



EPB discussion meeting on COVID-19 disruption to polar fieldwork and responses by Members

Attendees: J Francis (Chair, NERC), D Mateev (BAI), V Vitale (CNR), M Azzaro (CNR), J Sorribas (CSIC), M Ojeda (CSIC), G Vieira (FCT), MT Cabrita (FCT), N Biebow (HGF), J Chappellaz (IPEV), A Quesada (MINECO), A Barbosa (MINECO), H Burgess (NERC), D Blok (NWO), R Hokwerda (NWO), J Jania (PAN), ET Nielsson (RANNIS), N Koç (RCN), G Gotaas (RCN), V Willmotte (ARICE), J Ngo-Anh (ESA), A van Ombergen (ESA), J Mercer (FARO), R Badhe (Executive Secretary), J Nolan (Policy Officer), L Bellamy (Rapporteur)

Information provided online prior to meeting: P Huybrechts (FWO), T Giberyen (polar.lu)

1. Welcome - Jane Francis (NERC)

The aim of the meeting is for EPB Members to share information on the disruption to planned Arctic and Antarctic field seasons due to the COVID-19 pandemic, and their responses. COMNAP have held several meetings to discuss what individual national programs plans are in the Antarctic. One of the most important messages underlined from these meetings has been the importance of all operators following consistent quarantine measures. Particularly, while in the field and interacting it is essential to know that all individuals are following the same level of quarantine and trying to prevent the virus entering stations or research teams. In Antarctica, planned science activities have been severely reduced for the coming season, with many programmes only keeping necessary operational activities at stations. There is a high capacity for lesson-learning in relation to the current situation, such that in the event of similar disruption on a global scale in future, the polar research and logistics community will be better prepared and experienced to handle the situation. It is important to maximise information and experience sharing to ensure best possible preparedness for future issues of similar scale. This meeting contributes towards this goal.

Agenda:

- Slides and oral presentations by Members
- Short break
- Discussions and questions

2. Housekeeping – Joseph Nolan (Secretariat)

J Nolan gave a brief overview of the technical running of the meeting and presentations using the Zoom videoconferencing system. A recording of the meeting will be available on the Members' area of the EPB website.

3. Presentations

3.1 Jane Francis (NERC)

J Francis highlighted that at the end of last season 150 people were stuck as Antarctic gateway cities were closed. The next season has two scenarios planned for the Antarctic. In the first scenario the season will be kept to a minimum. To avoid all gateway cities, BAS will take RRS James Clark Ross with approximately 45 staff, who will be quarantined before departure, directly from the UK to the Antarctic. Roughly half will be winter-overs who will swap over with returning staff from Rothera.

The ship will refuel in the Falklands before going straight to Rothera. Rothera and South Georgia will open, but Halley and Signy will remain closed. Some long-term monitoring and equipment on Rothera and South Georgia will be maintained, but no major science will be performed during the season. No BAS aircraft will go into the field except for two BAS aircraft stationed in the Falklands in case of emergency need. If the situation begins to improve by September 2020, a second scenario may be followed instead, in which more people and more science activity can go ahead in Antarctica. Further people will be transported to Antarctica by air and, if possible, BAS aircraft will be brought from Canada to allow activity further into the continent, including for the large Thwaites project.

Construction work will continue at Rothera if possible to safely transport the construction team there.

3.2 Henry Burgess (NERC)

The UK Arctic Station in Ny-Ålesund did not open as planned in March, and remains closed. The early and middle parts of the season cancelled. It is hoped that work will start again next year but no further work this year. There is a chance the station will be opened for a week this season, but decision not made. James Clark Ross was not due in Arctic in the 2020 summer, but plans for the visit of blue-water ship James Cook remain suspended. Most fieldwork by university/institutional researchers in Norway, Canada, Greenland and Russia has either been halted or postponed to 2021. Negotiations with teams from UK joining final leg of MOSAiC, through work of AWI and planners on ship teams will be able to join the Polarstern, if final leg goes ahead.

Response to challenges: UKRI fund good proportion of Arctic science and have agreed no-cost grant extensions in a number of cases, and PhD students have been given extra time. UKRI is trying new approaches with instruments like the UK-Canada bursaries (bursaries to get UK-based researchers in Canadian projects over summer). Most of their research will not happen as originally planned, but plans being reworked to see if research teams can work with local residents, indigenous communities to gather some samples, and maintain equipment. Also researchers are thinking about using remote sensing and previously inaccessible datasets. Work with Russia continues strongly, and there are good examples recently from UK researchers building partnerships with Russian colleagues, which gave them access to previously inaccessible datasets. Other measurements will not take place in Arctic this season, perhaps some pre-existing ones could be used. There remains continued commitment to international partnerships. There are good examples of webinars and other links so far in last 3-4 months, these will increase in number in the future.

3.3 Andres Barbosa (MINECO)

Most plans for Spanish fieldwork in the Arctic this season have either been postponed, or cancelled. A project in Alaska plans to use INTERACT facilities, awaiting news from INTERACT, but possibly cancelled. A project that was included as part of MOSAiC has been modified. Two Spanish projects were planned on MOSAiC, only one will now go ahead due to reduction in number of people that can be on board the ship. They will have the Spanish experiment's equipment on board but no Spanish researchers on project.

3.4 Antonio Quesada (MINECO)

The last Spanish Antarctic season was closed in a rush, and Spanish programme staff and researchers were able to catch the last flight from Montevideo back to Spain. For the upcoming season, a full programme of science is planned in case it is possible to go ahead with activities. The programme is dependent on Antarctic gateway cities and ports, particularly in Chile and Argentina, but trying to find other gateways to Antarctica as alternatives. Facilities need to open for logistics and essential maintenance, and what science is possible will be completed. Spanish Antarctic stations are summer

only. Ongoing work with COMNAP in bilateral agreement with other countries is finding the best/safest approach to get to Antarctica, with the main objective being not to bring the virus into Antarctica. Two key points are noted:

- 1) The programme team will quarantine in Punta Arenas, with isolation of staff, medical monitoring and several COVID-19 tests completed, before staff are transferred directly to the ship for transportation to Antarctica. This year the Spanish Programme will only use ships from Punta Arenas to King George Island, and no flights. There will be lower activity than usual, as there is less capacity for movement from South America to Antarctica.
- 2) Secondly, while in Antarctica, the Spanish programme will remain isolated. No visitors will be allowed to enter Spanish facilities, and no visits will be made to other facilities by members of the Spanish team. No tourists will be accepted at stations. Non-Spanish researchers are able to join the Spanish team, but from a restricted limited listed of places, and they must all strictly follow the protocols set out by the Spanish programme.

The current length of quarantine is to be determined with the gateway cities used, but it expected to be 14 days. If the required quarantine length anywhere is increased to 1 month, options at other gateway ports may be explored.

3.5 Geir Gotaas (RCN)

G Gotaas presented the rules and regulations that apply to Svalbard, and particularly to Ny-Ålesund. Travellers to Norway are required to be in quarantine for 10 days, this rule also applies for Svalbard, but the quarantine must take place on Norwegian mainland, and cannot be on Svalbard. After 10 days of quarantine on the Norwegian mainland, travel to Svalbard and to Ny-Ålesund is permitted. There are some exceptions to the rule; visitors from Finland, Denmark, Greenland and Iceland do not have to quarantine. New rules in effect on 15th July that states that regions from within EU with low infection rate also exempt from travel and quarantine regulation. Updates about which countries exempt: <https://www.fhi.no/en/op/novel-coronavirus-facts-advice/facts-and-general-advice/travel-advice-COVID19/> and also <https://www.researchinsvalbard.no/>

UNIS has cancelled all courses this summer and autumn, no new students are being admitted, and restrictions on fieldwork are in place. Students already in Svalbard will remain accommodated, but UNIS will have minimal operations this autumn 2020. For Ny-Ålesund, general rules about travel to Svalbard apply. To minimise risk locally some specific measures for Ny-Ålesund are in place: reduced capacity, usual shared bathrooms are now separate, hence capacity for number of researchers is reduced. Research planning should follow normal procedures as described in the researchers guide to travel. The Norwegian polar research ship Kronpins Haakon had two planned research cruises in 2020 that have been postponed to 2021. One of these linked up to Nansen Legacy, the other focused on researching plastics in Arctic Ocean. The usual polar bear research and monitoring, which takes place in spring, is postponed to autumn 2020. The key priority is secure integrity of long time series. For Ny-Ålesund based projects, all researchers have been encouraged to provide information on type of activity; should capacity increase, maintenance and long time series will be prioritised. INTERACT projects have lower priority, and NPI technicians are taking over measurements from CNR who have sent their staff home to Italy.

3.6 Nalan Koc (RCN)

RCN have cancelled two cruises, but will run two scheduled cruises, including a Fram Strait monitoring cruise. Both scheduled cruises will only have Norwegian researchers on board. The Kronpins Haakon had planned to conduct some ice research, this will be accommodated by taking samples on behalf of non-Norwegians, who are not allowed on board. Regarding the Antarctic,

meetings with COMNAP have been ongoing. The priority is running of the station and safely exchanging overwintering staff. Limited research projects will be able to take place on the station, with and priority will be for long-term monitoring, which will be run by station staff. Plans are being made for both options of using Cape Town as gateway as usual, and second possibility is direct transport from Norway, with a stop either somewhere in Europe or north Africa for fuelling. In general, a limited season with only necessary staff for running station is expected.

3.7 Jérôme Chappellaz (IPEV)

Arctic: There has been a delay or cancellation of Arctic activities - most projects (except those in Svalbard/Norway) have been cancelled. Dependent on regulations set out by Norway, winter-over staff have been sent to Svalbard in early June with a 10 days quarantine on mainland Norway.

French austral territories in the Indian Ocean: Replacement of staff has taken place during containment/lockdown. This took place after quarantine and testing of expeditioners and ship staff at Réunion Island late March. This was successful, and could get them to the three sub-Antarctic islands without contamination. The returning staff had to get back to France and then their respective homes mid-containment/lockdown. This was difficult to organise as there were two Japanese, one Canadian and one Brazilian expeditioners, but managed with help from the French ministry of foreign affairs and custom officers. The main constraint were flights from Réunion during the peak of the COVID-19 situation.

Antarctica: J Chappellaz emphasised and acknowledged of the work of COMNAP, especially Kelly Falkner, Chair of COMNAP, and Michelle Rogan-Finnemore, the Executive Secretary. There is strong networking within COMNAP, this was particularly useful in handling crisis situation where IPEV shared its circumstances and tried to find best ways to operate with common gateways. BAS is also an important partner for IPEV because of its airborne capabilities. Currently IPEV winter-over staff are safe at Dumont D'Urville and must remain as such. For 20/21 field campaign priority is the change of winter-over staff, ensuring proper refuelling and maintenance of stations (Dumont D'Urville, Robert Guillard and Concordia station). The priority is to support long-term observatories, and prevent interruption of time series. Most projects that do not have long term observations have been postponed, including Beyond EPICA, which is postponed until 21/22. Concordia will be shifted into "winter mode" earlier than usual in relation to Italian colleagues who chose to close two stations earlier. Mario Zuccheli station is relied upon for airborne support for Concordia. For transfer of cargo to Concordia, only two logistic traverses will be made, for refuelling and transport of necessary cargo. IPEV have organised a strong reduction of both technical and research staff for Concordia. This year only 3 French scientists and 3 Italian scientists will travel to Concordia. Travel will be kept limited, with expeditioners transported in batches, as this makes it easier to handle quarantine in gateways. Most staff carried to Dumont D'Urville will be by the L'Astrolabe ship, starting from Hobart or Melbourne, depending on Australian constraints. There is continued coordination with Italy, so French and Italian staff will be transferred using Hobart as a gateway. Negotiations are ongoing with Australia about the place for quarantine; Hobart is preferable as location of connections onwards, however due to local restrictions, may have to use Melbourne or Sydney instead. In any case, this ship will have to go through Hobart for fuel. Regarding the return transport of winter-over staff on L'Astrolabe, negotiation is now if Australia will impose quarantine coming back from Antarctica. This might be a problem as winter-over staff would find difficult if another period of quarantine would be needed following their winter isolation. Operators are collectively working to convince Australian authorities that staff coming back from Antarctica are perfectly safe and need not quarantine. It was also noted that over-winterers coming home from Antarctica are also vulnerable as their immune systems are weakened.

3.8 Gonalo Vieira (FCT)

The Portuguese programme are small and without its own logistics. In current season, ProPolar have one project in Arctic Canada in February. Other projects currently ongoing in Iceland, these were deployed during the crisis and were possible to continue due to cooperation with Icelandic authorities – with participants undergoing quarantine before heading out to the field. Other Arctic projects have been postponed; this is significant for one marine project TINYARCTIC from University of Puerto. Two other projects to be held in Canada have been postponed until 2021.

The Portuguese campaign in Antarctica is implemented with several other partner programs, and have in general, 8-10 research projects in Antarctica every year. Around January each year, the Portuguese programme charters an Antarctic flight for about 60 seats – many of these are open to partner programs flying from Punta Arenas to King George Island, thus contributing to international logistics. Most Portuguese projects in Antarctica are single year projects and so are not severely affected as they have been postponed until next season. The call for projects for 20-21 season has been suspended, call opening same time next year. With reduced operations in Antarctica, there have been requests to integrate Portuguese researchers with other operational polar programs, so are expecting logistical support for projects. We are negotiating with logistical partners to address our needs due to observatories we run across the Antarctic peninsula. The programme is responsible for maintaining permafrost observatories and are negotiating with logistical operators for the maintenance of these observatories.

3.9 Egill N elsson (RANNIS)

Main disruptors have been individuals travelling into Iceland and Icelandic researchers going out, especially participating in larger international projects. Iceland is close to being back to normal – from 15th June, individuals can enter and take a test, and if they have not been in an area or near a person with infection, a 14-day quarantine is not required. There is an opportunity to keep up fieldwork in Iceland, however there are risks involved. Research in Iceland has not been disrupted as significantly as in other places.

3.10 Nicole Biebow (HGF)

MOSiAC: N Biebow presented a short video of the exchange of MOSAiC personnel between the Polarstern and the Sonne and Maria S Merian. Those joining the Polarstern had spent 14 days in quarantine before boarding. One crew exchange was missed as could not fly by Svalbard; potential plan for a charter ship to provide support (not yet confirmed). MOSAiC expedition will continue until the end. All German vessels had to come back to Germany, only performing cruises from and to German harbours, but foreign researchers are permitted to join if they follow set German protocols. The main challenge was to get the recently returned staff and researchers home from Germany, particularly the non-Europeans.

Arctic: All other expeditions for all Germans in Arctic have been cancelled and there will be no cruise or flight campaign this year. There is a German station in Russia which urgently needs maintenance and technical support, and as negotiations continue, hopefully this will be carried out by Russian colleagues. Colleagues from Geological Survey had to cancel Arctic expeditions that were to take place in the Canadian Arctic.

Antarctica: For Neumeyer station, staff will travel from Germany on the Polarstern straight to Antarctica, exchange winter-over team. The ship will bring the required but reduced staff to ensure long-term observations can continue. Marine expedition with Polarstern for long-term observations of the Weddell sea will take place, the ship returning directly back to Bremerhaven with stops only for fuel. This means for a simple cruise to Antarctic, staff will be away for nearly 5 months. For

access to Carlini station, Argentina has requested staff undergo a two-week quarantine in Argentina, and then another two week quarantine in Marambio station before reaching Carlini. There will be no flight mid-season, so researchers at Carlini will need to stay for the entire Antarctic season. It is currently unclear if returning staff will have a quarantine again in Argentina at the end of the season. A master's program run at St Petersburg has been interrupted and will now move to an online format.

3.11 Vito Vitale (CNR)

Antarctica: Concordia activities are secure particularly the long-term observations. Minimise impacts on future expeditions and activities, minimise tourism; science and logistics priority. Postpone any unnecessary new activities and projects. We have set up prioritised lists for all activity, both logistics and science and are collecting all information from projects, until the end of June. Constitution of science teams serving all identified activities at Concordia and Mario Zuccheli stations, will happen by the end of July. Complete plan for oceanographic campaign, has been postponed to February 2021. As J Chappellaz explained for Concordia, three Italian scientists will work as a team with winter-over staff to manage activity to preserve long-term observation and secure the winter operation of science in the upcoming season. The exchange of personnel is planned for December and will leave through Australia. For Mario Zucchelli, the logistics plan is to use flights for transfer, as there is some support from Australia and New Zealand. The Italian ship is in the process of being equipped with instruments, but work is delayed due to COVID-19. The idea is to have ship at disposal for latter half of December, around Christmas, so expecting to use ice craft to transport people when Mario Zucchelli starts operation again. The ship will come for refuelling and supplying materials for Mario Zucchelli and to bring back returning team. In Concordia, in December, last three scientists and technicians will come back for summer thanks to French colleagues and L'Astrolabe. Idea is to work to strict rules while undertaking as much necessary science as possible.

Arctic: The situation constrained by rules for Svalbard. The technicians have been brought back from station in June instead of March. All activities needing dedicated personnel have been cancelled until the end of August. Only automatic activities and monitoring activities that can be supported by local personnel (NPI, Kings Bay AS) are continuing. At the moment plan is to re-start operations onsite in September, depending on situation at the time. ENEA spring campaign including maintenance and YOPP activities at Thule station have been cancelled. At Dirigible Italia, automatic measurements are continuing with support of local technicians. At moment, there is no plan for the upcoming fall season, plan is to start normal operation Spring 2021. In Alaska; we have a joint program started last year between CNR and ENI, this has now been postponed for atleast one year.

J Chappellaz noted, to follow up on V Vitale's question, "what do we do if there is a corona case in Antarctica?", first of all see the conclusion from COMNAP because ENEA took part in all the meetings so they have the information. The main message to convey is that all must ensure that the virus does not come to Antarctica. Everyone must anticipate this situation, but it must not be allowed to happen as far as possible. Individuals will go through quarantine, tests, go on the fact most people will come through on ships meaning several days – weeks of initial travel. There must be plans to evaluate somebody having a fever that may not be COVID-19. One key aspect will be imposing vaccines on crew and being on the ship with COVID-19 test control, or use newer tests, such as saliva tests which provide results within hours. Second, all the doctors from all members, including those who are part of the Joint SCAR-COMNAP Expert Group on Human Biology and Medicine (JEGHBM) are working together with COMNAP. Doctors would have the final word and operators would apply the regulations. We have to follow gateway cities for their regulations; in extreme event if someone has COVID-19 we would evacuate the person, and this needs to be anticipated by the gateway city.

3.12 Jacek Jania (PAN)

The Polish programs faces a few challenges, one is the problem of monitoring the biological environment, as the physical environment possible to monitor with automatic tools; as biology needs direct observations, so majority of projects have been postponed. There are hopes that PhD students can do field observation in September in the Arctic. More difficult situation for Antarctica, as construction activity planned was planned. Additionally, reactivation of Arctowski station in Antarctica is currently under discussion. Quite good possibility of continuation of long-term monitoring and operation of station, but many other aspects of polar research might be limited. As noted, all must cooperate to fulfil rules, regulations etc., but also must work to ensure to increase automation and better satellite transmission of data collected.

3.13 Dragomir Mateev (BAI)

Working hard on two scenarios, best and worst case; in either case, science programs will be reduced in the coming year. First case BAI will try to open base only with technical staff, 4-5 people, for maintenance and to collect data from monitoring and scientific equipment on base. In second case, BAI will have projects from last year that run for two years; try to carry out ongoing research and send in replacement technical staff. Constraints are with South America and situation with gateway cities. BAI do not have own transport, so it needs to depend on partners. Through participation in COMNAP, BAI have protocol for transferring passengers through Chile, using these to make plans.

3.14 Daan Blok (NWO)

For the Arctic, the Netherlands had large expedition to Svalbard planned for fall, as a continuation from the 2015 SEES expedition. Participation was planned for 60 scientists, policy makers and several tourists. This has had to be postponed until roughly same time next year, around second week of August 2021. In 2020, the Dutch Minister of education and research was due to join expedition; since an election is due early 2021, not certain if there will be a new minister for 2021 expedition. For Antarctica, several projects were planned at the BAS station Rothera. A month ago at a meeting with BAS and others, plans were made to postpone all projects until summer 2021. BAS is forced to minimise activities to such extent they cannot bring foreign visitors to Rothera.

3.15 Philippe Huybrechs (FWO)

The FWO only supports a few projects dealing with polar research. Scheduled fieldwork from the Japanese station Syowa in Antarctica in November-December 2020 to core shallow marine basins near the coast to reconstruct the history of relative sea level in the area was postponed in April 2020. Fortunately this work only requires one season, and so will not be affected by any gap in between consecutive field seasons.

3.16 Tania Gibéryen (polar.lu)

Owing to school closures in Luxembourg, polar.lu outreach activities have been compromised. These activities have been postponed, with funding agencies cooperating.

4. Discussion and Questions

J Francis thanked all for their presentations, noting that COVID-19 has had a wide range of impacts on Arctic and Antarctic research, and will continue to cause disruption for the coming months. Thanks to the information shared by Members, the EPB has a good overview of the current situation and Members' plans to keep essential activity going in the polar regions. It was noted that 2021 is likely to be especially busy as projects from 2020 are rescheduled.

J Francis opened the discussion section of the meeting. The long tradition of international collaboration, often out of necessity, in the polar regions was noted. However, owing to restrictions to prevent the spread of COVID-19, collaboration in the Arctic and Antarctic has been strongly reduced. Marine research using vessels, where groups of researchers are isolated together, is better able to continue than terrestrial research where there is more interaction between different groups from different regions. As it cannot be guaranteed that all facilities follow the same quarantine standards and procedures, it is difficult to foresee a return to more collaborative polar field research, with interaction between research teams as normal, until the threat of COVID-19 is contained globally.

One impact of COVID-19 is that polar research has retreated into a less collaborative way of working. The question was posed as to whether this is the best manner in which to respond to a pandemic in the polar regions.

It was noted that one of the reasons for nation programmes each forming their own response and falling back on their own national regulations and protocols is the absence of an overall regulatory regime to respond to the pandemic in a coordinated international way in the Arctic and Antarctic. Coordinated and agreed protocols could allow a more efficient and less disruptive response to similar international crises in future for international polar research. Organisations such as the EPB can play a key role in ensuring knowledge of all national regulations and protocols is available to all Members, such that better coordination is possible in future.

While the current situation is not a positive context for the need to collaborate, and differs from the usual emphasis on benefit of international cooperation in polar research, it is a good opportunity to learn lessons, share information and identify best practices between Members.

A consistently emphasised point in all Member presentations was the importance of maintaining long-term observations and time series, along with technical maintenance of stations and facilities. It was suggested that, particularly in the Arctic, rather than sending staff to polar regions at great expense and COVID-19 risk only to maintain and service facilities, it could be better in future to build capacity and training in local communities and among other staff to complete this work. Thereby reducing the need to send personnel from Europe to remote regions. In the Antarctic qualified personnel from other national programmes could be used in a collaborative manner to perform maintenance work at several facilities and stations. Organising such a scheme could be difficult owing to the specific knowledge and maintenance traits unique to individual stations and facilities. While such an international station maintenance scheme is not immediately possible, it should be considered in future, promoting greater standardisation and interoperability of infrastructure and technical training.

Members noted that in Antarctica, particularly through COMNAP, there have been efforts to coordinate a response to the crisis, however information is not available in the public domain, so that researchers affected by disruption to their work may find it difficult to access this information, particularly if they are individuals working across projects, countries and logistical operators.

It was underlined that it must not be taken as automatic that Antarctica is or will remain free of COVID-19. Strict protocols must be followed by all operators and programmes, but even with coordination, it cannot be sure that individuals would follow procedures to prevent the virus's spread to the continent with the same rigour. With this, it is understandable that programmes have reverted to closed national operations without international interaction, ensuring they can keep control. This said, if tourists are again permitted to visit Antarctica control over those entering and

the protocols they have followed is significantly reduced. Members noted that COMNAP and ATCM, and the strong legal influence they hold, should work with IAATO to further ensure rules are firmly in place to best prevent the spread of COVID-19 to Antarctica.

It was underlined that meetings such as this organised by the EPB are very useful to help Members share their experiences and the issues they are having, that others may be tackling also.

It was noted that despite being part of an international treaty, all countries active in Antarctic have their own national regulations and protocols they must follow. All countries decide their own response to the situation to best suit their interests, while always working in an internationally responsible manner. Organisations such as COMNAP allow for the sharing of initiatives and ideas, and Members noted that the work of COMNAP in response to the COVID19 crisis has been excellent. The best way to ensure a coordinated and effect response at an international level is to promote best practices, share information and to maintain communication between programmes and operators on a multilateral scale. Further efforts need to be made for enforcement of rules of protocols within national regulations.

Members noted the importance of the Antarctic Treaty enforcing restrictions on tourism in Antarctica. The Treaty is the only mechanism through which regulations can be internationally imposed in Antarctica.

Aside from the current situation, programmes and operators must think more about the sustainability of their operations in the polar regions in future. It is increasingly difficult to justify sending personnel in such numbers to remote regions at great financial and environmental cost, and time. The current situation further emphasises the benefits of a shift to greater automation of observations and monitoring in the polar regions, with equipment designed for greater longevity and less maintenance. This would be a great opportunity to better engage engineers, technicians and designers in the future of polar research. Members noted that there is still scope to develop automated observing networks in Antarctica where monitoring networks are still being developed and are not yet at the scale and maturity of the Arctic.

There are few prior examples of polar stations having to close suddenly in response to major international issues of a similar scale to the COVID-19 pandemic. The BAS station Halley VI had to close and be relocated in recent years due to a growing crack on the ice shelf, but this was handled well by engineers and technicians over several months, rather than a sudden closure. Members noted an example of a station in the Arctic having to close at short notice due to geopolitical reasons, but not recently. While uncommon, planning for responses to major crises on a global or regional scale, that cause large-scale disruption or cancellation of polar research, should be better considered and coordinated multilaterally, through organisations such as the EPB. As an example, it was noted that the MOSAiC project had planned for many disruptive crises of different kinds on different scales, with many different possible scenarios for response. However, a global pandemic was not considered in the project's planning, but was ultimately the main disruptor to the meticulously planned project.

It was noted that discussions here will be useful contributions to the EU-PolarNet white paper on infrastructures that is currently being drafted. It was noted that the ideas for strengthened responses to future global crises by polar operators can be included, and suggestions for potential initiatives to improve future preparedness and coordination will be read by a high-level audience.

Members noted the usefulness of this meeting, and that a follow-up should be organised in the coming weeks. By that time there will be greater clarity on the situation and the scenarios which

each operator is likely to follow for the coming Antarctic season. It was suggested that a further meeting be held in the first two weeks of August 2020. It was noted that the EPB should hold more discussion meetings such as this on different topics, to share information and experience between Members.

R Badhe thanked J Francis for the idea of and chairing the meeting. Thanks were also noted to non-Member observers who attended from FARO and ESA, and thanks were noted to L Bellamy, the meeting's rapporteur.

End.