

ARM Aerial Facility Baseline Measurements and Instrumentation for the Unmanned Aircraft

Atmospheric State and Aircraft State

Instrument	Description	Source/Supplier
VN-200	Inertial navigation system/global positioning system: position, velocity, attitude	VectorNav
Aircraft Integrated Meteorological Measurement System – 30 (AIMMS-30)	5-port air motion sensing: true airspeed, angle-of-attack, side-slip Meteorology: temperature, relative humidity Inertial navigation system/global positioning system: position, velocity, attitude	Aventech
HS-2000DP	Temperature, relative humidity	Procon

Cloud Properties

Instrument	Description	Source/Supplier
Cloud Droplet Probe (CDP)	Cloud particle size distribution 2 to 50 μm	Stratton Park Engineering Company

Aerosol Properties

Instrument	Description	Source/Supplier
Aerosol Isokinetic Inlet	Sample stream of dry aerosol, sizes < 5 microns	PNNL build
Mixing Condensation Particle Counter (MCPC)	Total aerosol concentration > 0.007 μm	Brechtel Manufacturing Inc.
Miniaturized Optical Particle Counter (MOPC)	Aerosol size distribution 0.18 to 10 μm	Brechtel Manufacturing Inc.
Single-Channel Tricolor Absorption Photometer (STAP)	Aerosol light absorption	Brechtel Manufacturing Inc.
Portable Optical Particle Spectrometer (POPS)	Aerosol size distribution 0.15 to 3 μm	Handix Scientific
Aerosol Filter Sampler	Offline aerosol chemical composition	Brechtel Manufacturing Inc.

Gas-Phase Measurements

Instrument	Description	Source/Supplier
Gas Analyzer (LI-840A)	Concentration of CO ₂ and H ₂ O	LI-COR

Remote Sensing and Solar Radiation

Instrument	Description	Source/Supplier
Infrared Thermometer – CT09	Infrared (8 to 14 μm) temperature	Heitronics
Infrared irradiance (IR20)	Broadband irradiance	Hukseflux
Pyranometer, shaded, Zenith (SPN-1)	Total and diffuse irradiance	Delta-T Devices
Pyranometer, unshaded, Zenith (SPN-1)	Total irradiance	Delta-T Devices
Pyranometer, unshaded, Nadir (SPN-1)	Total irradiance	Delta-T Devices
Multispectral Imager (Altum)	Multispectral images blue, green, red, red edge, near infrared, and thermal infrared	MicaSense