

ARM North Slope of Alaska Research Facilities

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The Department of Energy Atmospheric Radiation Measurement program (ARM) has provided scientific infrastructure and data to the international Arctic research community via its sites on the North Slope of Alaska (NSA) since 1997. These facilities are operated by Sandia National Labs to maintain systems and protect instruments for continuous measurements of clouds, aerosols, precipitation, energy, and typical meteorological variables; as well as coordination and support of research field campaigns. The earliest site began operations at Barrow (1998), followed by a small facility in Atkasuk (1999-2010), with operation of the third ARM Mobile Facility at Oliktok Point begun in October 2013. Instruments maintained at both Barrow and Oliktok include: scanning precipitation radars, scanning cloud radars, Raman lidars, eddy correlation flux systems, ceilometers, manual balloon sounding systems, atmospheric emitted radiance interferometers, micro-pulse lidars, millimeter cloud radars and standard meteorological measurement systems. In addition to these instruments, the AMF3 operates a Raman lidar and an upgraded ceilometer; while Barrow additionally operates Doppler lidar, an automatic balloon sounding system, and a high spectral resolution lidar. The infrastructure at Oliktok is designed to be mobile and it may be relocated in the future to support other ARM science missions. Currently, unmanned aerial system (UAS) and tethered balloon system operations near Oliktok are enabled by using Federal Aviation Administration-designated (FAA) restricted air space (R2204) and international warning area (W220) activated by Sandia. UAS operations out of Barrow have also been done with FAA approval. The ARM facilities at Barrow have had many improvements over time to provide valuable datasets that cover nearly 20 years. Data from these ground-based and in-flight instruments is placed in the ARM data archives for use by the international research community. Located 70 miles south of Barrow, Atkasuk is adjacent to the Meade River. While not currently active, it is available for researchers to observe an Arctic climate that is much more continental than that of Barrow or Oliktok Point. Having these three Arctic sites within the ARM program allows for operations as a Megasite complex – where coordinated observations from the multiple sites enable broader regional data collection and comparison to support studies and modeling. With the growing capabilities in UAS operations and a broad network of partners, the ARM NSA facilities are poised to support scientific campaigns across multiple disciplines and agencies. This poster will introduce the atmospheric instruments at the ARM NSA facilities, the challenges of continuously operating these remote High Arctic sites with limited infrastructure, and future plans to improve or expand operations.

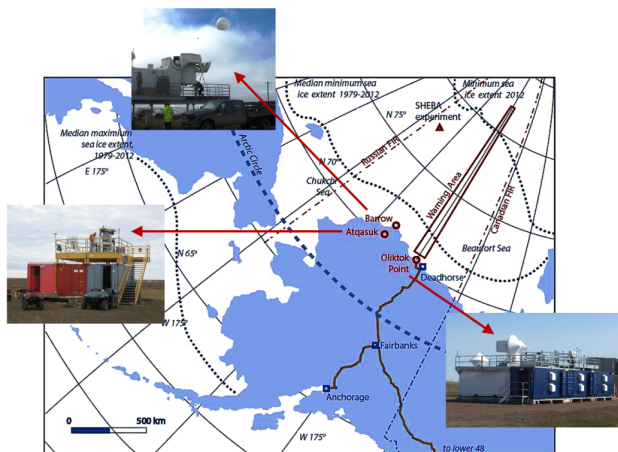


Figure 1. ARM North Slope Alaska facility site locations and Controlled airspaces.

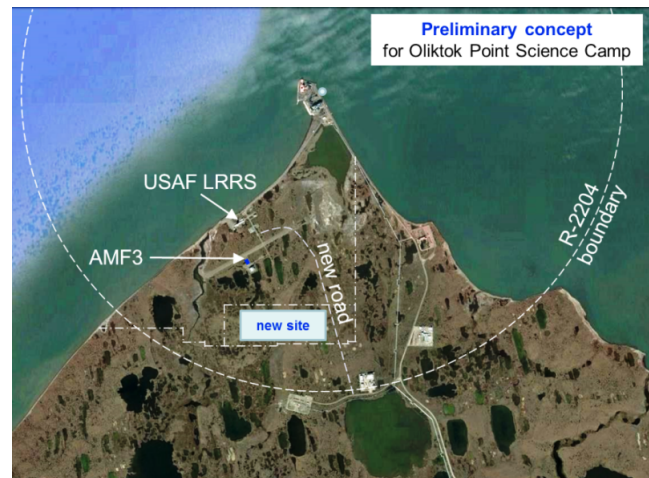


Figure 2. Schematic Plan of Proposed Oliktok Point Science Facility.