Towards harmonisation of polar infrastructure access

Workshop co-organisers: EPB, with ARICE, EU-PolarNet, FARO, GEO-CRI and INTERACT

1st August 2019, Grand Hotel Plovdiv, Bulgaria

Draft timetable

0900 – 1030 – Talks by individual polar programs

1030-1045 – Coffee break

1045 – 1215 – Talks by infrastructure networks and initiatives

1215 – 1330 – Brainstorming, next steps (in subgroups if needed, questions to be provided beforehand)

1330 - 1340 – Wrap up, next steps

1400-1430 – packed Lunch, and bus to Sofia airport and city

Session 1 0900-1030

- 1.1 Chair (EPB) / Chair Action Group introduce the workshop

M Ojeda welcomed all participants to the workshop, giving an overview of the agenda and thanking the Bulgarian Antarctic Institute for hosting the meeting.

A short round of introductions were made by all participants. A good mix of both Arctic and Antarctic expertise and experience among workshop participants was noted and appreciated.

K Latola, joining the workshop remotely, presented a brief introduction to the EPB and the Action Group on Infrastructure.

- 1.2 *Bulgarian Antarctic Institute* - A Polar program that has a large number of international collaborators

D Mateev gave a presentation on the Bulgarian Antarctic Institute's activities, including their infrastructure capabilities and the hosting of international researchers at the station in Antarctica.

There's a long history of Bulgarian cooperation in science and logistics in Antarctica. The Bulgarian Antarctic Program was born in 1988 when 2 scientists spent time with BAS on Livingstone Island, building a base in collaboration with the erstwhile Soviet Antarctic Programme. Since then, more than 300 scientists from several different nations have been hosted by BAI.

At the Bulgarian St. Kliment Ohridski Base in Antarctica, there are three habited buildings for sleeping accommodation, for communal facilities, and for communications, as well as a storage building for equipment. The station's infrastructure allows for collaboration, but the maximum capacity of the station is 22 people at a time, of which a maximum of 15 are scientists.

The Bulgarian logistics team always provides support scientists' projects at the station. As a small programme, there are a lot of international projects at the St. Kliment Ohridski Base. Bulgarian researchers are encouraged to collaborate internationally, but international projects may be hosted

at the base without the involvement of Bulgarian scientists. Hosting international projects promotes scientific collaboration, and also helps to ensure capacity is fully used at the station.

Projects at the Bulgarian station are conducted on a wide variety of disciplines, including geoscience, life sciences, physical science and medicine. Scientists also work on various interdisciplinary projects.

Current collaborations include work with Spanish colleagues (a Spanish base is a close neighbour), in both logistics and science. In regards to scientific projects, there is a long history of collaboration with the Portuguese, and a current long-standing project on permafrost with Portugal and Spain.

The benefit of these long-term collaborations were noted. Ongoing collaborations with Portuguese colleagues has brought new equipment to the Bulgarian station, thus expanding the pre-existing infrastructure available for research and observations.

Apart from Spain and Portugal, the Bulgarian Antarctic Institute supports scientists from countries with developing Antarctic research programmes and no national infrastructure, such as Cyprus, Mongolia, Turkey and Macedonia.

Visiting scientists to the Bulgarian station have their projects fit into the working calendar of the Bulgarian Antarctic Institute. To stay at St Klimint Ohridiski Station, international scientists provide a clear plan of their project. They are also required to pass a medical examination. Visiting scientists cover their own costs to reach Punta Arenas or Ushuaia, after which point logistics are handled by the Bulgarian programme, with international scientists becoming members of the Bulgarian expedition team.

It was noted that, particularly at a small station, the close proximity of people from different backgrounds and cultures can sometimes cause pressures, but there was rarely been any problems, and generally hosted scientists quickly become part of the Bulgarian team. Being a small stations also means that communication is easy within the facility, and any issues can be resolved quickly.

Each year, the Bulgarian station hosts between 2 and 6 international scientists, and as such, non-Bulgarian researchers make up a good proportion of the Bulgarian expedition team at any one time.

It was noted that the plans of scientists to be hosted at the station should be known by July the previous year at the latest, as logistics are arranged at the COMNAP AGM annually.

International scientists wishing to work at the Bulgarian station should contact the BAI. In future, the station will be part of a Bulgarian National Research Infrastructure roadmap, and applications to work at the station will be made through that system.

It was noted that guest scientists do no need to participate in Bulgarian projects to work at the station – they will be supported logistically regardless. However, it was noted that through collaboration infrastructure, there have been scientific collaborations that have emerged between Bulgarian and other scientists.

- *PROPOLAR:* Polar program without own infrastructure – *T Cabrita*

T Cabrita presented an overview of the Portuguese polar programme (PROPOLAR), and its work to organise logistics for its researchers, in both the Arctic and Antarctic. Portugal has no national-owned polar research infrastructure of its own, and so relies on cooperation with other partners in order to support scientists as they conduct their work.

PROPOLAR is multi-dimensional, promoting cooperation and supporting science research, whilst also working on logistics. It is a bipolar programme, giving scientists access to both Arctic and Antarctic regions.

PROPOLAR funding calls are for provision of logistics only - science must be funded from other sources.

Despite not having its own infrastructure, PROPOLAR contributes to logistics in other ways. Each year PROPOLAR charters a flight from Punta Arenas to King George Island, with spaces made available for international partners. They also run related workshops for background information and preparation for scientists to work in the polar regions. PROPOLAR also provides safety and survival training for scientists for land and sea, training them in fire prevention, and life support.

PROPOLAR hosts the annual Portuguese Polar Conference, which brings together scientists as well as infrastructure managers. Thus the meeting is important for developing connections and collaborations for the whole Portuguese polar research community, for logistics and science.

The Portuguese Foundation for Science and Technology supports a lot of Portuguese polar science. The Agency for Environment does a lot of the work for Environmental Impact Assessments for Antarctic projects (previously this was done by the Spanish Antarctic program). Life support courses are run by a specialised sports and medicine institute. PROPOLAR is also supported by the Portuguese Ministry of Foreign Affairs. As such, within Portugal, extensive collaborative efforts are ongoing to support polar research, both for science and logistics.

Annually, PROPOLAR supports 6-10 Antarctic projects, but there are many more applications. There are usually 20-24 researchers in the field, in 10-15 different areas for each Antarctic field season. In order to implement logistics for the Portuguese programme, PROPOLAR relies on support and collaboration with other countries, particularly with Spain, China, Korea, Bulgaria, United States and Turkey. The COMNAP AGM is the venue each year where contacts and arrangements are made for the next season's logistics in Antarctica. Transport of personnel and equipment needs to be organised by PROPOLAR to fit with the plans of partner programmes that provide infrastructural support.

Portuguese projects in the Arctic are usually supported by commercial flights, and thus planning is simpler than for the Antarctic. There is usually 6 Arctic projects supported by PROPOLAR annually, with a maximum of 12 scientists in the field.

PROPOLAR chartered flight is always full, and we occasionally additional seats are required. PROPOLAR organised the flight in cooperation with the Spanish programme, and make plans with other programmes to support them where possible. Chartering the flights takes up 60% of PROPOLAR's annual budget.

There are challenges to PROPOLAR's logistical planning. Adjusting their schedule to fit with partners is not always easy. There have been cases where PROPOLAR has had to call upon partner programmes to transport researchers to catch the chartered flight out of Antarctica when difficulties were met. It was noted that other programmes were more than willing to help.

There are differences in working in the Arctic and Antarctic for logistics. The Arctic is relatively straight forward from a logistical perspective. The Antarctic involves more constraints. PROPOLAR has fewer projects for the Arctic, but gradually there is becoming a balance between the two regions. Much of the Portuguese research in the Arctic is integrated within international projects, which makes logistics simpler to organise.

It was noted that PROPOLAR projects in the Antarctic often have international researchers involved in them.

It was noted that COMNAP is trying to collaborate better logistically, but there is no synergistic picture of the science that can aid better coordination of logistics. There are geopolitical reasons for this lack of shared information. SCAR is perhaps the organisation to give a better overview of science activities in Antarctica at a global level. Research projects could be better coordinated and aligned to help more efficient logistical support.

It was noted that around 50% of PROPOLAR's projects in Antarctica involved international partners. In the last ten years, the proportion of internationally collaborative projects in Antarctica as a whole has roughly tripled.

Best practice recommendations from PROPOLAR emphasise the important of networking, both for logistics and science. Collaborations emerge and by developing strong networks, logistical issues can be solved with the support of partners. Challenges remain for PROPOLAR – it can be difficult to adjust plans to fit the timelines of other programmes, and unexpected issues can emerge. But with good communication and cooperation with other programmes, difficulties can be solved.

Recommendations for programmes that host foreign research projects include earliest possible sharing of schedules to allow smaller programmes to more easily fit their plans into larger and more complex schedules and plans. Furthermore, continued improvements to communications before and during the Antarctic field season is always beneficial.

- Polar program that hosts other nations regularly – *V Vitale*

V Vitale presented an overview of the Italian Antarctic programme (PNRA) and their experiences hosting international scientists. From 1985 to 2010 8% of personnel at Italian Antarctic stations were foreign researchers, with 1% connected to projects involving no Italian scientists. There were also several journalists who visited Italian stations during the period.

59% of foreign researchers at Italian stations visited only for one field season. By comparison, 49% of Italian researchers spent only a single season. 80% of journalists/media reps are also only there for one season. It was noted that stays shorter than 3 days are not included in the statistics presented.

Most foreign researchers were linked to Italian projects. This has been quite stable for the last 25 years, and more or less stable for the last 10. In the Ross Sea region, the Italian Antarctic programme has strong cooperation with New Zealand and the US.

The Italian programme provided support for the BBC Blue Planet documentary series in 1999.

PNRA works in accordance with Italian Law, so training courses and medical examination required for visitors. Foreign researchers and other visitors to Italian Antarctic stations must cover travel to a departure harbour or airport, from where travel is organised by PNRA.

There are numerous advantages and disadvantages to the current situation. There is a lot of flexibility, which helps to promote international collaboration. Italian facilities have good connections in the Ross Sea region.

PNRA asks that details of international collaboration be set out in proposals, with information given about funding, to improve sharing of information.

A PNRA call for proposals is also opened each year for journalists, to be reviewed by a panel.

Concordia station has many limitations: on the Antarctic plateau, there is limited space and supporting science being undertaken more than 1km from the station is not easy, and space for work is limited. Only 50 people can be hosted at Concordia. The challenges of working at Concordia are greater for all researchers, than they are at coastal stations.

However, Concordia's position helps to simplify and support access to the plateau, and provides good opportunities for research and collaboration. PNRA can offer support for research activities over a large area thanks to Concordia's position.

At Terra Nova Bay, previously there was only McMurdo and Scott bases nearby. Currently there is also Gondwana and Jang Bogo Station, and a possible additional Chinese station nearby. More collaboration will undoubtedly arise from the proximity of these stations, but organised cooperation in the region is needed to ensure the full potential is realised.

PNRA is involved in discussions with Korean and Chinese counterparts to develop bilateral cooperation agreement for logistics in the Ross Sea and Victoria Land region.

Antarctic programmes need more visibility to the research community; this is fundamental, and it is important to develop a framework for access across the board.

More regulation is also needed, so that issues of sovereignty and jurisdiction that can be challenges to logistics can be addressed. This is more difficult in Antarctica, but clear-cut in the Arctic. Issues have arisen in the past, especially if something goes wrong.

- Access to vessels and difference compared to stations – *M Ojeda*

Miki Ojeda – Moving on to ships, which might provide other limitations to access?

M Ojeda gave a presentation on the access requirements to research vessels, and how this differs from stations, with a focus on the experiences of the Spanish polar programme.

The Spanish polar programme operates two vessels, the Hesperides, an ice class vessel, and the Sarmiento de Gamboa, which does not have ice capabilities, but operates in ice-free polar waters.

The main limitation to access to vessels is cost. Operating research vessels, particularly in polar regions, is expensive. The budget of the Spanish polar programme has not increased for several years.

Vessel capacity is another limitation. Projects wishing to use vessels may not fit within available berths – often, more than one project can't be accommodated. Available berths for scientists can be reduced if additional crew are needed.

Capability is the last barrier. The technical and equipment requirements of all projects cannot always be met by the vessels available to the Spanish polar programme. For example, the Hesperides and Sarmiento de Gamboa do not have deep-sea capabilities. This limits some of the research that can be done.

Geography can also limit access. Vessel planning tries to ensure ship time lost to transit days is minimised. Projects may not be accepted, or modified, to fit within a vessel's pre-existing schedules.

The combination of these factors means that access is restricted. Other restrictions exist to proposals for vessel access, but these are the most pressing.

How to improve access? If it was possible to have a European fleet at our disposal, it would be ideal for improving access – OFEG is the closest thing we have to this, a group of 5 institutions which are the major contributors to marine research, but how much does it cost to charter a vessel from one of these partners?

To improve access, a coordinated European fleet, including research vessels from different countries and institutions together, is need. The Ocean Facilities Exchange Group (OFEG) is a good example of this, including five European institutions. OFEG operates with points-based bartering system to exchange equipment and personnel between vessels. In this way there is no need for any financial exchanges between countries or institutions. The points system allows available capacity on vessels to easily be taken up by projects from other countries, minimising wasted time and capacity, and increasing opportunities for researchers to access facilities for their work. It is a system based on trust between partners, that shared capacity will be reciprocated, and relies on continued communication between partners to ensure any issues can be addressed quickly throughout the year.

Planning within OFEG is mostly done well in advance. It can be difficult to find compromises and flexibility in vessel schedules. Operators used online planning tools to track vessels and equipment, and plan for future activities, including through OFEG.

Improving access to research vessels needs to be done collectively to be successful. Perhaps a change of model is needed, moving beyond national facilities for national researchers, with any remaining capacity for guests. By coordinating a fleet of vessels at a European level providing access to all researchers, while continuing to recognise research vessels as national assets, access will be improved and wasted capacity reduced. This required careful planning in a fully coordinated manner.

To conclude, this kind of access needs to be done collaboratively, but perhaps we need to change the model. Perhaps we need to find other ways beyond just having our own researchers, and then seeing if we have space for guests. Also, we need to have more planning in advance.

It was noted that heavy icebreakers, such as the Polarstern, are not part of the OFEG system, as their high running costs are not comparable to other research vessels. Furthermore, there are most requests for access to icebreakers than for other vessels.

Coffee break 10.30 – 10.45

Session 2 – 10.45 – 12.15

Presentations on existing initiatives that aim to improve cooperation and access to polar infrastructure:

- INTERACT (Arctic terrestrial) – *H Savela*

H Savela presented INTERACT and its transnational access programme. INTERACT is a network of terrestrial field stations around the Arctic. Through its transnational access programme, INTERACT provides travel and logistical support, and subsistence for scientists, facilitating around 7820 days of in-person field access, and more remotely.

The INTERACT transnational access call is open annually, with proposals reviewed on science, by a panel. Recommendations are then made to stations, which have the final say if they are able to host researchers. An online system, INTERACCESS, is used for the transnational access proposal and review process, with project teams also reporting on their work via the same system. In addition to the call for in-person access, there are four calls for remote access each year, whereby station staff

collect samples and measurements on behalf of scientists. To date, there has been 169 projects and 375 scientists supported via INTERACT's transnational access system, and 42 of the 43 the available stations in the network have been made use of.

INTERACT's transnational access programme has high approval ratings from participating researchers and hosting stations. The network facilitates the continued development of a community of scientists and stations, and fosters collaboration through access. Furthermore, transnational access allows more efficient use of infrastructure, and reduces the amount of unused capacity at Arctic research stations.

INTERACT's streamlined system allows for easier management of a large number of projects and stations, and allows easy contact with scientists and station managers to follow progress through the INTERACCESS system. The system also allows INTERACT to receive feedback from researchers and stations, which helps to improve the programme.

Allowing stations to have the final say on access to their facilities is important. This allows them to follow their own procedures and fit INTERACT projects into their planning as well as possible. There is plenty of flexibility in the system and process, which allows INTERACT to work well across 13 countries and between different stations.

There are limitations to the transnational access programme. For example, where it can be seen that projects could be done elsewhere that the station applied to it is difficult to direct scientists to alternatives. Issues relating to import/export and customs for samples and equipment also exist, and are non-homogenous, as they are determined nationally. INTERACT encourages scientists to seek support with permitting at the earliest opportunity. Some transnational access users also find reimbursement processes difficult, as there are sometimes large initial costs to later be claimed back from INTERACT. This can be challenging, but the procedure is clear and open from the start.

There are novel solutions to these issues, such as remote access, removing the necessity for scientists to travel themselves to field sites. Remote access is part of the same application/review/feedback process as transnational access. It helps to reduce environmental footprint, and is useful for multi-station approaches. To facilitate remote access, it is important that project set up and procedures are simple, such that station staff can easily carry out the require work. Sometimes transnational access project proposals are granted remote access if it is felt that station staff could complete the work.

INTERACT also offers virtual access to stations in its network, directing scientists to databases of observation data from stations. There is no application process for INTERACT virtual access, and anyone can use it. Currently 18 INTERACT stations offer virtual access. Some stations have noted a 400% increase in the use of their data thanks to INTERACT's virtual access programme.

INTERACT's experience is that its system for access to stations works well and helps to harmonise access requirements and practises. The system allows for a certain level of standardisation, while also making space for station-specific budgets and requirements. The system's feedback loop for scientists and stations helps further standardisation and to improves the communication between the different parts of the access system.

INTERACT's 5 recommendations for best practise in polar infrastructure access:

1) What is aspects of the system for access are joint and what are up to individual stations? – work this out.

2) Define which parts of your system for access can take into account differences between stations.
3) Make sure feedback is efficient and used continuously to streamline the process.
4) Start small, and have options for this (e.g. pilots) and use the experience from the start to build further on.
5) Simple is best.

- Pilot COMNAP Antarctic Peninsula efficiency task force initiative (Antarctic terrestrial & marine) – *A Quesada*

A Quesada presented the pilot COMNAP Antarctic Peninsula efficiency task force. The task force was working throughout the 2018-2019 Antarctic field season, and includes colleagues from Chile, Korea, Poland, Spain and Turkey. The task force was led by A Quesada and A Kruszewska.

The Antarctic Peninsula has over 40 research stations operated by different countries, making it a complicated region for logistics, but also a good area for cooperation opportunities. The task force noted that bilateral cooperation works very well in the region, with movement of personnel and equipment between one country's station and another working well and issues usually resolved easily. It was also noted that science in Antarctica is limited by logistic constraints, and logistics eats up the budget. Furthermore, more often than not, infrastructure is not used to fullest capacity. It is therefore important to work to try to improve efficiency of infrastructure use, so to enable more research to be completed.

The task force developed a points-based bartering system, similar to that used by OFED. They then ran an analysis of the season's logistics to estimate the financial saving that could have been made, had it be employed – approximately USD 1.5 million. Using the points-based system could have reduced costs for programmes in the task force, ensured that infrastructure capacity is more fully utilised, by enabling access to facilities for researchers between countries. As there points-based system requires no financial transactions, difficulties relating to payments between countries are avoided.

1.5 million USD could have filled 600 empty seats to transport scientists to or from the Peninsula, or used for 100+ cargo containers. With more countries involved in such a system greater savings could be made. The system improves the sustainability of science, reducing carbon footprints and reducing wasted infrastructure capacity, freeing up programme budgets for science.

It was noted that increases in sustainability and efficiency in Antarctic logistics can only be achieved with greater cooperation between countries.

It is intended that the model system will be implemented as a pilot system with the task force members. A pilot program would also include port authorities in Punta Arenas. It was noted that timing is crucial to make the pilot a success, it is necessary to be flexible in accommodating schedules, but planning and scheduling in advance is crucial.

The task group is open to the involvement of other countries once the pilot is over. A paper will be published to summarise the results of this novel approach to Antarctic logistics.

It was noted that better integration of science and logistics is needed to truly realise the potential improvements to efficiency and access to infrastructure in the Antarctic. However, it was noted that previous attempts to do this have met with difficulties. Furthermore, by better coordinating logistics, more opportunities for science emerge.

- ARICE (Arctic Marine) – *N Biebow*

N Biebow presented the European-fund project Arctic Research Icebreaker Consortium (ARICE). While focus on the Arctic, ARICE is considered as a pilot project that could potentially be expanded to the Antarctic in future. ARICE has 16 partners in 13 countries, including two non-European partners from Canada and the United States.

There are not many icebreakers available for research, and so a coordinated approach to the available facilities is necessarily to support access to the central Arctic Ocean for research. Research icebreakers are operated in the Arctic by Russia, but access for European researchers to these facilities is difficult.

In the face of this limited capacity, ARICE wants to coordinate better access to available icebreakers. The ARICE project is based on EUROFLEETS, an earlier project coordinating access to European research vessels in all regions (including the Arctic), which has recently been funded for its third phase as EUROFLEETS+.

All icebreakers in ARICE are nationally owned and have to fulfil national research priorities first – access is through national programmes, the schedule of which is independent of international scheduling.

Access to icebreakers for research in the Arctic is can be limited by geography and by budget. There are also limitations on capacity. Duplications of work can occur due to national programmes working without coordination, and the limited capacity for international projects in icebreaker schedules.

Most icebreakers work in the Arctic and Antarctic, meaning that significant time and money is lost to transit between the poles each year, with heavy icebreakers operating in ice-free waters. Through better coordination of icebreaker fleets internationally, time operating in ice-free waters could be reduced.

There is a lot of demand to streamline the processes for access to icebreakers in the Arctic, and to this end a lot of work has been done by ARICE to establish industry dialogues and expand opportunities for researchers to access non-research icebreakers for their scientific work.

ARICE is working to improve research capacity on ships, and planning for virtual access.

There are 6 icebreakers in ARICE's transnational access programme, including one industry vessel. Compared to static infrastructure, such as stations, access to icebreakers in ARICE needs to be very clearly defined in terms of what region the vessels are available to work in, where researchers must travel to, and when the icebreaker access is available. Several proposals for icebreaker access through ARICE failed as they did not meet these restrictions. There are also eligibility restrictions for researchers to access icebreakers through the transnational access programme, which are clearly defined. A scientific liaison panel evaluates proposals received, firstly on scientific excellence, and logistical viability secondly.

The logistical viability of transnational access projects is assessed by ARICE, and projects placed with the most suitable vessel (this may not be the vessel to which the project team applied to access). Granted projects may use their awarded ship time without any cost.

The transnational access programme emphasises access to icebreakers for researchers from countries with no icebreaking facilities of their own. Project teams from any country, not only countries involved in the project, may apply for transnational access through ARICE, but not to access their own national icebreaker. ARICE also has a strong focus on encouraging early career

participation in icebreaker-based research, including as part of transnational access project teams, and through various training and capacity building elements of the ARICE project.

It was noted that ARICE has some weaknesses. The high costs of icebreaker operations mean that financially the project may difficult to sustain beyond its current funding period. Additionally, ARICE provides only access to icebreakers – research teams must use additional funding for their scientific work while on board. The restrictions for access through ARICE are also quite narrow, in terms of time windows and working areas geographically, that do not always meet the scientific needs of researchers.

It was noted that operators of icebreakers have the final say on the research teams they host on board their vessels.

It was noted that ARICE is a spinoff of EUROFLEETS, and only has funding for its current list of vessels to participate in the transnational access programme. After this first phase, it is intended that ARICE will expand to network with smaller vessels as well as large icebreakers. Smaller, ice-marginal vessels are accessible through EUROFLEETS+, whereas ARICE is currently focused on large, heavy icebreakers in the Arctic only.

- EUFAR (Research Aircraft access) – *P Brown (online)*

P Brown, joining the workshop remotely, presented the European Facility for Airborne Research (EUFAR). EUFAR is engaged in various activities including knowledge exchange, transnational access, communications and outreach, and joint research activities.

EUFAR has a long history and a series of projects in European framework programs – providing transnational access to European research aircraft since from 2004, up until the end of the Framework 7 funding period. EUFAR does not currently have funding for its transnational access programme to research aircraft.

EUFAR-AISBL is a non-profit organisation established to continue the work of EUFAR projects. EUFAR does not operate polar-specialist aircraft, but does operate in sub-polar regions, and in Svalbard, the Swedish Arctic and Alaska. EUFAR does not currently operate in the deep Arctic or the Antarctic.

As an international non-profit, EUFAR aims to develop open access to the existing fleet of European research aircraft. An OFEG-like points-based barter system has been considered, but issues regarding aircraft certification and the transferability of instruments make this more complex than for vessels.

EUFAR's access process in the past has been similar to that of ARICE. Proposals are published on the EUFAR website, which are peer-reviewed by experts who make sure proposals meet a threshold for scientific excellence, before an independent selection panel makes decisions. Our criteria were similar to ARICE and proposals were prioritised for those who did not have access to suitable infrastructure via national funding.

EUFAR's strengths are numerous. Where separate access funding is available they provide the user with cost-free access and limited travel support, and have enabled transnational access linked to supported national campaigns, with a range of facilities available (e.g. atmospheric research and remote sensing aircraft across Europe).

There are also limitations. EUFAR can't support transit flight costs to bring an aircraft to a specific location, and there are variable and high costs for aircraft activity. Through its transnational access programme, EUFAR could normally only provide 10 hours, which equates to approximately two observing flights. This is very limited in comparison to the access provided by national programs.

Coordination and combination of access with larger nationally-supported campaigns went some way to offsetting this limitation.

EUFAR also had issues attracting peer-reviewers for our panels, which caused significant delays to approve projects.

It was noted that researchers are not able to apply to access their own national infrastructure through EUFAR, but beyond that, they are able to apply for the facility they choose. Applications from early career researchers were encouraged, and EUFAR was able to help direct them to the most appropriate facilities for their research that were logistically possible.

EUFAR's recommendations based on experience are as follows:

1) Access calls for aircraft should have a timescale of 18-24 months in advance of the intended flight campaigns, as research aircraft schedules are usually planned this far in advance – it can difficult to get this across to the researchers who are applying for access and hope for shorter planning periods.
2) Working with other networks (for atmospheric research etc.) allows us to combine aircraft with other facilities. Coordination of access to different types of infrastructure is beneficial – EUFAR has had some successes this way, and in future projects that benefit from access to multiple RIs should be encouraged.
3) Calls for proposals to access infrastructure should be linked to broad strategic objectives so as to enhance their scientific impact.
4) External funding to support transnational access is needed.
5) Link to existing projects clustered in a geographic area in order to minimise transit flight requirements.
6) Link with existing peer-review systems to evaluate proposals, to reduce the need to attract new reviewers.

- *GEOCRI* (In situ observing system infrastructure) – *Y Qiu*

Y Qiu presented the GEO Cold Regions Initiative (GEOCRI) to the workshop, focusing on in situ observing infrastructure and access to data infrastructure. Additionally, the presentation touches on the Himalaya Third Pole region, and experiences there that are of possible value to the Arctic and Antarctic.

The Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS) are a system of initiatives by observing systems. GEOCRI is the polar and high mountain component of GEO. GEOCRI focuses on data more than infrastructure, before working with communities of researchers to analyse and apply that data on a larger scale.

Under its new director, GEO is shifting to a cloud-based, user-driven approach to data. Data is input from in-situ and satellite observations into an online system to empower experts across the globe, as the system allows for virtual access. GEO focused on open data for the first 15 years, but there is now more of a focus on open science more broadly, and support for the reproduction of data.

GEOCRI is a cross-cutting initiative for multiple regions. It aims to provide a service to Earth observation users. We want to provide Earth observation data to support decision making around a variety of activities.

GEOCRI has three pillars. The first is infrastructure. GEOCRI aims for new receiving stations to be established for satellite observations, and to improve the in-situ observation network and observatories involved. There has been a recent call for more observatories globally.

Secondly, GEOCRI aims to improve the GEOSS community data portal to ensure the data is open and accessible to all.

Thirdly, GEOCRI aims to develop cold region 'essential variables'.

GEOCRI's end goal is to support global policy and open science initiatives be improving coordination of the observations for cold regions.

GEOCRI works extensively in collaboration with polar partners, and have links with INTERACT and INTAROS. GEOCRI also works with HiMAC, which works on linking the alpine regions with the polar regions, as well as with polar data committees (e.g. SCADM at SCAR).

GEOCRI has met with difficulties in coordinating activities between many different countries, particularly in collating data from the polar and Himalayan regions.

A new project is soon to be launched to, which will improve the use of observation data to support navigation at sea.

The High Mountain Asia Regions (3rd Pole) includes many important and protected areas for observation. GEOCRI is currently collaborating with observatories in Central Asia and South Asia to study downstream effects on huge populations which will be affected by climate change in the Himalayas.

Further information is available in Y Qiu's presentation slides.

Session 3 12.15– 13.30

Brainstorming session:

It was noted that presentations had identified several best practices that can be explored and implemented to improve access to polar research infrastructure, notably points-based bartering systems for exchange of personnel and equipment between national facilities and logistics.

ACTION – Explore further development of points-based bartering systems for infrastructure and logistics access.

Discussions noted that, while it seems simple and well-known, improving communication and information sharing between operators is an important element in improving access to infrastructure. This can be informal communication between operators on their different capabilities and excess capacity that could be used by others, or through a more formal system.

It was also noted that infrastructure managers and researchers should clearly define what information they need, and when it is needed to better plan and facilitate access to infrastructure.

A standardised format for information exchange for infrastructure access would be useful. A standard system or central information point where requirements and eligibility for access to infrastructure can be easily found by researchers would be beneficial, along with clear information on the processes that are to be followed to access different infrastructure. This information could be incorporated into the European Polar Infrastructure Database.

ACTION – Explore possibilities to improve information on infrastructure access requirements and eligibility for researchers in the European Polar Infrastructure Database.

ACTION – Explore possibilities to standardise the format of information on infrastructure access requirements and eligibility, and on processes for access, between national operators.

The importance of advanced planning and information for infrastructure managers was emphasised. While spare capacity may be available at short notice, to host additional researchers requires planning.

It was noted that in order to minimise the environmental impacts of research, particularly in protected areas, researchers should be encouraged to make more use of remote or virtual infrastructure access, and operators should work towards using their infrastructure at full capacity to ensure efficiency.

The importance of balancing national priorities with requests for access from partners in other countries was noted. Research and polar infrastructure are national assets and there are political dimensions involved in access and collaboration between partners. To full integrate and harmonise infrastructure access and logistics, it will be necessary to better harmonise and coordinate research and science priorities between countries. When planning for logistics, science needs to be taken into account, and vice versa. Improvements can be made by focusing on logistics when it comes to filling empty seats and ensuring infrastructure capacity is not wasted, but a two-pronged approach is needed to truly optimise infrastructure access, whereby science and logistics are both coordinated together at an international level. However, it was noted that national research agendas and science funding are linked with sovereignty and other issues that mean there are limits to feasible coordination at an international level. Focus should be kept on the simple and effective options to improve infrastructure access and coordination, and to reduce wasted capacity.

The EPB was identified as a possibly suitable body to help facilitate coordination of scientific priorities between its Members, and that can identified overlapping strategic priorities for research. This information could be utilised to then better coordinate logistics between Members. However, it was noted that the polar research community is not euro-centric, and so there are limits to the amount of scientific coordination that can be achieved through the EPB. SCAR and IASC already focus on international science, and have a fuller overview of research priorities. Possibilities for more regional coordination of polar science could be explored by the EPB and its Members none the less.

It was noted that an online tool to organise infrastructure access and highlight spare capacity that others could use, would be useful. It was suggested that this could be adapted from existing systems used for other purposes, such as ship planning or even hotel booking systems. Existing systems could be adapted and expanded to meet the requirements of the research community. Such a system could integrate a points-based bartering system for infrastructure managers, and be integrated into the European Polar Infrastructure Database.

It was noted that any online infrastructure access system needs to be very user-friendly, with an easy and intuitive interface. Furthermore, it relies on infrastructure managers inputting information voluntarily. An incentive, such as a clearly demonstrated benefit to operators, is needed.

It was further noted that keeping any planning tool open and visible to all is necessary to make it successful. For such a tool to work, researchers and infrastructure operators need to be able to see what others are doing and planning with logistics, so that opportunities to coordinate can be identified.

ACTION – Explore possibilities for an only system for infrastructure access.

Different countries have different infrastructure planning regimes, meaning that advanced scheduling of vessels and other infrastructure is not always compatible. Previous efforts have been made to develop an international scheduling tool for vessels, but this relies on operators inputting their cruise information to a database and regularly updating it. There needs to be an incentive for operators to prioritise this task and allow information to be gathered in one place, which will allow opportunities for access and using spare capacity to be identified.

It was noted that within COMNAP, it seems operators are gradually moving towards longer planning periods. This could be an opportunity to move towards better coordination.

The European Infrastructure Database and Catalogue are a tremendous resource that should not be forgotten. It was emphasised that any system to improve access should be developed as an expansion of the database. INTERACT's experience is that this is the best approach. A metadatabase, giving information on research projects, linked with the infrastructure database is useful for proper coordination of science and logistics.

In order to fill spare logistical capacity that comes available at short notice, a waiting list of smaller projects could be kept that are ready to fill the capacity. This could perhaps prioritise early career researchers' projects, education and training, or even journalists and outreach initiatives. This would only be feasible if requirements for access are already met, and projects are ready to work at short notice. Information on available capacity would also need to be shared quickly and efficiently.

It was noted the in Antarctica, science and logistics are very international making the application of European regulation and coordination less feasible than in initiatives such as INTERACT and ARICE in the Arctic. In Antarctica there are many different approaches and regulations that have to be considered.

Emphasis was again made on the importance of information sharing for both science and logistics between countries. Managers have a good overview of their national situation, but less so when it comes to international activity. Science and logistical coordination require different approaches, but information sharing is the key to better coordination of both.

It is suggested that adding information on research and science to the EPB database would be a good first step towards integration of science and logistics. By sharing information on logistical and science activities in the same place, opportunities for coordination will begin to emerge.

It was noted that there is a mismatch in the approaches to logistics and science. The scientific community considers itself very international, with scientific questions taking the lead. Conversely, logistics in the polar regions are mostly operated under national control, with infrastructure considered as national assets. In the Arctic, these different approaches are often circumvented by bottom-up approaches by scientists and individual infrastructure managers at a small scale. Protocols and regulations, and the necessity of larger scale logistical support for science, mean that such approaches are more difficult in the Antarctic.

Emphasis was made on the importance of beginning small, and improving access to infrastructure on a small scale. Opportunities to expand can be found later once successful approaches are established. It is important not to be discouraged by what is not possible, and focus on the improvements to infrastructure access that can be made easily now. There is not a universal approach that will work perfectly in both the Arctic and Antarctic. A tailored approach to the specific challenges of access in both regions is preferable.

M Ojeda thanked all presenters and participants for their input to the workshop and fruitful discussions.

END

WORKSHOP ATTENDEES

Name	Organisation
Miguel Angel Ojeda	Council for Scientific Research
Christo Pimpirev	Bulgarian Antarctic Institute
Yubao Qiu	GEO-CRI
Kelly Falkner	COMNAP
Nicole Biebow	Helmholtz Association, AWI, ARICE, EU-PolarNet, SIOS
Antonio Quesada	Ministry of Economy and Competitiveness
Dick van der Kroef	Netherlands Organisation for Scientific Research
Piotr Głowacki	Polish Academy of Sciences
Agnieszka Kruszewska	Polish Academy of Sciences
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Vito Vitale	Italian National Research Council, SIOS
Geir Gotaas	Lead, NPI's Ny-Ålesund Programme
Amie Jackson	British Antarctic Survey
Joseph Nolan	EPB Secretariat
Iqra Choudhry	Rapporteur

Attending online

Kirsi Latola	EPB, Thule Institute, UArctic, INTERACT
Phil Brown	EUFAR