SMART
Surface-sensing Measurements for Atmospheric Radiative Transfer

The first mobile laboratory, SMART trailer established in 2001, which hosted an array of remote sensing instruments, has been transformed into network operations (Figs. A & B).

Key SMART Facts
- Nominal field configuration: unified sets, currently up to six of ground-based solar spectrometers (Fig. A), shortwave (with thermal-dome-effect corrected) and longwave irradiance radiometers (Fig. B), serving as the satellite units in “Ground-based Formation Flight” operations.
- Complementary setup: an additional spectroradiometer (Fig. a) in sun-tracking mode; or in surface bi-directional reflectance mode (Fig. b); and broadband radiometers on tracking station for diffuse and direct components (Fig. c) at various selected wavelength ranges.
- SMART URL: https://smartlabs.gsfc.nasa.gov/

Description
The original SMART instruments cover a wide spectral range, from ultraviolet to microwave, and were integrated into a 20-ft weather-sealed trailer with a thermostatic temperature control to facilitate the shipping to, and operation in, the field. As the suite evolved, SMART was transformed into six unified units (Figs. A&B), distributed around the core supersite of COMMIT-ACHIEVE mobile laboratories in 2011. Collectively, it became SMARTLabs (Surface-based Mobile Atmospheric Research & Testbed Laboratories) and has been deployed in many national and international field experiments. Many unique data sets have been generated for ground-based remote sensing and in situ studies in atmospheric sciences. The overarching goal of the SMARTLabs mobile facility is to enrich NASA Earth Sciences by (1) contributing to NASA satellite missions in providing calibration/validation of data products, (2) piloting innovative science research through the mobility, flexibility and rich suite of complementary instruments offered in these test-bed platforms, and (3) promoting NASA Earth Sciences through educational and public outreach activities.

Data Products
- Sun and sky solar spectral radiance at 1 nm resolution for retrieving trace gas, aerosol and cloud properties
- Surface spectral bi-directional reflectance and albedo at 1 nm resolution
- Hemispheric/direct-beam shortwave and longwave irradiance with various bands of energy partitioning

Parameters
- Solar spectra: 280–800 nm and 0.35–2.5 μm
- Broadband wavelengths: 0.3–3, 0.4–3, 0.7–3, and 4–50 μm (global, diffuse and direct component)

Science Questions To Be Addressed
- How is atmospheric composition changing?
- What are the effects of atmospheric composition changes on air quality and radiative energetics?
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**Key References**

**Planned and Participated Campaigns**


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