Absorbing aerosols, influence of the microscopic properties on the direct radiative forcing

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Introduction

Objective

We study the influence of aerosol microscopic properties (si... aerosol radia...

We use the s... forcing expe... MOMO.

We focus on

MOMO

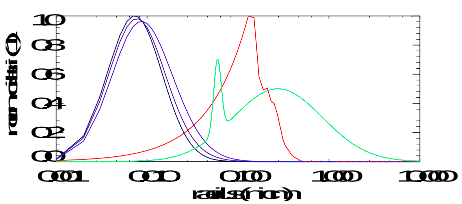
MOMO (**M**atrix-... developed by th... *Fischer and Gra...*

Radiative transf... experiments (*R...*

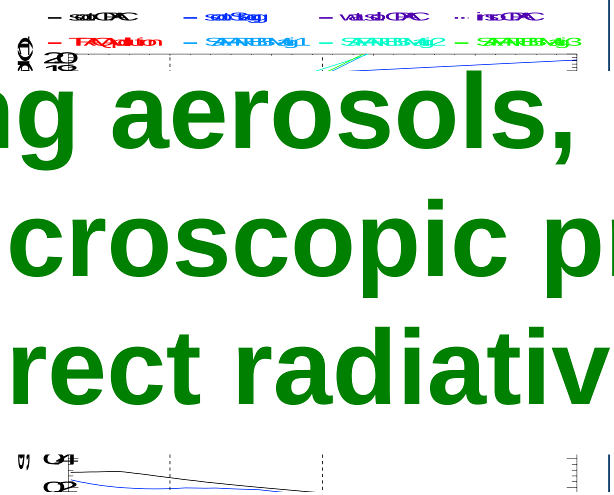
Band = [200 – 4000 nm]

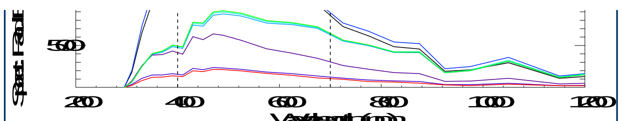
Inputs

- Aerosol layer [1 – 2 km]; AO... dark ocean, SZA = 30°
- Different aerosols:
  - **Soot OPAC**: Pure Soot of OPAC (*K...*
  - **Soot Stagg**: Pure Soot of Stagg dat... 1993) from Hitran 2012 (*Massie and...*
  - **Urban OPAC**: OPAC Urban aerosol mixture (soot + water soluble + insoluble)
  - **OPAC 50% soot**: OPAC mixture with 50% soot.
  - **TRAQA pollution**: Pô Valley pollution aerosol observed over sea during TRAQA campaign.
  - **magi 1**, **magi 2**, **magi 3**: Biomass Burning aerosol observed during SAFARI by *Magi and Redeman* 2007 (in Hitran 2012).
- Size distributions:



Spectral variations





Comments (spectral variation + integrated forcing)

- Rad efficiency = Rad forcing / AOT
- Spect rad efficiency = non integrated on the wvl
- Structure of the spectrum of Rad. eff. = solar spectrum first.
- Amount of soot = decisive parameter
- No big consequences of measurement variations (< factor 2) on Re(n) and Im(n)
- Size distribution = crucial parameter
- SSA group of aerosols having same Rad Eff
- Difficulties of extrapolation for soot and databases

Forcings and add. heating rates (spect. integr.)

Aerosol radiative forcing in Wm-2 for SZA = 30°

Aerosol	ATMO	TOA	SURF
			...6
			...9
			...8
			...4
			...5
			...9
			...1
			...9

- Importance of the size distribution
- Low SSA spectral variations
- Relevance of an effective refractive index?
- Difference size dist measured / OPAC
- Amount of soot = a parameter on which to play?

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OBJECTIVE: *Influence of microscopic properties on radiative forcing*

METHOD:

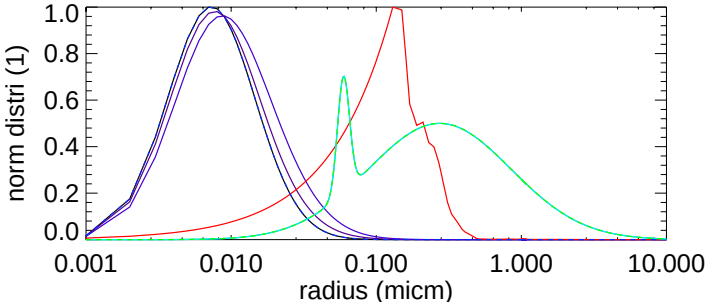
Different aerosols from litterature and meas. camp (Size dist, refractive index)

→ **Mie code of MOMO**

→ **SSA, Phase function**

Meteo data MS standard

→ **RT scheme like AeroCom experiment, with MOMO**



RESULTS:

Radiative forcing
Radiative efficiency
Heating Rates
Spectral rad. efficiency