

Overview of HARLIE Measurement Capabilities

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<http://harlie.gsfc.nasa.gov>

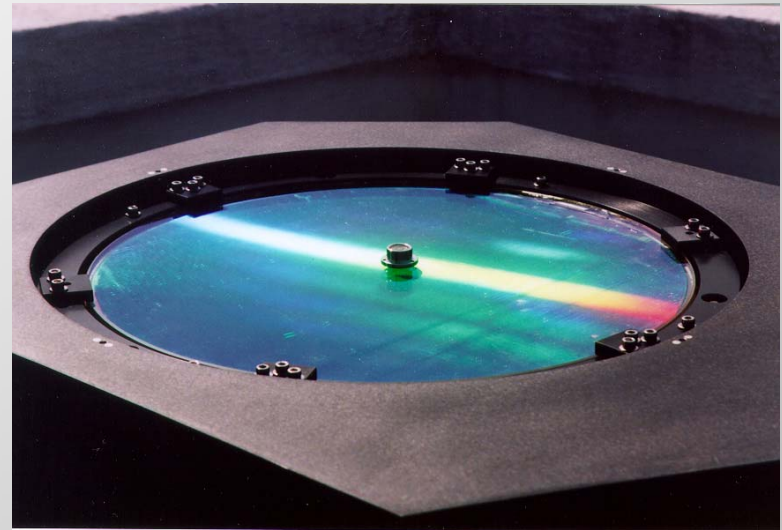
Overview

- Instrument Description
- Data products & examples
- Field study highlights
- Current work
- Summary

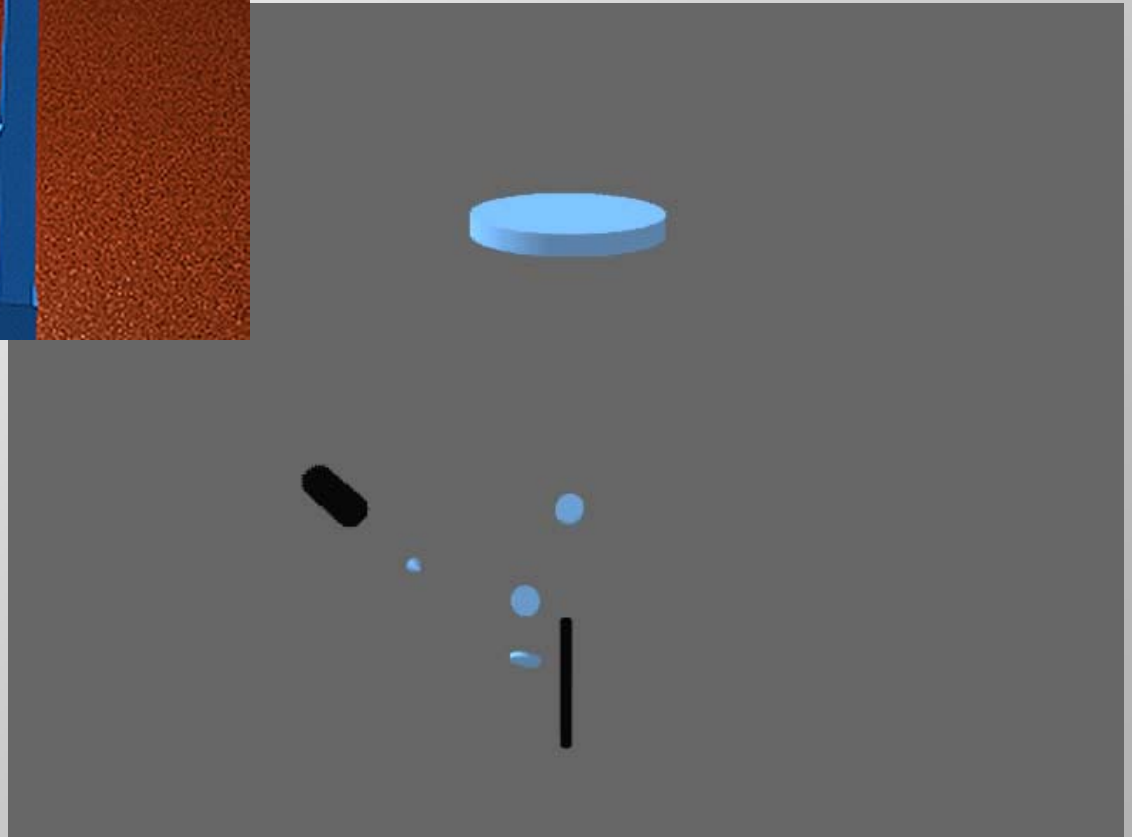
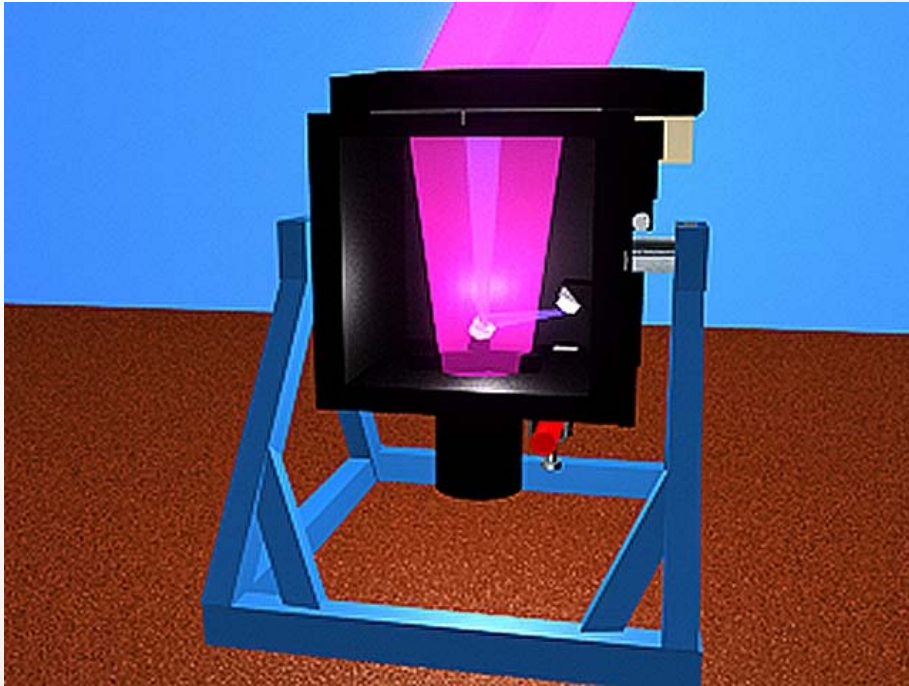


Technical Data

- Transmitter: *diode pumped Nd:YAG, 1064nm wavelength, 1 mJ, 40 nsec pulse length, 5 kHz rep-rate, 100 μ rad divergence*
- Receiver: *40 cm diameter, f/2.5 volume phase transmission HOE, 45° diffraction angle, effective collection area 1064 cm², 200 μ rad field-of-view, 0.5 nm bandpass*
- Detector: *Geiger mode Silicon Avalanche PhotoDiode*

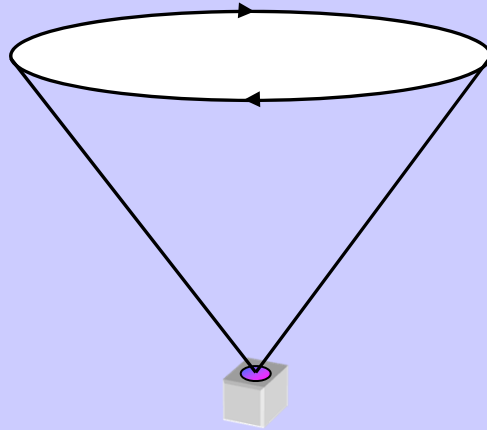


Optical system

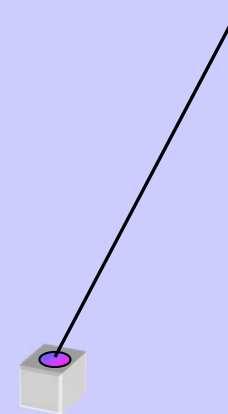


Scan Patterns

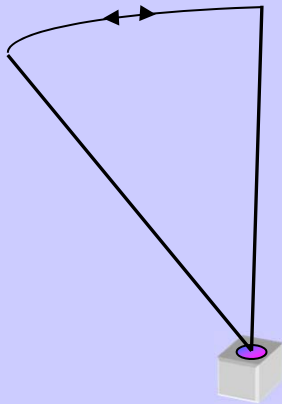
Continuous Rotation



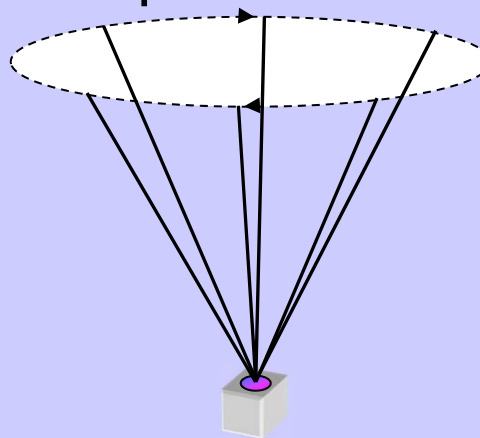
Static Mode



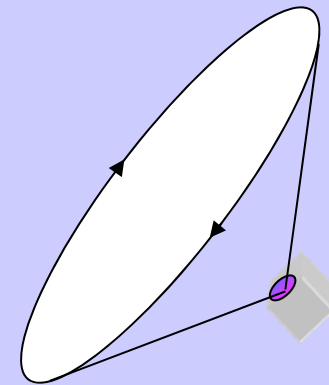
Sector Scan



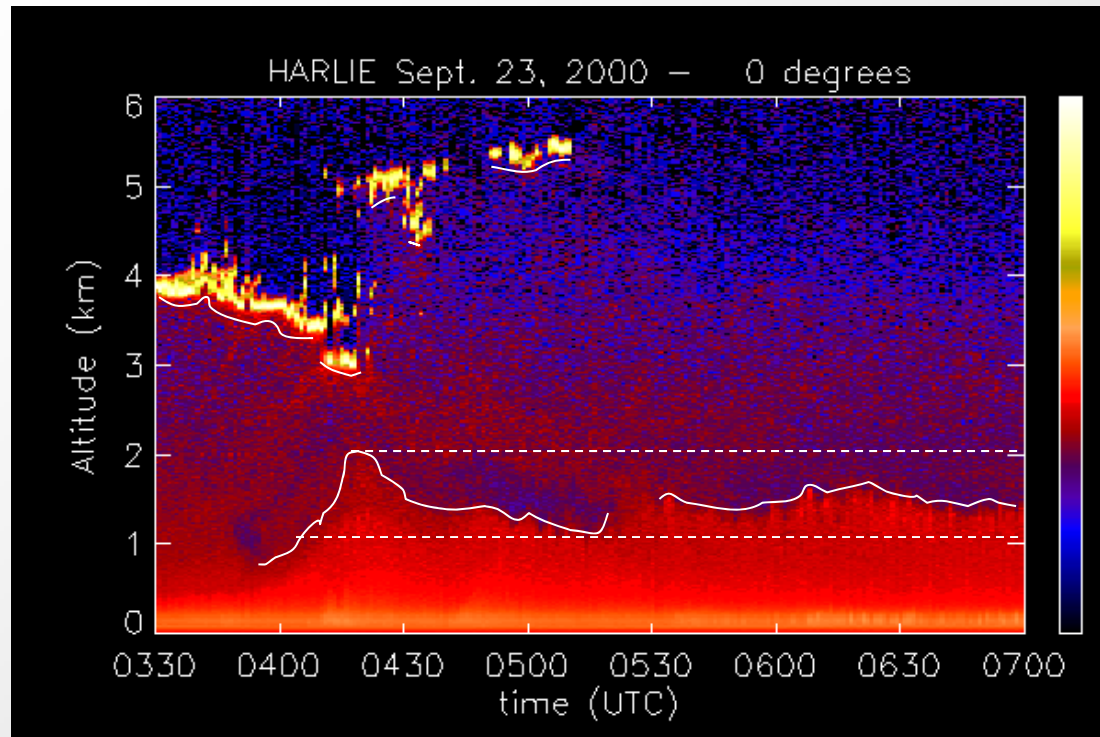
Step and Stare



One variation



Data Products



Real-Time Aerosol
Backscatter Profiles

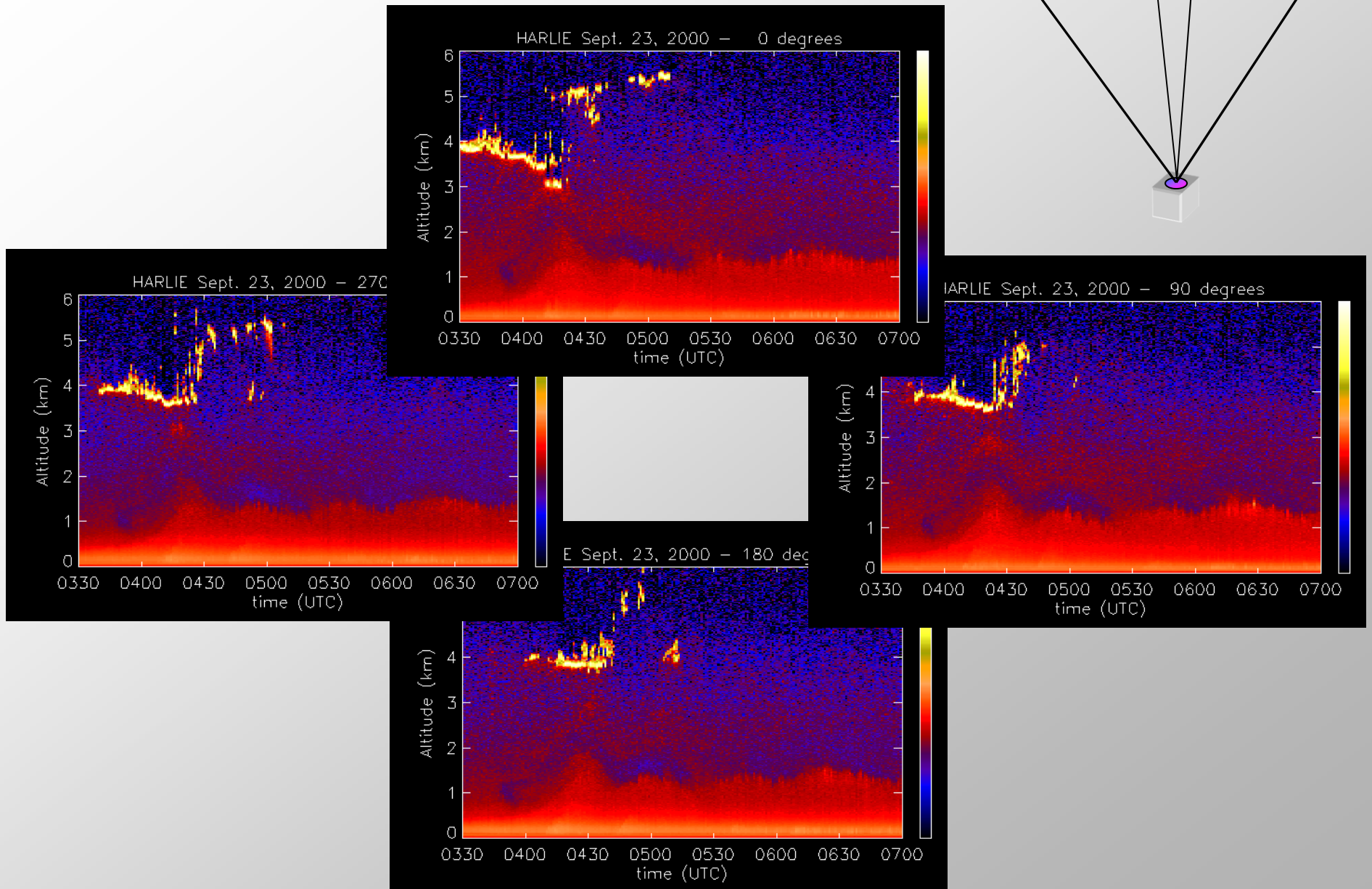
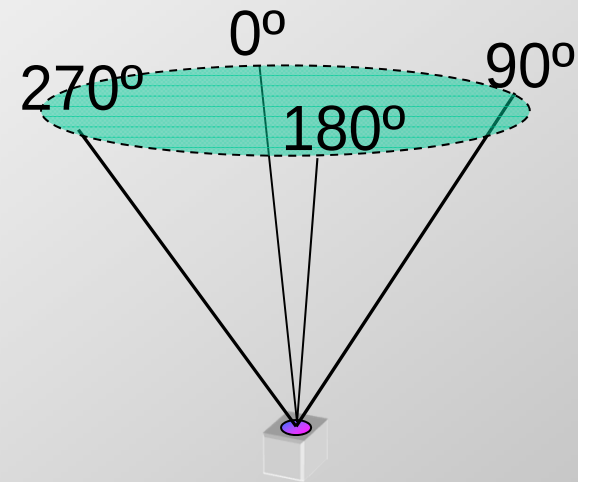
Boundary Layer top

Entrainment Zone
Thickness

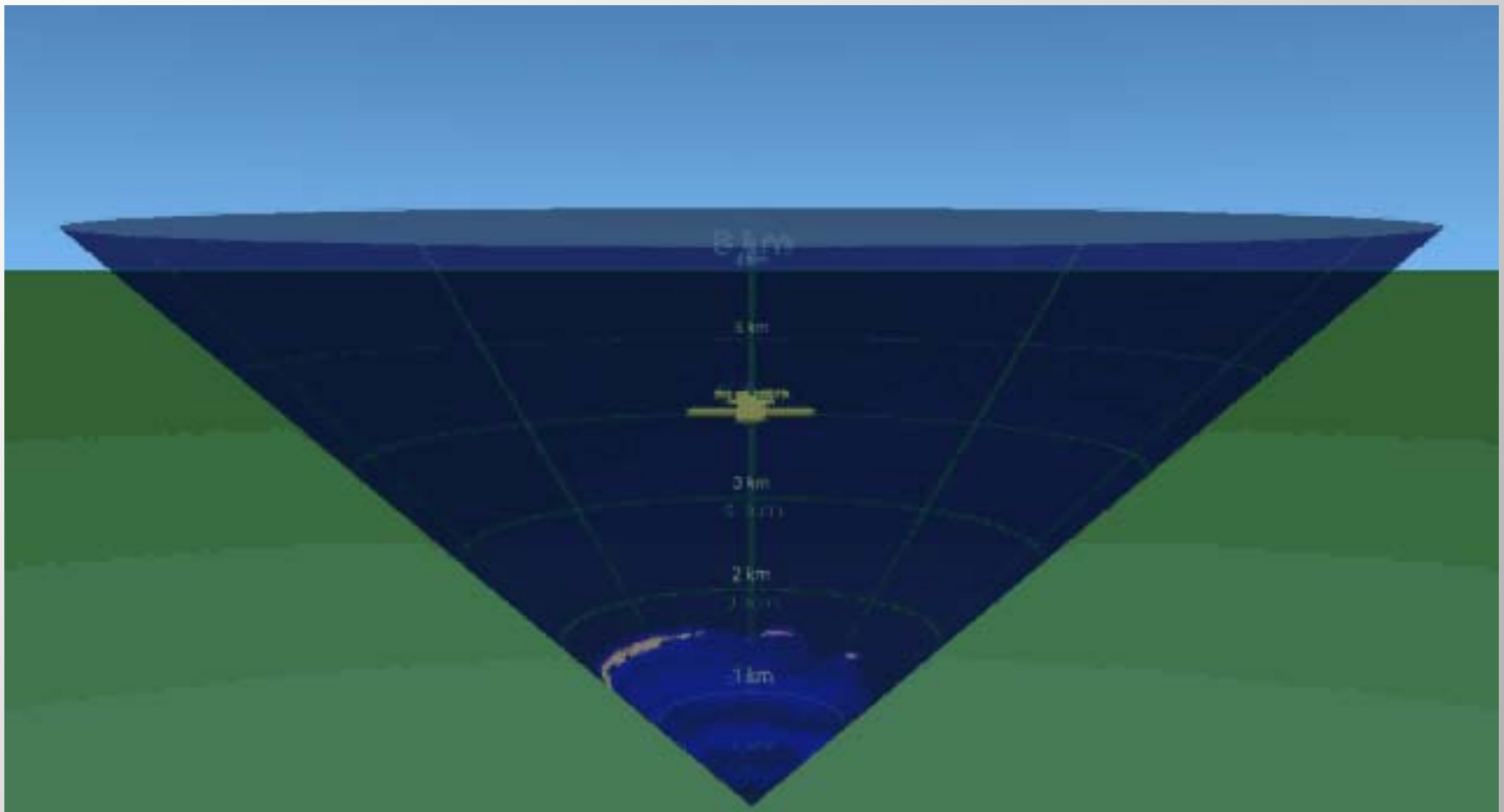
Cloud Bottom
Heights

Wind Profiles

Bore wave investigation



Data Visualization



HARLIE Field Study History

Engineering Test Flights
May-June 1998



HOLO-1
6-13 March 1999
Logan, Utah

HOLO-2
4-11 June 1999
Manchester, New Hampshire



HARLIE Field Study History

WVIOP 2000

17 September – 7 October 2000
Lamont, Oklahoma



HARGLO-2 Wind Intercomparisons

November 13 – 20, 2001
Wallops Island, VA



IHOP 2002

May 13 – June 26, 2002
Oklahoma Panhandle

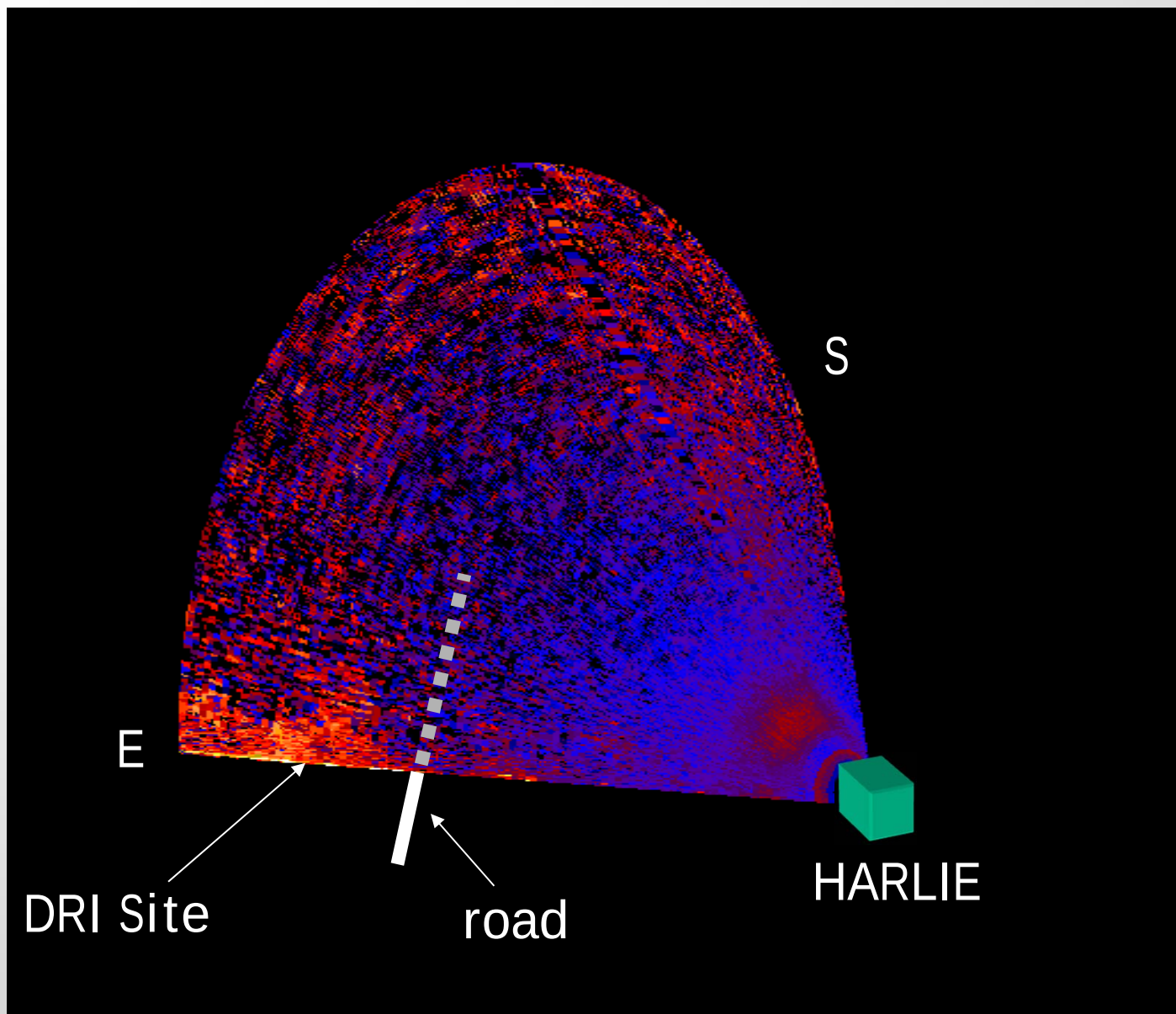
SERDP

April 12-26, 2002

Fort Bliss, TX

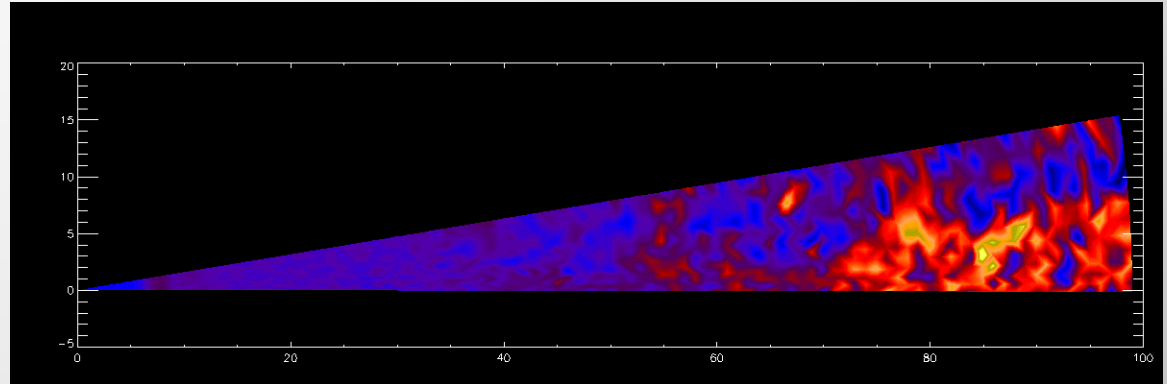


Measurement Geometry

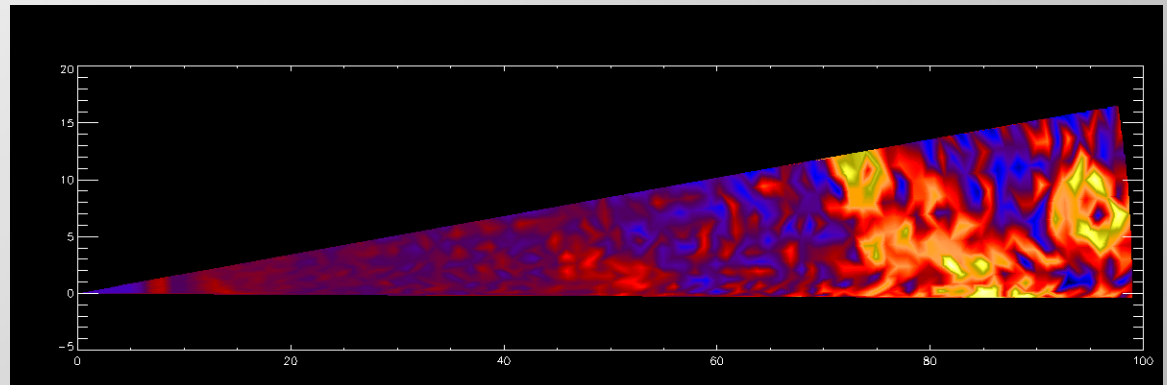


Plume Cross Sections

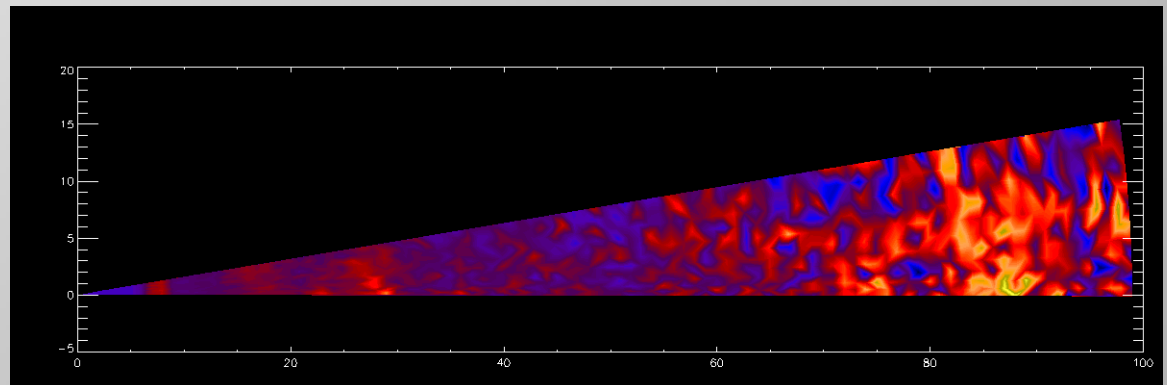
< 1 minute after
vehicle pass



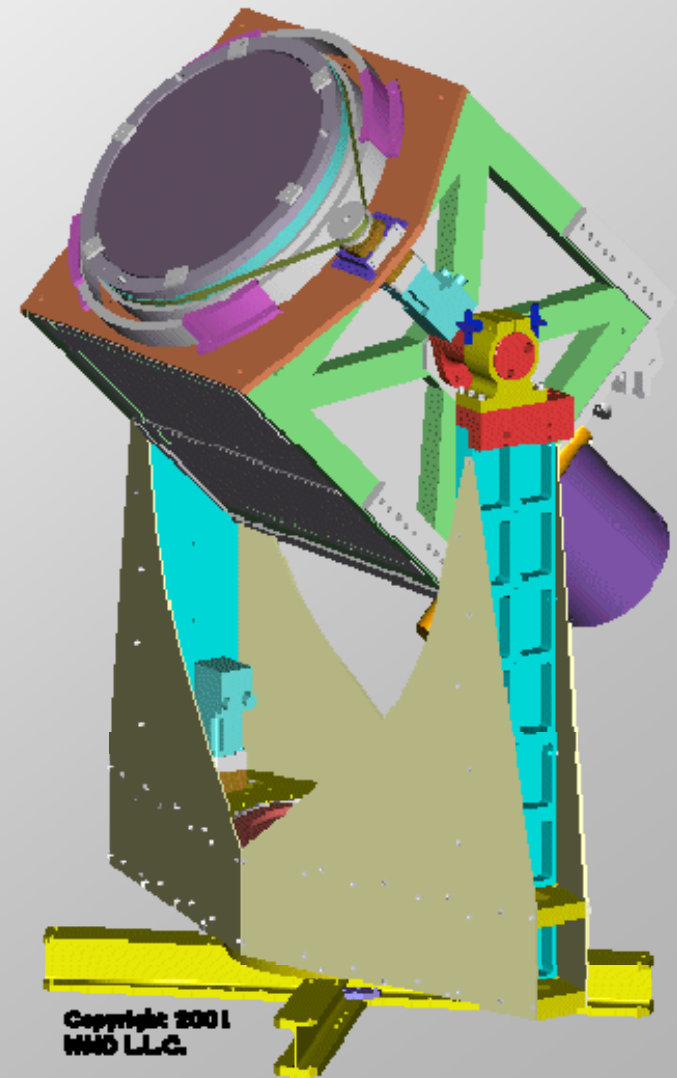
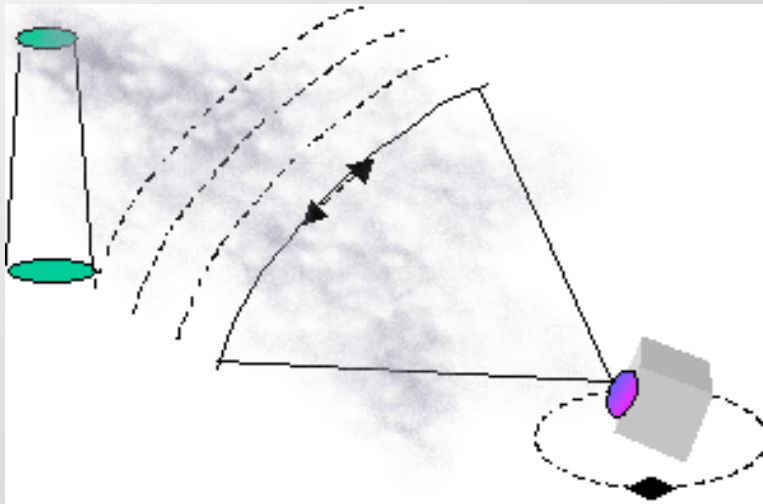
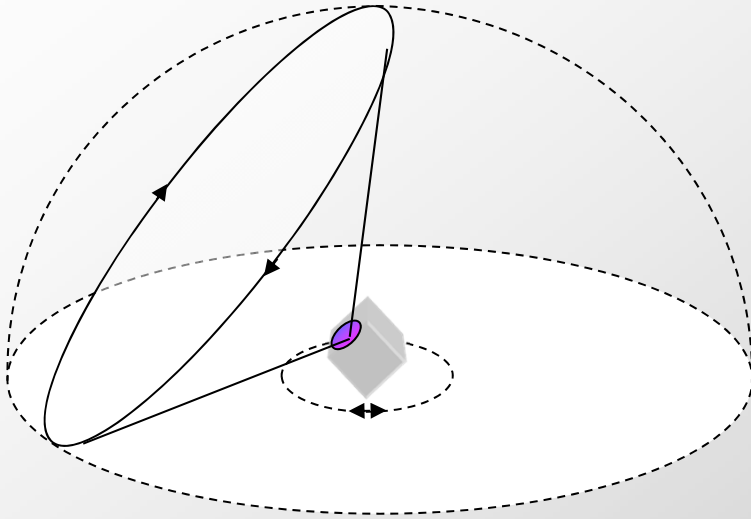
$\Delta t = 1$ minute



$\Delta t = 2$ minutes



Azimuth Scan Axis



Current work

- Calibrate HARLIE data – backscatter and extinction coefficients
- Aerosol mass loading
- Characterize plume extent and dispersion
- Characterize background aerosols
- Integrate the new azimuth scan axis

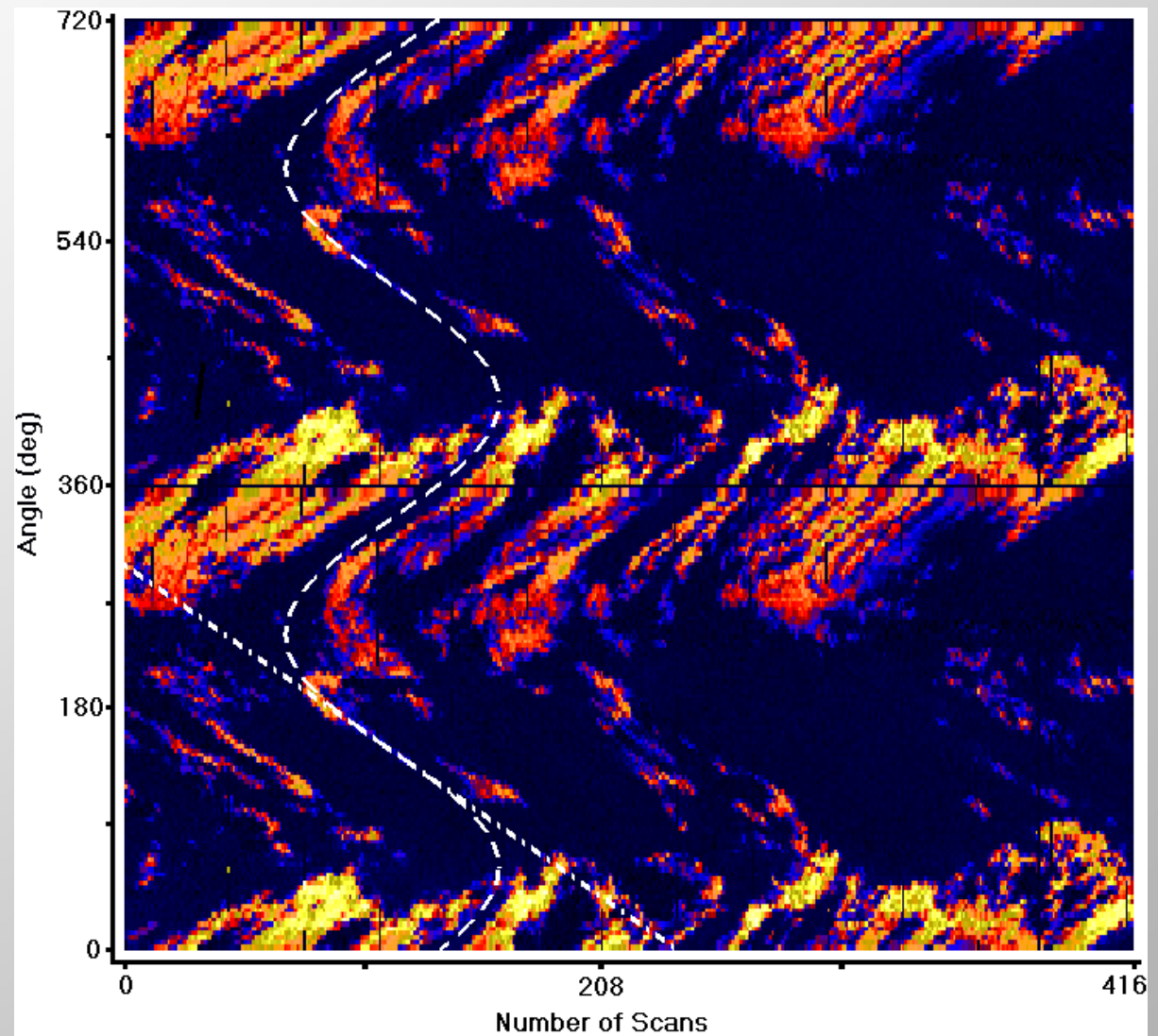
Summary

- Instrument overview
- Data products
- Field studies
- Current work





Wave Image of HARLIE Data



Aerosol Backscatter and Extinction Coefficients

