SAND2018-7928C

U.S. DOE ARM Tethered Balloon System at AMF3 in Oliktok Point, Alaska

Sandia National Laboratories (SNL) has operated a tethered balloon system (TBS) at the Advanced Mobile Facility 3 (AMF3) in Oliktok Point, Alaska, since 2015 on behalf of the U.S. Department of Energy's (DOE) Atmospheric Radiation Measurement (ARM) Climate Research Facility. The AMF3 site hosts ground-based instrumentation which collects a variety of continuous atmospheric measurements as well as user-conducted unmanned aircraft and tethered balloon campaigns. The TBS has been flown as part of numerous field campaigns at the AMF3, including being scheduled to fly for eight weeks during the summer of 2018 as part of the POPEYE (Profiling at Oliktok Point to Enhance YOPP Experiments) campaign.

The TBS offers advantages for Arctic observations, including the ability to operate for extended periods within supercooled liquid water clouds at altitudes up to 1.5 km above the ground. Varied instruments have been deployed simultaneously on the TBS, including Distributed Temperature Sensing (DTS) systems, printed optical particle spectrometers, a condensation particle counter, a video ice particle sampler, and supercooled liquid water content sensors (SLWCs). Measurements from these sensors, and their comparison with small unmanned aircraft system (UAS), radiosonde, and ground-based measurements are discussed. Statistics derived from tethered balloon-collected measurements from the ARM POPEYE campaign, including simultaneous flights with UAS, are presented. Varied deployments of the TBS are touched on, including recent efforts to deploy the TBS from offshore vessels.