

Title: Use of ARM's Tethered Balloon System to Collect In Situ Atmospheric Measurements

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Abstract:

The US Department of Energy's Atmospheric Radiation Measurement (ARM) program has developed a Tethered Balloon System (TBS) to collect in situ measurements of aerosol particle size distributions, temperature, horizontal wind, pressure, relative humidity, turbulence, and cloud particle properties and to calibrate ground-based remote sensing instruments. Periodic ARM TBS flights have been conducted since 2015 within restricted airspace at ARM's Advanced Mobile Facility 3 (AMF3) in Oliktok Point, Alaska, and have also been conducted at ARM's Southern Great Plains (SGP) Facility in Lamont, Oklahoma, since 2019.

A mechanical overview of the ARM TBS is presented, including efforts to ruggedize the system to operate reliably in temperatures from -30 to above 40 °C, in sustained wind speeds of 15 m/s, and within supercooled clouds. Results are also presented from two sensors repeatedly deployed on the TBS since 2015, Distributed Temperature Sensing (DTS) and supercooled liquid water sondes. A summary of the TBS aerosol payload will be provided, which includes printed optical particle spectrometers, condensation particle counters with varying cut sizes, and filter-based cascade impactors which then undergo analysis by SEM and optical microscope.