# Leveraging existing sites for meteorological observations to support Search and Rescue operations in the Arctic

Short Statement: Arctic Observing Summit 2020

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A disproportionate number of Search and Rescue (SAR) incidents occur in Canada's northern territories relative to the southern provinces. For instance, the Canadian Arctic experienced 240.5 ground-based SAR incidents per 100,000 population in 2012, which is up to two orders of magnitude larger than SAR incidents in the southern Provinces (Government of Canada, 2016; Statistics Canada, 2016). This high number of SAR incidents in Northern Canada is primarily due to a greater proportion of human activity in remote northern locations, combined with hazardous weather conditions. As population, economic development, and tourism continue to grow in the Canadian Arctic, commensurate demands will be placed on transportation and SAR-related infrastructure and services

The deployment and safety of SAR operations may be compromised by extreme weather conditions such as blizzards, high winds, and low visibility. These hazardous conditions are expected to become more frequent, longer in duration, and less predictable in future due to climate change (Ford et al., 2013). Despite the frequent occurrence of hazardous weather conditions, preventive actions may be taken to help reduce exposure and vulnerability, thereby reducing the risks placed on SAR agencies and their personal. One such measure is the provision of meteorological observations which can help individuals, groups and organizations make informed decisions about how and when to safely travel, conduct particular activities, and take precautionary actions to reduce incidents during SAR operations (WMO, 2017).

To address this growing need for detailed meteorological observations in northern Canada, Environment and Climate Change Canada (ECCC) commissioned two supersites in the Canadian Arctic and sub-Arctic as part of the Canadian Arctic Weather Science (CAWS) project. The supersites are located in Iqaluit (64$^{o}$N, 69$^{o}$W) and Whitehorse (61$^{o}$N, 135$^{o}$W). The sites are equipped with in-situ and remote sensing instrumentation, including weather radars, Doppler and water vapour LiDARs, precipitation, fog, and radiation sensors that operate autonomously and continuously during all weather conditions. To date, the CAWS project has been scientifically driven, providing enhanced meteorological observations during the World Meteorological Organization's Year of Polar Prediction for international numerical weather prediction (NWP) forecast model evaluation and verification, meteorological process studies, and to conduct research into the future operational monitoring and forecasting programs of ECCC in the Arctic. The meteorological observations are provided to operational forecasters, researchers, and the public in near-real time, and are already used to support informed decisions on NWP forecast model development and weather forecasting programs.

An opportunity exists to leverage existing scientific activities revolving around Arctic observation sites such as CAWS to support navigation, safety and security in the Arctic, including SAR operations. This could be accomplished by producing and communicating weather-related information such that it becomes salient, relevant and compatible with local and indigenous knowledge systems and practices. An important first step is to evaluate the awareness, use and suitability of hazardous weather forecast (e.g.: blizzard, wind, and visibility observation) and warning information, along with knowledge of sea ice thickness and movement, for decision making with respect to surface travel, traditional land use, and SAR operations. This includes developing strategies to integrate traditional Indigenous knowledge with scientific information to meet the needs of local communities, the Department of National Defense (DND) and SAR agencies with respect to improving the effectiveness of risk communication. Tailoring meteorological information to users and stakeholders is a value-added service that is essential to maximizing its efficacy at influencing preventive behavior among those at risk in the Canadian Arctic. ECCC scientists' role, along with scientists from other organizations, is to facilitate the successful integration of what is scientifically possible and technically feasible, with what is socially desirable and supportive of Indigenous Peoples and communities, Northerners, SAR officials, and local governments.

**References:**

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