Effective particle shape retrieval from dual satellite observations

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Objective
Cirrus clouds: 20% of the Earth / Radiative impact?

Strong link:
- Radiation / microphysics
- Cip crys size, shape, orientation in space

Particle shape:
- Complex / variable
- Albedo change: 30%

Requirement:
- Knowledge of the shape temporal and spatial variability

Method
Observations of one cloud parcel under 2 directions:
- dual-satellite measurements GOES, NOAA, TRMM, EOS, ...

Satellite 1: direction of observation: 165 ° < θ < 178 deg.
Satellite 2: direction of observation: 30 ° < θ < 170 deg.

For both satellites:
- Temporal resolution: variable
- Spatial resolution: 1 to 8 km
- λ = 650 nm

Television Ratio of GOES-9 and YR3S
October 1, 1999 16:05 & 16:06 UTC

Example of Application

Reflectance Ratio

Application to Crystal-FACE case: 13 of July

MODIS 1640 GMT
MODIS 1645 GMT
Spatial resolution: 0.1°
θ = 23°
50° < c < 110°
θ = 23°, v = 117°

Interest of the method:
- Good phase determination (except θ = 10° and 140°)
- Phase function discrimination possible most of the time: shape retrieval

Future work on CRYSTAL-FACE
Study of several ice cloud cases with good colocation and viewing geometries between:
MODIS and GOES:
July 5, 6, 15, 16, 20, 22-25, 29

Comparisons with complementary particles shape retrieval:
In-situ
Lidar depolarization
Polder airborne