Atmospheric Correction Discussion

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Reminder

Ultimate goal of atmospheric correction discussion is understanding the impact of uncertainties in the correction

- Develop a set of recommended approaches to ensure better comparability between different groups
  - Permit development of new methods
  - Create a common starting point for all groups
- Areas for best practices are
  - Radiative transfer code
  - Input parameterization
  - Measurement approaches
  - Instrumentation
  - Retrieval methods

Why IVOS?

Many subgroups in CEOS and other multi-agency groups rely on atmospheric correction

- End result is an understanding of how atmospheric effects alter the calibration process in vicarious methods - TOA radiance
- Accuracy of correction depends on knowledge of atmospheric conditions - Atmospheric Composition Subgroup
- Correction depends on surface BRF - Land Prdoucts Validaton Subgroup
- IVOS goals do not care about the quality of the inputs
  - Emphasizes sensivity to the inputs
  - Knowing the accuracy of input
- IVOS does not want to be distracted by retrieval algorithms but to concentrate on RT codes

Radiative transfer code

Decided that code comparisons were still worthwhile even though it repeats past comparisons

- Codes show favorable results when given identical inputs
- Typical IVOS applications are straightforward RT cases
  - High reflectance
  - Low aerosol amounts
- Comparisons are really of the processing approaches
  - Aerosol parameterization
  - Surface assumptions
- Plan was to use Tuz Golu campaign data to create a *standard input data set*
  - Use the standard data set to predict at-sensor radiance
  - Compare the at-sensor radiances
- Seems to have lost momentum

Standard data set

Standard data set to allow groups to evaluate their processing approaches

- Web access to standard input and result from an established group using these inputs
  - Good tool for groups initiating new field programs
  - Good tool for groups implementing a new radiative transfer approach
- Rely on an artificial data set
  - Allows coupling of aerosol optical depth and surface reflectance
  - Can limit impacts from input parameterization
- Risk is that it drives users towards simply matching the standard results

Atmospheric parameterization

Agreed to the following list of parameters used as inputs to the radiative transfer models

- Spectral optical depth (total, component)
- Aerosol optical depth at 550 nm
- Angstrom coefficient (also known as power law exponent)
- Junge parameter
- Surface pressure
- Column water vapor amount
- Column ozone amount
- Aerosol type (colloquial model as well as real and imaginary index of refraction, minimum/maximum radius)
- View-sun geometry
- Surface height
- Sensor height

Standard data set

Recommend that the base input data set on a clean aerosol over a moderately bright surface

- Low aerosol absorption reduces impact of aerosol composition selection
- Modest aerosol loading (0.1 at 550 nm)
- Spectral reflectance constant with wavelength
  - Initial input of 0.4 reflectance
  - Second case with 0.05 reflectance
- 45 degree view angle (no ambiguity on elevation versus zenith)
- 60-degree solar zenith angle (large difference in radiance if elevation versus zenith angle confusion)
- Lambertian surface
- Radiance output at 1-nm intervals

Sensitivity analysis

Sensitivity studies were planned among two Tuz Golu groups to evaluate uncertainties from atmospheric correction

- Recommend moving forward only with standard input sets
- Repeating past published sensitiviy analyses is not recommended
- Should concentrate on cases directly applicable to a given test site
- Use standard inputs to give guidance to participants to perform sensitivity analyses for their specific site
    - Atmospheric parameterization
    - Surface reflectance
- Ignore lambertian vs. non-lambertian for now

Summary

Slightly modified path forward for developing best practices for atmospheric correction

- Radiative transfer code intercomparison based on standard input data sets for “training”
- Guidance on sensitivity analyses will help groups understand significant differences from standard output
- Compiling results leads to a set of best practices
  - Processing schemes
  - Input parameterization
  - Recommended measurement approaches