

Penn State Preparation for CAPABLE 2010

| Participants | Affiliation | Dates Attended |
|-----------------|-------------------------|-----------------|
| Anne Thompson | Penn State, Meteorology | ~July 2-8 |
| Douglas Martins | Penn State, Meteorology | June 14-July 30 |
| Ryan Stauffer | Penn State, Meteorology | June 14-July 30 |
| Anders Jensen | Penn State, Meteorology | ~July 2-8 |

NATIVE Specifications

Dimensions: 22.75 ft. long x 8.5 ft. wide x 12 ft. high

Tower: 10 m extendable

Weight: ~5000 lbs.

Power requirements: Maximum start-up: 80 Amps
 Normal operation: ~35 Amps
 Total Power: ~10 kW

Instrumentation:

Ozone analyzer (Thermo, Inc. 49C)

NO_y analyzer (Thermo, Inc. 42C-Y)

SO₂ analyzer (Thermo, Inc. 43C)

CO analyzer (Thermo, Inc. 48C)

Dynamic gas calibrator (Thermo, Inc. 146C)

Mechanical wind anemometer (R.M. Young, Model 05103)

Temperature & relative humidity probe (R.M. Young, Model 41382) w/ multi-plate

radiation shield (R.M. Young, Model 41003)

Barometric pressure sensor (R.M. Young, Model 61202)

Data systems controller (Environmental Systems Corp., Model 8832)

Ultraviolet multi-filter rotating shadowband radiometer (Yankee, UVMFR-7)

J-NO₂ filter radiometer (Metcon, Inc. 2-pi) 3-D sonic anemometer (Applied Technologies, K-style)

Fast ozone sensor (built in-house, see Ridley et al., 1992)

Measurement of ozone production sensor (Cazorla and Brune, 2010)

Ozonesondes (En-Sci Corp., ECC)

Radiosondes (Vaisala, RS-80)

Standard gases used:

Zero air (Perma Pure, Zero air generator)

Nitric oxide (~5 ppm in nitrogen)

Nitric oxide (2% in nitrogen)

Sulfur dioxide (~10 ppm in nitrogen)

Carbon monoxide (~10 ppm in nitrogen)

Nitrogen (UHP 5.0) Helium (Birthday party grade)

NATIVE measured or derived quantities:

| Measurement | Units | Spatial Resolution | Temporal Resolution | Estimated Uncertainty |
|---------------------------------------------------------------------|----------------------------------------------------|----------------------------------|-------------------------|-----------------------|
| Ozone (O3) | ppb | surface | minute | 4% |
| Nitric oxide (NO) | ppb | surface | minute | 3% |
| Total reactive nitrogen (NOy) | ppb | surface | minute | 3% |
| Carbon monoxide (CO) | ppm | surface | minute | 5% |
| Sulfur dioxide (SO ₂) | ppb | surface | minute | 5% |
| Wind speed | m/s | surface | minute | 0.3 m/s |
| Wind direction | deg (meteor.) | surface | minute | 3° |
| Temperature | °C | surface | minute | 0.3°C |
| Relative humidity | % | surface | minute | 2% |
| Barometric pressure | hPa | surface | minute | 0.3 hPa |
| Total UV (299.0, 304.6, 310.7, 316.8, 323.7, 331.7, 367.2 nm) | W m ⁻² nm ⁻¹ | surface | minute | 3% |
| Diffuse UV (299.0, 304.6, 310.7, 316.8, 323.7, 331.7, 367.2 nm) | W m ⁻² nm ⁻¹ | surface | minute | 3% |
| Direct UV (299.0, 304.6, 310.7, 316.8, 323.7, 331.7, 367.2 nm) | W m ⁻² nm ⁻¹ s ⁻¹ | surface surface surface | minute minute 10 min | 3% 5% 30% |
| NO ₂ photolysis (J _{NO2}) Net ozone production | ppb hr ⁻¹ | | | |
| Wind speed (u) | m/s | surface | 0.1 s | 0.03 m/s |
| Wind speed (v) | m/s | surface | 0.1 s | 0.03 m/s |
| Wind speed (w) | m/s | surface | 0.1 s | 0.03 m/s |
| Wind direction | deg (meteor.) | surface | 0.1 s | 0.1° |
| Temperature (absolute) | °C | surface | 0.1 s | 2°C |
| Friction velocity Momentum flux | m/s m ² s ⁻² | surface surface | 30 min 30 min | 10% 10% |
| Heat flux | W m ⁻² | surface | 30 min | 10% |
| Ozone flux | μmol m ⁻² s ⁻¹ | surface | 30 min | 20% |
| Ozone advection rate | ppb hr ⁻¹ | surface (horizontal+vertical) | | 40% |
| Ozone | ppb | profile (0-30 km, 10 m) | ~bi-weekly | <11% |
| Temperature | °C | profile (0-30 km, 10 m) | ~bi-weekly | 0.5°C |
| Dew/frost point | °C | profile (0-30 km, 10 m) | ~bi-weekly | 0.5°C |
| Pressure | hPa | profile (0-30 km, 10 m) | ~bi-weekly | 1 hPa |