ACAM Data Status Report

Scott Janz , Matt Kowalewski, Sam Xiong, Kent McCullough, Nickolay Krotkov, Lok Lamsal, Melanie Follette-Cook/GSFC

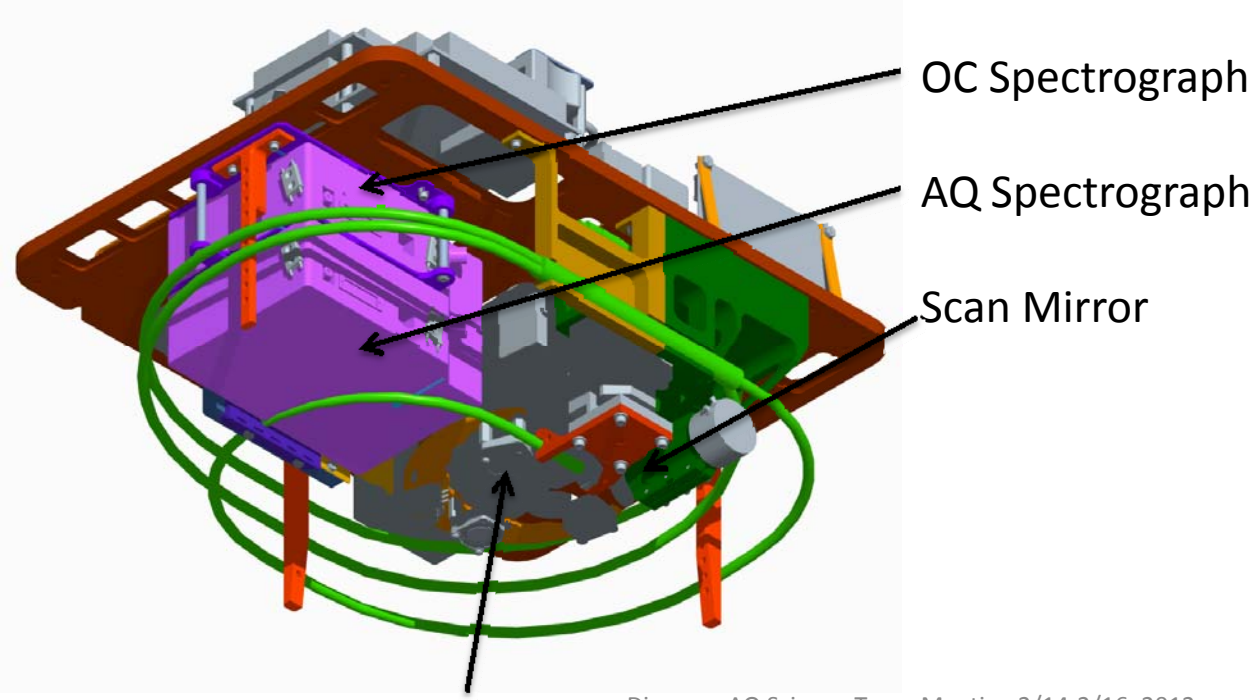
Xiong Liu/SAO

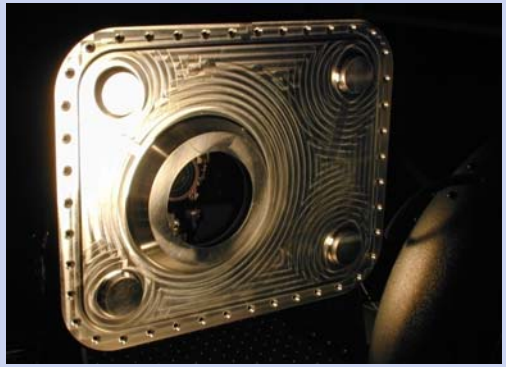
Outline

- Instrument overview
- Data characteristics
  - Sensitivities
  - What to look out for
- Current work
  - Instrument
  - Retrievals/Comparisons

ACAM Sensor Configuration

- Two spectrographs + HD video camera
  - Air Quality (AQ) 304:520 nm 0.8 nm resolution (NO_2, O_3, UV absorbing aerosols, *HCHO*)
  - Ocean Color (OC) 460:900 nm 1.5 nm resolution
  - Both downward and upward view capability
  - Video camera (2592x1936 pixels) – 3 pixel FWHM
  - GPS for time and location





Optical bench and support electronics contained in pressure and temperature controlled enclosure

50 lbs total weight
250 watts avg. power

UC-12 Platform

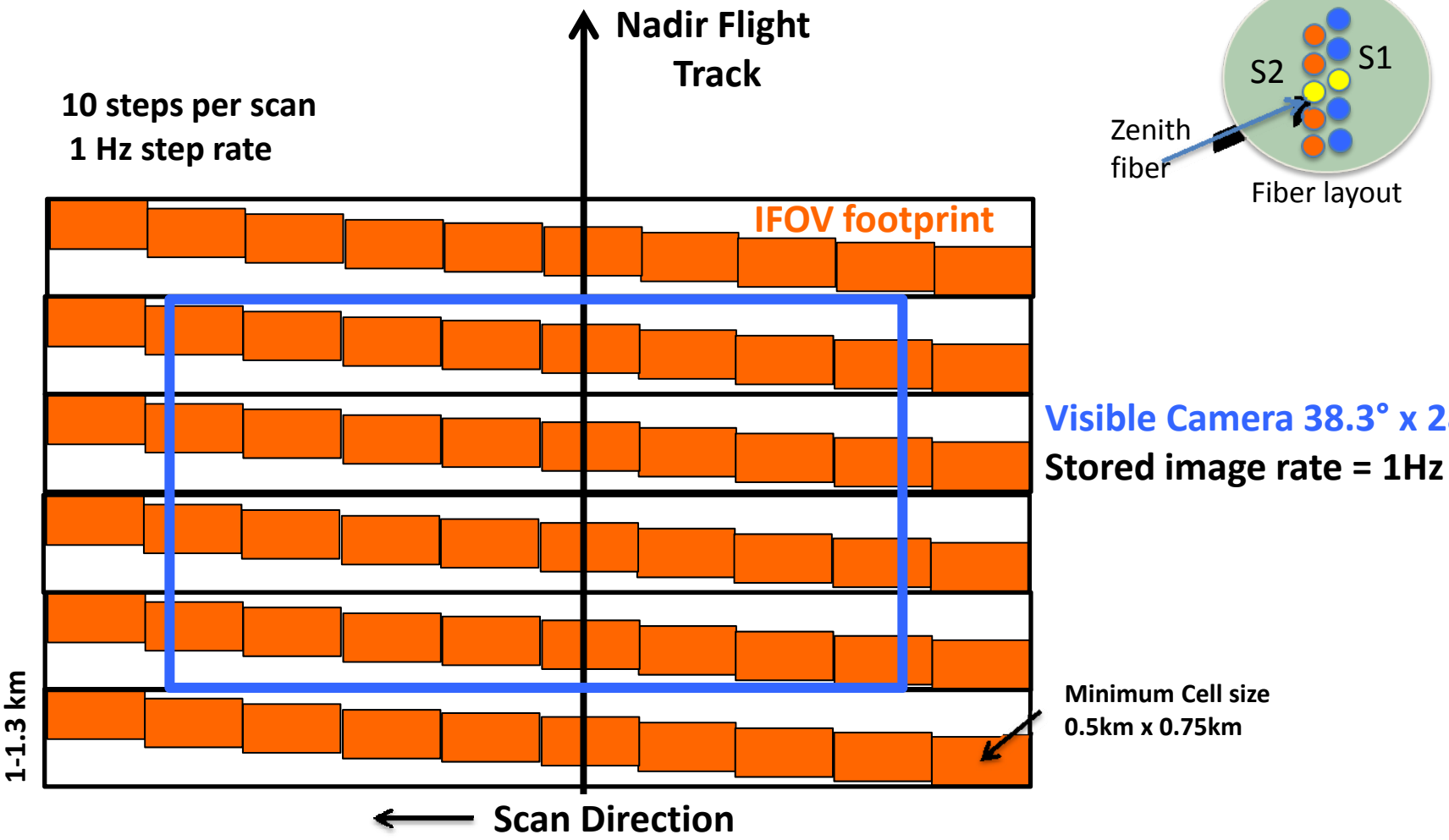
Zenith fiber port

Co-manifested with the HSRL aerosol lidar

ACAM nadir port location

Altitude 8.5 km, Avg. ground speed 110 m/s, Duration 4 hours

Spatial Sampling Pattern



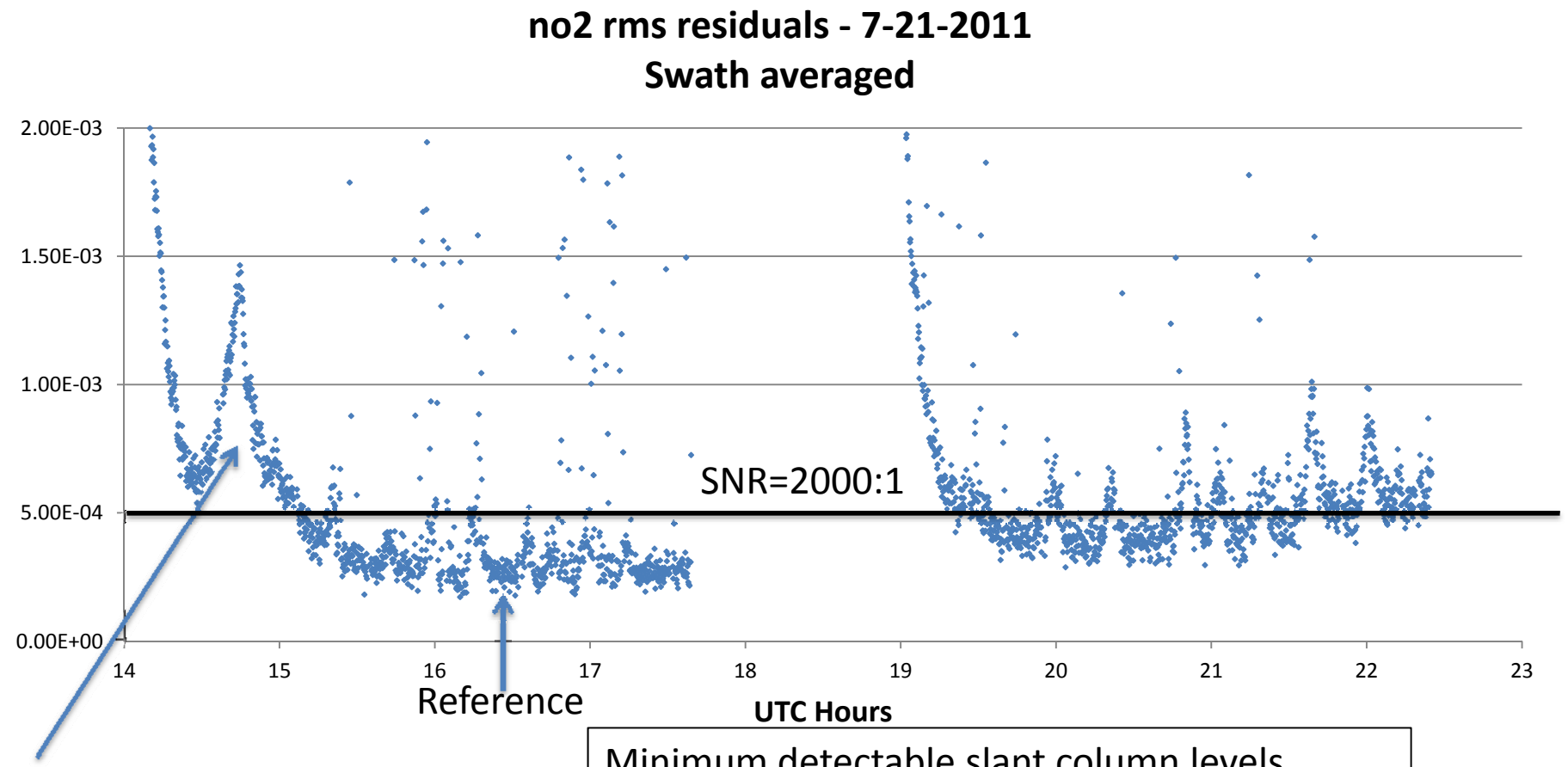
July/Aug. Data Set Summary

- 13.5 Flight Days under various very clean to polluted conditions from July 1st 2011 through July 29th 2011.
- 4 Additional flights were performed for EPA studies in the Richmond area during August.
- Primarily cloud free, a couple of days with 30-40% cloud cover.
- ACAM was operational for the entire mission with no anomalies or downtime.
- First version of retrieved slant column data was submitted to the archive in late November.

Archive Data Description

- Three slant column products (NO_2, HCHO, O_3) are provided using three different spatial co-add schemes:
  - Pixel pair averages to generate 5 cross-track pixels
    - Sample area is ~1.5 km cross-track by ~1.1 km along track
  - Cross track averages to generate 1 cross-track pixel (swath)
    - Sample area is ~7.5 km cross-track by ~1.1 km along track
  - 8 along-track swath pixels are co-added
    - Sample area is ~7.5 km cross-track by ~8.8 km along track
- The calibration or reference spectra for each product is the 6 minute average which yielded the minimum slant column for that product.
- A quality flag is included to indicate either problems with NO_2 fits that generate fill values, or identify high albedo scenes that should be used with caution, particularity for the HCHO product.

NO_2 residuals – instrument stabilization



Minimum detectable slant column levels

- Pair average pixel : 1.3e15 molecules/cm^2
- Swath average : 9.0e14 molecules/cm^2

Slant column sensitivity

Sample size	NO_2	HCHO	O_3
HighRes	0.13	1.5	12.0
Swath	0.09	0.8	5.0
LoRes	0.05	0.6	3.5

Current values of RMS slant column residuals in molecules/cm^2 over the entire flight track (stabilization periods are exclude)

Instrument level improvements

Current work is focusing on:

- Absolute calibration (important for SAO retrievals)
  - Post-mission calibration at NIST has been performed
- Slit function characterization (wavelength and temperature dependent)
  - Post-mission slit function characterization at NIST has been performed
- Stray light correction (reduce systematic errors in O_3,HCHO retrievals)
  - Stray light correction algorithm in development

Ongoing Collaborative Analysis status

- NO_2 vertical columns for inter-comparison with ground/satellite measurements – Nick Krotkov
  - AMF code is in place, will compare with OMI tropospheric product
- Alternative retrieval techniques – Xiong Liu (SAO)
  - Will compare with GSFC AMF corrected data and exploit visible channel
- Spatial variability studies/Integrated comparisons – Melanie Follette-Cook
  - Awaiting vertical column products, assess agreement with Pandora, OMI and in-situ
- Improving Ocean color NO_2 corrections
  - Need to explore possibilities here