Integration of HSRL Measurement Capability into the Ozone DIAL System

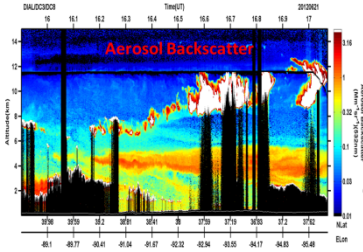
PI: Johnathan Hair, NASA LaRC

Objective

Reconfigure and upgrade the NASA LaRC Airborne O_3 Differential Absorption Lidar (DIAL) system with new High Spectral Resolution Lidar (HSRL) technology

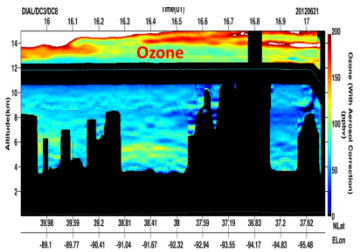
- Add calibrated and accurate nadir and zenith HSRL measurements of aerosol and cloud optical properties to O_3 DIAL measurements.
- Demonstrate the technology with flights onboard the NASA DC-8.
- Demonstrate applicability to NASA Tropospheric Composition; Aerosols, Clouds, and Radiation; Upper Atmospheric Chemistry and Physics; and Meteorology field programs.

DIAL/HSRL onboard the NASA DC-8



Data – DC3 Field Mission

(Deep Convective Cloud & Chemistry)



Accomplishments

- Integrated system on the NASA DC-8 aircraft for the Deep Convective Cloud and Chemistry (DC3) Field Campaign (Summer 2012)
- Successfully demonstrated the ozone and new HSRL aerosol and cloud measurements on all (19) science flights and submitted data to archive.
- Completed major redesign and retrofit to extend the science capabilities of the NASA benchmark Ozone DIAL lidar.
  - Characterized and integrated a narrow-band frequency-stabilized laser onto the current DIAL optical bench and incorporated that seed laser into the instrument data rack adding key HSRL capabilities.
  - Reconfigured the beam transmit optics breadboard to condition and beam steer three additional wavelengths.
  - Redesigned the optical layout of the DIAL zenith and nadir receivers, packaged the receiver optics, iodine filters, and detectors into a compact form factor that maintained the overall weight, volume and power while adding new science capability.
  - Integrated new data acquisition system that added four additional science data channels.

Co-Is/Partners

Chris Hostetler, Syed Ismail, NASA LaRC