

Workshop Summary: Arctic Air Pollution

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Location and date: Boulder, Colorado; 3-5 February 2015

Sponsors: IASC Atmosphere WG and IGAC (International Global Atmospheric Chemistry Project under IGBP).

More than 30 members of the research community gathered in Boulder for a workshop¹ to discuss future directions for internationally coordinated Arctic air pollution research over the next 10 years. Participants represented research institutes from Asia, Europe and North America; their science interests included both aerosols and trace gases with research expertise in campaign and long-term observations, global and regional modeling, and community-based observing. Workshop objectives included but were not limited to:

- Discussing future directions in Arctic air pollution research and defining outstanding science questions related to air pollution emissions and their impacts on regional air quality, ecosystems (deposition) & climate;
- Discussing the creation of a new international initiative on Arctic air pollution - complementary to on-going/planned initiatives (e.g. Year of Polar Prediction and Future Earth).

A guiding question for the workshop was: “What research would not be possible without international collaboration?”. The organizing committee prepared a survey in advance of the workshop – it was distributed to all invitees and garnered 42 responses. These surveys revealed the diversity of community interests, how researchers are currently collaborating and what questions are most pressing to address in the next 10 years. Collaboration results revealed that our 42 respondents collaborate on this topic with more than 170 other researchers and institutes. While many responded that they were interested in engaging at the science policy interface, only 15 currently were and nearly all of those respondents engaged through the Arctic Monitoring and Assessment Project (AMAP) Expert Group for Black Carbon and Ozone.

In addition to revealing current patterns of collaborative interaction, the survey results served to guide the development of 3 progressive workshop sessions focused on:

- The Key Science Questions (requiring collaborative efforts)
- Advances and Needs in Technology and Modeling
- Building Collaborative Efforts for the Next Decade

¹ The workshop was co-sponsored by the International Arctic Science Committee (IASC) and the International Global Atmospheric Chemistry (IGAC) project.

The workshop utilized a world café² input process to draw out the full diversity of perspectives around these themes, cross-pollinate concepts and identify the strongest conclusions. The majority of workshop attendees, including early career scientists, played a role in either facilitating round-table conversations or reporting back to the group. A final synthesis round concluded that a new international Arctic Air Pollution initiative would add substantial value and serve to raise the profile of this issue in the international arena. It would also serve to improve our understanding about impacts of emissions on air quality, climate and ecosystems.

Several science issues were highlighted as priorities in the coming decade:

- Improved understanding of the relative roles of local versus remote sources of Arctic air pollution emissions their response to past and future Arctic and global change, relative to natural emissions;
- Improved understanding of long-range transport, pollutant processing, scavenging, wet/dry deposition processes and improved representation in models;
- Improved understanding of current and projected impacts of emerging local Arctic pollution sources;

At the same time various approaches leading to improved understanding were also discussed:

- Extensive and sustained vertical sampling well coordinated with surface-based sites, and targeted at improved process understanding especially in poorly sampled locations or time periods (e.g. polar night).
- Promotion of open access for scientific research in all areas of the Arctic as well as expanded platforms for sharing metadata (field campaigns, surface, satellite) and model outputs;
- Improved connectivity with Arctic communities and engagement in citizen science initiatives to increase sampling network, improve knowledge exchange and increase the relevancy of new understanding. Similar discussions were had about improved connectivity with industry and the regulatory community.
- Improved links at the science-policy interface including communication of the current state of knowledge, impacts of pollution, and mitigation options.

The workshop outcomes will be detailed in a short White Paper that will be published over the summer, which encapsulates the key conclusions from the workshop and provides a framework for the development of a new internationally collaborative Arctic Air Pollution research initiative, initially under the auspices of IGAC. As an IASC activity, there is an opportunity to engage with the Social & Human Working Group to explore greater collaboration on topics related to human impacts and drivers of Arctic air pollution, community observing

² The "World Café" is a structured conversational process intended to facilitate open and intimate discussion, and link ideas within a larger group to access the "[collective intelligence](#)" or [collective wisdom](#) in the room. (from Wikipedia) See also: <http://www.theworldcafe.com/method.html>

opportunities, as well as expanded work on this topic at the science policy interface. An international steering committee for the new initiative is currently being established.