Geostationary Atmospheric Correction Issues and Future Directions

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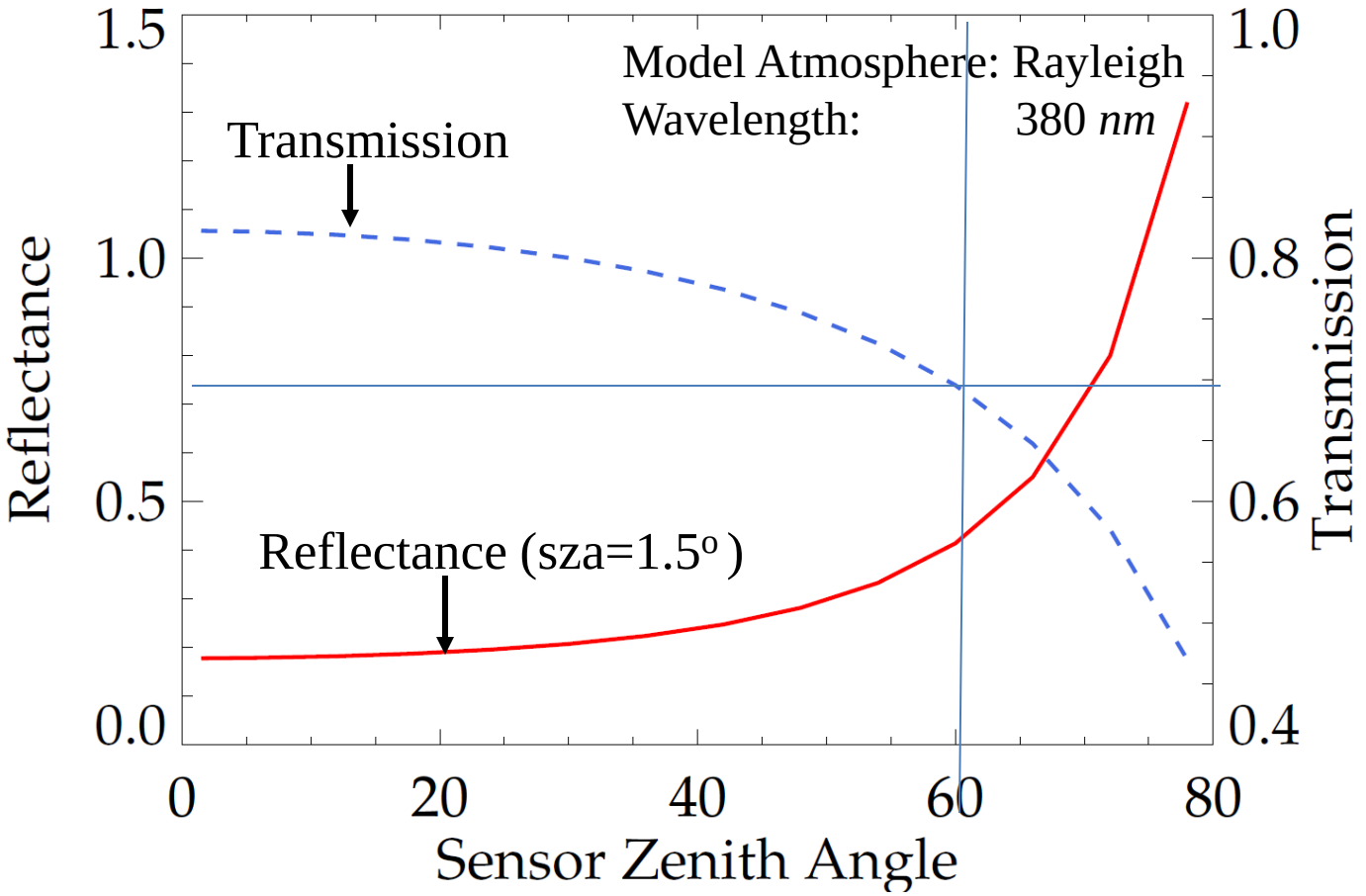
Some Geo-Cape Atmospheric Correction related Issues

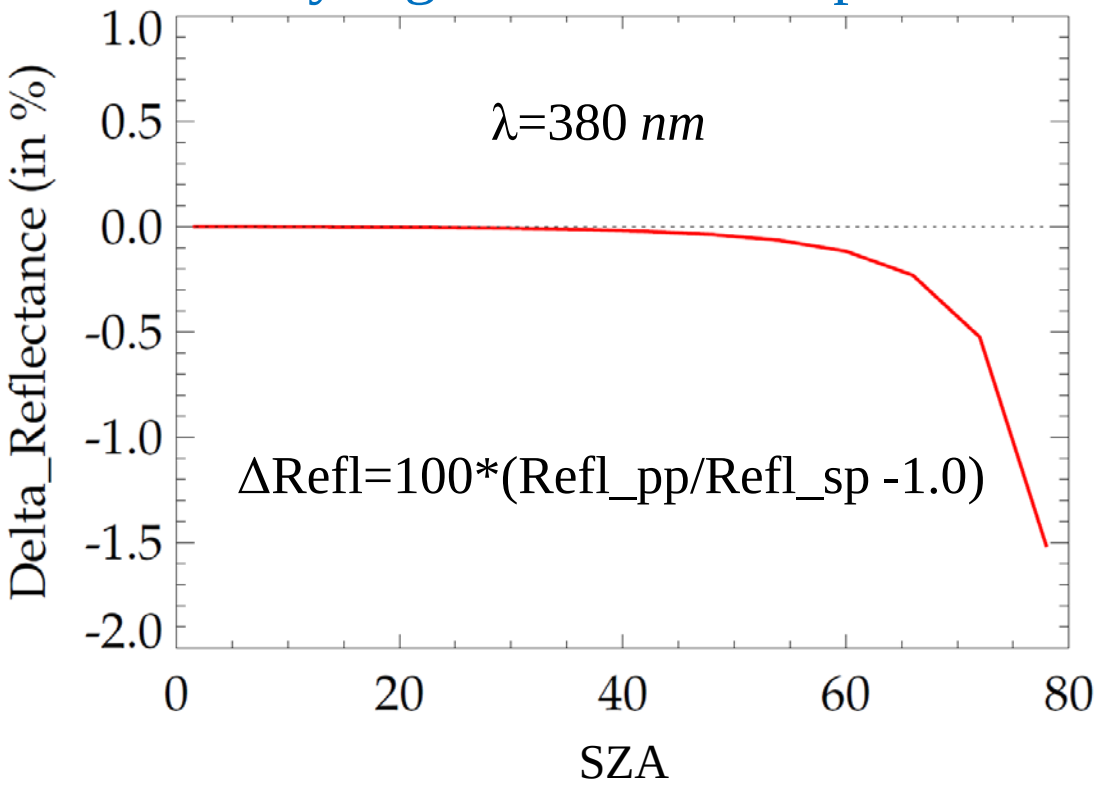
- Large solar and sensor zenith angles
- Trace gases
- Absorbing aerosols
- Atmospheric correction algorithms (heritage vs. spectral matching and Bayesian methods)

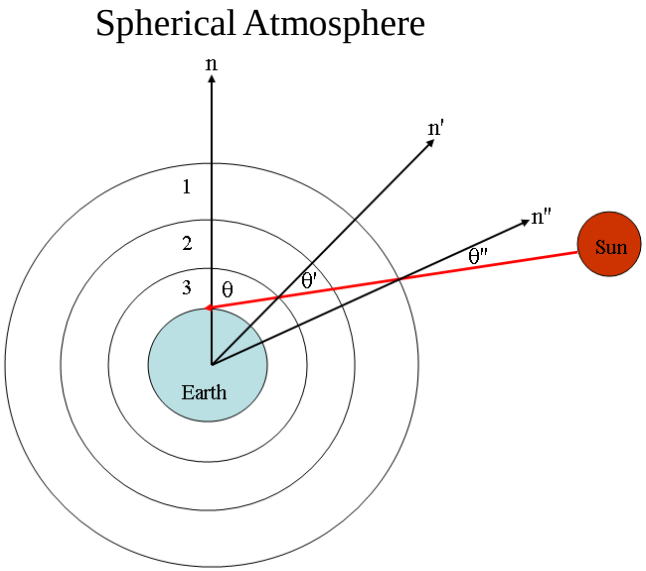
Effect of Large View Angle on TOA Reflectance

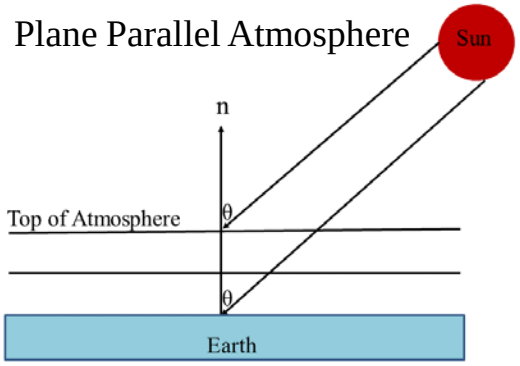


- At 60^o (senza), the reflectance is ~2 times higher, and the transmission is 12% lower than its values at the nadir.

Effect of Earth's Sphericity on TOA reflectance

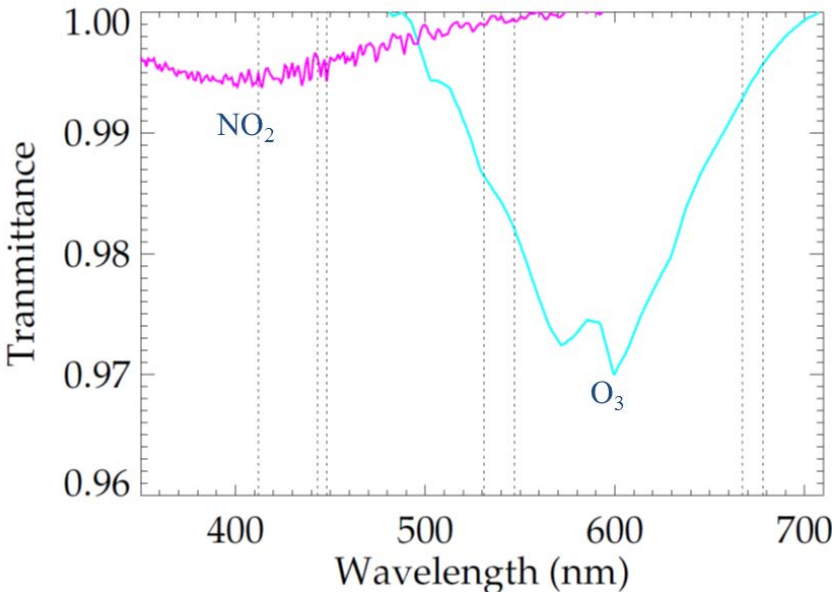


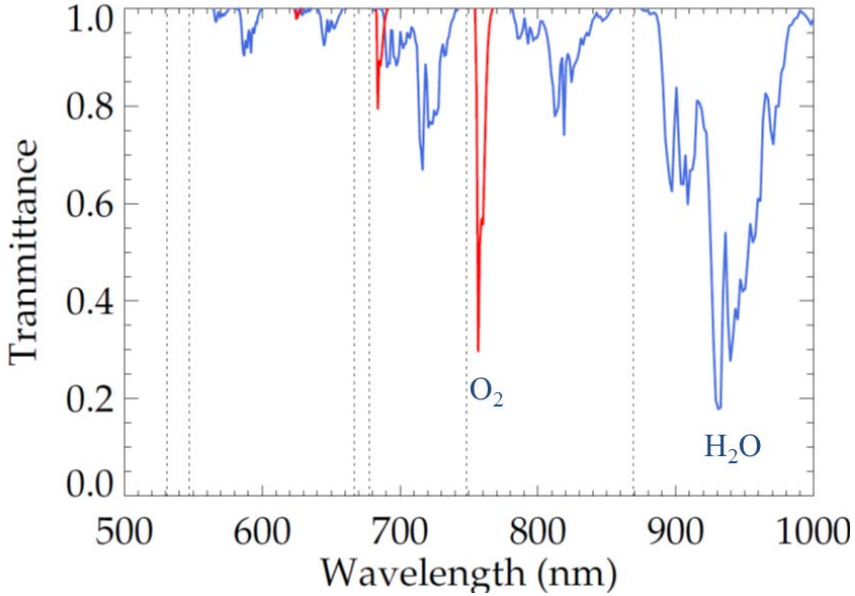




- At SZA=75º, Δrefl is ~1.0%

Trace Gases Corrections

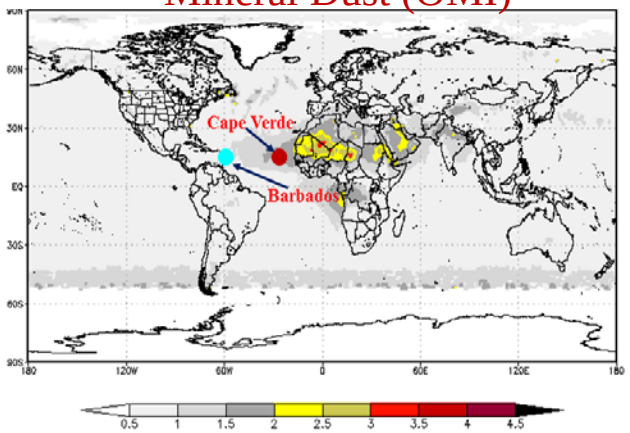




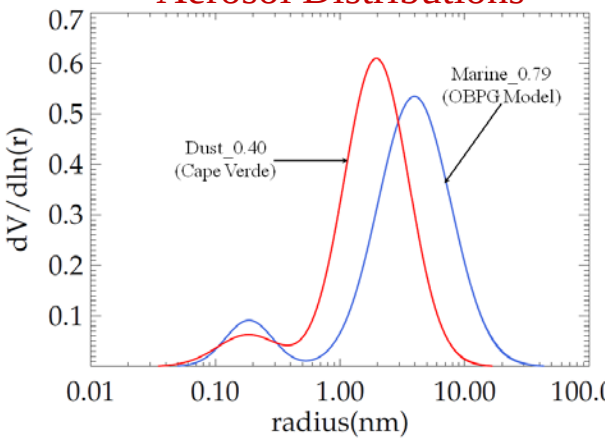
- Ancillary data must be corrected for diurnal variation, otherwise, retrieved parameters will show false time-dependent variations.

Effect of Absorbing Aerosols (Mineral Dust)

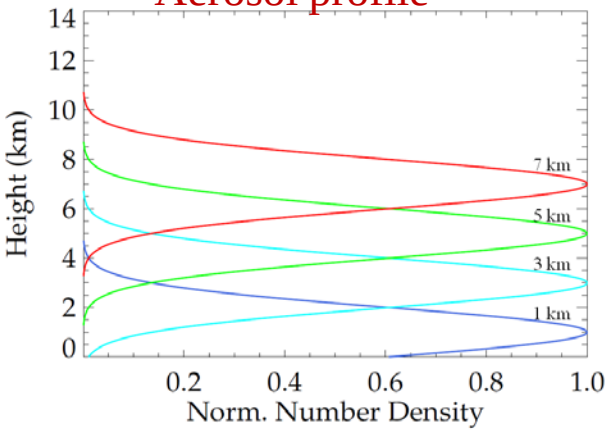
Mineral Dust (OMI)



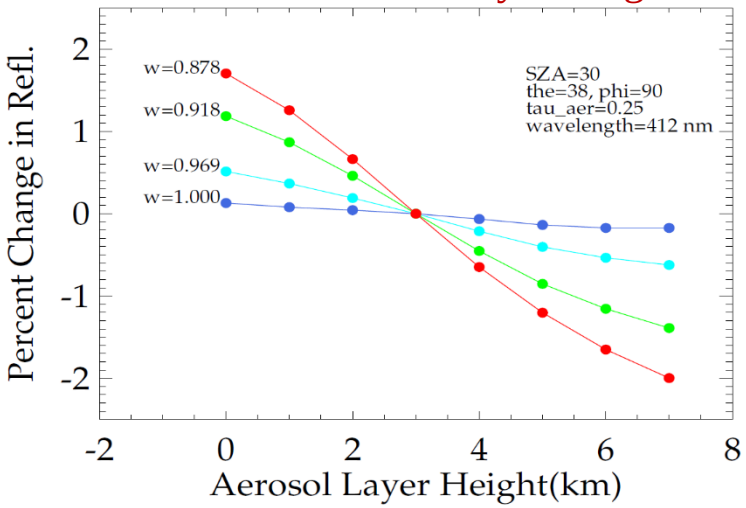
Aerosol Distributions



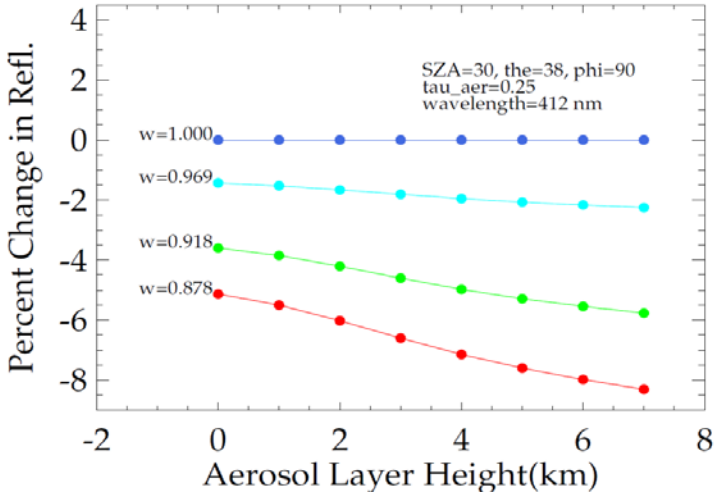
Aerosol profile



Effect of Aerosol Layer Height



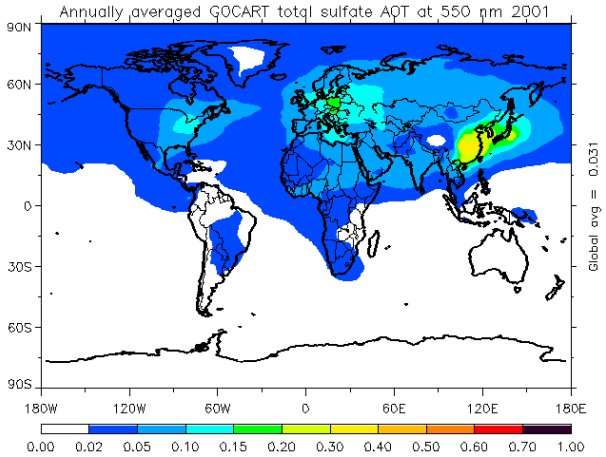
Effect of Aerosol SSA



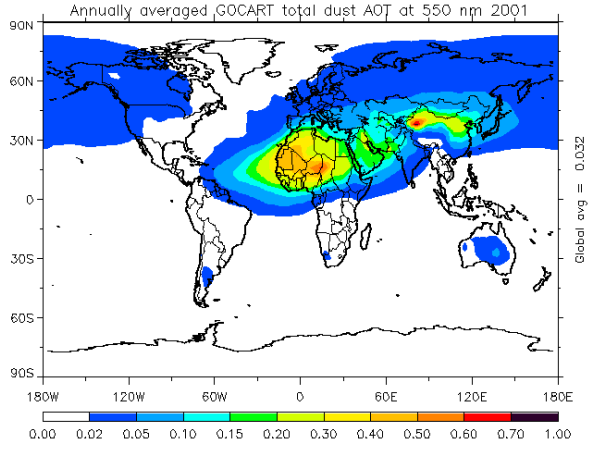
- Knowledge of aerosol height and SSA are required for absorbing aerosol correction

Detection of Absorbing Aerosols

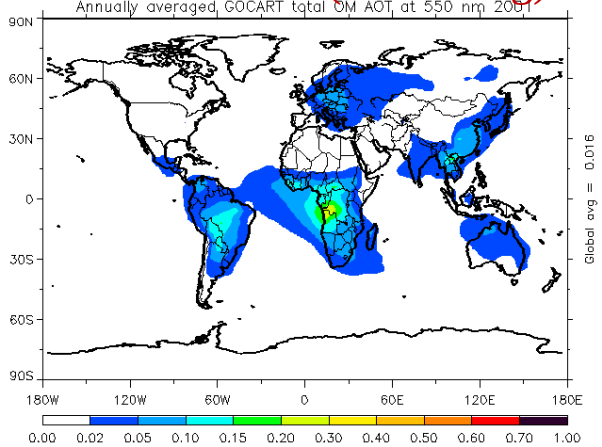
Sulfate (non-absorbing)



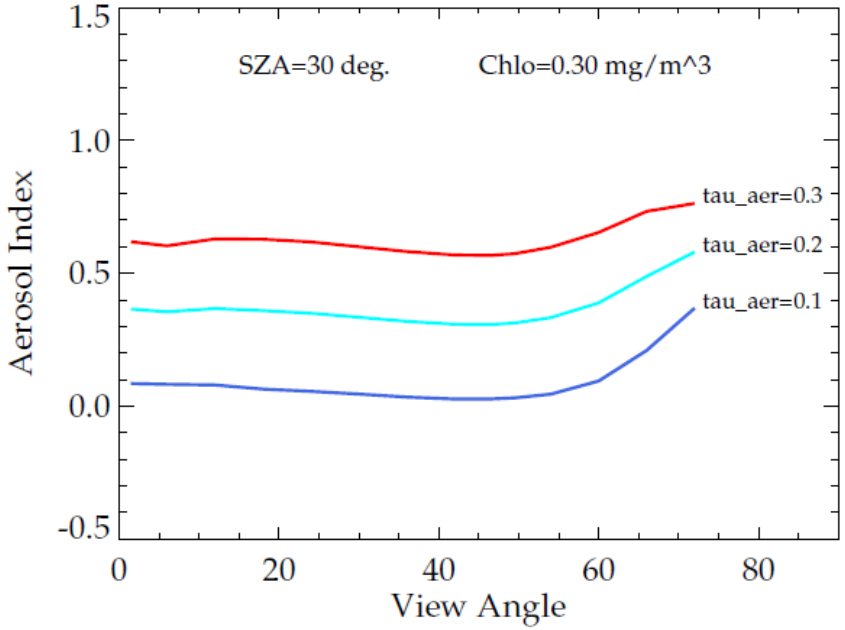
Dust (absorbing)



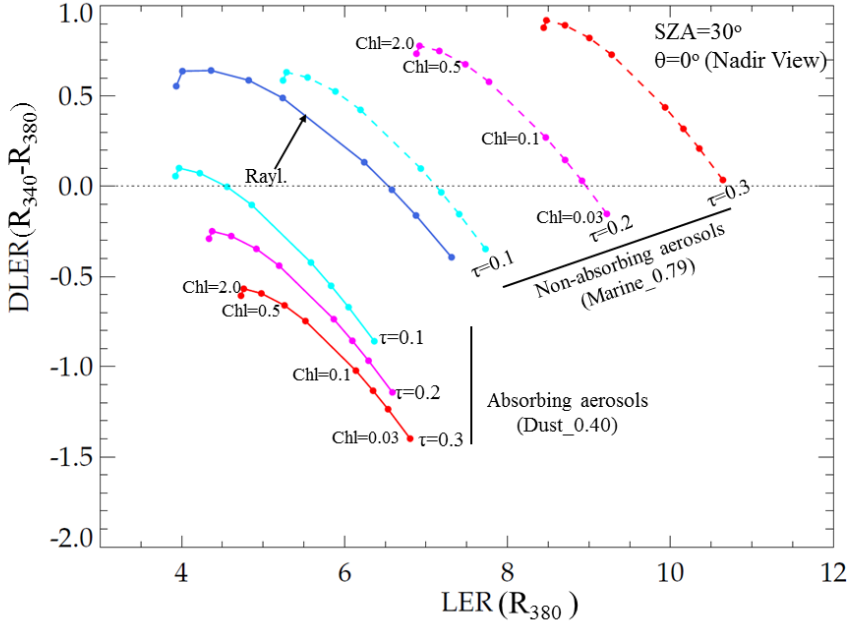
Black Carbon (Absorbing)



Aerosol Index



DLER(R_{340}-R_{380}) vs. LER(R_{380})



Directions

• Perform sensitivity studies to examine the accuracy of retrievals at large sensor and solar zenith angles.

•Optimize OBPG aerosol models for coastal regions.

• Develop methods to detect different types of absorbing aerosols.

- Saharan dust
- Black Carbon
- Industrial pollution (Brown Carbon)
- Continental aerosols

• Explore the possibility of using transport models like GOCART to identify and correct for different types of aerosols.

• Follow PACE Science Team for atmospheric correction algorithm