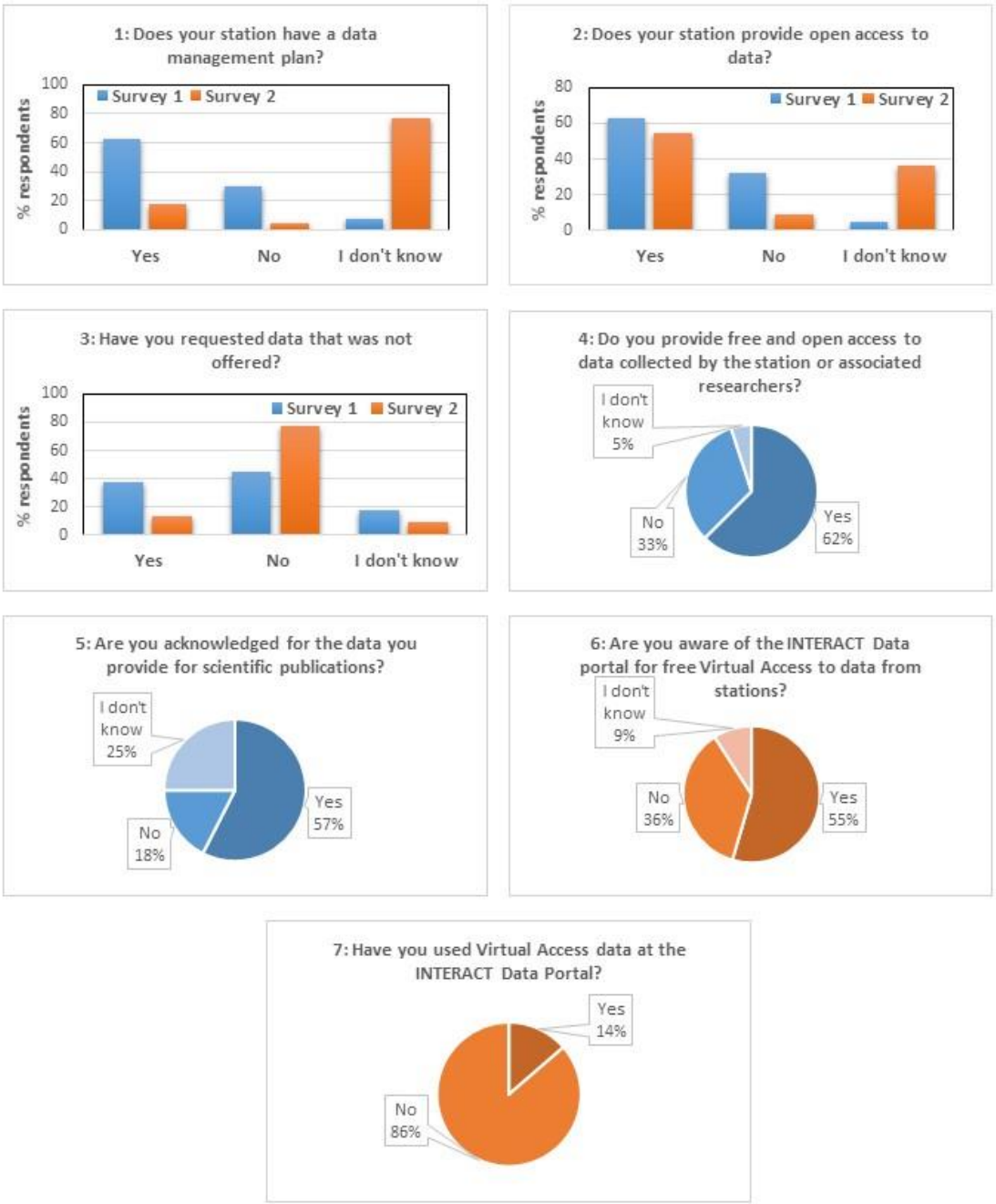
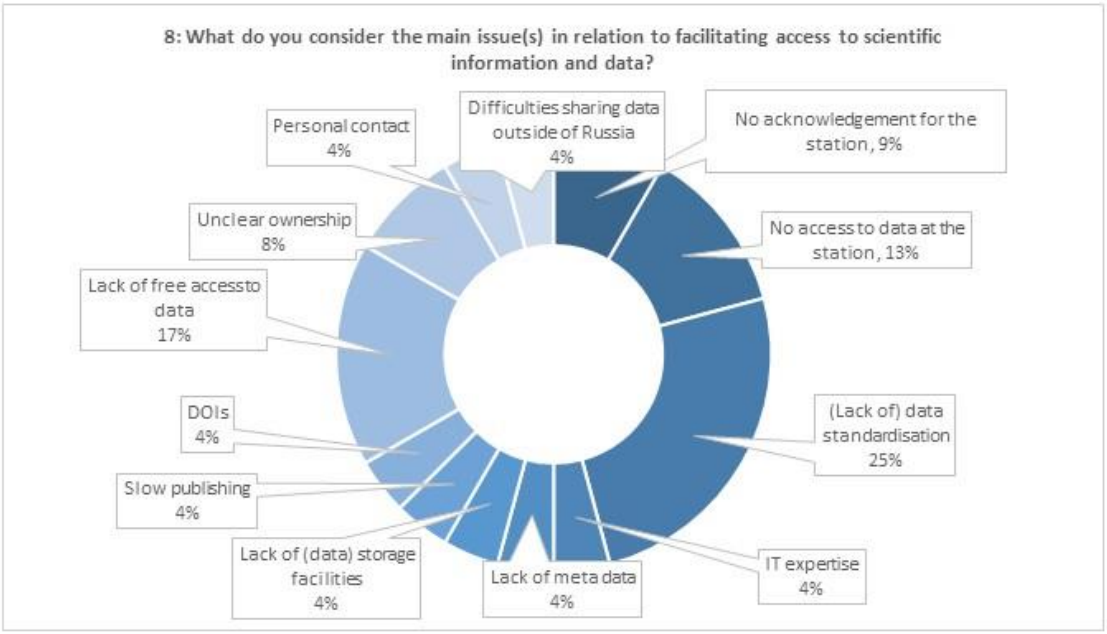


***Figure 7.1**: Data Management of Research Stations and Associated Researchers*

Figure 7.1 shows information if research stations use data management plans and how the sharing of data is organised. Graph 1 shows from respondents of both surveys if their associated research stations have a data management plan. Graph 2 shows from respondents of both surveys if their associated research stations provide open access to data and Graph 3 shows if respondents of both surveys have access to requested data when visiting research stations. Graph 4 shows if respondents of Survey 1 provide open access to the data from their associated stations and researchers and Graph 5 shows if respondents from Survey 1 who provide data are acknowledged for providing data. Graph 6 and 7 show knowledge of and usage by respondents of Survey 2 regarding the INTERACT Data portal.



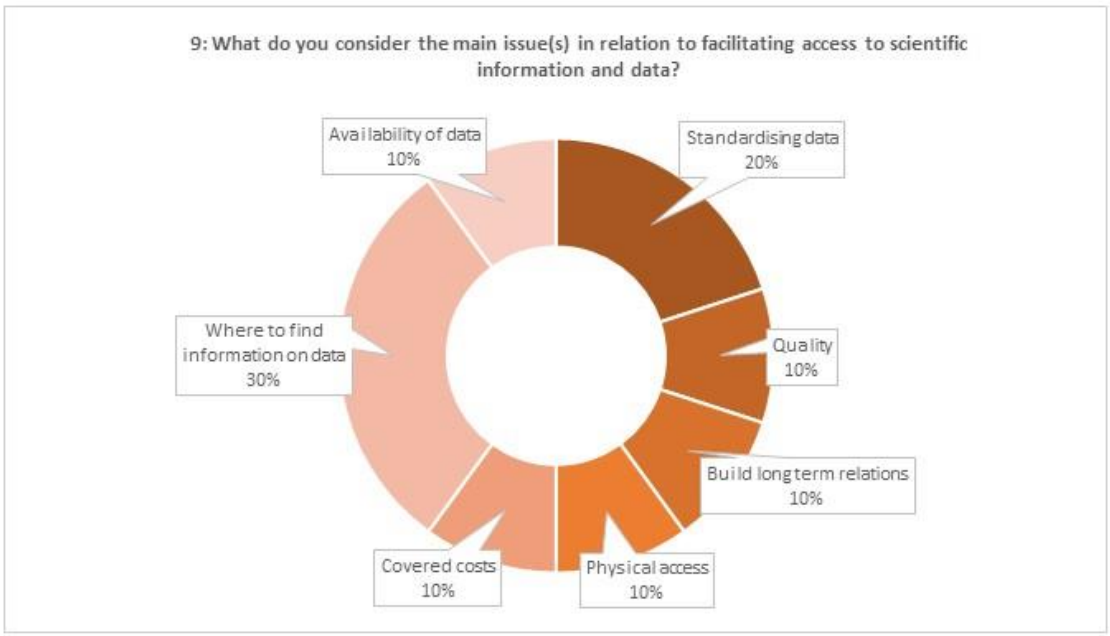


Figure 7.2: *Data Management of Research Stations and Associated Researchers*
Figure 7.2 shows in Graph 8 (respondents of Survey 1) and Graph 9 (respondents of Survey 2) what the main issues are considered by respondents of both surveys regarding facilitating access to scientific information and data.

3.8.Section 8: Preparedness of Visitors at Research Stations and Inclusiveness of ECRs, Indigenous communities and local communities

The following paragraph will discuss the preparation of visitors to research stations scientifically, logistically and culturally, how research stations include local and Indigenous communities in their direct surroundings and provide educational opportunities to students.

When respondents of both surveys visit research stations they indicate to be scientifically prepared (Figure 8.1, Graph 1). While respondents of Survey 1 note to only feel partially prepared logistically when they travel to research stations (Figure 8.1, Graph 2), respondents of Survey 2 note to be fully prepared logistically when traveling to research stations (Figure 8.1, Graph 2). When visiting research stations, the majority of respondents Survey 1 indicate to be partially culturally prepared (Figure 8.1, Graph 3), while the majority of respondents of Survey 2 note to be fully prepared culturally when visiting research stations (Figure 8.1, Graph 3). In both surveys it is noted that there are opportunities to work with local and Indigenous communities, though the respondents of Survey 1 state to provide these opportunities more often than respondents of Survey 2 (Figure 8.1, Graph 4). Almost all respondents of Survey 1 note that they provide opportunities for students and Early Career Researchers (ECRs). Of the respondents of Survey 2, half note to provide opportunities for students and ECRs.

Working with local and Indigenous communities

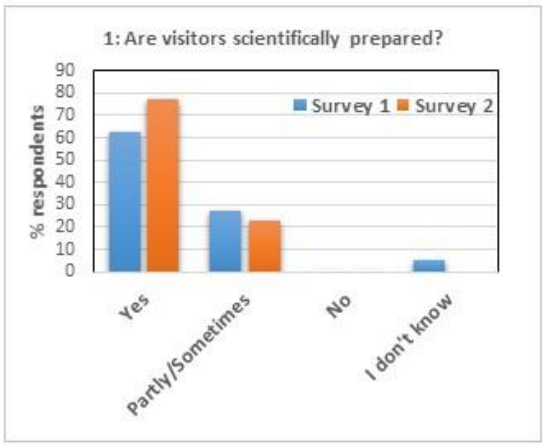
Local and Indigenous knowledge is often very specific for a particular region with deep knowledge of the local environment and its dynamics. In case there is an aim from both the local and Indigenous communities and scientists, scientists may include (with informed consent) local and Indigenous knowledge in their research. Research stations close to local and Indigenous communities may attempt to work with these communities by either offering employment, sharing of knowledge and data or by providing services to local and Indigenous communities (such as WiFi). In Figure 8.2, Graph 6, most respondents of Survey 1 note to have frequent contact with local and Indigenous peoples, have local staff members and engage local and Indigenous peoples in their research projects. Less often, respondents note to provide services of the station to locals, or have cooperation with local universities.

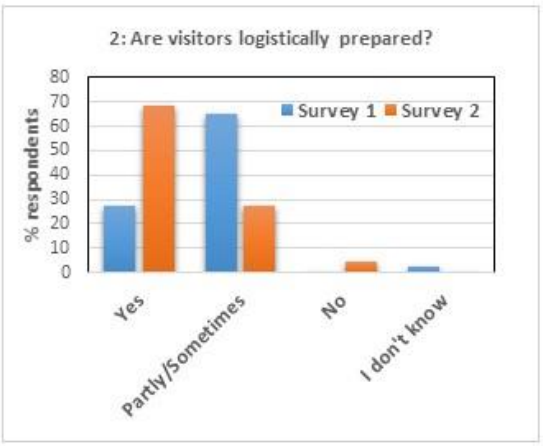
Working with and providing opportunities for early career scientists and youth

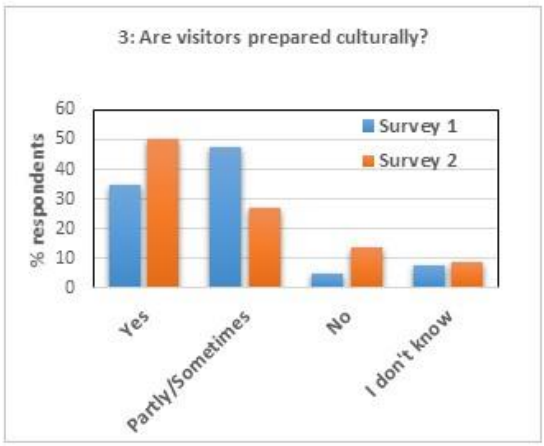
There are several manners respondents note to engage early career scientists with their stations. The most noted one in Survey 1 is to involve early career scientists in fieldwork (see Figure 8.2, Graph 7), provide education on site and assist early career scientists with their BA/MA or PhDs. Some stations offer internships and several provide datasets that researchers have collected operating from their research stations.

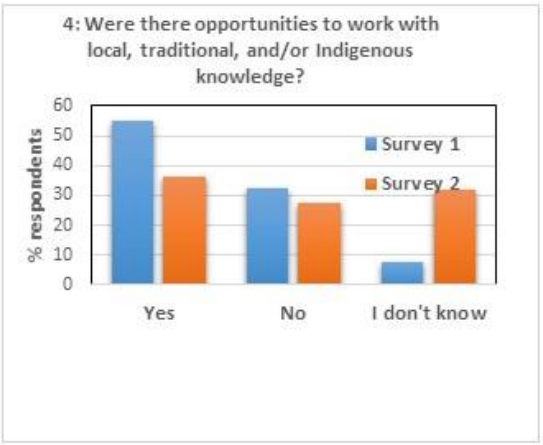
Improving international scientific cooperation

Respondents of both surveys were asked which three things they would wish to see improve to promote more international scientific collaboration. Many respondents in both surveys indicated that funding for international access is still challenging, and they wish this would be improved (see Figure 8.2, Graph 8 and Graph 9). Other often mentioned topics that may be improved to promote more scientific international collaboration were: data standardisation, and sharing and more collaboration between research stations in general. It was also noted that better access for staff, equipment and samples would improve international scientific collaboration. There was also a wish to have more advanced digital infrastructures, such as online meeting spaces and other digital collaboration tools.









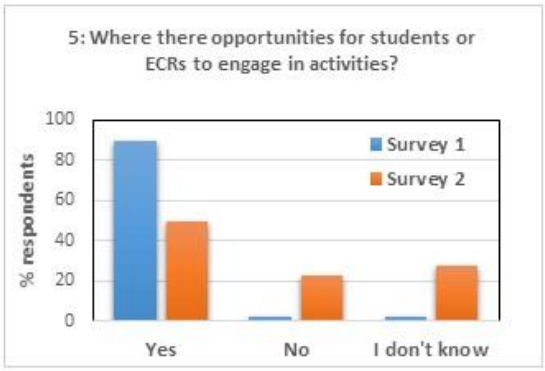


Figure 8.1: *Preparedness of Visitors at Research Stations and Inclusiveness of ECRs, Indigenous and Local Communities*

Graph 1, 2 and 3 of Figure 8.1 show the scientific, logistical and cultural preparedness of visitors according to respondents of both surveys. Graph 4 shows the opportunities to work with local, traditional and Indigenous Knowledge at associated research stations of respondents of both surveys, and Graph 5 show if there are opportunities for students and ECRs to engage in activities of associated research stations of respondents of both surveys.

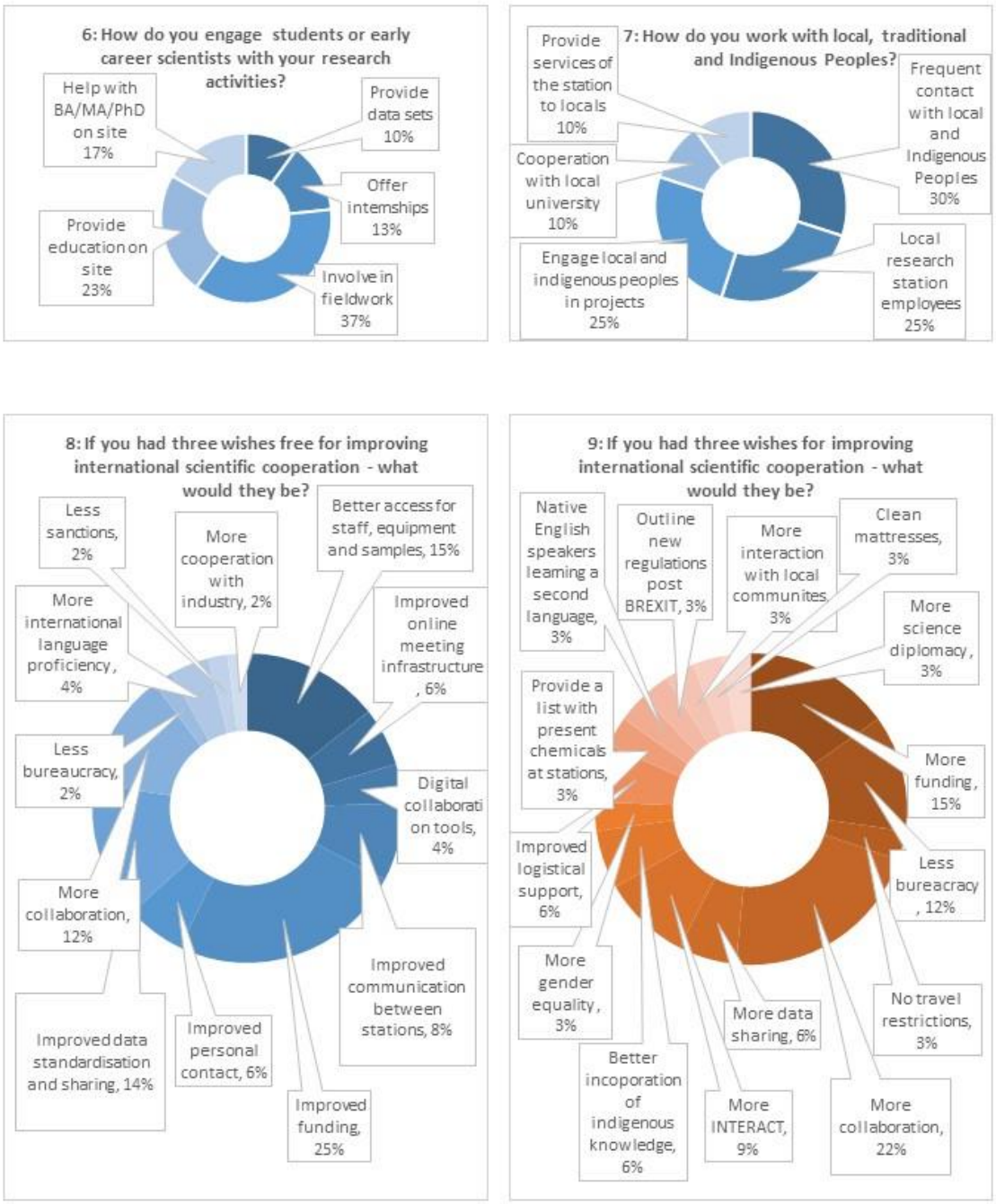


Figure 8.2: *Preparedness of Visitors at Research Stations and Inclusiveness of ECRs, Indigenous and Local Communities*

Graph 6 and 7 of Figure 8.2 show how associated research stations of respondents of Survey 1 engage with students and ECRs (Graph 6) and local, traditional and Indigenous Peoples (Graph 7). Graph 8 (Survey 1) and Graph 9 (Survey 2) show wishes of respondents to improve international scientific cooperation.

4. General Recommendations

General recommendations on identified bottlenecks challenging international Arctic scientific cooperation, based on data from two surveys conducted amongst international Arctic researchers, research station managers and staff and representatives of research institutes active in the Arctic region:

- **Promotion of the Agreement:** The Agreement was designed to improve international Arctic scientific cooperation with lowering barriers for transnational science. Results from the surveys show that many transnational access users, who are the target group of the Agreement, were not aware of the Agreement. It was suggested the Agreement could be proactively disseminated at relevant science conferences, through national authorities, provided to Arctic research stations and included in funding proposals to reach the Arctic scientific community. If the target group for the Agreement is more aware of its existence, this may help lowering existing barriers for international Arctic scientific cooperation.
- **Improved awareness of National Points of Contact (NPCs):** In each Arctic country, there is a National Point of Contact (NPC) that can be contacted in case any problems or general questions arise when using the Agreement during transnational traveling. These NPCs may be able to assist in lowering any barriers in international Arctic scientific cooperation. To improve visibility of NPCs, it would be useful if NPCs are listed at relevant websites (such as websites used for applying for permits) or make relevant NPC contact details available at sites such as research stations. This would enable them to serve as more effective interlocutors between scientists and national authorities and infrastructure managers.
- **Improving importing and exporting of samples internationally:** Respondents of both surveys have identified that exporting samples internationally causes challenges. The multitude of regulations per country makes it difficult for scientists to identify the correct measures that need to be taken for them to successfully conduct their importing and exporting of samples. A recommendation would be to either provide a very clear framework that includes all sample-regulations per country as a starting point for scientists, or to attempt to homogenise sample-regulations in the Arctic countries multilaterally.
- **Data standardisation:** Respondents have identified that the lack of standardised data at research stations causes challenges for international scientific collaboration. A recommendation would be to continue the effort (including the providing of necessary resources) to stock-take current data policies in research stations, and attempt to standardise data in the future.
- **Improved awareness and visibility of existing public available information platforms:** respondents in both surveys indicate to not always be certain about which permits are required in what region. A minority notes to use INTERACT resources to identify which permits are required for their research. A recommendation to improve awareness to identify the right permits for researchers active in the Arctic region, promotion of the INTERACT page on 'Permits and Regulations for Arctic Fieldwork' may be an option, as it lists per country and region information about applying for permits to conduct fieldwork in the Arctic region.

- **Online networks:** respondents of both surveys indicated international scientific collaboration would be improved when online networks would advance further, such as more access to online meeting rooms and access to other improved online tools to maintain and operate international scientific networks.

5. Discussion

Both surveys point at several bottlenecks experienced by transnational access users of the Arctic scientific community. Results can be divided into five main topics for discussion: knowledge and use of the Agreement, continued challenges that the Agreement is meant to ameliorate and other practical bottlenecks experienced by the international Arctic scientific community when using transnational access.

5.1. Knowledge of the Agreement and obstacles in implementation of the Agreement

The Agreement was signed with the aim to promote international scientific collaboration in the Arctic region by aiming to ease several issues experienced by transnational access users. The Agreement is agreed upon by the highest-level forum for dialogue in the Arctic. Despite the high level of the Agreement, the results of the two surveys this paper is based on show that the majority of respondents have limited knowledge of the Agreement, and many have no significant knowledge at all (see Figure 2). The surveys point out that respondents (mostly) do not know if the Agreement is efficient (see Figure 2), as most of them were unaware of the Agreement prior to filling in the surveys. Between Survey 1 and Survey 2 there is hardly any difference regarding the knowledge and awareness of the Agreement amongst respondents of Survey 1 and Survey 2.

A potential reason for the high degree of unawareness about the Agreement might be that shortly after the ratification of the Agreement, the COVID-19 pandemic caused heavy restrictions on any transnational travelling. Due to very limited travelling opportunities and many research institutions focussing on how to continue core-tasks despite the implications of the COVID-19 pandemic, promoting and using the Agreement could be presumed to have been temporarily less prioritised.

Following the COVID-19 pandemic, another major global crisis developed. The Arctic Council's operations were 'paused' in March 2022 due to the Russian invasion of Ukraine. All work of the Arctic Council was put on hold, including any potential promotion of the Agreement. During this pause, many countries (EU-countries, Canada and the United States) prohibited working with any individuals or institutions associated with the Russian government. This severely limited international scientific cooperation with Russia, and access to the Russian Arctic.

The Agreement is an internationally binding treaty from its entry into force on 23 May 2018, encouraging all Arctic Council member states to strive towards its goals. However, sanctions implemented by most participating national governments have temporarily put the Agreement in abeyance with respect to cooperation with Russia.

In case of the continuation of implementing the Agreement, respondents note that more active promotion would be useful. They note (see Figure 4) that the Agreement could be promoted by informing relevant research stations of its existence and contents, so the stations can inform potential visitors of the Agreement. Other options for the promotion of the Agreement that were mentioned in both surveys is to promote the Agreement at relevant conferences and science meetings and ensure scientific funding agencies are aware of the Agreement, so they can inform applications during funding procedures of the Agreement.

5.2. Practical challenges and issues experienced with international access to Arctic research sites

Respondents were asked if they experienced challenges regarding international access of persons, samples, research equipment and reaching research infrastructures. In both surveys, respondents had mixed views on these potential challenges. International access of persons seemed to be regarded as the least problematic – however, in some cases issues were still experienced (see Figure 5). Importing and exporting samples was considered the largest problem, as many respondents indicated that they experienced difficulties either frequently or sometimes. In both surveys, they shared experiences of, for example, samples that were lost or samples that had to be stored for over a year in the local research station before the sample could be exported.

Article 4 of the Agreement states that: 'Each Party shall use its best efforts to facilitate entry to, and exit from, its territory of persons, research platforms, material, samples, data, and equipment of the Participants as needed to advance the objectives of this Agreement.' If the Agreement is upheld in the future and promoted sufficiently, it should also ease the importing and exporting of samples, which is identified in this paper as one of the most prominent bottlenecks of international scientific-related travelling within the Arctic region.

5.3. Knowledge about scientific permit systems

The procedures to apply for permits vary depending on the country and region in which researchers and scientific staff operate. Respondents indicate that it can be challenging to understand which permits are needed to conduct research. Respondents in both surveys note that less than half are confident in finding their way through procedures to apply for and obtain permits. Consequently, most respondents are not comfortable with explaining to other potential transnational access users how permit systems work.

Respondents noted that the INTERACT guide on permit systems is a tool often used to identify which permits need to be applied for, and how to apply for them. Other tools they use are National Contact Points and local research institutes. To be informed about any changes in regulations or local rules regarding their work, respondents noted either following the general local news or reaching out to local institutes. To improve the understanding of where (and how) to apply for permits, more promotion of the initiative of INTERACT to explain what permits are needed in which regions on their 'Permits and Regulations for Arctic Fieldwork' page may be beneficial, as respondents note to not always be aware of this initiative (see Figure 6).

5.4. Shared Logistics at Research Facilities

Based on the data of Survey 1, there are several bottlenecks that can be identified regarding international access for the Arctic science in terms of travel, obtaining permits, importing and exporting samples internationally and sharing data. Other significant issues are international sanctions, visas and costs of accessing research facilities. Travel to and from especially seems to pose challenges, both in costs, permits and visas. Please note that this was prior to geo-political changes that have driven stronger polarisation between Russia and Europe, the United States, and Canada.

Respondents of Survey 1 indicate that more of their associated research stations have data management plans and provide more open access to data than respondents of Survey 2. From the data gathered from Survey 1 and Survey 2 it is not clear why there is a discrepancy between Survey 1 and Survey 2.

5.5. Improving International Scientific Cooperation

Respondents of both surveys were asked which three things they would like to be improved to promote more international scientific collaboration. Many respondents in both surveys noted that funding for international access is still challenging, and they wish this would be improved (see Figure 8, Graph 8 and Graph 9). Another often mentioned topic was improved data standardisation to ease international data sharing efforts. Respondents noted that general international collaboration between research stations would be favourable to improve international Arctic science. It was also noted that better access for staff, equipment and samples would improve international scientific collaboration.

6. Conclusion

The need for the Agreement is described by the respondents when identifying bottlenecks for international Arctic scientific cooperation. The Agreement focusses on promoting international collaboration by facilitating better international access, regarding persons, data, samples and equipment. To a certain extent, all of the latter mentioned topics are regarded as bottlenecks according to respondents of both surveys, with the importing and exporting of samples being the most severe issue.

The Agreement has been subject to unforeseen global occurrences, such as the COVID-19 pandemic and the war of Russia on Ukraine, halting scientific cooperation between Russia and other Arctic countries. The surveys used for this paper point out that the target group of the Agreement (the international Arctic scientific community) was largely unaware of the existence of the Agreement, or if there was awareness, a lack of depth of knowledge about the Agreement. This may be caused due to national travel restrictions during the COVID-19 pandemic that superseded the Agreement

and later due to the lack of promotion of the Agreement when travel restrictions ceded due to the pause of the work of the Arctic Council.

Respondents of both surveys note that active promotion of the Agreement would create more awareness in the international Arctic science community and potentially increase the use of the Agreement by transnational access users. Promotion at relevant platforms, conferences and research stations could increase the awareness of the Agreement, and improved visibility of NPCs may help its implementation.

Less than half respondents indicate to use the tools and services INTERACT has designed (see Figure 6) and operates when for international scientific collaboration. A continued effort of providing access to data from the INTERACT research stations (virtual access) and more promotion of tools and information-pages such as the page on 'Permits and Regulations for Arctic Fieldwork' may result in improved knowledge amongst the Arctic scientific research community on where to apply for required permits.

In general, more proactive and targeted promotion at relevant events, websites and institutes of existing Agreements, tools and sites to gather information may improve international collaboration in Arctic science.

APPENDICES

Appendix I: Questions survey 1

Survey on Barriers in Arctic Science

Dear participant,

Thank you for your time and interest in this survey!

ABOUT THIS SURVEY

On 11 May 2017, the eight arctic countries signed the "Agreement on Enhancing International Arctic Scientific Cooperation" ("Arctic Science Agreement") in Fairbanks, Alaska (available at: https://oaarchive.arctic-council.org/handle/11374/1916).
The agreement aims at facilitating better access for researchers to the Arctic areas of the eight Arctic Council member states, including (i) entry/exit of persons, (ii) import/export of equipment and materials/samples, (iii) access to research infrastructures and facilities and (iv) access to data.

The agreement also calls for the parties to promote education, career development and training opportunities, and encourages activities associated with traditional and local knowledge.

With this survey, we want to identify bottlenecks and challenges for the free mobility of scientists and their equipment/samples based on the perspectives of Transnational Access Users (TA Users). In particular, we want to assess to what extent the "Arctic Science Agreement" has benefitted your daily work.

The questions are structured in five different sections, each dealing with different aspects in relation to the agreement. To answer the questions, you will need approximately 20 minutes.

BACKGROUND

This survey has been developed by APECS (Association of Polar Early Career Scientists) in collaboration with INTERACT (International Network for Terrestrial Research and Monitoring in the Arctic) and EPB (European Polar Board). Anonymous results of the survey will be communicated to the EPB and compiled into a report to be communicated to the Arctic Council.

****
Should you have any questions please do not hesitate to contact Svenja Holste (APECS) at svenja.holste@apecs.is

* Indicates required question

2. What station did you visit?

Mark only one oval.

- Abisko Scientific Research Station
- Adam Mickiewicz University Polar Station "Petuniabukta"
- Adygine Research Station
- Aktru Research Station
- Alpine Research and Education Station Furka
- Arctic DTU Research Station
- Arctic Station
- Avachinsky Volcano Field Station
- AWIPEV Arctic Research Base
- Barrow Arctic Research Center/Environmental Observatory
- Beliy Island Research Station
- Canadian High Arctic Research Station CHARS
- CEN Boniface River Field Station
- CEN Bylot Island Field Station
- CEN Clearwater Lake Research Station
- CEN Kangiqsualujjuaq Sukuijarvik
- CEN Radisson Ecological Research Station
- CEN Salluit Research Station
- CEN Umiujaq Research Station
- CEN Ward Hunt Island Research Station
- CEN Whapmagoostui-Kuujjuarapik Research Station
- China Iceland Arctic Research Observatory
- Chokurdakh Scientific Tundra Station
- Churchill Northern Studies Centre
- CNR Arctic Station "Dirigibile Italia"
- Czech Arctic Research Station
- ECN Cairngorms
- EGRIP Field Station

- [ ] Flashline Mars Arctic Research Station
- [ ] Greenland Institute of Natural Resources
- [ ] Hyytiälä Forestry Research Station
- [ ] Igarka Geocryology Laboratory
- [ ] Igloolik Research Center
- [ ] International Ecological Educational Center "Istomino"
- [ ] Kainuu Fisheries Research Station
- [ ] Kajbasovo Research Station
- [ ] Karkonosze National Park
- [ ] Kevo Subarctic Research Station
- [ ] Khanymey Research Station
- [ ] Khibiny Educational and Scientific Station
- [ ] Kilpisjärvi Biological Station
- [ ] Kluane Lake Research Station
- [ ] Kolari Field Site
- [ ] Krkonoše Mountains National Park
- [ ] Labrador Institute Research Station
- [ ] Lammin-Suo Peatland Station
- [ ] Litla-Skard
- [ ] M'Clintock Channel Polar Research Cabins
- [ ] M&M Klapa Research Station
- [ ] Meinypil'gyno Community Based Biological Station
- [ ] Mukhrino Field Station
- [ ] Netherlands' Arctic Station
- [ ] NIBIO Svanhovd Research Station
- [ ] Nicolaus Copernicus University Polar Station
- [ ] North-East Science Station
- [ ] Numto Park Station
- [ ] Nunavut Research Institute
- [ ] NPI Sverdrup Ny-Ålesund Research Station
- [ ] Orotuk Field Station

- [ ] Polish Polar Station Hornsund
- [ ] Research Station Samoylov Island
- [ ] Rif Field Station
- [ ] Sermilik Research Station
- [ ] Skálanes Nature and Heritage Center
- [ ] Sonnblick Observatory
- [ ] Spasskaya Pad Scientific Forest Station
- [ ] Stanisław Baranowski University of Wrocław Polar Station
- [ ] Station Hintereis
- [ ] Sudurnes Science and Learning Center
- [ ] Summit Station
- [ ] Svartberget Research Station
- [ ] Tarfala Research Station
- [ ] The Arctic Research Station (Former Labytnangi Ecological Research Station)
- [ ] The DMI Geophysical Observatory Qaanaaq
- [ ] Toolik Field Station
- [ ] Uapishka Research Station
- [ ] UK Arctic Research Station
- [ ] Värriö Subarctic Research Station
- [ ] Villum Research Station
- [ ] Western Arctic Research Centre
- [ ] Willem Barentz Biological Station
- [ ] Zackenberg Research Station

3. Which modality of access did you utilize? *

Mark only one oval.

- [ ] Physical transnational access
- [ ] Remote access
- [ ] Virtual access
- [ ] A combination of the above

4. When did you visit the station? Please provide the YEAR.

_____

1. Your knowledge about the Agreement on Enhancing International Arctic Scientific Cooperation

5. (1) How would you describe your level of knowledge about the "Arctic Science Agreement"? *

Mark only one oval.

I have never heard of it

1 ◯
2 ◯
3 ◯
4 ◯
5 ◯

I know every detail about it

6. (2) Have you ever referred to the "Arctic Science Agreement" to a permitting authority? (E.g. when applying for entry, import/export of research equipment and samples) *

Mark only one oval.

◯ Yes
◯ No
◯ I don't know

7. (2a) If the answer to above question is YES: Has the reference to the "Arctic Science Agreement" changed the position of the permitting authority/official?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

8. (2b) If wanted, please specify your answer below.

_____

_____

_____

_____

_____

9. (3a) The "Arctic Science Agreement" foresees a mechanism for reporting difficulties with international access for scientific research in the Arctic countries. The reported difficulties are discussed at the annual meetings of the 'Competent National Authorities' (CNAs). Is there a national contact point or a 'Competent National Authority' in the country you are working in? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

10. (3b) Please answer the below questions in relation to the reporting mechanism of the 'Arctic Science Agreement'. *

Mark only one oval per row.

	Yes	No	I don't know
Are you aware of this reporting mechanism?	◯	◯	◯
After submitting a report on experienced barriers, would you like to be further engaged in follow-up actions?	◯	◯	◯
Do you think this reporting mechanism is sufficient to solve problems with international access?	◯	◯	◯
Have you ever used this reporting mechanism?	◯	◯	◯

11. (4) Do you think the "Arctic Science Agreement" should be better promoted to the science community and infrastructure operators? *

Mark only one oval.

- ◯ Yes
- ◯ No

12. (4a) If answer above is YES: How should the "Arctic Science Agreement" be better promoted?

13. (4b) If answer above is NO: Where have you heard about the "Arctic Science Agreement"?

2. Legal barriers to Arctic Science - Transboundary access

14. (1) Have you ever experienced problems regarding cross-border travels/transport? *

Mark only one oval per row.

	Yes, frequently	Yes, sometimes	It depends	No
Problems with entry and exit of persons	◯	◯	◯	◯
Problems with import/export of equipment	◯	◯	◯	◯
Problems with import/export of samples	◯	◯	◯	◯
Problems with access to research infrastructure	◯	◯	◯	◯

15. (1a) Please describe the structural problem for each of the four questions you have answered with YES (see above)

16. (1b) If answered YES to above questions: Has the problem been reported to your 'Competent National Authority' (CNA)?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ There is no CNA in my country
- ◯ I don't know

17. (1c) If wanted, please specify your answer and provide more details below.

_____

_____

_____

_____

_____

18. (2) Speaking from your daily experience and your perception of international cooperation in Arctic Science: Have barriers been reduced since the ratification of the "Arctic Science Agreement" in 2018? *

Mark only one oval.

- ◯ Yes
- ◯ Sometimes
- ◯ No
- ◯ I don't know

3. Legal barriers to Arctic Science - National permit systems and environmental legislation

19. (1) Your access to knowledge on relevant permits and regulations: Is it possible for you to know about all relevant permit types and where to obtain these? *

Mark only one oval.

- ◯ Yes
- ◯ Partly
- ◯ No
- ◯ I don't know
- ◯ Other: _____

20. (2) In your experience, can scientists identify all relevant permit types themselves? *

Mark only one oval.

- ◯ Yes
- ◯ Partly
- ◯ No
- ◯ I don't know
- ◯ Other: _____

21. (3) Do you know any useful information platforms, tools or online guides for national permit systems?

_____

_____

_____

_____

_____

4. Researcher and operator's barriers: Data Management and logistics

22. (1) Lack of access to laboratory facilities, workshops or scientific instruments can be a barrier (logistically and financially) for some research projects. What kind of "shared logistics" was available for your research at the visited station? (Multiple answers possible)

Tick all that apply.

- [ ] Laboratory equipment
- [ ] Platforms for installing instrumentation/sensors (e.g. masts, buoys, drones)
- [ ] Safety equipment
- [ ] IT Infrastructure
- [ ] Chemicals
- [ ] Staff services (e.g. drone operation, field assistance, mechanics)
- [ ] Field equipment
- [ ] Vessels/Vehicles for local transport
- [ ] Data
- [ ] Storage facilities
- [ ] Other: _____

23. (1a) What could be improved regarding "shared logistics"?

_____

_____

_____

_____

_____

24. (2) Data management/Data Policy at the visited research station

Mark only one oval per row.

	Yes	No	I don't know
Did the station have a Data Management Plan?	◯	◯	◯
Did the station have a policy for you as visiting researchers to provide free and open access to data collected at the station?	◯	◯	◯
Have you requested access to data that the station did not offer?	◯	◯	◯
Are you aware of the INTERACT Data portal for free Virtual Access to data from stations?	◯	◯	◯
Have you used Virtual Access data at the	◯	◯	◯

25. (3) What do you consider the main issue(s) in relation to facilitating access to scientific information and data?

5. Additional aspects to improve scientific cooperation in the Arctic

Last section - nearly done!

26. (1) How would you assess your level of preparedness as a visiting researcher at the station?

Mark only one oval per row.

	Yes	Partly	No	I don't know
Were you adequately prepared scientifically?	◯	◯	◯	◯
Were you adequately prepared logistically?	◯	◯	◯	◯
Were you adequately prepared culturally?	◯	◯	◯	◯

27. (2) Bridging knowledge systems: Were there opportunities to work with local, traditional and Indigenous knowledge at the visited station?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

28. (2a) If answered above with YES, please provide more details.

29. (3) Education, career development and training opportunities: Were there opportunities for students or early career scientists to engage in research activities at the visited station?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

30. (3a) If answered above with YES, please provide more details.

31. (4) If you had three wishes for improving international scientific cooperation - what would they be? *

32. (5) If you want to express further opinions, experiences or questions, please use the space below.

Thank you for your participation!

33. You are invited to leave your contact details and/or last comments you would like to make. By providing your contacts, you agree to get contacted in case APECS, EPB or INTERACT has questions.

Appendix II: Answers to Survey 2

Country where representatives of research stations are based. (Corresponds with Figure 1, Graph 1)	
Sweden	5%
Canada	5%
Austria	8%
Greenland	8%
Svalbard	18%
Canada	10%
UK	3%
Poland	3%
Iceland	8%
Faroe Islands	5%
Finland	8%
No station mentioned	8%
Russia	10%
Norway	3%
Czech Republic	3%

What is your current position? (Corresponds with Figure 1, Graph 2)	
Technical staff/Logistics	10%
Station manager	50%
Educator co-coordinator	3%
Management/administration	13%
Scientific staff	23%
Director	3%

How would you describe your level of knowledge about the "Arctic Science Agreement? (Corresponds with Figure 2, Graph 1)	
I have never heard of the Agreement	30%
I have heard about the Agreement but do not know much about it	28%
I have heard of the Agreement and know a little about it	33%
I know about the contents of the Agreement	8%
I know every detail about the Agreement	3%

Your involvement in the process: Have you or your institution contributed to the development and/or implementation of the "Arctic Science Agreement"? (Corresponds with Figure 2, Graph 2)	
I don't know	30%
Yes	13%

No	58%

The "Arctic Science Agreement" provides a list of national authorities and contact points. [Do you know who your national point of contact is? (Corresponds with Figure 2, Graph 3)	
Yes	28%
No	73%

The "Arctic Science Agreement" provides a list of national authorities and contact points. [Have you ever been in contact with your national point of contact? (Corresponds with Figure 2, Graph 4)	
Yes	25%
No	75%

The "Arctic Science Agreement" provides a list of national authorities and contact points. Spend two minutes on the internet - are you able to find your national point of contact? (Corresponds with Figure 2, Graph 5)	
Yes	55%
No	45%

As part of the implementation process, the Terms of References established a mechanism for reporting difficulties with international access for scientific research in the arctic countries. The reported difficulties are discussed at the annual meetings of the 'Competent National Authorities' (CNAs). [Are you aware of this reporting mechanism? (Corresponds with Figure 3, Graph 1)	
Yes	13%
No	83%
I don't know	5%

As part of the implementation process, the Terms of References established a mechanism for reporting difficulties with international access for scientific research in the arctic countries. The reported difficulties are discussed at the annual meetings of the 'Competent National Authorities' (CNAs). After submitting a report on experienced barriers, would you like to be further engaged in follow-up actions? (Corresponds with Figure 3, Graph 2)	
Yes	65%
No	13%
I don’t know	23%

As part of the implementation process, the Terms of References established a mechanism for reporting difficulties with international access for scientific research in the arctic countries. The reported difficulties are discussed at the annual meetings of the 'Competent National Authorities' (CNAs). [Do you think this reporting mechanism is sufficient to solve problems with international access? (Corresponds with Figure 3, Graph 3)	
Yes	8%
No	25%
I don't know	68%

As part of the implementation process, the Terms of References established a mechanism for reporting difficulties with international access for scientific research in the arctic countries. The reported difficulties are discussed at the annual meetings of the 'Competent National Authorities' (CNAs). [Have you ever guided researchers through the reporting mechanism? (Corresponds with Figure 3, Graph 4)	
Yes	3%
No	95%
I don't know	3%

As part of the implementation process, the Terms of References established a mechanism for reporting difficulties with international access for scientific research in the arctic countries. The reported difficulties are discussed at the annual meetings of the 'Competent National Authorities' (CNAs). [Do you have your own reporting/feedback mechanism at your station? (Corresponds with Figure 3, Graph 5)	
Yes	33%
No	63%
I don't know	5%

Do you think the "Arctic Science Agreement" should be better promoted to the science community and infrastructure operators? (Corresponds with Figure 4, Graph 1)	
Yes	98%
No	3%
I don't know	0%

If answer above is YES: How should the "Arctic Science Agreement" be better promoted? (Corresponds with Figure 4, Graph 2)	
Information sent to the stations / available at research stations	16%
Contact point at each research institute / through national research institutes	19%
Include creating awareness in funding/ application procedures	6%
Active reaching out / internet	9%
Conferences	22%
National contact points	13%
Email (lists)	3%
INTERACT website	3%
Inform research operators	3%
Social media	3%
Politics	3%

If answer above is NO: Where have you heard about the "Arctic Science Agreement"? (Corresponds with no Graph, as answer was only filled in twice).	
INTERACT	50%
National authorities	50%

If you want to express further opinions, experiences or questions regarding knowledge about the "Arctic Science Agreement", please use the space below. (Corresponds with no Graph)	
Should be a self-evaluation after several years how the Agreement is working out	33 %
Knowing more about best practices would be useful	33 %
Confusion why observer states are not mentioned	33 %

Have you ever experienced problems regarding cross-border travels/transport? [Problems with entry and exit of persons] (Corresponds with Figure 5, Graph 1)	
Yes, frequently	3%
Yes, sometimes	30%
It depends	20%
No	48%

Have you ever experienced problems regarding cross-border travels/transport? [Problems with import/export of equipment and instrumentation] (Corresponds with Figure 5, Graph 2)	
Yes, frequently	10%
Yes, sometimes	38%
It depends	3%
No	50%

Have you ever experienced problems regarding cross-border travels/transport? [Problems with import/export of samples] (Corresponds with Figure 5, Graph 3)	
Yes, frequently	8%
Yes, sometimes	40%
It depends	13%
No	40%

Have you ever experienced problems regarding cross-border travels/transport? [Problems with access to research infrastructure and facilities] (Corresponds with Figure 5, Graph 4)	
Yes, frequently	0%
Yes, sometimes	18%
It depends	13%
No	70%

Please describe the structural problem for each of the four questions you have answered with YES (see above). (Corresponds with Figure 5, Graph 5)	
Visa	15%
COVID-19	15%
Customs (equipment and batteries)	21%
Cooling of probes	3%
Samples	24%
Misunderstanding of / difficulties with permit requirements	12%
Sanctions	3%
Ceased travel routes	3%
Costs of travel	3%

If you answered YES to above questions: Has the problem been reported to your 'Competent National Authority'? (Corresponds with no Figure)	
Yes	8%
No	56%
I don't know	36%

If wanted, please specify your answer and provide more details below. (Corresponds with no Figure)
Issues not only Russian Arctic, but also within the EU and US
Report independently from the Agreement
Problems occur traveling from non-schengen to Greenland

Speaking from your daily experience and your perception of international cooperation in Arctic Science: Have barriers been reduced since the ratification of the "Arctic Science Agreement" in 2018? (Corresponds with Figure 6, Graph 1)	
Yes	0%
No	18%
I don't know	83%

If you want to express further opinions, experiences or questions regarding transboundary access in Arctic Science, please use the space below (Corresponds with no Figure, quote used in Result section).
Sanctions against Russia inflict problems for Russian Arctic scientists such as creating barriers

Your access to knowledge on relevant permits and regulations: Is it possible for you to guide researchers through all relevant permit types and where to obtain these? (Corresponds with Figure 6, Graph 4)	
Yes	33%
Partly	48%
No	8%
I don't know	13%

In your experience, can scientists identify all relevant permit types themselves? (Corresponds with Figure 6, Graph 3)	
Yes	13%
Partly	40%
No	28%
I don't know	20%

Do you know any useful information platforms, tools or online guides for national permit systems? (Corresponds with Figure 6, Graph 5)	
INTERACT guide	38%
National contact points	24%
Local research institutes	34%
VFS Global	3%

How do you keep track of new regulations and changes to e.g. existing environmental legislation, military zones, sanctuaries etc.? (Corresponds with Figure 6, Graph 6)	
General news and internet	42%
National and local authorities	50%
INTERACT	4%
Science meetings	4%

If you want to express further opinions, experiences or questions regarding legal barriers of national permit systems and environmental protection legislation, please use the space below. (Corresponds with no Figure, quotes used in Result section).
In Canada, permitting takes place at multiple levels (national, international, Indigenous private lands). Navigating this can be complex for International researchers.
The sanctions make international scientific cooperation more difficult

Do you offer funding for researchers to access your station (travel and accommodation)? (Corresponds with no Figure)	
Yes, full funding provided by national/international funding programme	30%
Yes, partly funding provided	20%
Via INTERACT / eLTER only	10%

No, researchers need their own funding to access the station	38%
Not applicable	3%

What kind of "shared logistics" was available at your research station? (Survey 1)	
Laboratory equipment	73%
Platforms for installing instrumentation/sensors	63%
Safety equipment	70%
IT infrastructure	68%
Chemicals	48%
Staff services	83%
Vessels/Vehicles for local transport	73%
Field equipment	70%
Data	60%
Storage facilities	70%
Heavy machinery	3%

Data management/Data policy at your station [Do you have a Data Management Plan at your station?] (Corresponds with Figure 7.1, Graph 1)	
Yes	63%
No	30%
I don't know	8%

Data management/Data policy at your station [Do you provide free and open access to data collected by the station or associated researchers?] (Corresponds with Figure 7.1, Graph 2)	
Yes	63%
No	33%
I don't know	5%

Data management/Data policy at your station [Have you requested data that was not offered?] (Corresponds with Figure 7.1, Graph 3)	
Yes	38%
No	45%
I don't know	18%

Data management/Data policy at your station [Do you have a policy for visiting researchers to provide free and open access to data collected at the station?] (Corresponds with Figure 7.1, Graph 4)	
Yes	38%
No	58%
I don’t know	5%

Data management/Data policy at your station [Are you acknowledged for the data you provide for scientific publications (acknowledgement or DOI reference)?] (Corresponds with Figure 7.1, Graph 5)	
Yes	58%
No	18%
I don't know	25%

What do you consider the main issue(s) in relation to facilitating access to scientific information and data? (Corresponds with Figure 7.2, Graph 8)	
No acknowledgement for the station	8%
No access to data at the station	13%
(Lack of) data standardisation	25%
IT expertise	4%
Lack of meta data	4%
Lack of (data) storage facilities	4%
Slow publishing	4%
DOIs	4%
Lack of free access to data	17%
Unclear ownership	8%
Personal contact	4%
Difficulties sharing data outside of Russia	4%

If you want to express further opinions, experiences or questions regarding data management, funding and logistics, please use the space below. (Corresponds with no Figure) (XXX is used to anonymise data)
More TA calls
Unfortunately XXX has not an internal budget to support external researchers.
XXX as a whole promote open access to data and that data from the station is made available to a broader research community. For data collected XXX we do the same. XXX-data are for the most available in our XXX Data Centre. For non-XXX monitoring, we can put researchers in dialoge with the institutes responsible for the monitoring. So both at our institute and as a community as a whole in XXX we work to promote open sharing of data and shared use of data.

How would you assess the level of preparedness of visiting researchers at your station? [Are visitors at your research station adequately prepared scientifically?] (Corresponds with Figure 8.1, Graph 1)	
Yes	66%
Sometimes	29%
No	0%
I don’t know	5%

How would you assess the level of preparedness of visiting researchers at your station? [Are visitors to your research station adequately prepared logistically?] (Corresponds with Figure 8.1, Graph 2)	
Yes	29%
Sometimes	68%
No	0%
I don’t know	3%

How would you assess the level of preparedness of visiting researchers at your station? [Are visitors to your research station adequately prepared culturally?] (Corresponds with Figure 8.1, Graph 3)	
Yes	37%
Sometimes	50%
No	5%
I don't know	8%

Bridging knowledge systems: Are there opportunities to work with local, traditional and Indigenous knowledge at your station? (Corresponds with Figure 8.1, Graph 4)	
Yes	58%
Sometimes	0%
No	34%
I don’t know	8%

If answered above with YES, please provide more details. (Corresponds with Figure 8.2, Graph 7)	
Frequent contact with local and Indigenous Peoples	30%
Local research station employees	25%
Engage local and indigenous peoples in projects	25%
Cooperation with local university	10%
Provide services of the station to locals	10%

Education, career development and training opportunities: Are there opportunities for students or early career scientists to engage in your research activities? (Corresponds with Figure 8.1, Graph 5)	
Yes	95%
No	3%

I don't know	3%

If answered above with YES, please provide more details. (Corresponds with Figure 8.2, Graph 6)	
Provide data sets	10%
Offer internships	13%
Involve in fieldwork	37%
Provide education on site	23%
Help with BA/MA/PhD on site	17%

If you had three wishes free for improving international scientific cooperation - what would they be? (Corresponds with Figure 8.2, Graph 8)	
Better access for staff, equipment and samples	14%
Improved online meeting infrastructure	6%
Digital collaboration tools	4%
Improved communication between stations	8%
Improved funding	24%
Improved personal contact	6%
Improved data standardisation and sharing	14%
More collaboration	12%
Less bureaucracy	2%
More international language proficiency	4%
Less sanctions	2%
More cooperation with industry	2%

Appendix III: Questions survey 2

Survey on Barriers in Arctic Science

Dear participant,

Thank you for your time and interest in this survey!

UPDATE
The original version of this survey on reducing barriers in Arctic Science was conducted until mid of February 2022. On 24th February 2022, the situation regarding transnational access in the Arctic changed dramatically due to the Russian invasion of Ukraine. In order to understand the impacts of the war in Ukraine has had on the implementation of the Arctic Science Agreement, it was decided to conduct a second round of this survey to compare the data from before the war with the current situation.

ABOUT THIS SURVEY

On 11 May 2017, the eight arctic countries signed the "Agreement on Enhancing International Arctic Scientific Cooperation" ("Arctic Science Agreement") in Fairbanks, Alaska. The agreement aims at facilitating better access for researchers to the arctic areas of the eight Arctic Council member states, including (i) entry/exit of persons, (ii) import/export of equipment and materials/samples, (iii) access to research infrastructures and facilities and (iv) access to data.

The agreement also calls for the parties to promote education, career development and training opportunities, and encourages activities associated with traditional and local knowledge.

With this survey, we want to identify bottlenecks and challenges for the free mobility of scientists and their equipment/samples based on the perspectives of Transnational Access Users (TA Users). In particular, we want to assess to what extent the "Arctic Science Agreement" has benefitted your daily work.

The questions are structured in five different sections, each dealing with different aspects in relation to the agreement. To answer the questions, you will need approximately 20 minutes.

BACKGROUND

This survey has been developed by APECS (Association of Polar Early Career Scientists) in collaboration with INTERACT (International Network for Terrestrial Research and Monitoring in the Arctic) and EPB (European Polar Board). Anonymous results of the survey will be communicated to the EPB and compiled into a report to be communicated to the Arctic Council.

****
Should you have any questions please do not hesitate to contact Pjotr Elshout (EPB) at

1. *

2. What station did you visit?

Mark only one oval.

- Abisko Scientific Research Station
- Adam Mickiewicz University Polar Station "Petuniabukta"
- Adygine Research Station
- Aktru Research Station
- Alpine Research and Education Station Furka
- Arctic DTU Research Station
- Arctic Station
- Avachinsky Volcano Field Station
- AWIPEV Arctic Research Base
- Barrow Arctic Research Center/Environmental Observatory
- Beliy Island Research Station
- Canadian High Arctic Research Station CHARS
- CEN Boniface River Field Station
- CEN Bylot Island Field Station
- CEN Clearwater Lake Research Station
- CEN Kangiqsualujjuaq Sukuijarvik
- CEN Radisson Ecological Research Station
- CEN Salluit Research Station
- CEN Umiujaq Research Station
- CEN Ward Hunt Island Research Station
- CEN Whapmagoostui-Kuujjuarapik Research Station
- China Iceland Arctic Research Observatory
- Chokurdakh Scientific Tundra Station
- Churchill Northern Studies Centre
- CNR Arctic Station "Dirigibile Italia"
- Czech Arctic Research Station
- ECN Cairngorms
- EGRIP Field Station

- [ ] Flashline Mars Arctic Research Station
- [ ] Greenland Institute of Natural Resources
- [ ] Hyytiälä Forestry Research Station
- [ ] Igarka Geocryology Laboratory
- [ ] Igloolik Research Center
- [ ] International Ecological Educational Center "Istomino"
- [ ] Kainuu Fisheries Research Station
- [ ] Kajbasovo Research Station
- [ ] Karkonosze National Park
- [ ] Kevo Subarctic Research Station
- [ ] Khanymey Research Station
- [ ] Khibiny Educational and Scientific Station
- [ ] Kilpisjärvi Biological Station
- [ ] Kluane Lake Research Station
- [ ] Kolari Field Site
- [ ] Krkonoše Mountains National Park
- [ ] Labrador Institute Research Station
- [ ] Lammin-Suo Peatland Station
- [ ] Litla-Skard
- [ ] M'Clintock Channel Polar Research Cabins
- [ ] M&M Klapa Research Station
- [ ] Meinypil'gyno Community Based Biological Station
- [ ] Mukhrino Field Station
- [ ] Netherlands' Arctic Station
- [ ] NIBIO Svanhovd Research Station
- [ ] Nicolaus Copernicus University Polar Station
- [ ] North-East Science Station
- [ ] Numto Park Station
- [ ] Nunavut Research Institute
- [ ] NPI Sverdrup Ny-Ålesund Research Station
- [ ] Orotuk Field Station

- [ ] Polish Polar Station Hornsund
- [ ] Research Station Samoylov Island
- [ ] Rif Field Station
- [ ] Sermilik Research Station
- [ ] Skálanes Nature and Heritage Center
- [ ] Sonnblick Observatory
- [ ] Spasskaya Pad Scientific Forest Station
- [ ] Stanisław Baranowski University of Wrocław Polar Station
- [ ] Station Hintereis
- [ ] Sudurnes Science and Learning Center
- [ ] Summit Station
- [ ] Svartberget Research Station
- [ ] Tarfala Research Station
- [ ] The Arctic Research Station (Former Labytnangi Ecological Research Station)
- [ ] The DMI Geophysical Observatory Qaanaaq
- [ ] Toolik Field Station
- [ ] Uapishka Research Station
- [ ] UK Arctic Research Station
- [ ] Värriö Subarctic Research Station
- [ ] Villum Research Station
- [ ] Western Arctic Research Centre
- [ ] Willem Barentz Biological Station
- [ ] Zackenberg Research Station
- [ ] I have not visited a station

3. Which modality of access did you utilize? *

Mark only one oval.

- ◯ Physical Transnational Access
- ◯ Remote Access
- ◯ Virtual Access
- ◯ A combination of the above
- ◯ I have not used any of the above

4. When did you visit the station? Please provide the YEAR. If you have not visited a station, please insert an X.

_____

Impact of the war in Ukraine on your research

5. (1) Had you planned to conduct fieldwork at a Russian research station from March 2022? *

Mark only one oval.

- ◯ Yes
- ◯ No

6. (1a) If answer to above question is YES: Were you able to shift your field campaign to other Arctic regions?
If not, please write “NO”.
If yes, please provide the name of the country, region and, if applicable, research station.

_____

7. (1b) In light of these developments, was Virtual Access to data an option for you?

8. (2) Have you experienced any problems with the return or recovery of research equipment from Russia after 24th February 2022? *

Mark only one oval.

- ◯ Yes
- ◯ No

9. (2a) If the answer to above question is YES, please specify your answer.

10. (3) Open space for comments and thoughts regarding the developments in international Arctic research cooperation this year.

1. Your knowledge about the Agreement on Enhancing International Arctic Scientific Cooperation

11. *Have you filled in the survey that was sent out in February 2022 before? (If so, please still fill out this survey).

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Prefer not to answer

12. *Has your awareness of the Arctic Science Agreement changed since the first survey in February 2022? If YES, please explain how:

13. (1) How would you describe your level of knowledge about the "Arctic Science Agreement"? *

Mark only one oval.

	I have never heard of it
1	◯
2	◯
3	◯
4	◯
5	◯

14. (2) Have you ever referred to the "Arctic Science Agreement" to a permitting authority? (E.g. when applying for entry, import/export of research equipment and samples) *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

15. (2a) If the answer to above question is YES: Has the reference to the "Arctic Science Agreement" changed the position of the permitting authority/official?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

16. (2b) If wanted, please specify your answer below.

17. (3a) The "Arctic Science Agreement" foresees a mechanism for reporting difficulties with international access for scientific research in the Arctic countries. The reported difficulties are discussed at the annual meetings of the 'Competent National Authorities' (CNAs). Is there a national contact point or a 'Competent National Authority' in the country you are working in? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

18. (3b) Please answer the below questions in relation to the reporting mechanism of the 'Arctic Science Agreement'. *

Mark only one oval per row.

	Yes	No	I don't know
Are you aware of this reporting mechanism?	◯	◯	◯
After submitting a report on experienced barriers, would you like to be further engaged in follow-up actions?	◯	◯	◯
Do you think this reporting mechanism is sufficient to solve problems with international access?	◯	◯	◯
Have you ever used this reporting mechanism?	◯	◯	◯

19. (4) Do you think the "Arctic Science Agreement" should be better promoted to the science community and infrastructure operators? *

Mark only one oval.

- ◯ Yes
- ◯ No

20. (4a) If answer above is YES: How should the "Arctic Science Agreement" be better promoted?

21. (4b) If answer above is NO: Where have you heard about the "Arctic Science Agreement"?

22. (5) If you would like to provide any further feedback, please use the space below.

2. Legal barriers to Arctic Science - Transboundary access

23. (1) Have you ever experienced problems regarding cross-border travels/transport? *

Mark only one oval per row.

	Yes, frequently	Yes, sometimes	It depends	No
Problems with entry and exit of persons	◯	◯	◯	◯
Problems with import/export of equipment	◯	◯	◯	◯
Problems with import/export of samples	◯	◯	◯	◯
Problems with access to research infrastructure	◯	◯	◯	◯

24. (1a) Please describe the structural problem for each of the four questions you have answered with YES (see above)

25. (1b) If answered YES to above questions: Has the problem been reported to your 'Competent National Authority' (CNA)?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ There is no CNA in my country
- ◯ I don't know

26. (1c) If wanted, please specify your answer and provide more details below.

_____

_____

_____

_____

_____

27. (2) Speaking from your daily experience and your perception of international cooperation in Arctic Science: Have barriers been reduced since the ratification of the "Arctic Science Agreement" in 2018? *

Mark only one oval.

- ◯ Yes
- ◯ Sometimes
- ◯ No
- ◯ I don't know

3. Legal barriers to Arctic Science - National permit systems and environmental legislation

28. (1) Your access to knowledge on relevant permits and regulations: Is it possible for you to know about all relevant permit types and where to obtain these? *

Mark only one oval.

- ◯ Yes
- ◯ Partly
- ◯ No
- ◯ I don't know
- ◯ Other: _____

29. (2) In your experience, can scientists identify all relevant permit types themselves? *

Mark only one oval.

- ◯ Yes
- ◯ Partly
- ◯ No
- ◯ I don't know
- ◯ Other: _____

30. (3) Do you know any useful information platforms, tools or online guides for national permit systems?

_____

_____

_____

_____

_____

4. Researcher and operator's barriers: Data Management and logistics

31. (1) Lack of access to laboratory facilities, workshops or scientific instruments can be a barrier (logistically and financially) for some research projects. What kind of "shared logistics" was available for your research at the visited station? (Multiple answers possible)

Tick all that apply.

- [ ] Laboratory equipment
- [ ] Platforms for installing instrumentation/sensors (e.g. masts, buoys, drones)
- [ ] Safety equipment
- [ ] IT Infrastructure
- [ ] Chemicals
- [ ] Staff services (e.g. drone operation, field assistance, mechanics)
- [ ] Field equipment
- [ ] Vessels/Vehicles for local transport
- [ ] Data
- [ ] Storage facilities
- [ ] Other: _____

32. (1a) What could be improved regarding "shared logistics"?

_____

_____

_____

_____

_____

33. (2) Data management/Data Policy at the visited research station

Mark only one oval per row.

	Yes	No	I don't know
Did the station have a Data Management Plan?	◯	◯	◯
Did the station have a policy for you as visiting researchers to provide free and open access to data collected at the station?	◯	◯	◯
Have you requested access to data that the station did not offer?	◯	◯	◯
Are you aware of the INTERACT Data portal for free Virtual Access to data from stations?	◯	◯	◯
Have you used Virtual Access data at the	◯	◯	◯

34. (3) What do you consider the main issue(s) in relation to facilitating access to scientific information and data?

5. Additional aspects to improve scientific cooperation in the Arctic

Last section - nearly done!

35. (1) How would you assess your level of preparedness (as provided by your home institute) as a visiting researcher at the station?

Mark only one oval per row.

	Yes	Partly	No	I don't know
Were you adequately prepared scientifically?	◯	◯	◯	◯
Were you adequately prepared logistically?	◯	◯	◯	◯
Were you adequately prepared culturally?	◯	◯	◯	◯

36. (2) Bridging knowledge systems: Were there opportunities to work with local, traditional and Indigenous knowledge at the visited station?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

37. (2a) If answered above with YES, please provide more details.

38. (3) Education, career development and training opportunities: Were there opportunities for students or early career scientists to engage in research activities at the visited station?

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I don't know

39. (3a) If answered above with YES, please provide more details.

40. (4) If you had three wishes for improving international scientific cooperation - what would they be? *

41. (5) If you want to express further opinions, experiences or questions, please use the space below.

Thank you for your participation!

42. You are invited to leave your contact details and/or last comments you would like to make. By providing your contacts, you agree to get contacted in case APECS, EPB or INTERACT has questions.

Appendix IV: Answers to survey 2

What country are you based? (Corresponds with Figure 1, Graph 4)	
Czech Republic	14%
Italy	14%
UK	24%
Germany	5%
Denmark	5%
Norway	5%
Finland	5%
Poland	10%
Russia	10%
Switzerland	5%
Romania	5%

Country where representatives of research stations are based (Corresponds with Figure 1, Graph 3)	
U.S. (Alaska)	5%
Iceland	5%
Norway	5%
Finland	23%
Sweden	9%
Greenland	9%
Russia	18%
Svalbard	23%
Austria	5%

Which modality did you utilise (Corresponds with no Figure)	
Physical access	82%
Remote access	9%
A combination of the above	9%

When did you visit the station? (Corresponds with no Figure)	
2011	4%
2012	4%
2017	17%
2018	0%
2019	25%
2020	13%
2021	33%
2022	4%

How would you describe your level of knowledge about the "Arctic Science Agreement (Corresponds with Figure 2, Graph 1)	
I have never heard of the Agreement	23%
I have heard about the Agreement but do not know much about it	45%
I have heard of the Agreement and know a little about it	32%
I know about the contents of the Agreement	0%
I know every detail about the Agreement	0%

Have you ever referred to the "Arctic Science Agreement" to a permitting authority? (E.g. when applying for entry, import/export of research equipment and samples) (Corresponds with no Figure)	
I don't know	14%
Yes	5%
No	82%

The "Arctic Science Agreement" foresees a mechanism for reporting difficulties with international access for scientific research in the Arctic countries. The reported difficulties are discussed at the annual meetings of the 'Competent National Authorities' (CNAs). Is there a national contact point or a 'Competent National Authority' in the country you are working in? (Corresponds with no Figure)	
Yes	0%
No	5%
I don't know	95%

Please answer the below questions in relation to the reporting mechanism of the 'Arctic Science Agreement'. [Are you aware of this reporting mechanism?] (Corresponds with Figure 3, Graph 1)	
Yes	18%

No	82%
I don’t know	0%

Please answer the below questions in relation to the reporting mechanism of the 'Arctic Science Agreement'. [After submitting a report on experienced barriers, would you like to be further engaged in follow-up actions?] (Corresponds with Figure 3, Graph 2)	
Yes	55%
No	14%
I don't know	32%

Please answer the below questions in relation to the reporting mechanism of the 'Arctic Science Agreement'. [Do you think this reporting mechanism is sufficient to solve problems with international access?] (Corresponds with Figure 3, Graph 3)	
Yes	9%
No	9%
I don't know	82%

Please answer the below questions in relation to the reporting mechanism of the 'Arctic Science Agreement'. [Have you ever used this reporting mechanism?] (Survey 2) (Corresponds with Figure 3, Graph 6)	
Yes	5%
No	91%
I don't know	5%

Do you think the "Arctic Science Agreement" should be better promoted to the science community and infrastructure operators? (Corresponds with Figure 4, Graph 1)	
Yes	91%
No	9%
I don't know	0%

If answer above is YES: How should the "Arctic Science Agreement" be better promoted? (Corresponds with Figure 4, Graph 3)	
Social media	16%
Conferences	11%
During application process for access (also trough INTERACT)	11%
Mail (lists)	16%
Webinars	16%

Regular media	5%
National programmes and contacts	11%
Through (Arctic) research grants	11%
Newsletters	5%

If answer above is NO: Where have you heard about the "Arctic Science Agreement"? (Corresponds with no Figure)	
Through IASC working groups	1

Have you ever experienced problems regarding cross-border travels/transport? [Problems with entry and exit of persons] (Corresponds with Figure 5, Graph 1)	
Yes, frequently	0%
Yes, sometimes	0%
It depends	14%
No	86%
Have you ever experienced problems regarding cross-border travels/transport? [Problems with import/export of equipment] (Corresponds with Figure 5, Graph 2)	
Yes, frequently	5%
Yes, sometimes	23%
It depends	9%
No	64%

Have you ever experienced problems regarding cross-border travels/transport? [Problems with import/export of samples] (Corresponds with Figure 5, Graph 3)	
Yes, sometimes	14%
Yes, frequently	18%
It depends	14%
No	55%

Have you ever experienced problems regarding cross-border travels/transport? [Problems with access to research infrastructure] (Corresponds with Figure 5, Graph 4)	
Yes, sometimes	0%
Yes, frequently	5%
It depends	14%
No	82%

Please describe the structural problem for each of the four questions you have answered with YES (see above) (Corresponds with Figure 5, Graph 6)

Russian regulations on samples and research equipment	29%
UK regulations on samples and equipment	6%
Airports are suspicious of equipment	6%
Ethanol difficult to import and export	6%
Italian regulations on samples and equipment	6%
Access to infrastructre expensive	12%
Visitor invitations are difficult to organise	6%
Samples in general	18%
EU sample import from Russia difficult	6%
Equipment lost during traveling	6%

If answered YES to above questions: Has the problem been reported to your 'Competent National Authority' (CNA)? (Corresponds with no Figure)	
Yes	0%
No	64%
I don't know	27%
There is no CNAin this country	9%

If wanted, please specify your answer and provide more details below. (Corresponds with no Figure)
Spoken with XXX officials at XXX and the XXX
Problems reported to authorities in XXX, which assisted and helped with costs.

Speaking from your daily experience and your perception of international cooperation in Arctic Science: Have barriers been reduced since the ratification of the "Arctic Science Agreement" in 2018? (Corresponds with Figure 6, Graph 1)	
Yes	14%
No	0%
I don't know	86%

Your access to knowledge on relevant permits and regulations: Is it possible for you to know about all relevant permit types and where to obtain these? (Corresponds with Figure 6, Graph 2)	
Yes	23%
Partly	55%
No	14%
I don't know	9%

In your experience, can scientists identify all relevant permit types themselves? (Corresponds with Figure 6, Graph 3)	
Yes	0%
Partly	45%
No	45%
I don't know	9%

Do you know any useful information platforms, tools or online guides for national permit systems? (Corresponds with Figure 6, Graph 8)	
General internet search engines	12%
National authorities	18%
Station managers	18%
INTERACT	18%
No	35%

What kind of "shared logistics" was available for your research station? (Survey 2)	
Laboratory equipment	50%
Safety equipment	68%
IT infrastructure	55%
Vessels / vehicles for transport	36%
Data	36%
Chemicals	36%
Staff services	50%
Field equipment	68%
Storage facilities	27%
Platform for installing sensors	23%
Staff services	50%
Heavy machinery	0%

What could be improved regarding "shared logistics"? (Corresponds with no Figure)
More coordination from the station managers
Making payments easier (especially to and from Russia)
More information on what is available
IT infrastructure
Better internet on site

Data management/Data Policy at the visited research station [Did the station have a Data Management Plan?] (Corresponds with Figure 7.1, Graph 1)	
Yes	18%
No	5%
I don't know	77%

Data management/Data Policy at the visited research station [Did the station have a policy for you as visiting researchers to provide free and open access to data collected at the station?] (Corresponds with Figure 7.1, Graph 2)	
Yes	55%
No	9%
I don’t know	36%

Data management/Data Policy at the visited research station [Have you requested access to data that the station did not offer?] (Figure 7.1, Graph 3)	
Yes	14%
No	77%
I don’t know	9%

Data management/Data Policy at the visited research station [Are you aware of the INTERACT Data portal for free Virtual Access to data from stations?] (Figure 7.1, Graph 6)	
Yes	55%
No	36%
I don't know	9%

Data management/Data Policy at the visited research station [Have you used Virtual Access data at the INTERACT Data Portal?] (Corresponds with Figure 7.1, Graph 7)	
Yes	14%
No	86%
I don't know	0%

What do you consider the main issue(s) in relation to facilitating access to scientific information and data? (Corresponds with Figure 7.2, Graph 9)	
Standardising data	20%
Quality	10%
Build long term relations	10%
Physical access	10%
Covered costs	10%
Where to find information on data	30%
Availability of data	10%

How would you assess your level of preparedness as a visiting researcher at the station? [Were you adequately prepared scientifically?] (Corresponds with Figure 8.1, Graph 1)	
Yes	77%
Partly	23%
No	0%

How would you assess your level of preparedness as a visiting researcher at the station? [Were you adequately prepared logistically?] (Figure 8.1, Graph 2)	
Yes	68%
Partly	27%
No	5%
I don't know	0%

How would you assess your level of preparedness as a visiting researcher at the station? [Were you adequately prepared culturally?] (Figure 8.1, Graph 3)	
Yes	50%
Partly	27%
No	14%
I don't know	9%

Bridging knowledge systems: Were there opportunities to work with local, traditional and Indigenous knowledge at the visited station? (Figure 8.1, Graph 4)	
Yes	36%
No	27%
I don't know	32%
Not filled in	5%

If answered above with YES, please provide more details.	
Working with local XXX, XXX and other XXX scientists	14%
Only for local travelling	14%
At the station, close collaboration with Indigenous people	14%
Staff station was local	43%
Local guides to understand the surroundings better	14%

Education, career development and training opportunities: Were there opportunities for students or early career scientists to engage in research activities at the visited station? (Corresponds with Figure 8.1, Graph 5)	
Yes	50%
No	23%
I don't know	27%

If answered above with YES, please provide more details (Corresponds with no Figure)	
Inclusion was in the proposal	14%
Engage more directly	29%
Organise meetings	14%
Season school opportunities (for international and local students)	29%
INTERACT	14%

If you had three wishes for improving international scientific cooperation - what would they be? (Corresponds with Figure 8.2, Graph 9)	
More funding	15%
Less bureacracy	12%
No travel restrictions	3%
More collaboration	21%
More data sharing	67%
More INTERACT	9%
Better incoporation of indigenous knowledge	6%
More gender equality	3%
Improved logistical support	6%

Provide a list with present chemicals at stations	3%
Native English speakers learning a second language	3%
Outline new regulations post BREXIT	3%
More interaction with local communites	3%
Clean matrasses	3%
More science diplomacy	3%