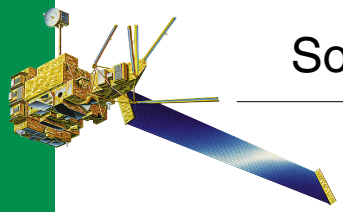

Sources and Transport of Tropospheric Aerosols

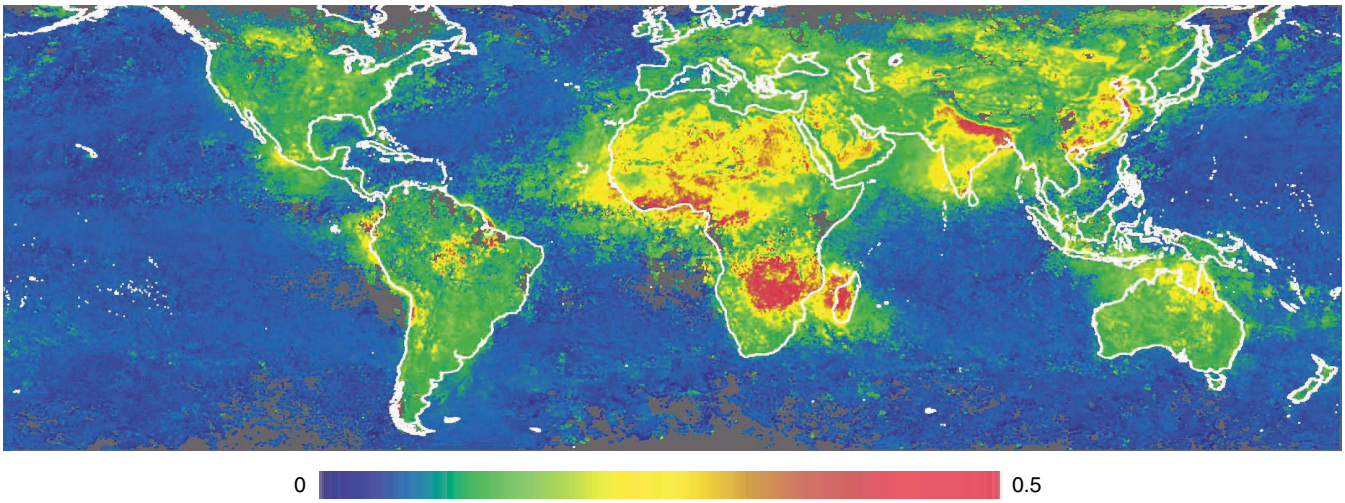

Fig.1 POLDER Aerosol Index Maps [November 1996]

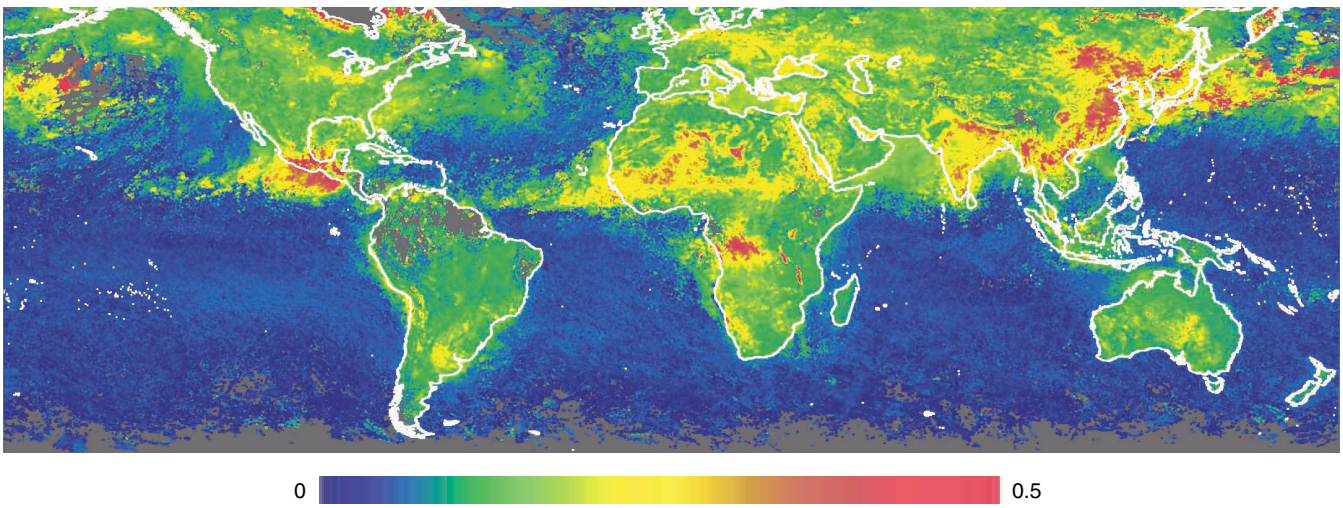

Fig.2 POLDER Aerosol Index Maps [May 1997]

Provided by NASDA/CNES
Processed by LOA/LSCE

Sources and Transport of Tropospheric Aerosols

Aerosols consist of particles suspended in the atmosphere (sulfates, mineral particles, soot, etc.). They may be of natural origin (soil erosion by wind, forest fires, etc.) or of human origin (industrial fumes, exhaust gases, agricultural fires, etc.). Their effect on radiation is one of the major uncertainties in considering the Earth's radiation budget.

Aerosols may be characterized from space due to their optical properties. Characterization is designed to determine parameters such as aerosol content (optical thickness), type (related to size distribution) and refraction index (*1).

By providing the world maps of aerosols, POLDER has opened up the way to observe the sources and transport of tropospheric aerosols. The inversion of aerosols above land surfaces is obtained through polarized observations at 670 and 865 nm. The optical thickness is derived by taking the hypothesis of an average aerosol model as used in the current NOAA/AVHRR inversion over sea. Seasonal changes in sources are clearly revealed on monthly POLDER maps.

In November (Fig. 1), high optical thickness values are recorded over southern Africa and Madagascar during forest fires. Over western Africa and the Gulf of Guinea, there is a mixture of desert aerosols and aerosols produced by biomass burning. In May (Fig. 2), biomass-burning aerosols are no longer located in the same areas. They are now found over central America and off the west coast of Africa along the Equator. Desert dust aerosols persist over western Africa. Major dust outbreaks, suspected of containing sulfate particles, may be observed over the whole of south-east Asia, from eastern China to the sea of Japan.

Over sea, aerosol inversions are based on the measurements taken at 670 and 865 nm. The multiple viewing angles and the polarization measurement are further assets used to bound the inversion.

*1 Refraction index. The ratio of the velocity of light in vacuum to the phase velocity in the medium.