# Aerosol modelling in the Oslo Chemistry Transport Model 2 (CTM2)

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- Oslo CTM2 is an offline global chemical-transport model driven by meteorological data from ECMWF
- Sulfate, BC, OC, Mineral dust, Sea salt are included
- The model can be run at various resolutions, at the moment most of the meteorological data are at T42 and 40 layers, results to AEROCOM for 1996 at T63 and 19 layers

# Sea salt

- Formulas for sea salt generation is based on Monahan et al. (1986) (small particles) and Smith et al. (1993) (large particles). The formulas for a given particle radius depend on the 10-m wind.
- 8 size bins from 0.03 – 25 µm at 80% relative humidity
- Particle growth calculated with formula in Fitzgerald (1975), which depend on dry radius and relative humidity.
- Optical properties calculated with Mie theory with refractive index for sea salt and modelled size distribution

# Mineral dust

- Dust emissions are modeled using the Dust Entrainment and Deposition model (DEAD) (Zender et al., 2003).
- Emissions start when wind friction speeds reach a threshold wind friction speed of approximately 0.2 m/s and for certain threshold values of precipitation.
- Use satellite retrieved surface reflectance (MODIS data) for erodibility factor, as sand dunes have the highest reflectivity of all surfaces and regions with sand dunes thought to be most intensive source regions
- 8 size bins from 0.03 – 25 µm, with no hygroscopic growth included
- Refractive index from the SHADE campaign ($n_{550nm}$=1.47 – 0.0012i)

# Carbonaceous particles

- The method of implementing the carbonaceous particles are based on Cooke et al. (1999)
- BC and OC are separated in a hydrophobic fraction and a hydrophilic fraction
- Separated emissions for biomass burning and fossil fuel emissions
- OM/OC ratios differ for biomass burning and fossil fuel
- No hygroscopic growth included
- Lognormal size distribution for fossil fuel OC and BC are used with $r_m$=0.05 µm and $r_m$=0.0118 µm, respectively
- Size distribution and refractive index from aircraft measurements during SAFARI-2000.

# Sulfate aerosols

- Six sulfur components included (DMS, $SO_2$, sulfate, OCS, $H_2S$, and MSA)
- The sulfur components are calculated interactively with the ozone chemistry
- Emissions for 1996 used

# References


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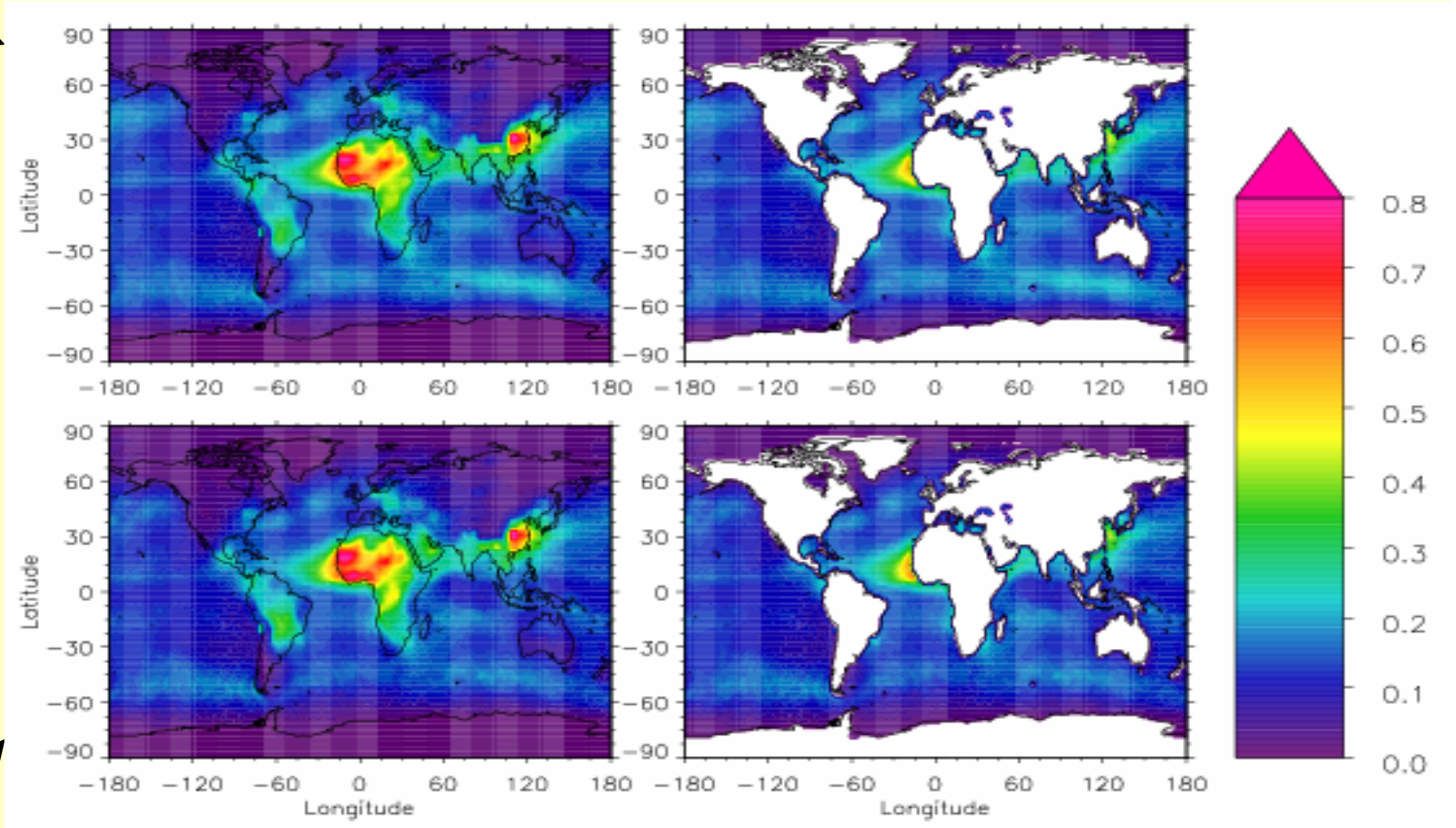
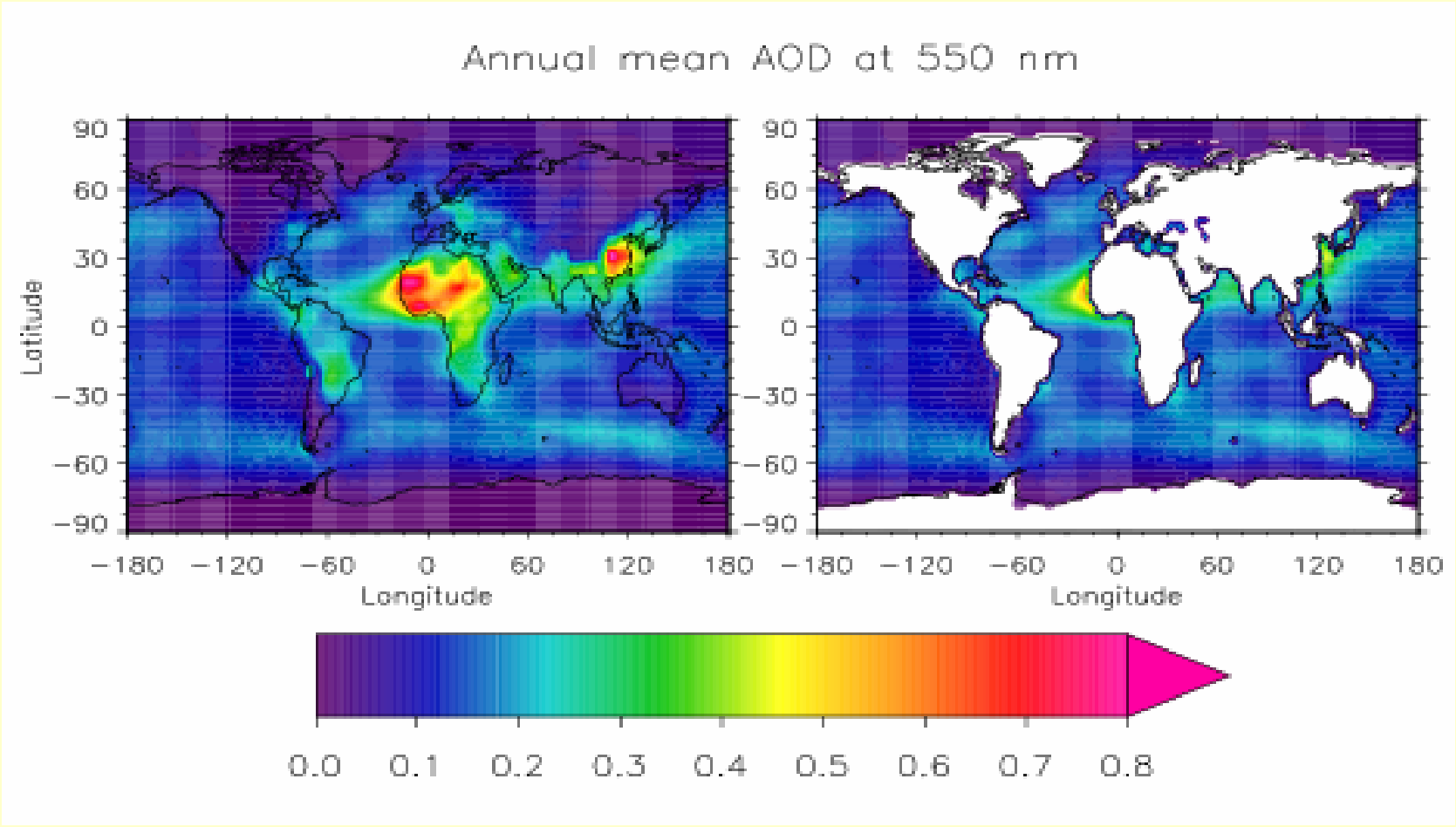
# Annual mean AOD at 550 nm

All days included




Cloud fraction
smaller than 90%


Annual mean AOD at 550 nm
90
60
30
0
−30
−60
−90
Latitude
−180 −120 −60 0 60 120 180
Longitude
90
60
30
0
−30
−60
−90
−180 −120 −60 0 60 120 180
Longitude
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8