

Fotometri solari e la rete AREONET

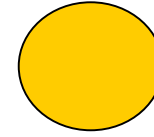


*Ministero
dello Sviluppo Economico*

Spessore ottico

$$N_F(z) = N_F(0) \exp\left(-\int_0^z \alpha(x, \lambda) dx\right)$$

$$\tau(\lambda) = \int_0^{\infty} \alpha(x, \lambda) dx$$



Sole :
 $150 \cdot 10^6$ km

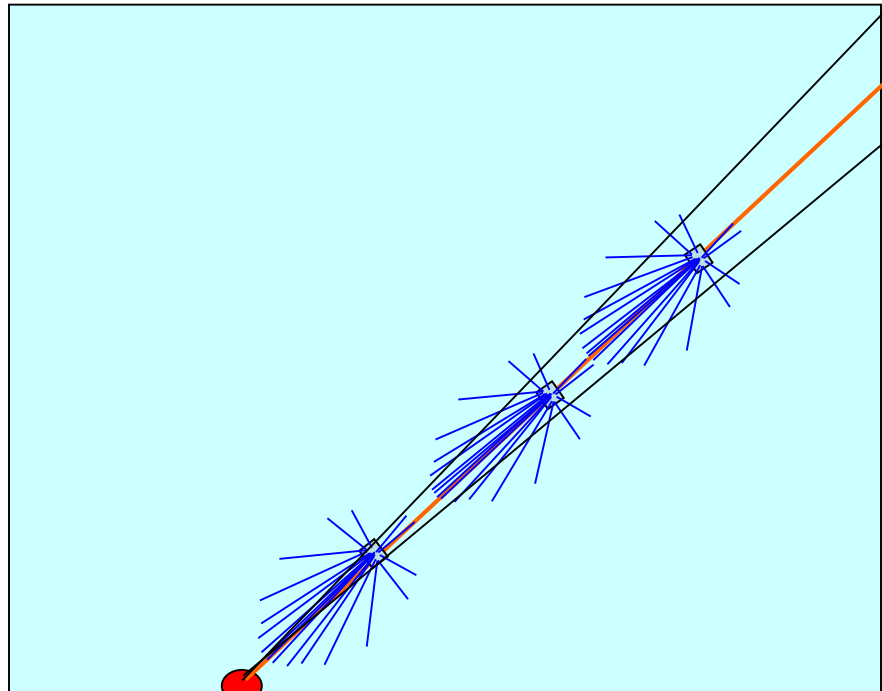
Fotometria solare da terra
1) Estinzione

Misuro: irradianza DIRETTA in
funzione della lunghezza d'onda

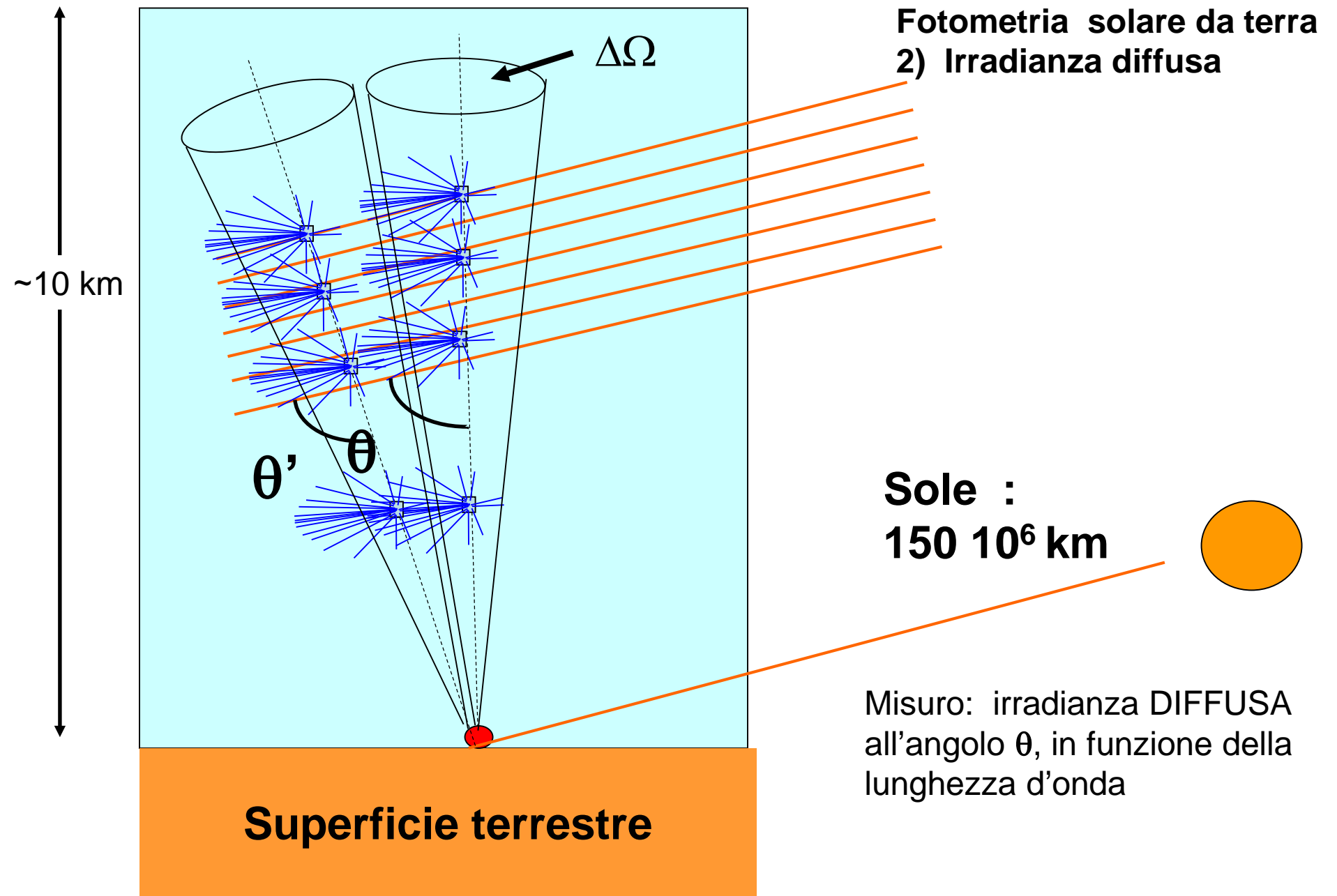
Otengo lo spessore ottico
dell'atmosfera.



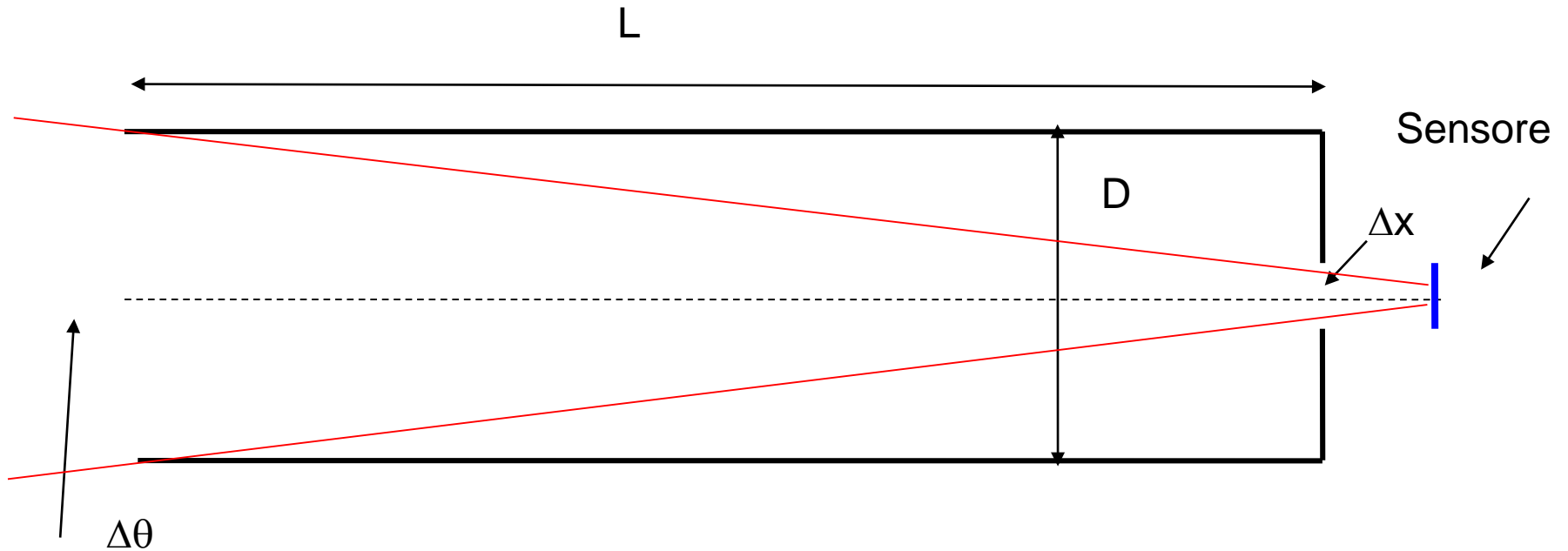
~ 10 km



Superficie terrestre



Ottica di raccolta- campo di vista - I

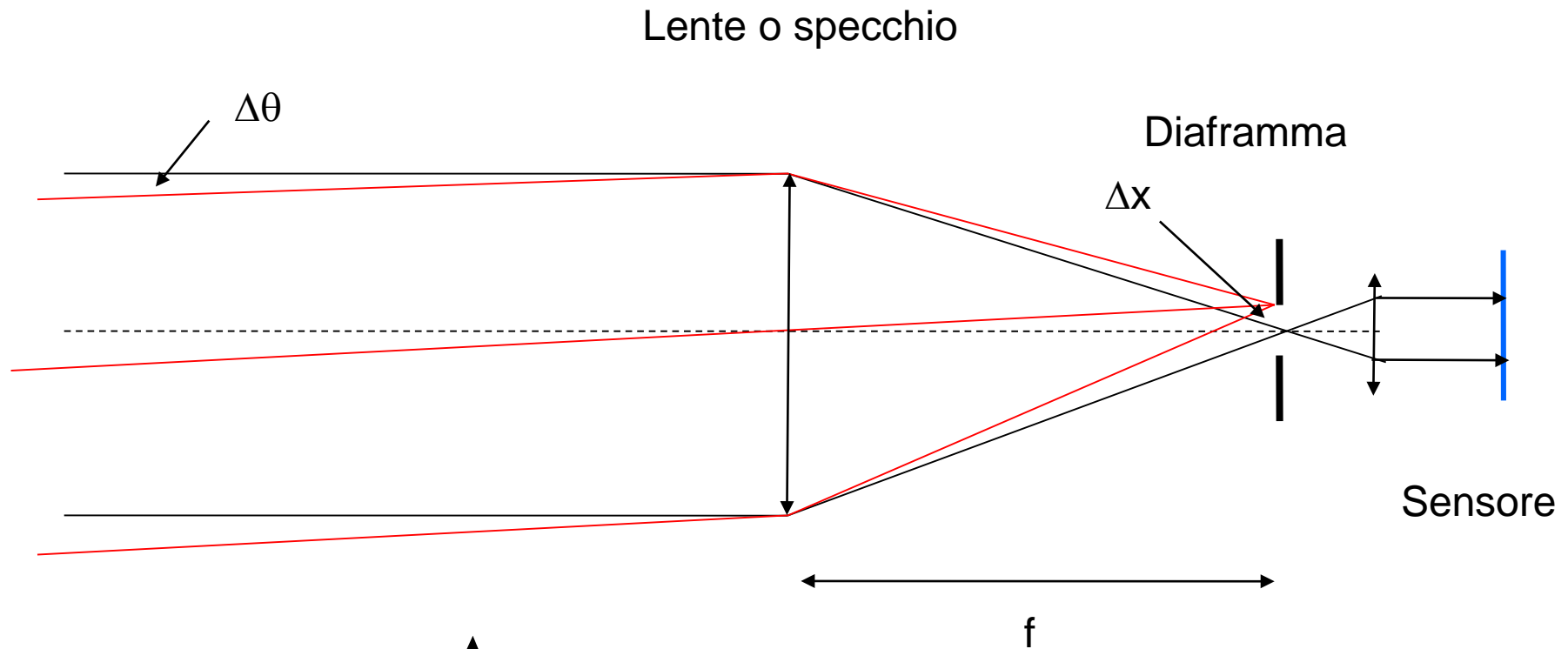


Tubo di diametro D e lunghezza L

Se $\Delta x \ll D$

$$\Delta\theta \approx \frac{D}{L}$$

Ottica di raccolta- campo di vista - II

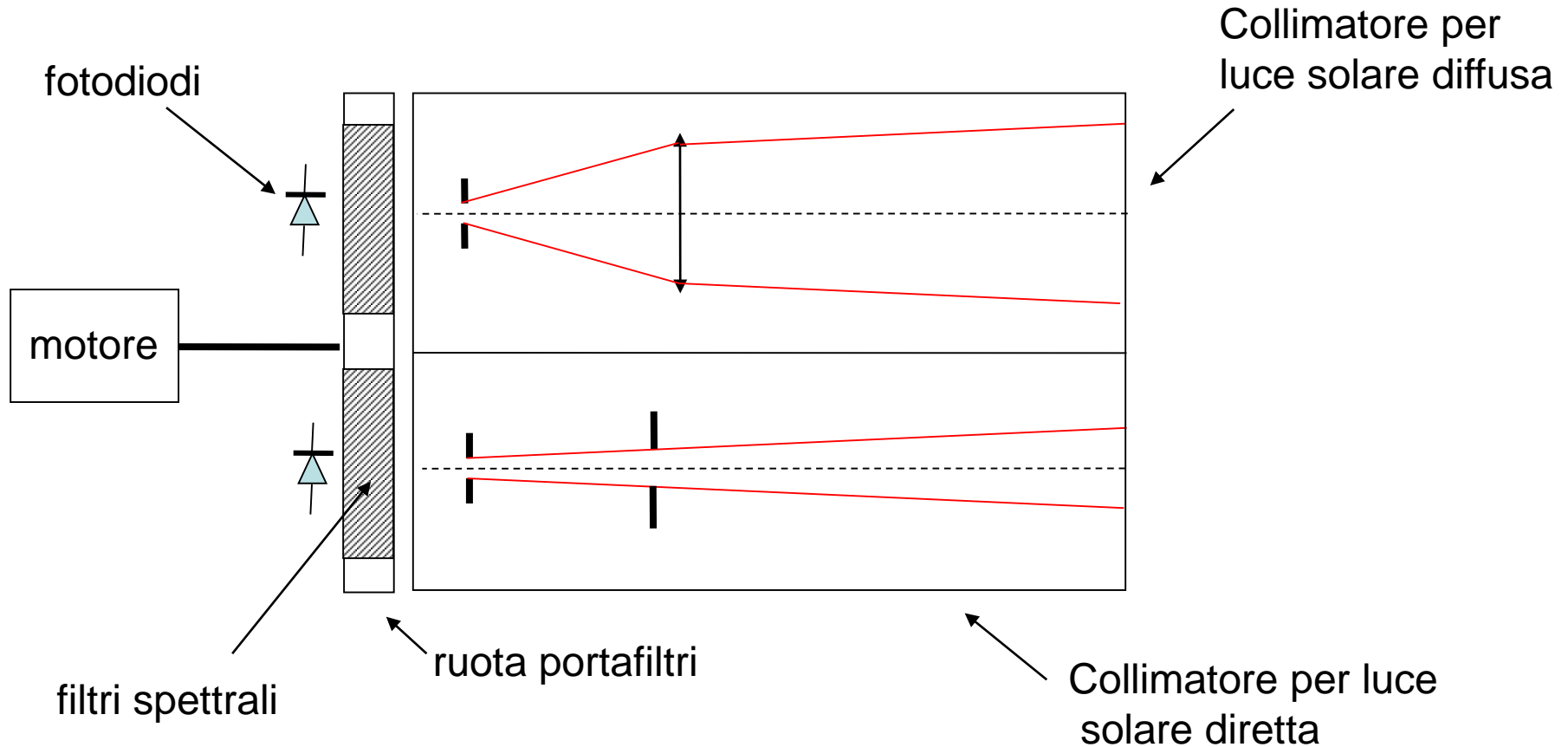


$$\Delta\theta = \frac{\Delta x}{f}$$

Fotometri solari e AERONET



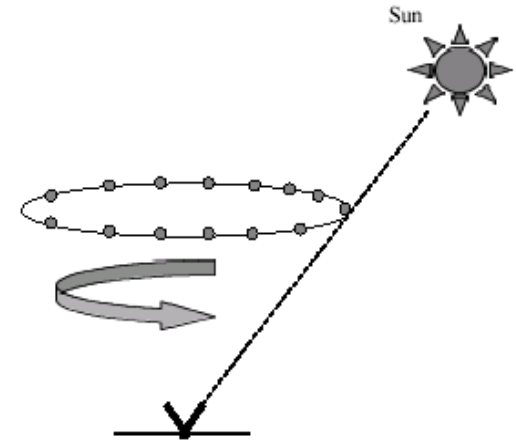
Fotometri solari e AERONET



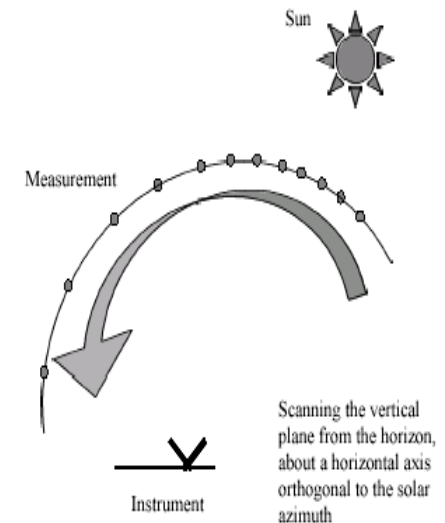
340-380-440-500-675-870-936-1020 nm filters

- Misure di irradianza diretta
(spessore ottico, misura diretta)
- Misure di irradianza diffusa

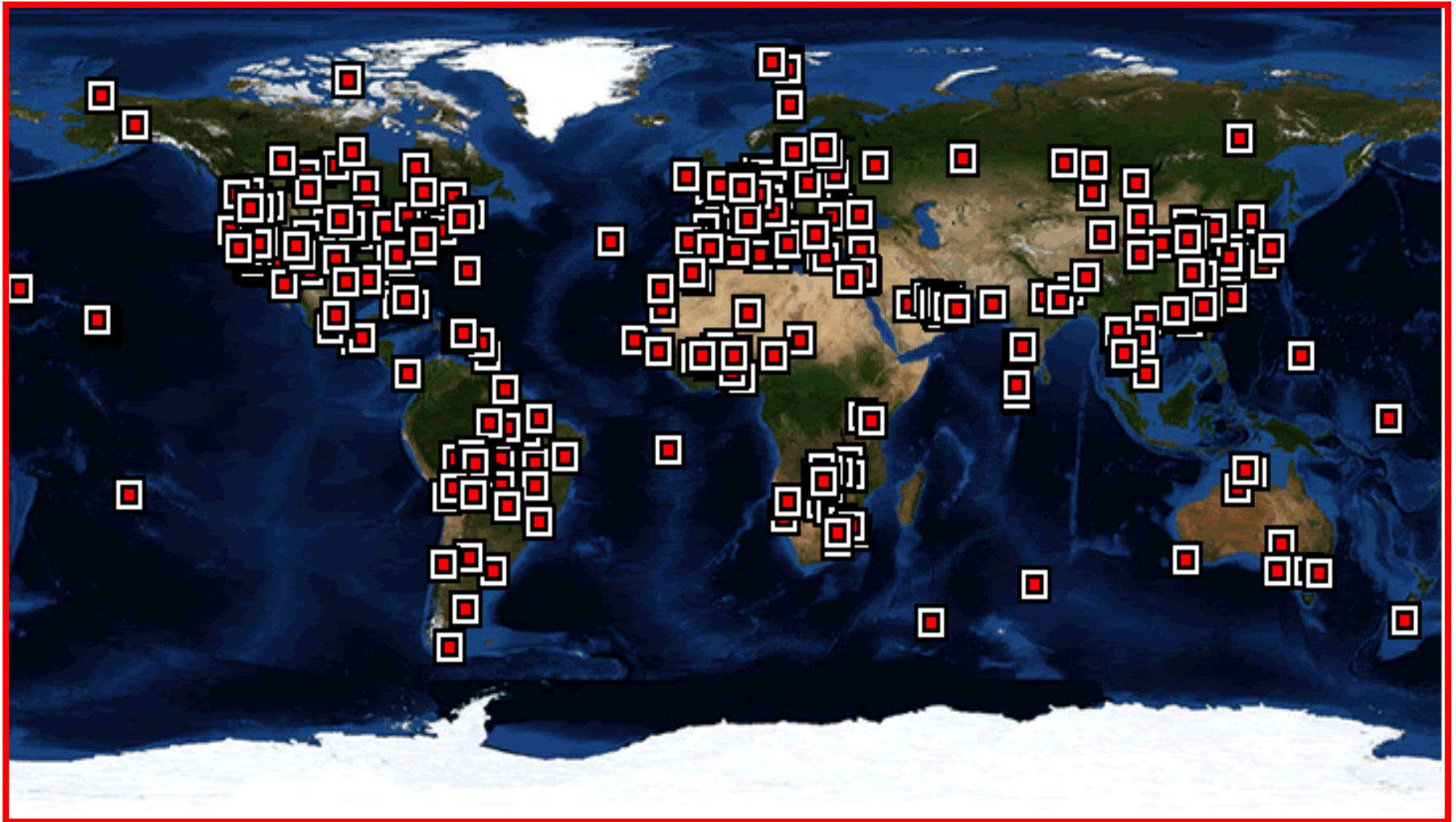
a) sul piano di almucantar



b) sul piano principale



Distribuzione del network

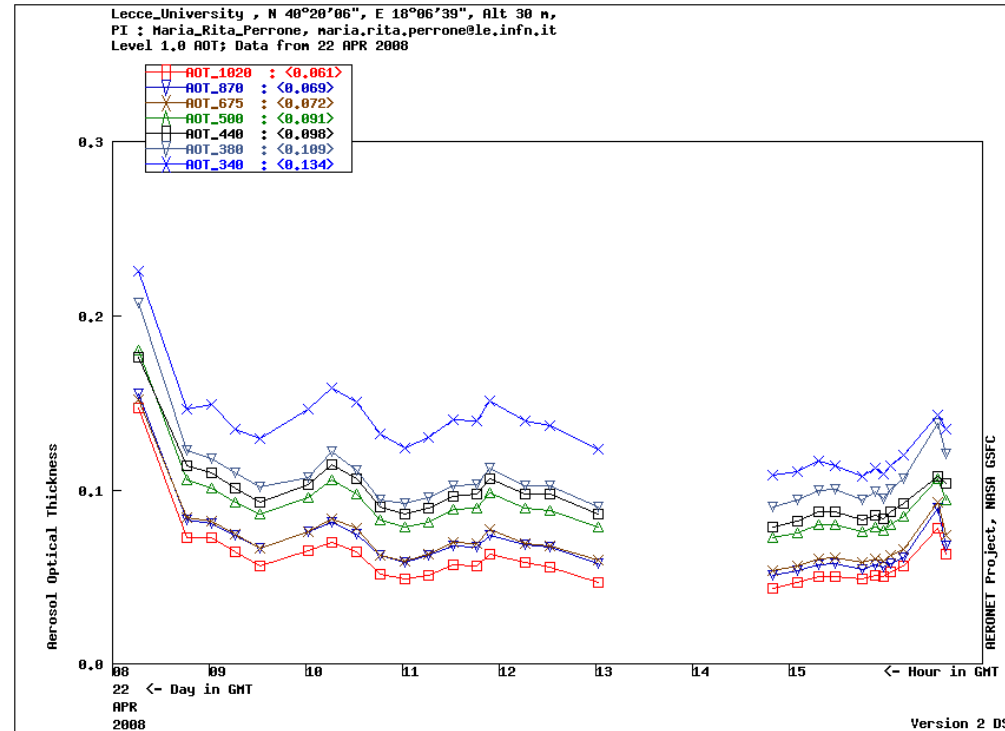


Caratteristiche

- 735 fotometri
- periodicamente calibrati
- funzionamento automatico, trasmissione dati automatica, analisi dei dati centralizzata
- 3 livelli di dati (grezzi, cloud-screening automatico, ricalibrati e ispezionati)

Prodotti:

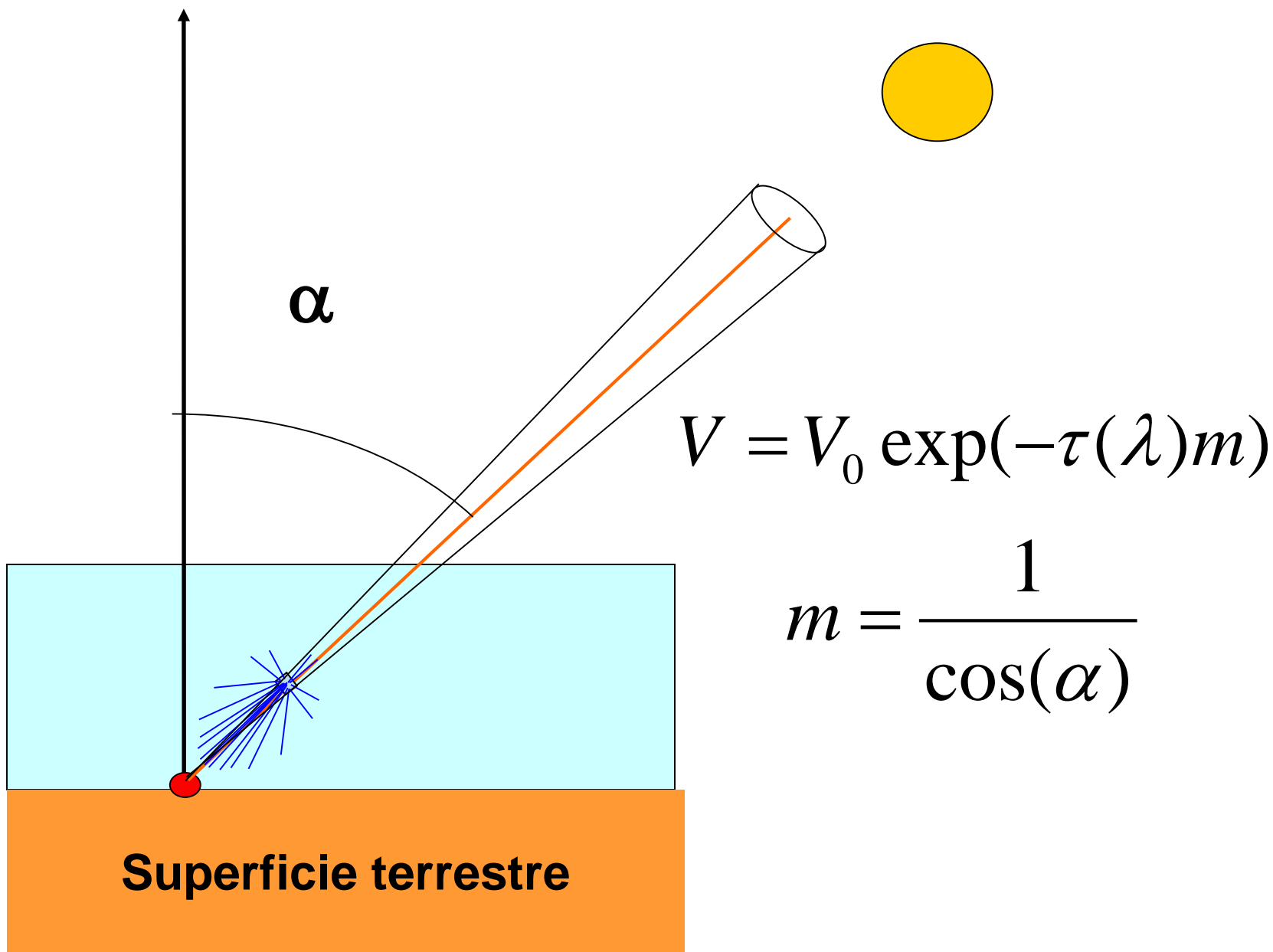
- spessore ottico a 7 lunghezze d'onda (340,380,440,500,675,870,1020)
- albedo di singolo scattering
- indice di rifrazione
- parametri dimensionali degli aerosol (distribuzione bimodale assunta)
- Concentrazione in numero
- Eventuale correzione per non sfericita'



Dati PUBBLICI, scaricabili dal sito web

<http://aeronet.gsfc.nasa.gov/>

E' anche un comodo interfaccia verso altri prodotti NASA



Spessore ottico totale

$$\tau = -\frac{1}{m} \ln\left(\frac{V}{V_0}\right)$$

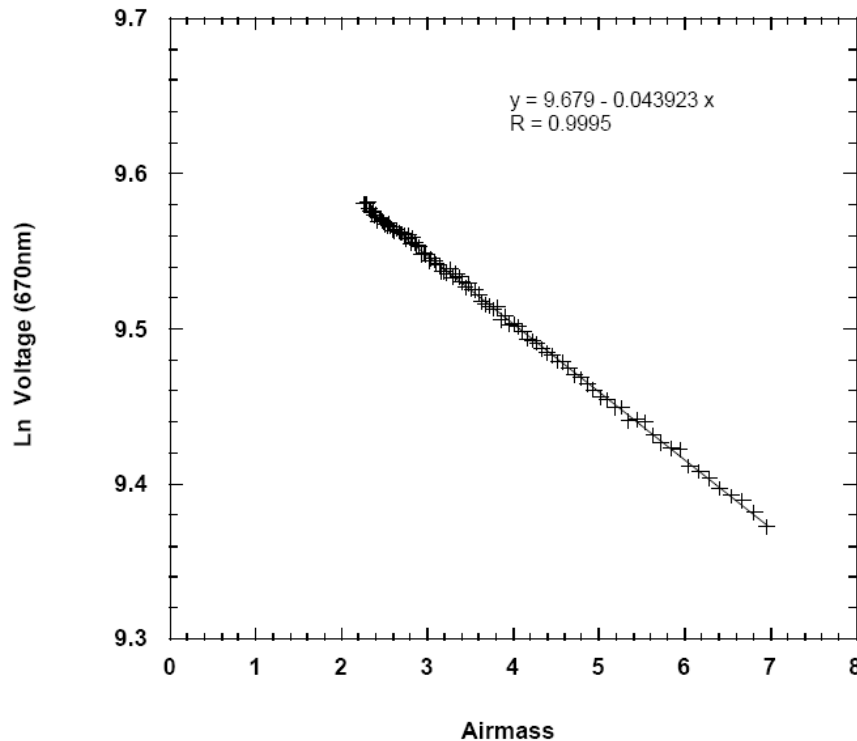
Per ottenere lo spessore ottico aerosolico occorre sottrarre i contributi dell'estinzione per scattering Rayleigh e per assorbimento (principalmente O₃)

$$\tau_a = \tau - \tau_{mol} - \tau_{Ozono}$$

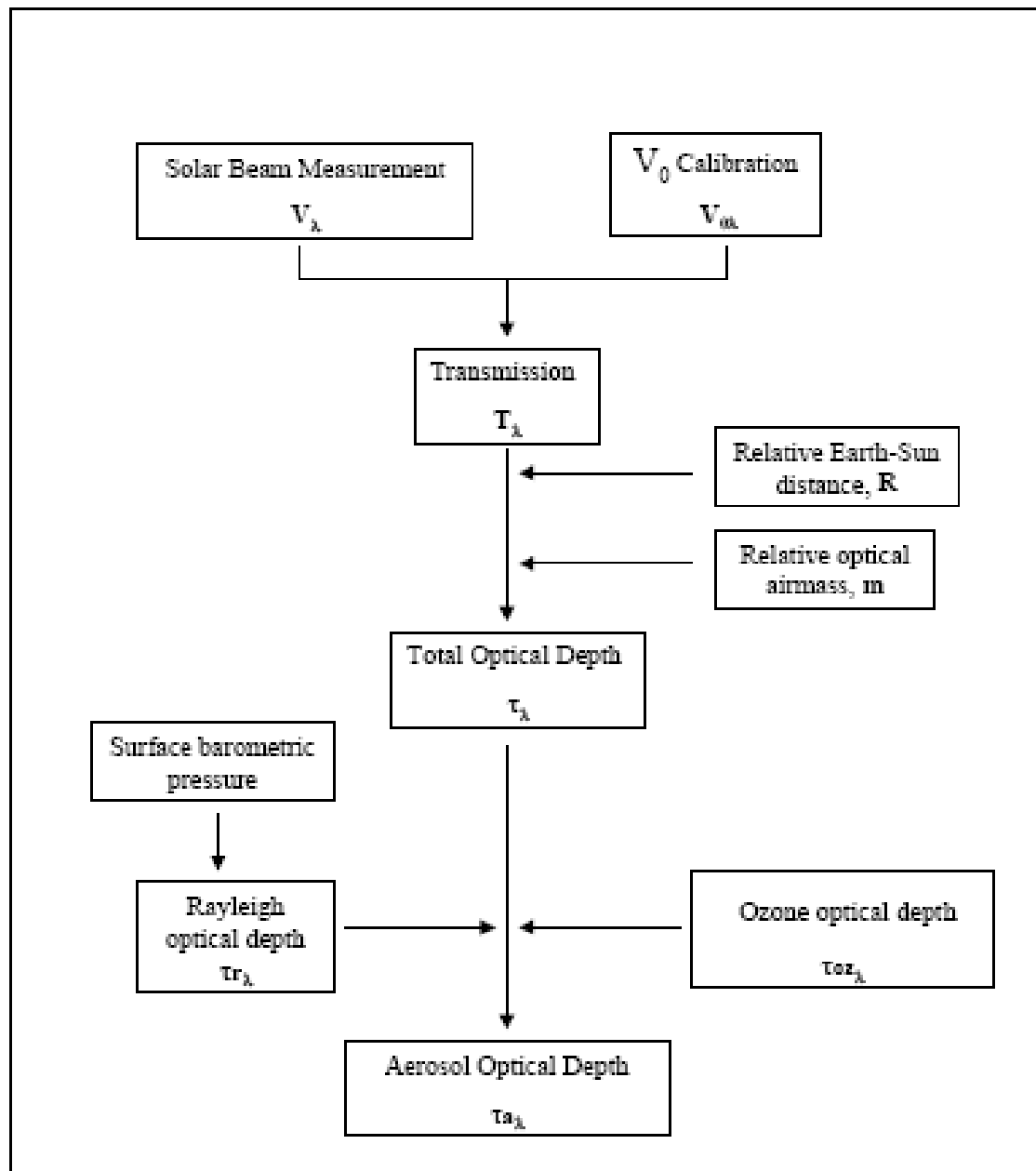
Calibrazione

In condizioni di atmosfera costante,

$$\ln(V) = \ln(V_0) - m \tau$$



Queste condizioni di atmosfera invariante sono in pratica ottenute solo in siti di alta montagna, dove la concentrazione di aerosol e' comunque molto bassa



Spessore ottico alle lunghezze d'onda:

(340,380,440,500,675,870,1020)

Si stima il coefficiente di Angstrom:

$$\delta = -\frac{d(\ln(\tau))}{d(\ln(\lambda))}$$

Valori di δ vicini a zero indicano la presenza di particelle grandi (dust)

Valori di δ vicini a 2 indicano la presenza di particelle fini (ex. fumo o solfati)

<http://aeronet.gsfc.nasa.gov/>

Aerosol Robotic Network (AERONET) Homepage - Mozilla Firefox

File Modifica Visualizza Cronologia Segnalibri Strumenti Aiuto

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AERONET
AEROSOL ROBOTIC NETWORK

+ AEROSOL OPTICAL DEPTH Web Site Feature + AEROSOL INVERSIONS + SOLAR FLUX + OCEAN COLOR + MARITIME AEROSOL

AERONET Data Synergy Tool - Access Earth Science data sets for AERONET sites

AERONET Update (March 2013)

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AERONET DATA ACCESS
DATA SYNERGY TOOL

MISSION

The AERONET (AErosol RObotic NETwork) program is a federation of ground-based remote sensing aerosol networks established by [NASA](#) and [PHOTONS \(Univ. of Lille 1, CNES, and CNRS-INSU\)](#) and is greatly expanded by [collaborators](#) from national agencies, institutes, universities, individual scientists, and partners. The program provides a long-term, continuous and readily accessible public domain database of aerosol optical, microphysical and radiative properties for aerosol research and characterization, validation of satellite retrievals, and synergism with other databases. The network imposes standardization of [instruments](#), [calibration](#), [processing](#) and [distribution](#).

AERONET collaboration provides globally distributed observations of spectral aerosol optical depth (AOD), inversion products, and precipitable water in diverse aerosol regimes. Aerosol optical depth data are computed for three data quality levels: Level 1.0 (unscreened), Level 1.5 ([cloud-screened](#)), and Level 2.0 (cloud-screened and [quality-assured](#)). Inversions, precipitable water, and other AOD-dependent products are derived from these levels and may implement additional quality checks.

The processing algorithms have evolved from Version 1 to Version 2.0 (fully released in July 2006) and are available from the AERONET and PHOTONS web sites. Version 1 data may be downloaded from the web site through 2006 and thereafter upon [special request](#). New AERONET products will be released as new measurement techniques and algorithms are adopted and validated by the AERONET research community. The AERONET web site also provides AERONET-related news, a description of research and operational activities, related Earth Science links, and an AERONET staff directory.

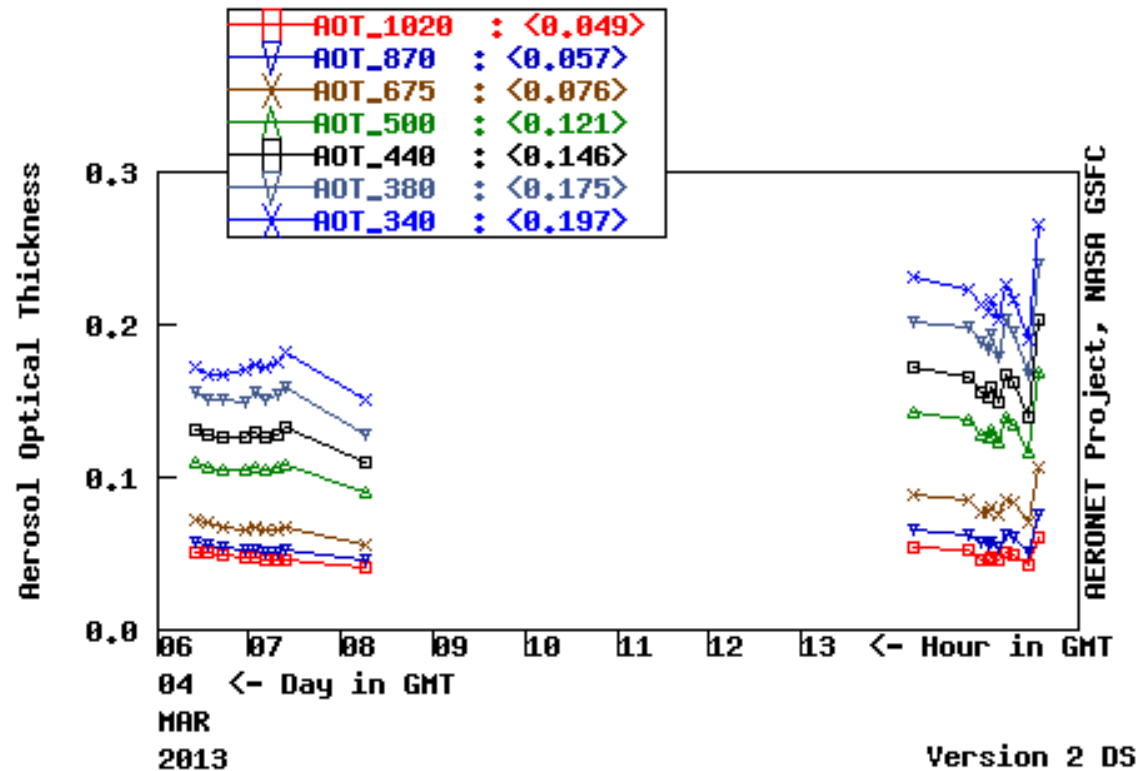
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Spessore ottico

AOD Level 1.5 data from MAR 4 of 2013

Lecce_University , N 40°20'06", E 18°06'39", Alt 30 m,
PI : Maria_Rita_Perrone, maria.rita.perrone@le.infn.it
Level 1.5 AOT; Data from 4 MAR 2013



Dalle misure di diffusione a piu' angoli si puo' ricavare la distribuzione di popolazione degli aerosol

