

Enhancing Environmental Observations and SAR Operations in the Arctic

*Submitted by the AMAP UAS Experts Group
for consideration by the Senior Arctic Officials*

The Arctic has profound significance for climate and functioning of ecosystems around the globe. The region is particularly vulnerable to rapid change. Increasing air and ocean temperatures, thawing permafrost, loss of sea ice, and shifts in ecosystems are evidence of ongoing widespread and dramatic change. As a result, critical environmental and economic issues are emerging, many of which have significant impacts on human lives, livelihoods and ocean communities. Yet determining the cause of these changes is poorly understood, impeding reliable forecasting or predictive capability. More routine and consistent environmental observations in the Arctic are needed to address these issues, and to enable sound decision-making based on state-of-the-art scientific information.

The unique capabilities of Unmanned Aircraft Systems (UAS) provide a new and innovative method for filling observational gaps in the Arctic. As a result, UAS are emerging as a revolutionary and cost-effective tool for Arctic nations to enhance environmental observation in the region by complementing and augmenting international efforts such as the Sustained Arctic Observing Network (SAON). Currently Norway, Sweden, Finland, Denmark, Canada, Russia and the United States are exploring and pursuing efforts to apply UAS technology for scientific operations. For example, Russia is using small UAS to map and characterize the ice around its ice camps and other locations. Norway and the United States are using UAS technology to study the effects of black carbon on snow and ice, and both are beginning to explore the use of UAS technology for oil spill detection and monitoring. Finland is using small UAS to make meteorological soundings. The United States has been using UAS for counting seals, characterizing sea ice, measuring trace gases, and studying Arctic clouds.

Many of these countries have also recognized the potential utility of UAS for Search and Rescue (SAR) operations in the Arctic, and are beginning to explore how to augment their current SAR operations with UAS. Challenges remain, however, because of the difficulties related to airspace access. Regulations currently do not exist for regular operations of UAS in the airspace, and the Civil Aviation Authorities (CAAs) suffer from a lack of resources to put toward developing UAS regulations, which has resulted in a lack priority for UAS.

Airspace access is still achievable on a case-by-case basis, but there is a lack of understanding of the requirements, which vary from country to country.

Recognizing the potential of UAS in the Arctic as well as the challenges, the AMAP UAS Expert Group was created in 2010 by the Arctic Council. Since then, the Expert Group has been working to help the science community understand UAS and its applicability, as well as engaging with the CAAs from each of the Arctic States to understand how UAS can access the airspace. As a result of the work done by the Expert Group, collaborative scientific missions utilizing UAS have been and are being conducted. In 2011, Norway, Russia and the United States combined their efforts to fly three UAS for the first time during a science campaign out of Ny Alesund, Svalbard, Norway. Similar international science missions are being planned for 2012 and beyond.

The AMAP UAS Expert Group currently is working with the Emergency Preparedness, Prevention, and Response (EPPR) Working Group to co-host a joint workshop in summer 2012 to exchange operational information and lessons-learned towards applying UAS for SAR operations in the Arctic. UAS is applicable to other Arctic Council work, and the UAS Expert Group is working to identify how to become more engaged with these other efforts.

Working under AMAP has allowed the UAS Expert Group to establish itself and gain an understanding of what the barriers and obstacles are to flying UAS in the Arctic. The UAS Expert Group is finalizing a report that will act as an initial assessment of the State of the Arctic for UAS flights and plans to develop a handbook for new UAS users in the science and search and rescue communities. Engaging the CAAs from Arctic Council (AC) member countries has been a challenge for the Expert Group, thus severely hampering progress in applying this technology within the Arctic. To help address these issues, the AMAP UAS Expert Group proposes to elevate the UAS Expert Group to report directly to the Senior Arctic Officials (SAOs). The benefits of this would include:

- Raising the awareness, understanding and importance of UAS, emphasizing the contributions it can make in support of the Arctic Council's scientific, observational, and environmental priorities;
- Extending the reach of the Expert Group to help improve two-way communications among Arctic experts and officials, allowing the Expert Group access to critical input/guidance, which would broaden UAS applications in the region; and

- Attract higher political interest and engagement by member countries so the necessary support and cooperation from respective CAAs can be leveraged to make trans-border or pan-Arctic UAS science missions a reality in the near future.

The Arctic Council is an ideal forum to catalyze needed cross-sectoral engagement and collaboration that will enable trans-border UAS science and SAR missions to move forward, and maximize derived benefits and cost savings when applying this revolutionary technology in the Arctic context.

Recommendation

The UAS Expert Group recommends that the SAOs give consideration to proposing to Ministers the creation of a UAS Expert Group during the Canadian Chairmanship of the Arctic Council.