UNIVERSITÀ
DEGLI STUDI
DI MILANO

Aerosol Optical Diagnostics

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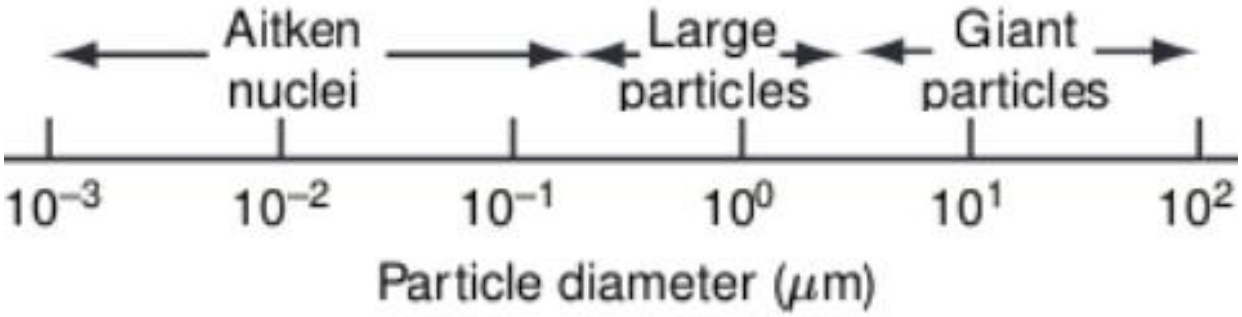
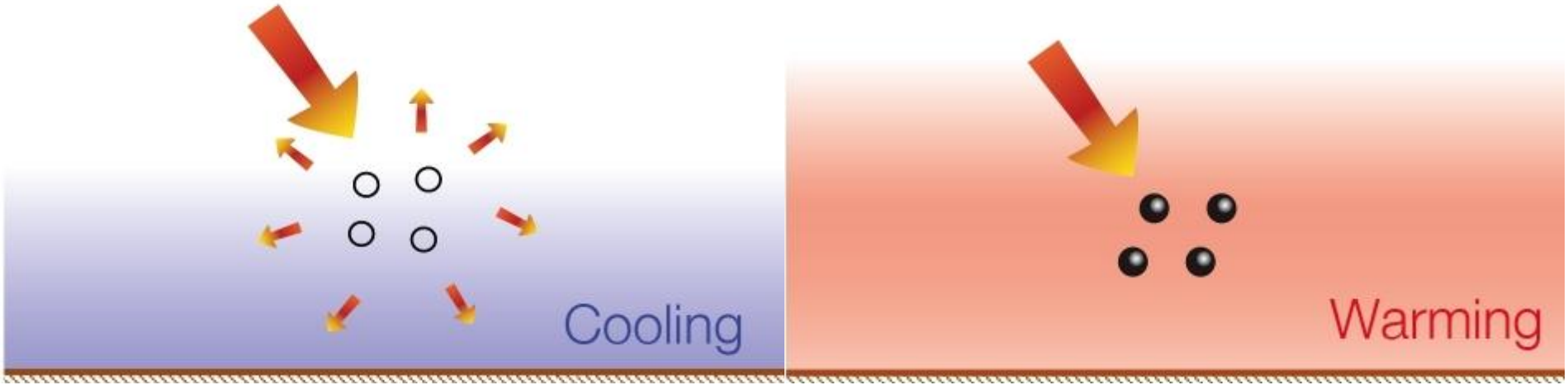
Aerosols: definition and typical size



Aerosols impact on the climate: radiative forcing



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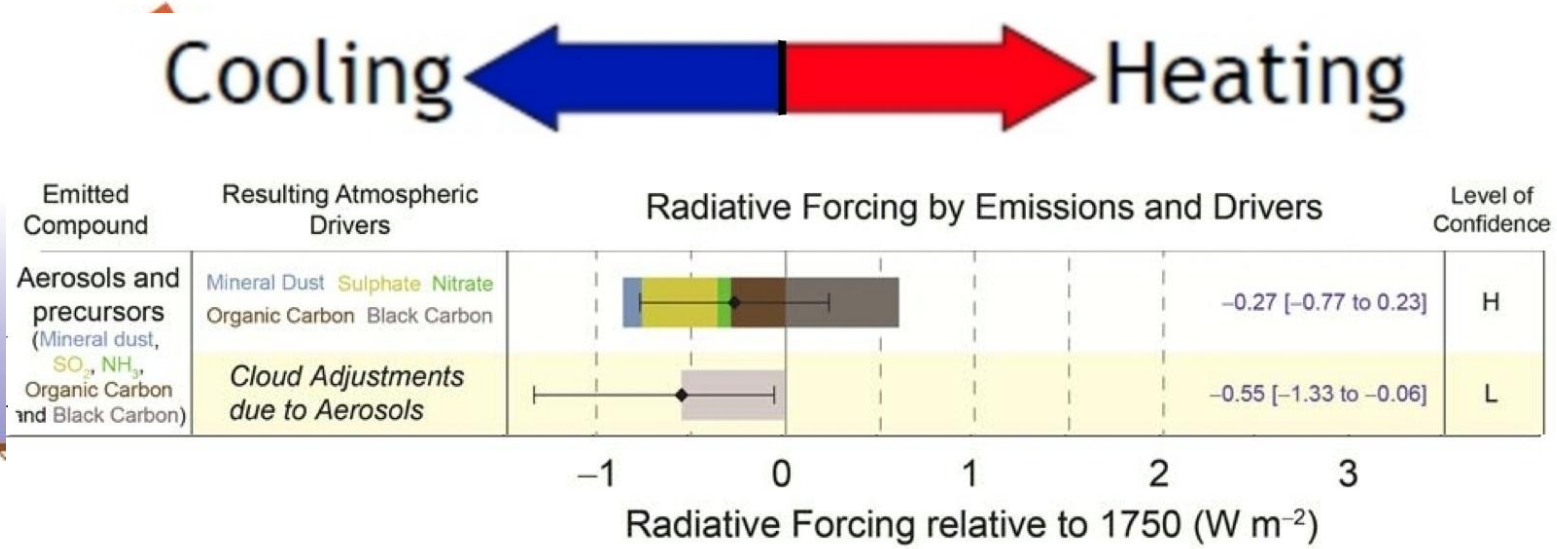

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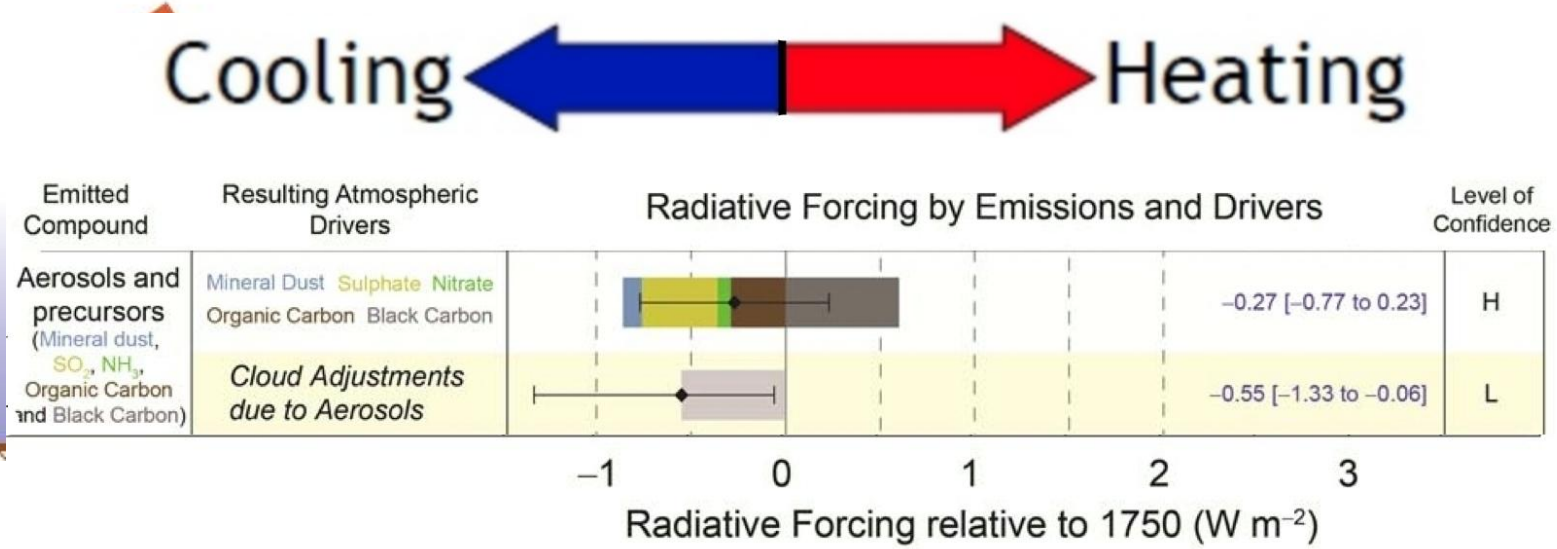
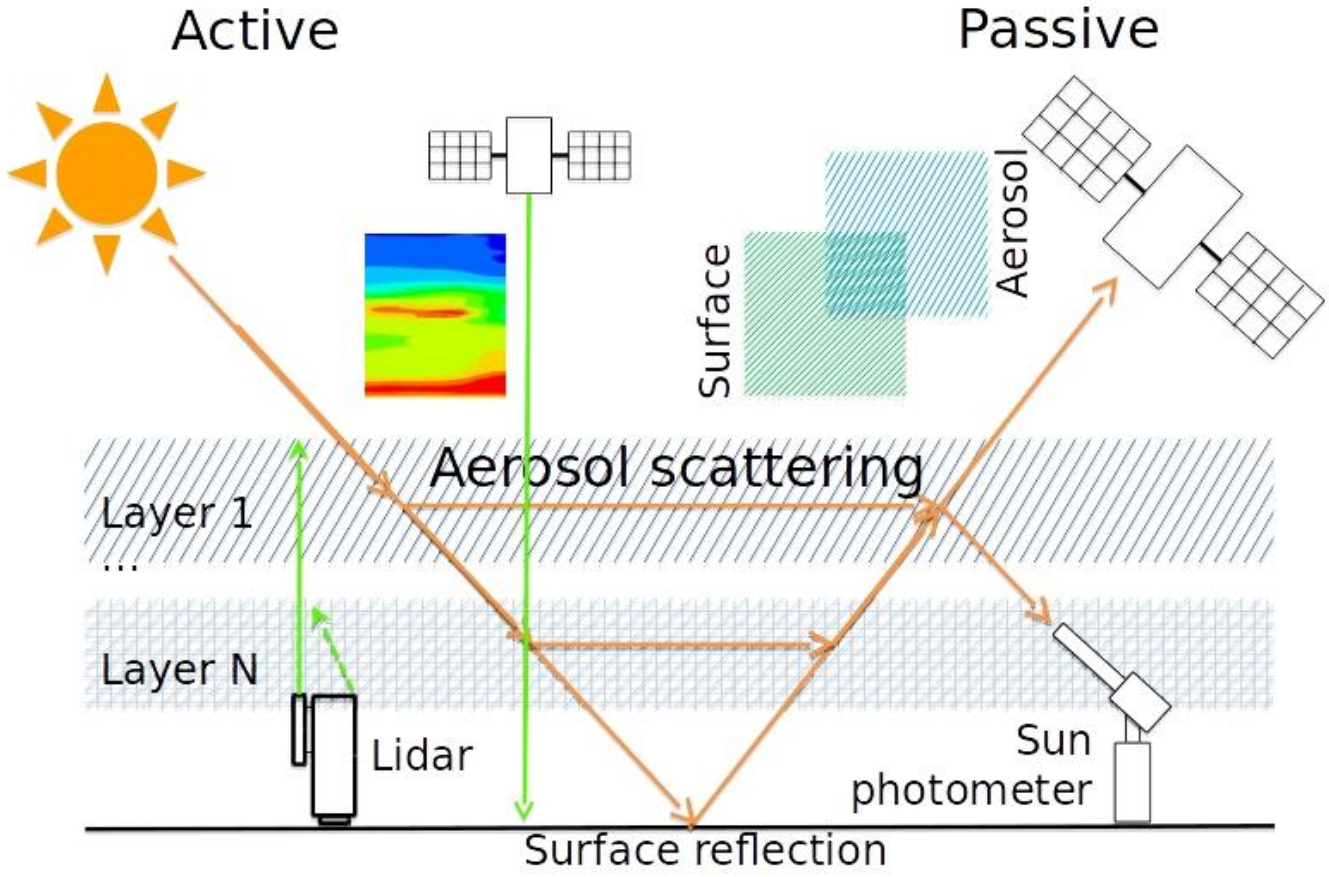


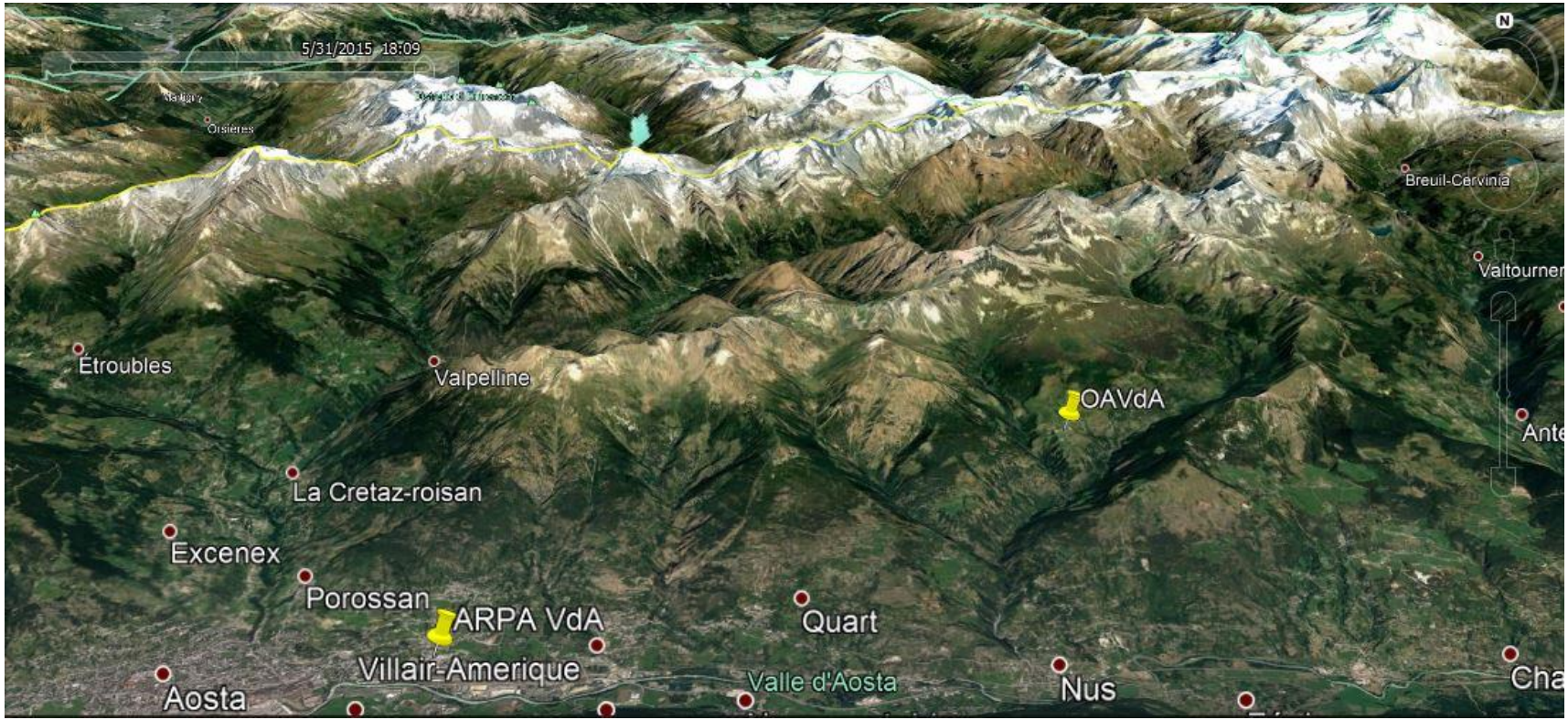
Aerosols continue to contribute the largest uncertainty to the total radiative forcing estimate.

IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change

Remote Sensing



GAIA project



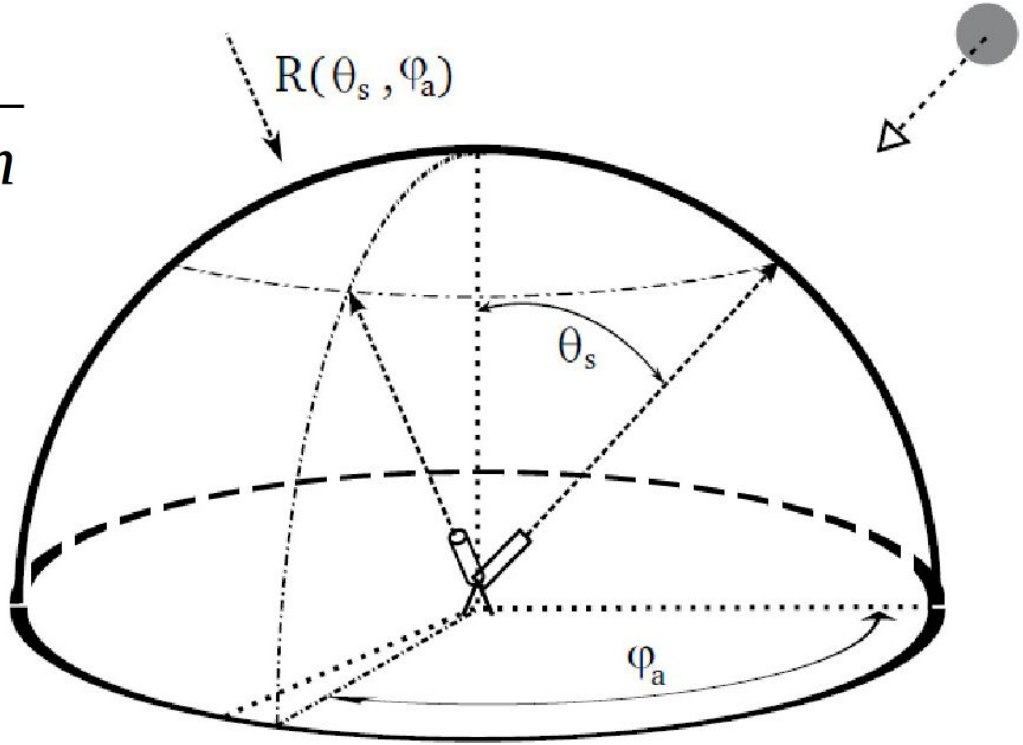
ARBOL: ARray of BOLometers

GAIA project

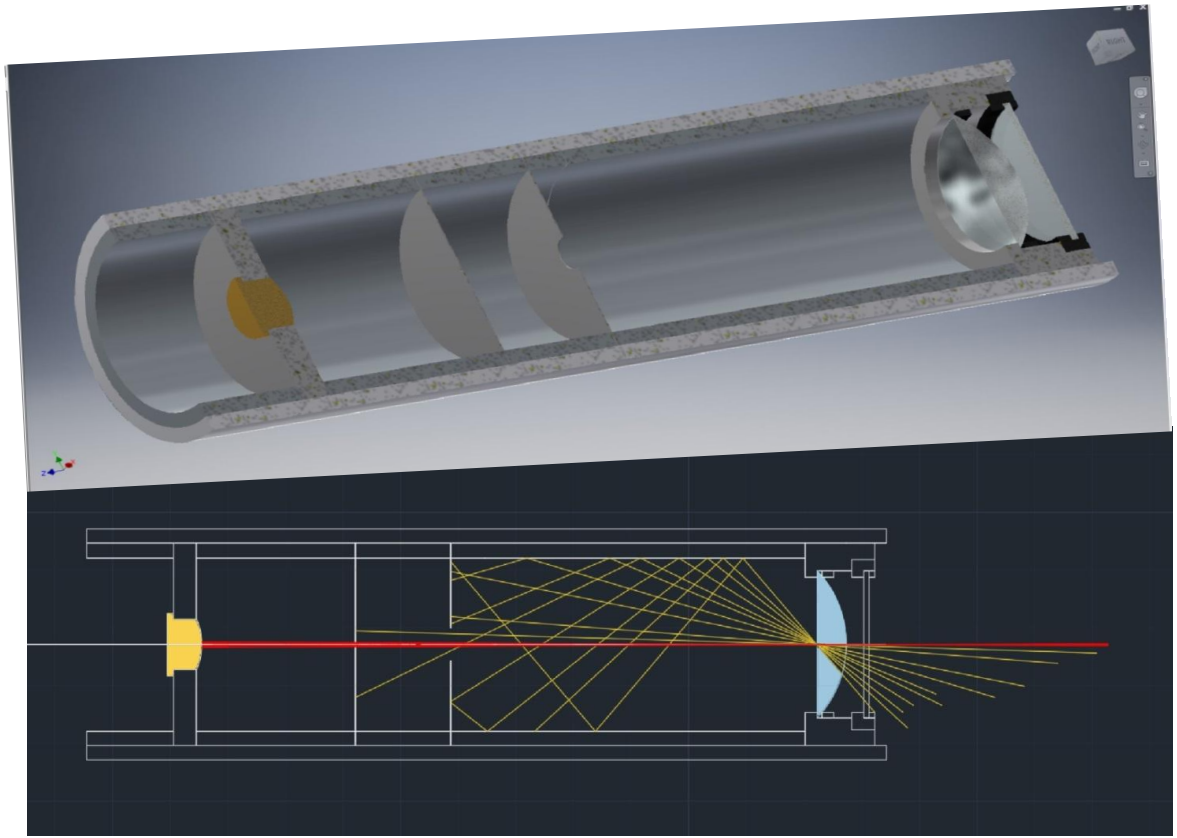
ARBOL Observations

Diffuse sky flux density:

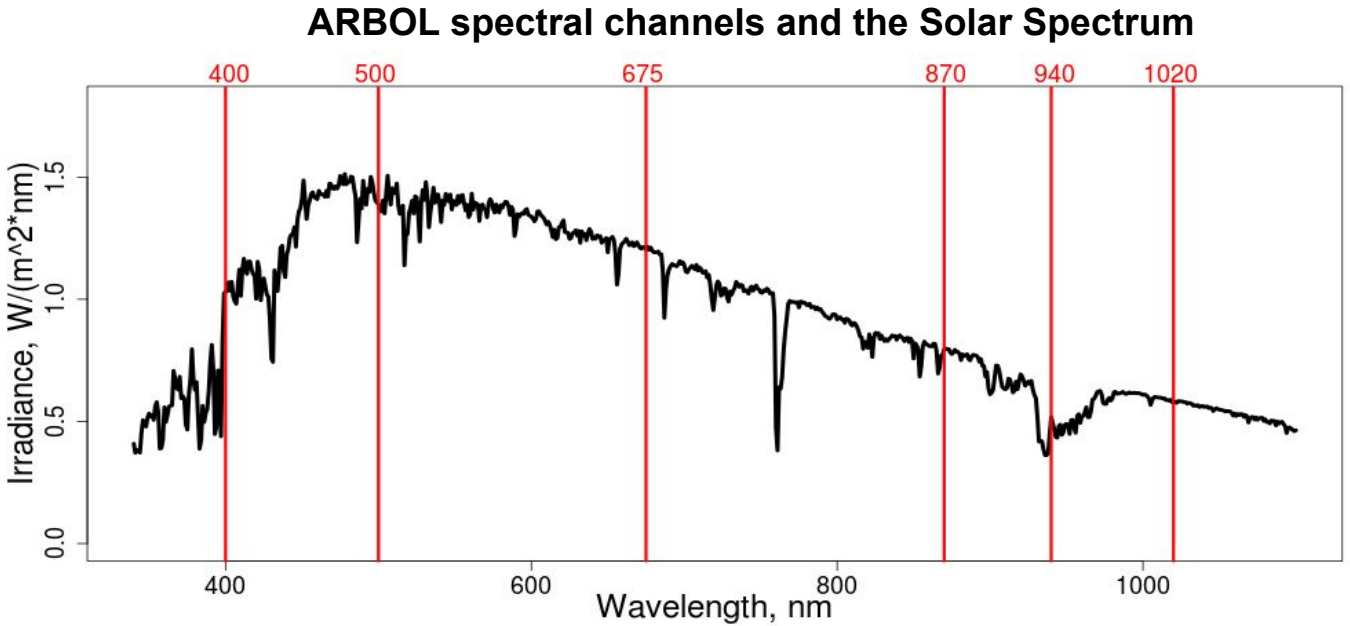
$$E(\Theta,\lambda) \quad \frac{W}{m^2 nm}$$



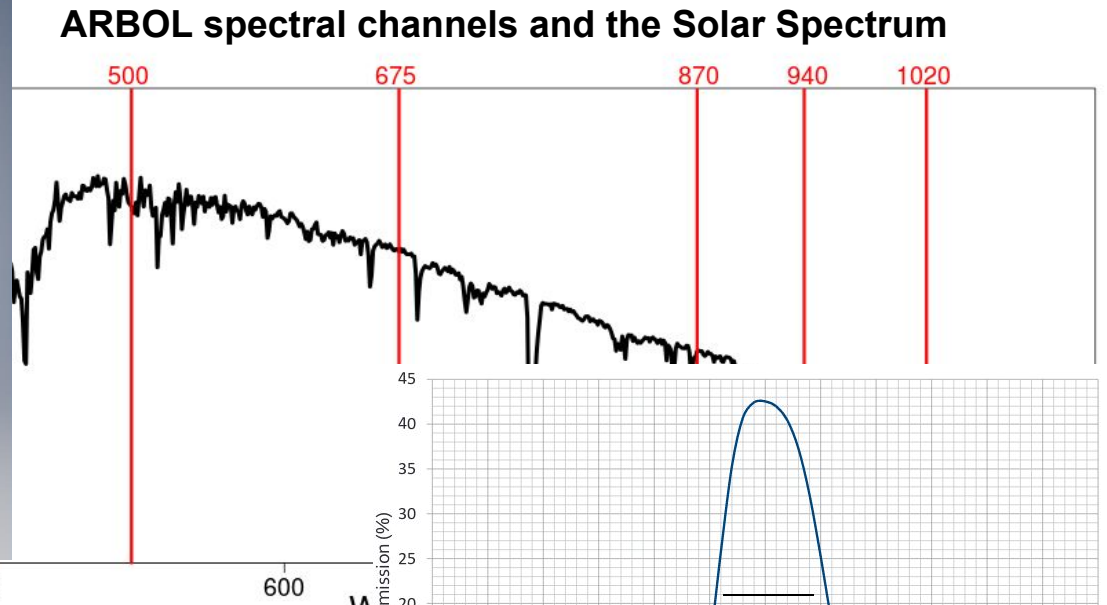
ARBOL: pointing and angular selection

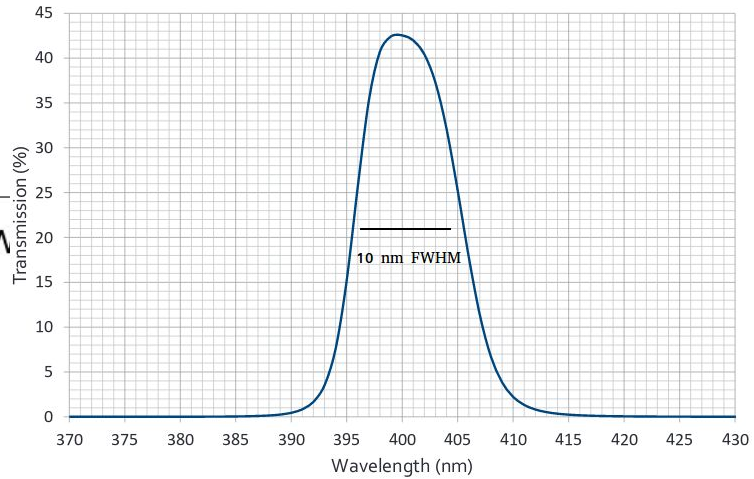


ARBOL: spectral observations



ARBOL: spectral observations



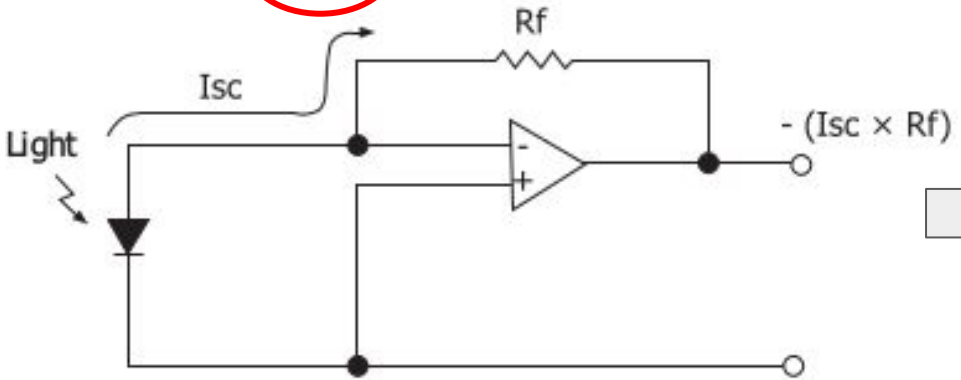


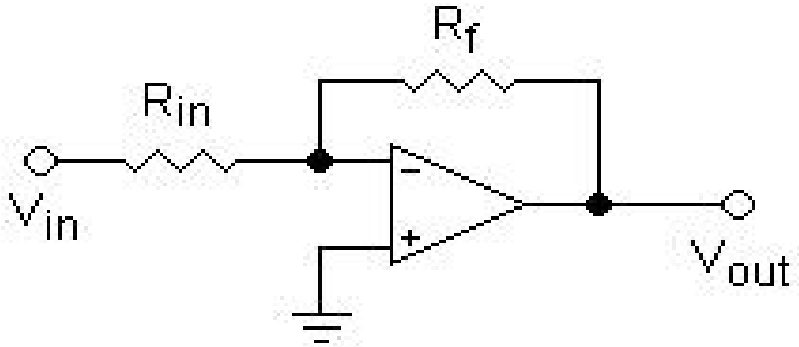
Retrieval of the scattering phase function

$$R(\Theta,\lambda)=\frac{E(\Theta,\lambda)}{F(\lambda)m_0\Delta\Omega}\propto P(\Theta,\lambda)$$

Direct flux density:

$$F(\lambda)\quad \frac{W}{m^2 nm}$$





ARBOL: next steps

- angular calibration
- spectral calibration of filters and photodiodes
- temperature characterization of the electronics
- reconstruction of top of the atmosphere signal: Langley calibration

Inversion Algorithms and their role

Measured Quantities

- Sun Irradiance
- Sky Radiance

Optical Properties to be retrieved

- Size Distribution
- Refractive Index
- Sphericity Index

General Retrieval of Aerosol and Surface Properties

- Recently released (december 2016)
- Inheritage of previous algorithms benefits
- Strong versatility:
  - lidars, ground based and satellite measurements included in a single retrieval
  - can account for small spatial and temporal differences


Thank You