CSPHOT Cloud Retrievals

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CSPHOT Operating Modes (scenarios)

- CSPHOT = Cimel Sun Photometer automated Sun and Sky scanning photometer
- 2 detectors with one filter wheel with 8 filters:
  - Si (340, 380, 440, 500, 675, 870, 1020 nm),
  - InGaAs(1020nm, 1640 nm channels)
- Measurements are sequential, 1 detector, 1 filter wheel, 1 pointing position at a time.
- NASA AERONET (AERosol RObotic NETwork) calibrates, and maintains the instruments, and processes the data as part of their global data archive.

Default Scenarios

- **Park**
  - Point towards ground whenever idle (most of the time)
  - And when wet-sensor is tripped to prevent rain from entering the collimators
- **Direct Sun Observations**
  - Attempt to acquire the Sun every 15 min or so
  - If Sun, collect 3 sets of measurements at each filter position.
  - Obtains spectral irradiance and extinction optical depth
- **Zenith Radiance Observations (cloud mode)**
  - If Sun is blocked by clouds, point to zenith and obtain high gain sky mode observations in 6 channels.
- **Almucantar**
  - Once an hour (more frequently at high SZA)
- **Principal Plane**
  - A few times a day.

Continuous cloud mode (skyship)

- For MAGIC new EPROMs were added to two CSPHOTs
- New "skyship" scenario
  - Since Sun acquisition would fail on moving platform, do zenith (near zenith) observations continuously, except for hourly pauses to download data.
  - And park when wet-sensor is tripped (rain or corrosion).

Cloud Optical Depth Retrieval

- Prerequisites:
  - Normalized zenith radiances in two (440, 870) or three (440, 870, 1640) channels
  - Spectral Surface Albedo
  - Model Atmosphere Radiative Transfer Lookup Table
- Calibrated Zenith Radiances
  - Now available from AERONET in all 6 channels
  - In process of creating an ingested data-product.
- Normalized radiances:
  - Still need solar flux integrated over filter response functions for pre- and post-deployment spectral calibrations. To normalize for use in the lookup tables.
- Spectral Albedo Sources
  - Christine's algorithm uses interpolation of MODIS products, if this is desired for other data-products/VAPs, XDC could create an external data-product.
  - ARM has MFR narrowband albedos for tower sites (SGP, NSA).

2-channel v. 3-channel

- 2-channel implemented at AERONET, could be downloaded and ingested as external VAP, but is it needed?

- 3-channel is more widely applicable

  - Wei Wu and Laurie making good progress on running it at XDC

  - Need to verify outputs, specify output parameters and data-flagging, e.g. number of retrievals, retrieval quality, uncertainty estimate.

  - Produces cloud droplet effective radius in addition to COD.

Sample

Cloud Optical Depth Comparison