IASC Atmosphere Working Group Meeting Summary
Vienna, Austria, 19th Feb 2023
Steve Arnold, Jo Browse (UK representatives)

Around 25 national representatives attended the 2023 AWG meeting, with around half in-person and half attending online. New members were welcomed, and retiring members were thanked: New IASC AWG Fellows: Remy Lapere, University of Grenoble, France. New national representatives: Michael Mayer and Ramiro Checa-Garcia (Austria),Marek Kejna (Poland), François Massonnet, Xavier Fettweis (Belgium), Masakazu Yoshimori (Japan), Malte Muller (Norway). Goodbye and thanks to Leopold Haimberger and Harald Rieder (Austria), Andrzej Araźny (Poland), Jun Inoue (Japan), Thomas Spengler (Norway).

The AWG Chair (Steve Arnold, UK) gave a short welcome report, emphasising the strong position of the AWG, and the next steps in following up large-scale international research activities (MOSAiC, PACES, and YOPP) that sit under the AWG pillars. The AWG will work towards developing vehicles for taking forward science under these activities, and a priority will be developing initiatives to contribute to ICARP IV, and aligning these with planning for IPY 2032/33.

Update on AWG-specific activities granted in 2022/3: The High Latitude Fires: Arctic Climate, Environment and Health (HiFACE) workshop on high latitude took place in Tromso in March 2022, with sessions on fire drivers, broader interdisciplinary topics, ecosystem response and social health impacts. There were 30 participants from across the community. Emerging themes for high latitude fires were documented, understanding and knowledge gaps were addressed and issues arising from the four sessions were distilled within a working paper. A draft is being circulated to the people who attended the workshop allowing input from all attendees.

Updates on AWG Pillars:

Atmosphere in the Coupled Arctic System The status of the MOSAiC international drift experiment 28 months after the return. Work continues on publications and communicating initial results. All of the MOSAiC datasets are archived in 1 major datastore, be that ADC, PANGEO or the department of Energy and several overview data papers have been published in the fields of atmospheric, ocean and ice sciences. Most datasets were made available to the public by 23rd Jan 2023. In terms of papers there is currently around five per month, many interdisciplinary and with a lot more to be released. MOSAiC covers multiple AWG pillars, and topics including aerosol-cloud interactions, ice-ocean-atmosphere coupling, mid-latitude Arctic linkages, and analysis across scales, will benefit enourmously from ongoing MOSAiC analysis. A MOSAiC science workshop took place between 13-17th February 2023 in Boulder, Colorado with 150-200 people in attendance for the plenary sessions.

Arctic Climate, Weather, and Predictability: The YOPP summit and final report are now completed. A follow-up programme to the Polar Prediction Project is under planning. Other aspects of this AWG can benefit from developments in Arctic CORDEX and elsewhere. Other aspects of large-scale international community efforts include the AC^3 project and the Copernicus Arctic Regional Reanalysis which have the potential to inform large-scale developments under this pillar. A workshop is proposed on Arctic Midlatitude Weather Linkages. This will focus on two key topics: 1) Movement of polar vortex and alignment during North American cold air outbreak including the vertical stacking of troposphere and lower stratosphere; 2) Wave train geopotential height at 300hPa level between warm and cold Decembers over the Barents/Kara Sea (polar vortex strength). A motivation within this theme is Arctic linkages to population welfare, and dependence on non-linear behaviour.

Arctic pollution, Socio-economic and Environmental Change: PACES is a bottom-up initiative developed in 2016 and now IASC and IGAC sponsored. PACES has two main science foci named ‘WG1

Improving predictive capability' (with a focus on remote pollution sources) and 'WG2 Local sources and societal impacts'. WG1 emerged from previous research to improve models reproducing Arctic trace gas aerosol budgets and trying to improve that process. WG1 hopes to initiate new field measurements in evaluation and improving models – following air masses and investigating pollution transport, potentially with a new proposal in the pipeline. The ALPACA Campaign led by Bill Simpson was part of WG2. 50 scientists were involved in a field experiment in Fairbanks, taking detailed trace gas and aerosol measurements to understand processes important in cold, dark polluted atmospheres in winter. There has been an initiative to try to build a twin cities model to contrast North American Arctic cities with different regions (Russia). That hasn't happened to date owing to geopolitics and seems unlikely to do so (in Russia) in the future and so we are looking at different directions this could take. QUiESCENCE is an overarching project bringing together WG1 and WG2 to think about cross-disciplinary approaches in improving understanding of aerosol-cloud interactions in the Arctic. 6-8th June 2023 there is an open PACES science session in Helsinki. This will cover ALPACA, linking with MOSAiC and potential follow-up and will be attended by 60 people.

State of the Arctic Science Report 2022: It was noted that this was published in late 2022, and is now available online (https://iasc.info/about/publications-documents/state-of-arctic-science). The report is based on distilled national reports collated every two years, representing a bottom-up collation of national priorities in Arctic science. Common themes are consistent among national groups, overlapping with key AWG themes and pillars -e.g. Arctic-global linkages, aerosol cloud interactions, Arctic energy budget, radiation, coupling of atmospheric, oceanographic and land-surface processes, understanding the drivers of high latitude fires and an increased focus on more applied areas including how this affects peoples everyday lives. There was a discussion around who the State of the Arctic Science report could inform ICARP IV, IPY and the Arctic Funders Forum (AFF). There was a strong suggestion that the AFF should increase multilateral arrangements and build international funding connections based on priorities from the State of the Arctic Science Report.

ICARP IV / IPY 2032/3: A large fraction of time was devoted to an active discussion around potential AWG contributions to ICARP IV and potential planning for IPY 2032/3. The dsicussion focussed on how to identfiy the grand Arctic science challenges for the coming decade, and how to plan new large multi-national efforts to tackle these challenges. The clear need for increased cross-disciplinary approaches in tackling these challgenges was highlighted. Similarly, addressing challenges that help protect the livelihoods and lifestyles of Arctic residents was seen as high priority, as well as involving local and indigenous knowledge. Improving models that are used for prediction and impact assessment was seen as a grad challenge. Discussion was focussed on improving understnading of interactions between Arctic system components and tackling model uncertainty using a heirarchy of small scale process-based models to inform processes in coupled Earth system models. These themes build on further exploitation of exisiting datasets, as well as using model evaluation exercises to target new observations.

During the closed AWG meeting, elections were held for a new AWG Chair and a replacement AWG Vice-Chair. Gijs de Boer (USA) was elected AWG Chair and was replaced as AWC Vice-Chair by Jennie Thomas (France). Steve Arnold (UK) steps down as AWG Chair after 4 years.