Airborne Compact Atmospheric Mapper (ACAM)
Overview

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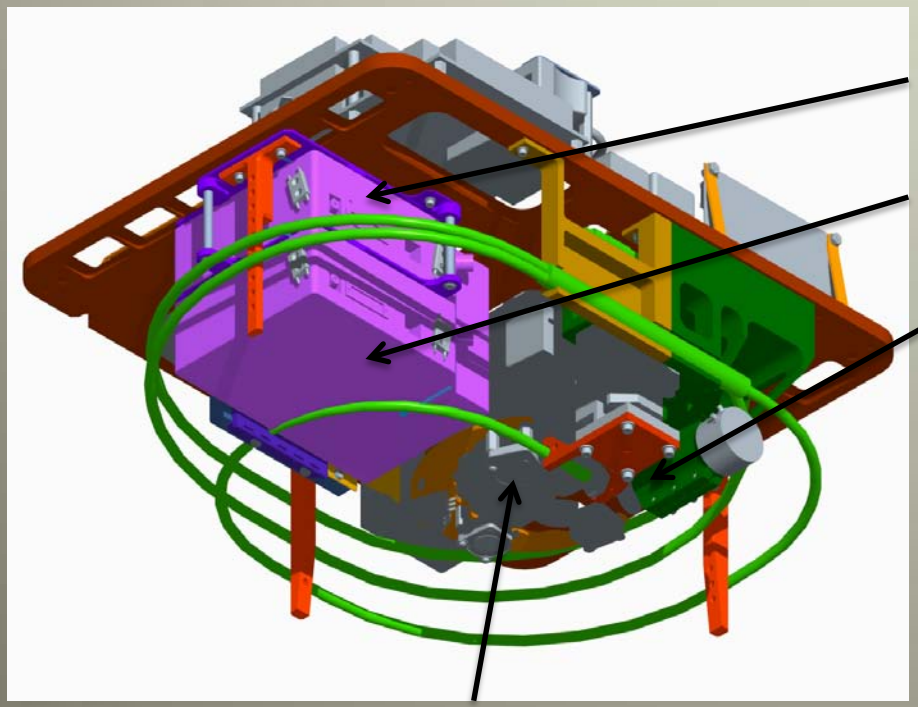
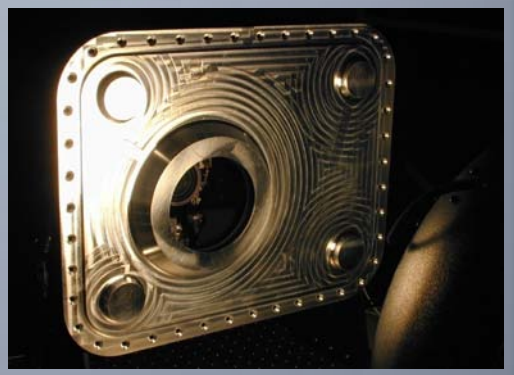
Outline

- Instrument description
  - Sensor specs
  - Viewing configuration during our last deployment (GloPac) –> scan pattern
- Previous measurement results
  - Imagery
  - Trace gas retrievals
    - NOVICE (NO_2), GloPac (O_3)
  - Discover-AQ preparations

ACAM Sensors

- Two spectrographs + HD video camera
  - Air Quality (AQ) 304:520 nm 0.8 nm resolution (NO_2, O_3, UV absorbing aerosols, *SO2, HCHO*)
  - Ocean Color (OC) 460:900 nm 1.5 nm resolution
  - Video camera (2592x1936 pixels) – 3 pixel FWHM

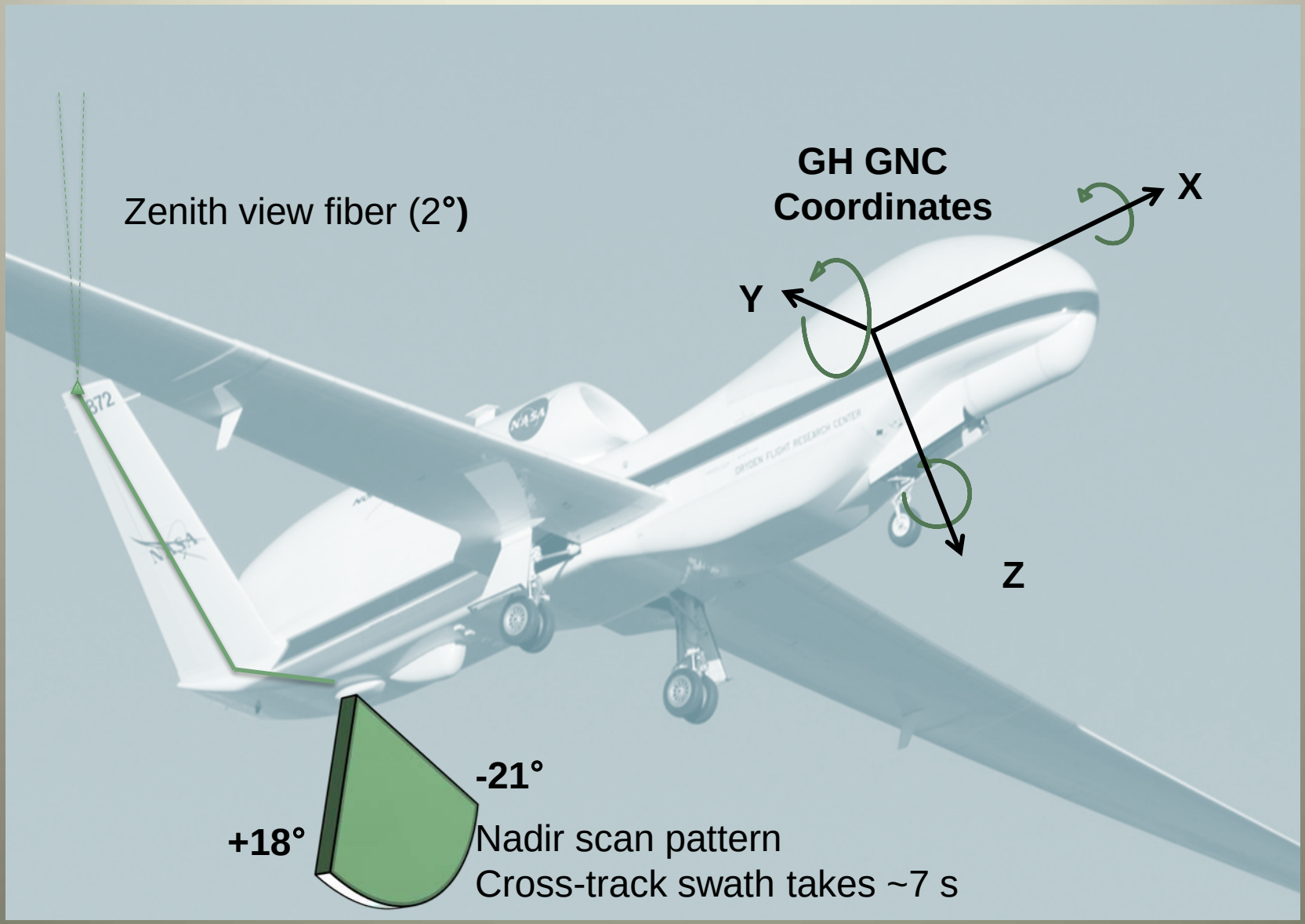




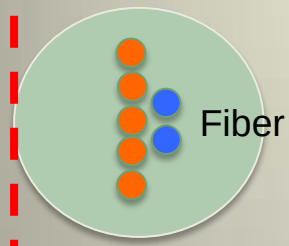
Optical bench and support electronics contained in pressure and temperature controlled enclosure

50 lbs total weight
250 watts avg. power

Viewing Configuration



Spatial Sampling Pattern



Fiber layout

Visible Camera 65° x 51°

Stored image rate = 2Hz

Note – OC sampling will be reconfigured to match AQ on B200

Nadir Flight Track

11 steps per scan
~0.7sec/step

Air Quality **Ocean Color**

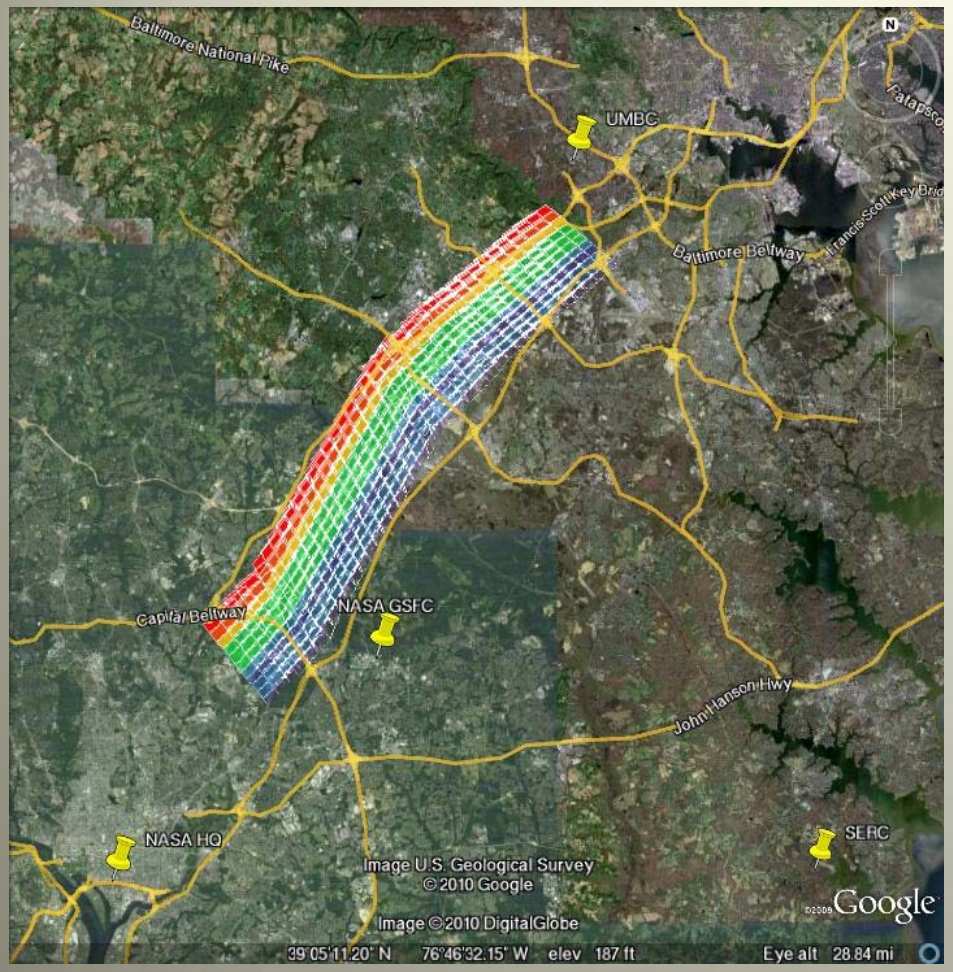
51°

3.6°

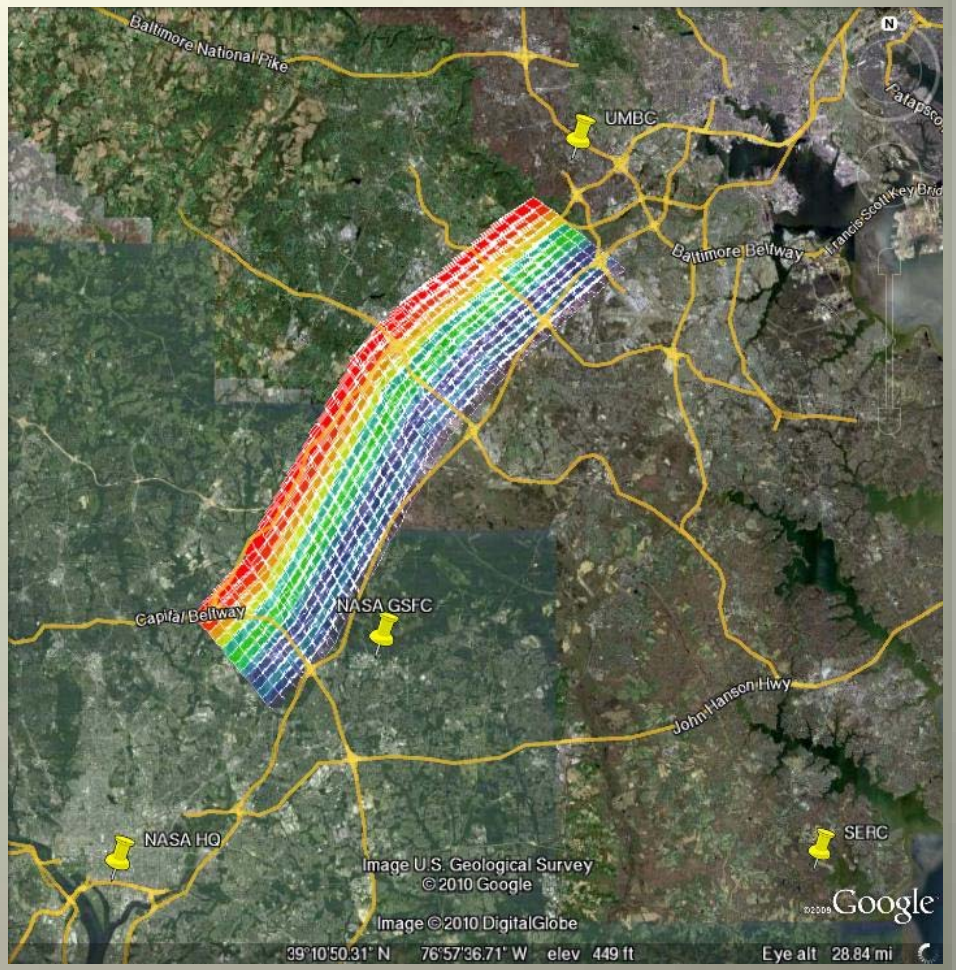
1.6°

Scan Direction

Coverage @28,000 ft altitude



11-steps

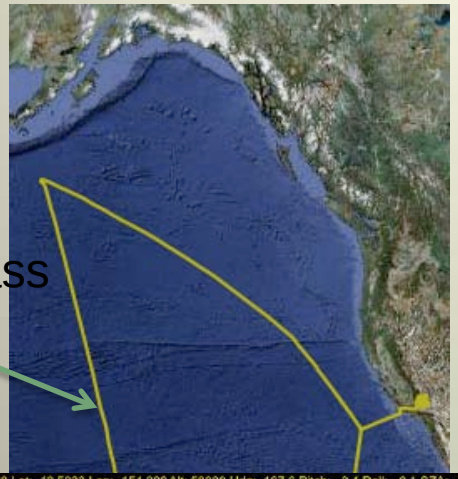


13-steps

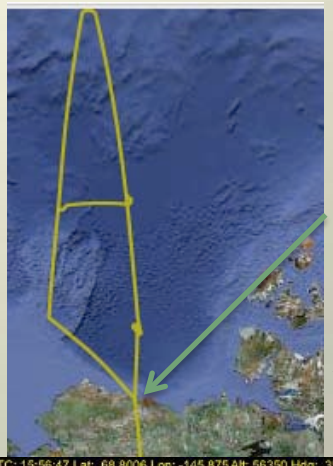
- 11 step pattern will not get simultaneous I95/Parkway coverage
- 13 step (need to test in lab) gets closer but has gaps
- Recommend centered sequential overflights

ACAM Images

OMI underpass
23:30 UT
Apr. 13th

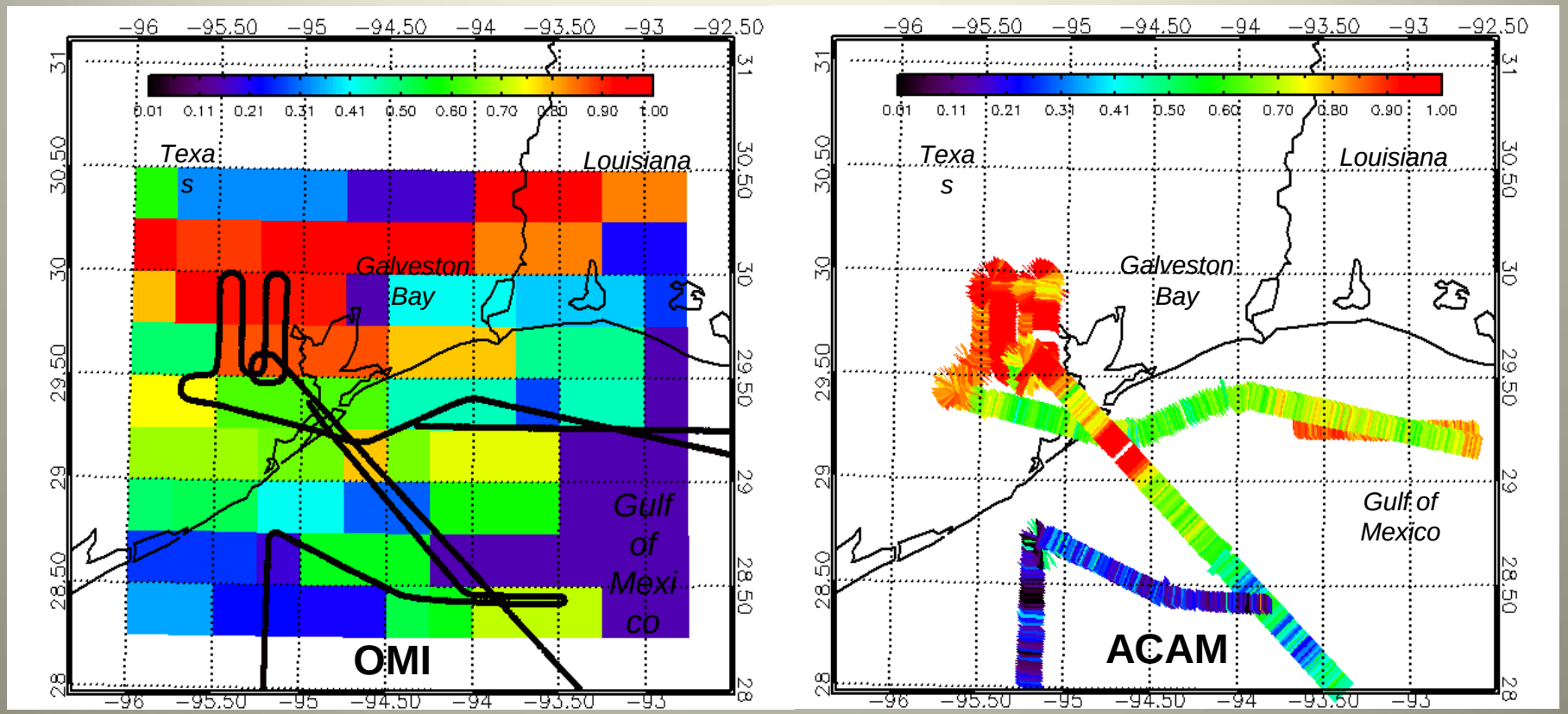


North Alaskan
coast transition to
sea ice 16:00 UT
Apr. 23rd



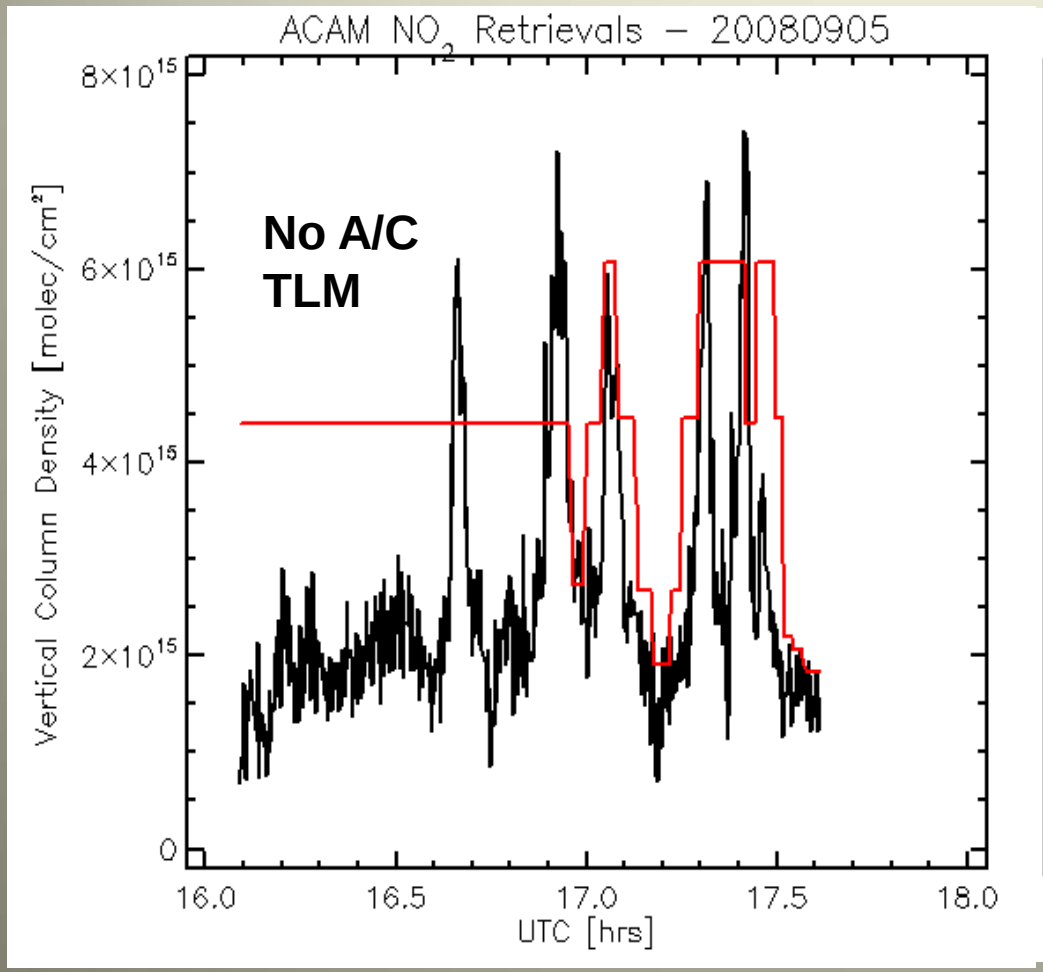
Movies available at http://avdc.gsfc.nasa.gov/pub/data/aircraft/GloPac/ACAM/movies/

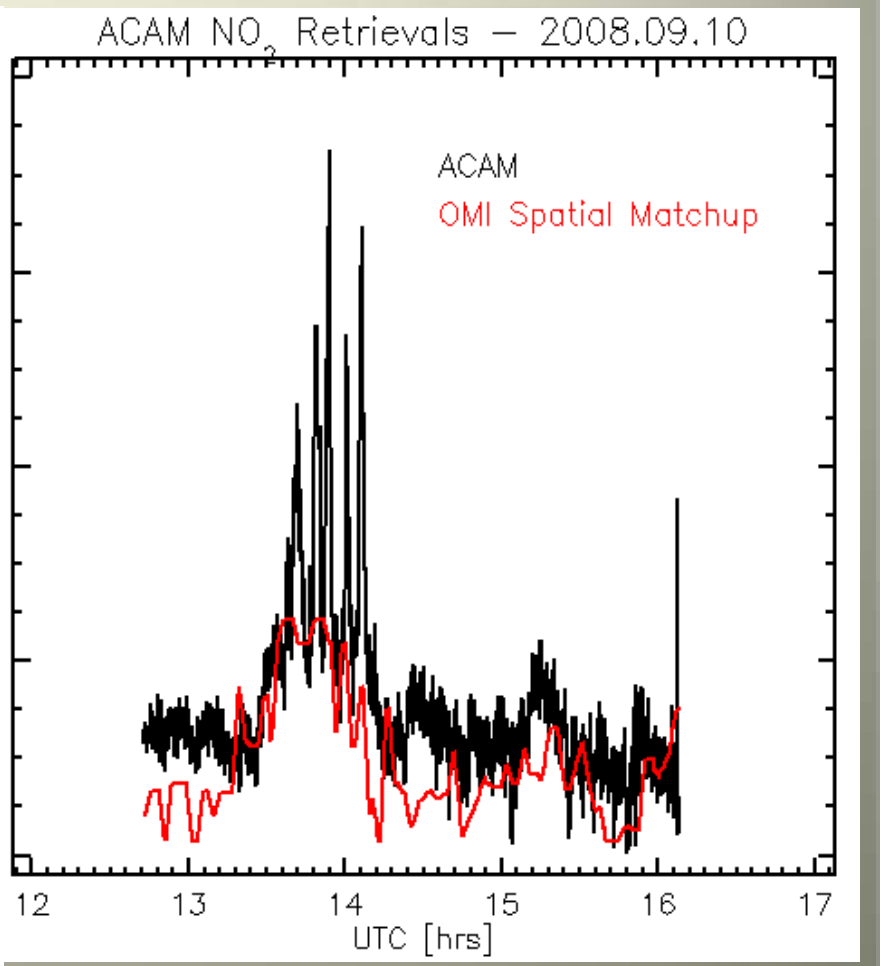
NO_2 measurements during WB-57 NOVICE campaign



- Normalized NO_2 columns for OMI and ACAM during NOVICE deployment
- ACAM swath averaged data
- OMI Tropospheric NO_2, 0.25° gridded data
- 2010 AGU Poster (variogram analysis)

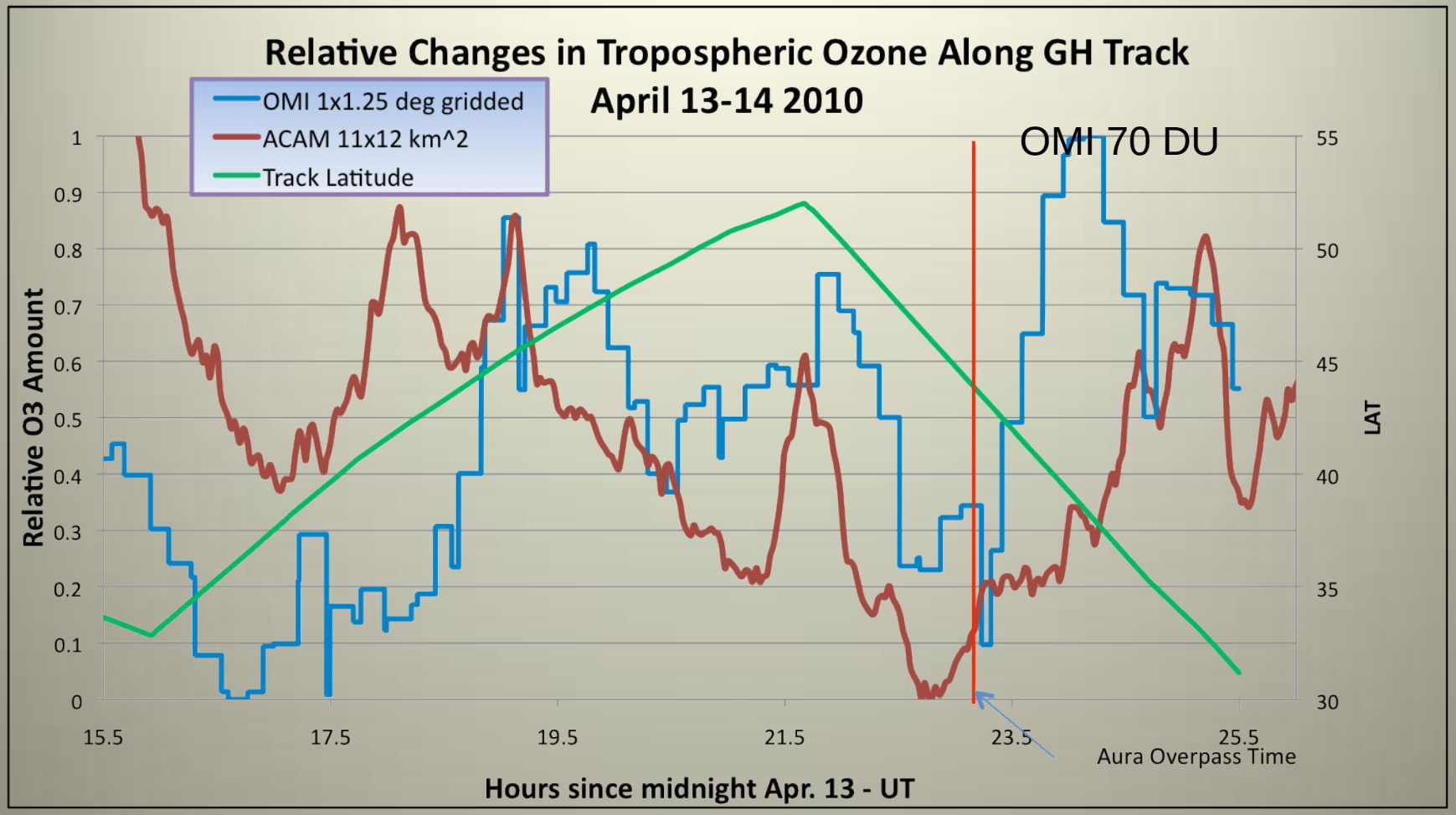
OMI/ACAM Spatial Matchup





Slant column precision (swath averaged 1x11) = 5e14 mol./cm2
Predicted precision for Discover-AQ (1 km x 1 km) = 1e15 mol./cm2

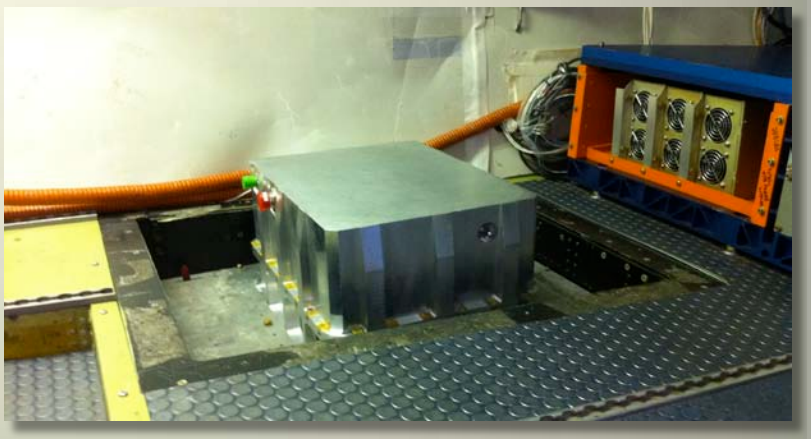
GloPac - ACAM/OMI Comparison of O_3 Features



- ACAM O_3 absorption spectra are fit to known cross-section amplitudes to produce slant column densities (no path length correction)
- Correlations in structure can be seen between OMI and ACAM that can be used to validate retrieval methods
- Some features appear to be shifted in time earlier in the flight track as ACAM would have observed them a few hours prior to OMI

Preparations for Discover-AQ deployment

- Test fit (yesterday) went well. Re-routing of zenith fiber coupler will be required



- ACAM mods
  - zenith fiber coupler
  - Replace fiber bundle-> UV/VIS – VIS/NIR spectrometers have the same spatial resolution
  - Adjust video FOV and check swath FOV
  - GPS connector and switch wire re-route

- Aircraft support tasks
  - Build flight harness
    - Power, Data, GPS feed-through
    - Power switch routing
  - Mount zenith fiber lens holder and route fiber
  - Safety qualification

UC-12 Test fit

- Test flight
  - DITL? We can be ready in Feb-March timeframe if this happens.
  - Ground ops

- Algorithm development and data archive prep
  - Radiances, NO_2 slant and vertical columns
  - O_3 – UV/Chappuis band?