

IASC AWG Strategic Work Plan

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The scientific scope of the Atmosphere Working Group (AWG) includes research towards understanding and prediction of rapid Arctic change, especially around interactions between the atmosphere, ocean, and cryosphere, the role of the atmosphere in Arctic socio-economic development, rapid Arctic climate change, and extreme weather and Arctic predictability. All of these priority areas are cross-disciplinary, and foster cross-cutting activities with other IASC Working Groups. Other key priorities are Arctic-lower latitude coupling, liquid (rain) and solid precipitation (snow), reconstruction of past Arctic climates, and to improve our knowledge of aerosol-cloud interactions in the Arctic. The geographic scope of the AWG is the Arctic but will also include the Arctic's responses to global change processes and impacts of Arctic changes on the general atmospheric circulation.

The AWG has identified five core science topics associated with the above priorities:

- Arctic Energy Budget, aerosols and clouds, and surface fluxes
- Arctic Air Pollution
- Atmosphere coupling within the Arctic system
- Arctic Weather extremes
- Role of the Arctic in the global climate system

A particular focus of the AWG is to improve understanding of Arctic atmospheric processes in a cross-disciplinary context, and to exploit existing datasets to develop process-level understanding of key phenomena and to evaluate weather and climate prediction systems. Work to support advanced understanding of the topics and priority areas discussed above are grouped under the three thematic pillars of the AWG, which build on the working group's three previous project-oriented pillars, MOSAiC, PACES, and YOPP. The revised pillars include:

- **Atmosphere in the coupled Arctic system:** The focus of this pillar is on improving our understanding of the expected roles and responses of the atmosphere to changes in the coupled Arctic system. The overall aim is to better understand processes in the coupled Arctic climate system to improve model parameterisations, and to improve our knowledge of the Arctic as a component of the larger-scale climate system across a range of timescales. This pillar will build on new field observations and modelling activities such as those from the MOSAiC experiment and long-term monitoring sites in the Arctic. This pillar will also seek to drive new activities designed to target emerging issues from analysis of these datasets. A particular focus will be to build on cross-cutting interdisciplinary linkages, particularly with the cryosphere, marine, and terrestrial working groups.
- **Arctic Climate, Weather, and Predictability:** This theme encompasses Arctic interactions with weather and climate across a range of spatial and temporal scales, including long-range teleconnections between Arctic and mid-latitude conditions. The overall aim is to better understand Arctic extreme weather and Arctic-lower latitude coupling, using models together with contemporary, past, and long-term observations, with a view to improving prediction on weather and climatic timescales. The pillar will build on work from YOPP, including satellite and modelling activities aimed at improving predictability of Arctic weather and sea ice change. Cross-

cutting linkages to other working groups, mainly marine, cryosphere, and social-human, will be a key focus.

- **Arctic pollution, socio-economic and environmental change:** Work under this pillar addresses Arctic air pollution within the context of all Arctic pollutants and its societal and ecosystem impacts, including understanding future development of local and remote anthropogenic and natural sources (e.g. industrialisation, wildfires). The overall aim is to improve knowledge of local and remote pollution sources, and their impacts, in the context of Arctic development and environmental change. The pillar builds on recent work under the PACES activity to develop experimental and modelling activities around the themes of local air pollution sources and transformation, Arctic urbanisation, wildfire impacts on air quality, and aerosol sources in the context of Arctic cloud microphysical processes. Existing links with the social-human and terrestrial working groups will be further developed.

Work conducted towards the identified core science topics under these pillars will be guided by, and tracked through, the AWG Implementation Plan. This Implementation Plan will highlight specific tasks and associated deliverables that will help the AWG meet the following goals:

1. **Advancement of Arctic Atmospheric Science:** *Identify and support priority topics and activities to advance understanding of the Arctic atmosphere and its role in the Earth system.*
2. **Advancement of Arctic Atmospheric Science Researchers and Networks:** *Enable research networks that foster linkages across career stages, disciplines, and backgrounds to advance scientific productivity, and help advance the abilities of early career and Arctic resident researchers.*
3. **Advancement of IASC as an organization:** *Actively engage the atmospheric science community to implement the IASC strategic plan and enhance the visibility and effectiveness of IASC.*
4. **Advancement of Ethical Research Practices in Arctic Atmospheric Science:** *Facilitate practices in Arctic atmospheric science to ensure ethical and fair research practices and outcomes.*

The activities included in the Implementation Plan are international in nature, involving multiple IASC nations, and should constitute means to facilitate significant advancement of the international Arctic Atmospheric Science community.