



Determinarea proprietatilor optice ale aerosolilor folosind teledetectie activa si pasiva

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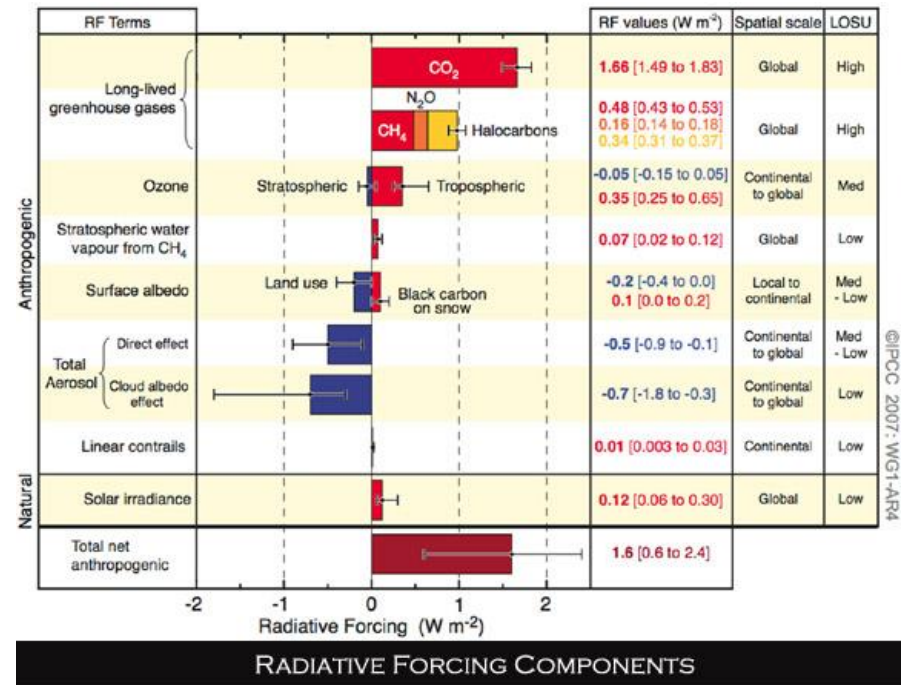
C.S. II, Nemuc Anca*

Cuprins

- Introducere (motivatie)
- Proprietati optice ale aerosolilor
- Metodologia determinarii proprietatilor optice ale aerosolilor folosind teledetectie activa si pasiva
 - Teledetectie activa si teledetectie pasiva
 - Functia de overlap (suprapunere)
 - Comparare
- Concluzii
- Bibliografie

Introducere

- Aerosolul
- Importanta aerosolului
 - Forcing radiativ
 - Aerosolul in troposfera joasa si impactul asupra omului



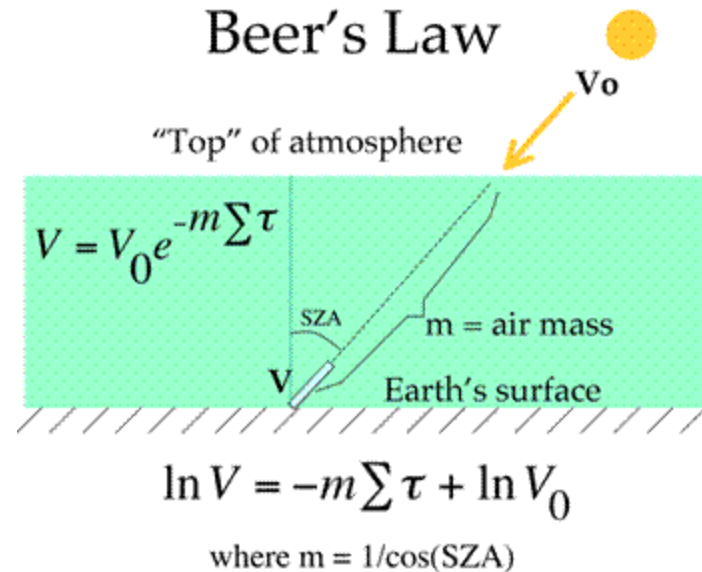
Proprietati optice ale aerosolilor

Adancimea optica a aerosolului

- Se obtine utilizand legea Lambert – Beer:

$$\tau_{\lambda} = \frac{1}{m} \ln \left(\frac{E_{0\lambda}}{E_{\lambda}} \right)$$

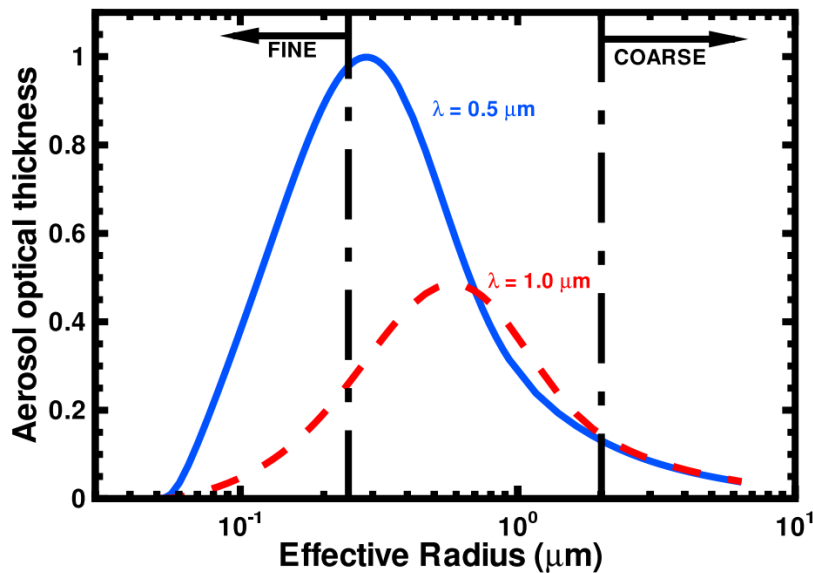
- Parametru adimensional ce da informatie despre cat de mult flux s-a pierdut pe coloana de aer masurata



ASIA-PACIFIC JOURNAL OF ATMOSPHERIC SCIENCES, 45, 3, 2009, p. 307-317

Proprietati optice ale aerosolilor

Exponentul Angstrom



- Dependenta adancimii optice de lungimea de unda:

$$\tau(\lambda) = \tau_1 \lambda^{-a}$$

- Indicator calitativ al dimensiunii particulelor dominante din coloana

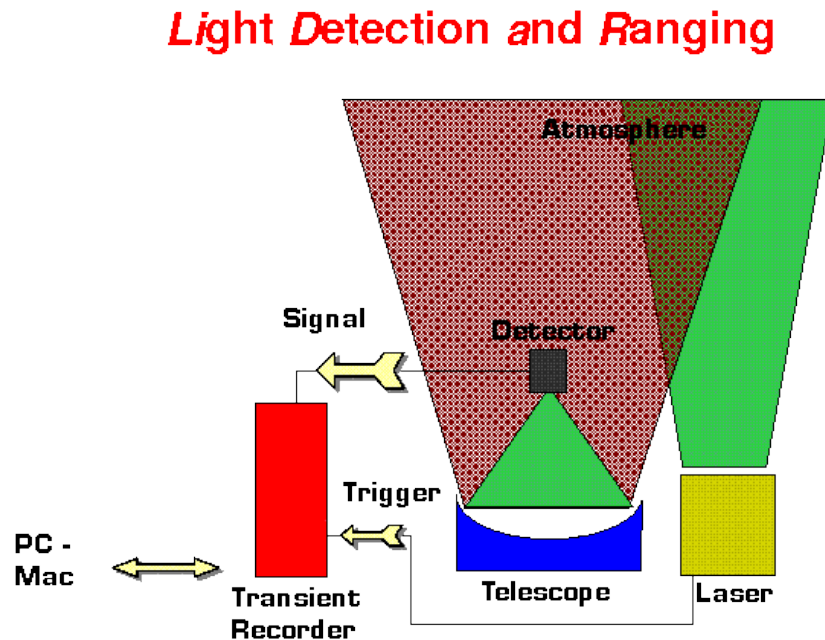
METODOLOGIA DETERMINARII PARAMETRILOR OPTICI FOLOSIND TELEDETECTIE ACTIVA SI PASIVA

21.01.2016

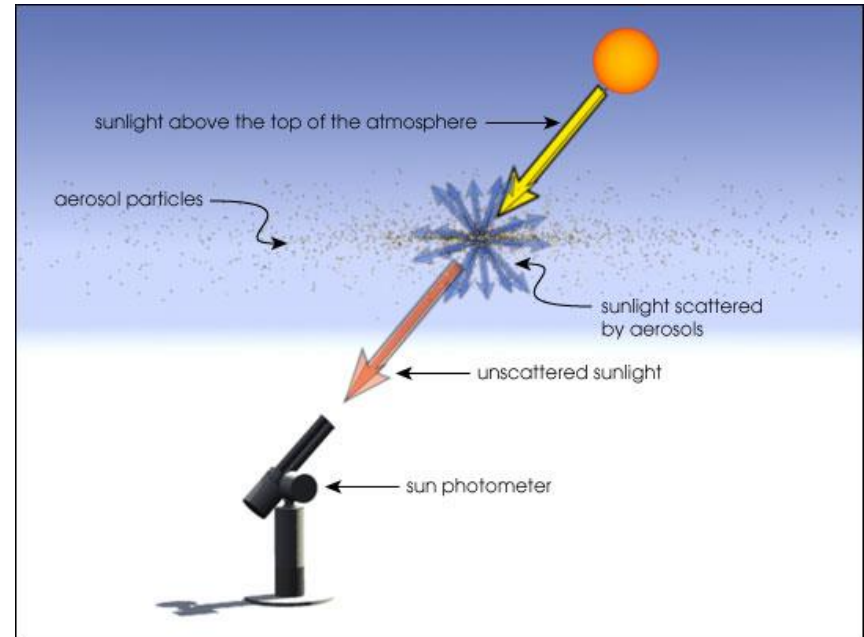
Sesiunea de prezentari - Cercetare 3,
Ingineria si aplicatiile laserilor si
acceleratorilor, Facultatea de Stiinte
Aplicate

Metodologie

Teledetectie activa



Teledetectie pasiva



Metodologie

Teledetectie activa

- Rezolutie temporala:
 - Setata de utilizator
- Rezolutie spatiala:
 - Profil pe verticala (o valoare la ~4 m)
- Rezolutie spectrala
 - 3 canale de detectie elastice + 2 canale Raman

Teledetectie pasiva

- Rezolutie temporala:
 - Functie de un program prestabilit
- Rezolutie spatiala:
 - O singura valoare pe toata coloana atmosferica
- Rezolutie spectrala
 - 8 filtre intre 340 nm si 1020 nm

Metodologie

Teledetectie activa

- Limitari
 - Nu poate masura in orice conditii meteorologice
 - Profil de la ~800m pana la ~9000m
 - Seturi de date de ~4h
 - Necesitatea unui operator
- Alte precizari:
 - Standardizat la nivel european -> EARLINET

Teledetectie pasiva

- Limitari:
 - Nu poate masura in orice conditii meteorologice
- Alte precizari:
 - Standardizat la nivel mondial -> AERONET
 - Sistem automat

Metodologie

Teledetectie activa

- $P(z) = KG(z)\beta(z)T(z)$

- AOD se definește ca integrala extincției

- Exponent angstrom:

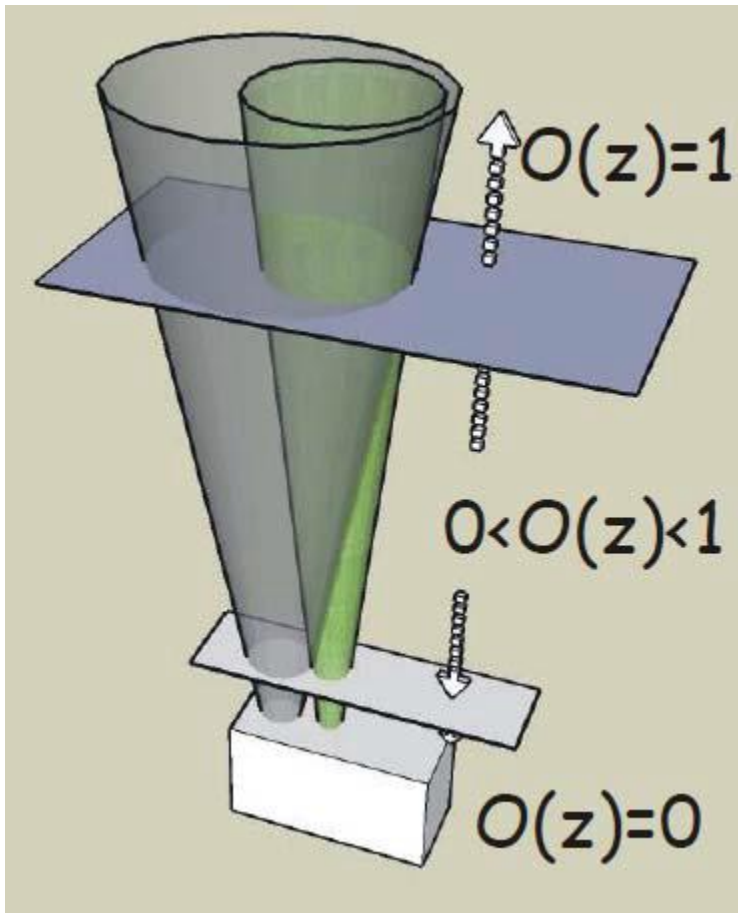
- $$\alpha_{\lambda_1\lambda_2} = -\frac{\ln\left(\frac{\tau_{\lambda_1}}{\tau_{\lambda_2}}\right)}{\frac{\lambda_1}{\lambda_2}}$$

Teledetectie pasiva

- $$\tau_{\lambda} = \frac{1}{m} \ln\left(\frac{E_{0\lambda}}{E_{\lambda}}\right)$$

- $$\tau(\lambda) = \tau_1 \lambda^{-a}$$

Funcția de overlap



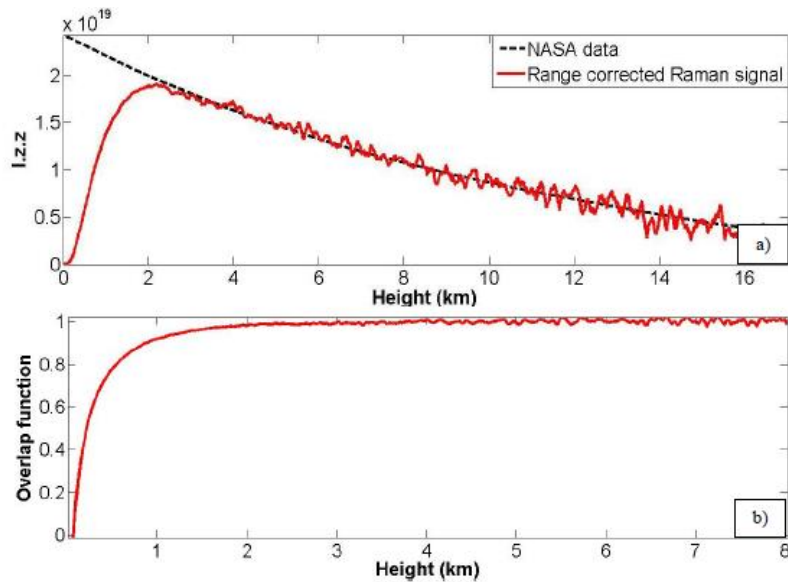
- $G(z) = \frac{O(z)}{z^2}$

Functia overlap – Cum?

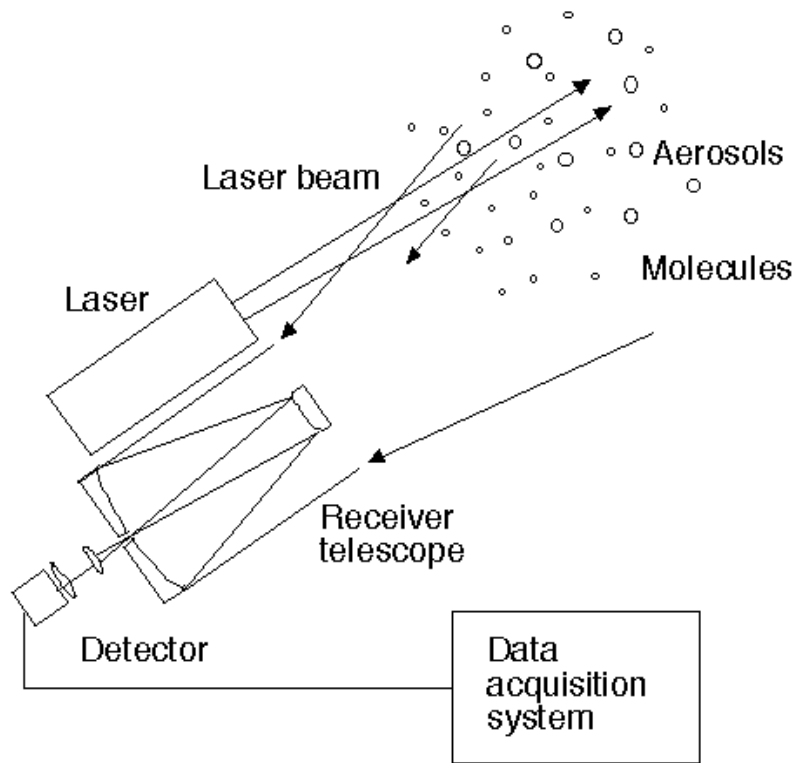
- Utilizand canalul Raman (literatura)
- Idee originala?

Utilizand canalul Raman

- Se rezolva ecuatia lidar pentru canalul de azot
- Se compara cu modelul
- Se obtine functia de overlap



Idee originala



- Doua sisteme lidar care masoara in paralel avand functii de overlap diferite
- Doua sisteme lidar care masoara in paralel – unul vertical, unul sub un unghi anume

Comparare proprietati optice ale aerosolilor

- Gasirea unor seturi de date initiale -> compararea parametrilor
- Obtinerea functiei de overlap pentru sistemul lidar
- Implementarea functiei seturilor de date pentru sistemul lidar
- Compararea parametrilor obtinuti

Concluzie

- Determinarea parametrilor optici ale aerosolilor obtinuti prin metode de teledetectie pasiva si activa
- Gasirea si implementarea unei functii de overlap pentru sistemul de teledetectie activa
- Compararea proprietatilor optice ai aerosolilor

Bibliografie

- Claus Weitkamp, Lidar Range-Resolved Optical Remote Sensing of the Atmosphere, Springer, 2005
- V. Kovalev, Elastic Lidar – Theory, Practice, and analysis methods, John Wiley & Sons, Inc, 2004
- B. van Hai, et.al., Estimation of the Lidar overlap function by using Raman signal, conference paper, 2013
- F. Navas-Guzman, Retrieval of the lidar overlap function using Raman signals, Optica Pura y Aplicada, 2011
- J.D. Spinhirne, Vertical distribution of aerosol extinction cross section and inference of aerosol imaginary index in the troposphere by Lidar
- Ming-Dah Chou, Effects of aerosols on the surface solar radiation in a tropical urban area, J. of Geophysical Research, 2006
- I. Berezhnyy, A combined diffraction and geometrical optics approach for lidar overlap function computation, Physical Optics Corporation, 2009
- G. Schuster, Angstrom exponent and bimodal aerosol size distributions, J. of Geophysical Research, 2006
- S. Pal, Monitoring depth of shallow atmospheric boundary layer to complement Lidar measurements affected by partial overlap, Remote Sensing, 2014

Mulumesc pentru atentie!