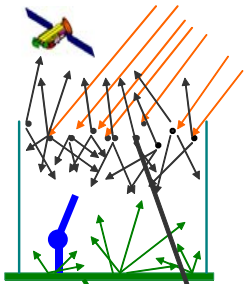
AEROSOL AND SURFACE PRIOPERTIES CHARACTERIZATION FROM JOINT INVERSION OF SATELLITE AND GROUND-BASED OBSERVATIONS

Sinyuk, A., O. Dubovik, B. Holben, T.F. Eck, F-M Breon, J. Martonchik, R. Kahn, D. J. Diner, E. F. Vermote, J-C Roger, T. Lapyonok, and I. Slutsker, Simultaneous retrieval of aerosol and surface properties from a combination of AERONET and satellite, Rem. Sens. of Env., 107, 2007, doi:10.1016/j.rse.2006.07.022.

Idea:



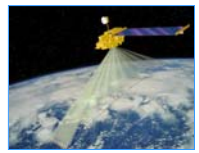
Idea:
1 Combine observations from satellite and ground based instruments observing the same atmospheric column.
2 Simultaneously retrieve aerosol and surface properties

Motivation:
1 Ground based and satellite measurements are complementary
2 Potential to distinguish between aerosol and surface signals
3 Less assumptions are needed in retrieval algorithm

Atmospheric correction is required to retrieve surface properties

Aerosol retrievals rely on assumption of surface reflectance

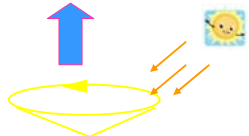
Algorithm:



Modeling of radiative properties of surface-atmosphere system (forward modeling)
Detailed aerosol (same as in AERONET)
Multiple scattering
BRF modeled using parameterized model (Rahman-Pinty-Verstraete, 1993)

Observations

Numerical inversion:
-Accounting for noise
-Solving ill-posed problem
-Setting a priori constraints
(Dubovik and King, 2000)



OUTPUT:
aerosol : particle size distribution, complex refractive index, single scattering albedo
surface: BRF, surface albedo

Parameters:

AEROSOL:
-Particle size distribution (in the total atmospheric column)
-Complex refractive index (at both AERONET and satellite wavelengths)

→ **Single scattering albedo (calculated)**

Surface :
-Bidirectional reflectance factor (BRF)
BRF model: Rahman-Pinty-Verstraete, 1993
Observations: (AERONET/MISR and/or ARONET/POLDER)

→ **Surface albedo**

-Lambertian surface albedo
Observations: (AERONET/MODIS)

Joint inversion helps improving ground-based inversion