SPARC: SSEC Portable Atmospheric Research Center

Jonathan Gero, Timothy Wagner, Erik Olson, Zachary Buckholtz
Edwin Eloranta, Robert Holz, Fred Best, Mark Mulligan
University of Wisconsin–Madison, Space Science and Engineering Center

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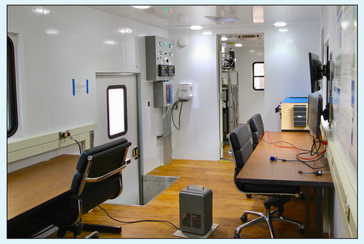
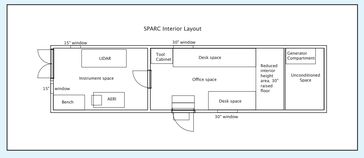
sparc.ssec.wisc.edu

Overview

- The SPARC is a **mobile research laboratory** designed for observing the atmosphere with ground-based remote sensors and in situ instruments
- The SPARC instrumentation includes a suite of instruments ideally suited to capture the fine scale thermodynamic and kinematic **evolution of the planetary boundary layer**, as well as properties of the entire atmosphere
- The SPARC can transition from transit to full deployment in 30 mins, facilitating the study of **transient phenomena**

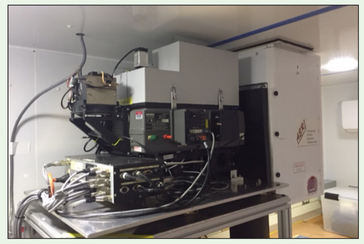




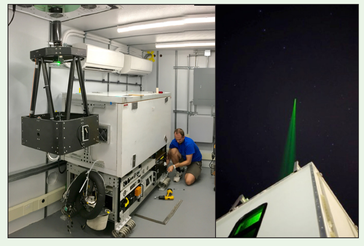
- Two separate **thermally separated rooms** provide space for instrumentation, as well as a productive environment for researchers and technicians to work while deployed in the field
- A sister enclosure called **SPARClet**, a customized sea container, provides additional deployment options, and is particularly well suited for international and marine deployments as well as challenging environments
- The heritage of the SPARC is the **AERIBAGO**, a modified 194 Winnebago that participated in over 30 field campaigns between 1998–2013

Instruments

The Atmospheric Emitted Radiance Interferometer (**AERI**) measures downwelling thermal infrared radiance and can provide high temporal resolution profiles of temperature and water vapor in the lower troposphere, as well as information on trace gases, clouds and aerosols



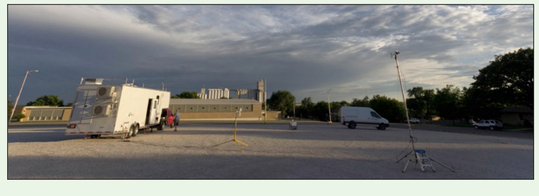
The High Spectral Resolution Lidar (**HSRL**) measures absolutely calibrated vertically resolved backscatter and extinction cross-sections, and can provide detailed cloud and aerosol profiles with sensitivity to the entire atmospheric column, including cirrus and stratospheric aerosols



A **Doppler Lidar** (DL) measures profiles of wind speed and direction

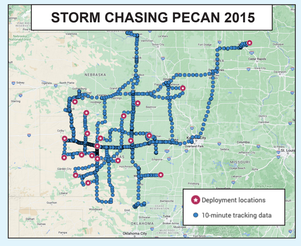
SPARC supports Vaisala RS-41 **radiosondes** for in situ atmospheric profiling

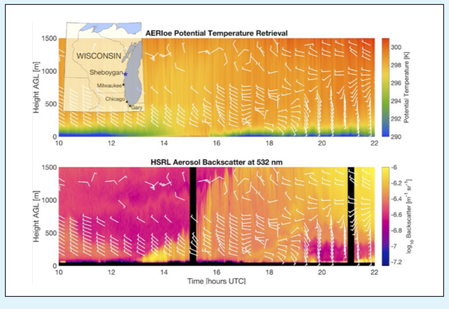
Surface Met station measures air temp., humidity, wind speed and direction



Science Capabilities

- The unique capability of the SPARC instruments to provide simultaneous **thermodynamic and kinematic profiles** in the lower troposphere along with detailed profiles of **cloud and aerosol properties** at high temporal and vertical resolution, allows the discernment of changes in atmospheric structure in response to forcings with unprecedented detail, not available with any other observing system
- The SPARC is able to fill in the **spatial and temporal gaps** of existing operational observing networks, and add value through targeted deployments to locations where existing observations are sparse and knowledge of atmospheric profiles would have substantial benefit
- The suite of instruments on board SPARC have demonstrated scientific advances in **diverse fields** such as mesoscale meteorology, tropospheric chemistry, cloud physics, land-atmosphere interactions, climatology, and energy balance studies





The SPARC instruments working in concert to monitor a lake breeze event at Sheboygan, Wisconsin, on the western shore of Lake Michigan, during the LMOS field campaign. Temperature (AERI), aerosol backscatter (HSRL) and winds (DL) show a comprehensive picture of the evolution of the atmosphere.

- The SPARC is part of the National Science Foundation's Facilities for Atmospheric Research and Education (FARE), and is available for request under the Facility and Instrumentation Request Process (FIRP) solicitation
- For inquiries about requesting use of the SPARC, please contact the SPARC CIF Principal Investigators