GeoTASO: Geostationary Trace gas and Aerosol Sensor Optimization

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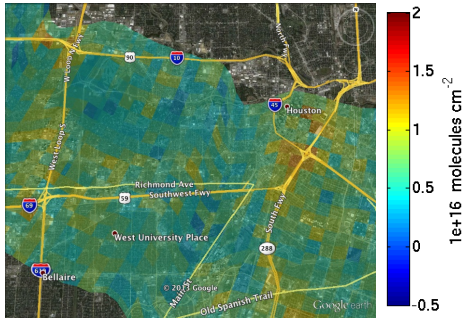
Objective

- Develop a multi-order spectrometer with a reduced footprint to enable measurements for the GEO-CAPE mission
  - Demonstrate a compact multi-order two channel spectrometer with up to 4x spectral oversampling
  - Determine optimal spectral/spatial sampling and resolution for the GEO-CAPE UV-Vis spectrometer
  - Develop a ruggedized airborne sensor to support future GEO-CAPE spectral and spatial trades and validation
- Advance retrieval algorithm maturity using airborne spectral radiance measurements

The GeoTASO instrument inside the NASA Falcon



NO_2 measurements made over Houston, Texas

Accomplishments

- Built a wide-angle pushbroom airborne spectrometer spanning 290 to 695 nm with 0.4 to 1.0nm spectral resolution in a stable, ruggedized package (1.5'x2'x3'). Sensor measures a 9km ground swath with 40x80m spatial resolution.
- Conducted aircraft flights collecting spectral radiance data and ancillary data sets. Compiled 32 hrs of flight data spanning various atmospheric conditions, surface types, and spectral resolution values for use in air quality remote sensing studies.
- Collaborated with EV-S DISCOVER-AQ and GeoCAPE ocean teams to make coincident airborne measurements with GeoTASO instrument providing a satellite-eye view of near-surface air pollution and ocean color.
- Retrieved atmospheric gases and surface reflectances from data at fine spatial scale and high sensitivity. Major trace gas pollutants measured in a 500x640m footprint with sensitivity needed to distinguish background and polluted levels.
- Developed calibration and processing to produce Level 1b data sets from raw flight data. Algorithm and analysis developments assist planning and production of EV-I TEMPO mission data calibration and processing tools and techniques.

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$TRL_{in} = 3$ $TRL_{out} = 6$