Evaluation of SPRINTARS
(Spectral Radiation-Transport Model for Aerosol Species)

Toshihiko Takemura
(Research Institute for Applied Mechanics, Kyushu University) (Japan)
Aerosol optical properties by SPRINTARS

- Optical thickness (0.55µm)
- Ångström exponent
- Single scattering albedo (0.55µm)

Northern Hemisphere winter

Northern Hemisphere summer
Comparison with satellite retrievals

CCSR vs. satellite data
AVHRR TOMS MODIS

AOT
oc be sulfate seasalt dust

yearly AOT (at 550nm) 0.1 0.2 0.3 0.4

Kinne et al. (2003)
Comparison with AERONET
Comparison with AERONET

- Cape Verde (18°43'N, 22°56'W)
- Barbados (13°10'N, 59°30'W)
- Mongu (15°15'S, 23°09'E)

Graphs showing changes in optical thickness, Angstrom, and single scattering for different locations and months.

Legend:
- Model
- AERONET
- Model soil dust
- Model carbonaceous
- Model sulfate
- Model sea salt
Aerosol direct radiative forcing by SPRINTARS

Clear-sky

Whole-sky

\(\text{W m}^{-2}\)
Global mean radiative forcing by anthropogenic aerosols

**IPCC TAR**

- Sulfate: -0.4 W m\(^{-2}\)
- Biomass Burning: -0.2 W m\(^{-2}\)
- Fossil Fuel BC: +0.2 W m\(^{-2}\)
- Fossil Fuel OC: -0.1 W m\(^{-2}\)

**SPRINTARS**

- Sulfate: -0.27 W m\(^{-2}\)
- Biomass Burning BC: +0.21 W m\(^{-2}\)
- Fossil Fuel BC: +0.21 W m\(^{-2}\)
- Fossil Fuel OC: -0.07 W m\(^{-2}\)
- Biomass Burning OC: -0.22 W m\(^{-2}\)
- Other BC: +0.02 W m\(^{-2}\)
- Other OC: -0.04 W m\(^{-2}\)

- Direct: -0.18 W m\(^{-2}\)
- Indirect: -1.0 W m\(^{-2}\)

(only first effect)
Trans-Pacific aerosol transport in 2001

April 8

TOMS aerosol index

April 12

SPRINTARS optical thickness (carbon+sulfate)

April 14

SPRINTARS optical thickness (dust)

Takemura et al. (GRL, 2002GL016251, 2002)