Aerospace Transportable Lidar System

The Aerospace Transportable Lidar System 2 (ATLS-2) is stationed at the Pacific Missile Range Facility (PMRF) at Barking Sands, HI, and contains a suite of instruments designed to collect high quality ground-truth atmospheric profiles coincident with soundings by sensors aboard environmental satellites. ATLS-2 has a long heritage of providing ground truth data to support the calibration/validation of sensors aboard Defense Meteorological Satellite Program (DMSP) assets. ATLS-2 began supporting Suomi-NPP in 2012. Instrumentation includes:

1. **UV lidar (Raman/Rayleigh/Mie)**
   - Water Vapor mixing ratios (0-20 km)
   - Temperature (30 – 60 km)
   - Relative Humidity (0 – 20 km)

2. **Vaisala RS-92 Radiosondes**
   - Temperature (0 – 30 km)
   - Relative Humidity (0 – 20 km)

3. **RPG-Hatpro Upward-Looking Radiometer**
   - Integrated Water Vapor
   - Cloud liquid water
   - Boundary layer water and temperature

### Lidar System Details

- Pulsed laser illuminates molecules and particles
- Molecules and particles scatter laser light in all directions
- Light scattered back is collected, filtered, and recorded
- Signal strength indicates concentration of scatterers and attenuation along the propagation path
- Delay from the transmitted time indicates distance

#### Transmit: 15 W, 355 nm, 30 Hz

#### Receive: 36-inch Dall-Kirkham, UV-enhanced AI

#### Filters: Rayleigh/Mie = 355 nm (0.1 mm FWHM)

#### Nitrogen Raman = 386 nm (0.2 nm FWHM)

#### Water Raman = 407 nm (0.4 nm FWHM)

#### Detectors: Hamamatsu PMTs, multichannel scalers, two altitude ranges/mechanical chopper to increase dynamic range

#### Statistical Comparison with NUCAPS EDR

The EDR calibration team collects CrIiMS operational data collocated with the ground truth anchor points. These data include three to right.

#### NUCAPS EDR

NUCAPS EDR – ATLS2 Years 2-3 (FY13-14) Data

### Year 1 (FY12) Data

#### Year 1 (FY12) Data

**NUCAPS EDR – ATLS2 Years 2-3 (FY13-14) Data**

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<th>Variable</th>
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<th>Temp RMS</th>
<th>Temp Std Dev</th>
<th>TempBias</th>
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#### References


### Comparison with Lihue Synoptic Radiosondes

The weather station at Lihue launches daily radiosondes as part of the synoptic radiosonde network. Due to S-NPP overpass times, we obtain time-coincident data sets near 0 and 12 UTD. Differences show both orographic effects and potential errors in humidity data from the Lockhead/Martin Mark 2B GPS radiosondes used at Lihue.