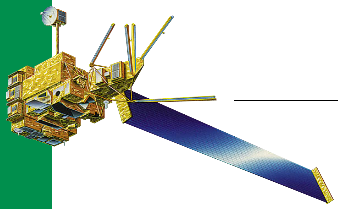
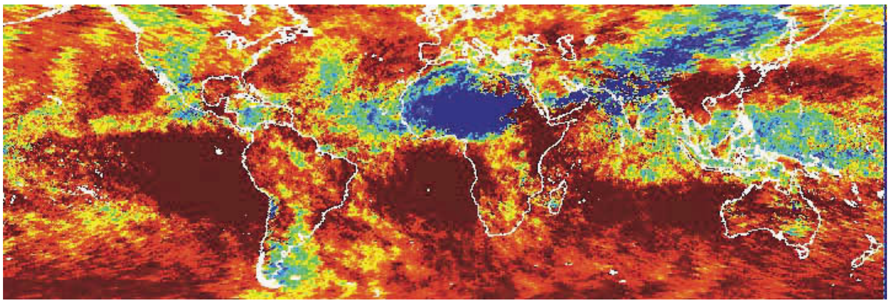


Global Cloud Properties and Water Vapor

Monthly averages, November 1996

Fig.1 Cloud phase



Water droplets — Ice crystals

Fig.2 Cloud level pressure*
[Rayleigh scattering method]

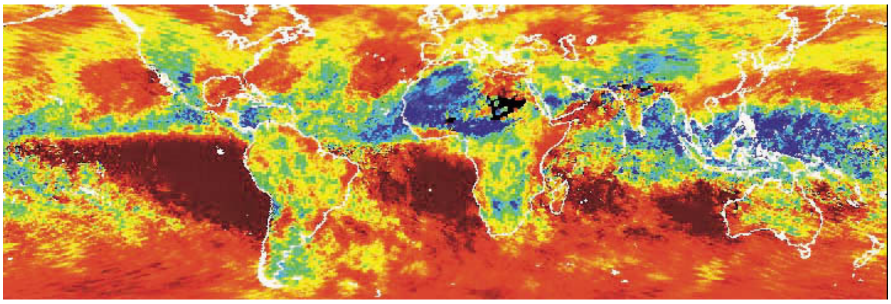
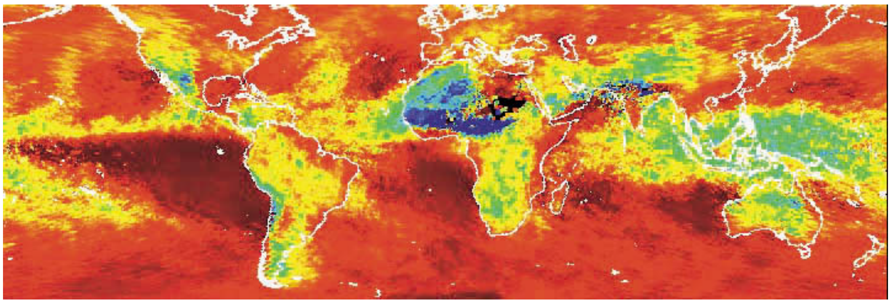


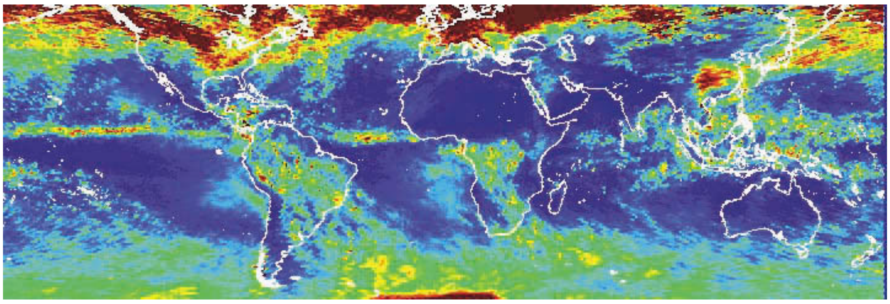
Fig.3 Cloud level pressure*
[oxygen absorption method]



* For the sake of clarity, the monthly mean pressures are shown as altitudes.

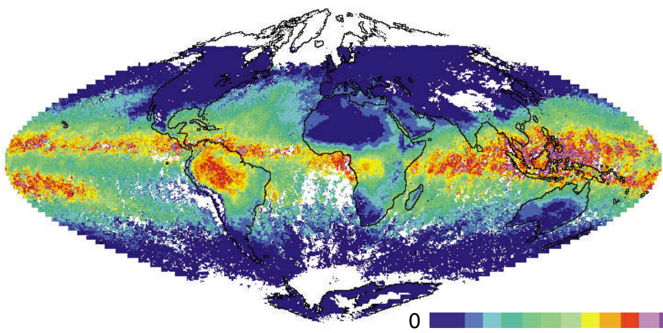
0 — 10km

Fig.4 Liquid water content



0 — 0.2mm

Fig.5 Water vapor integrated content



0 — 70kg/m²

Provided by NASDA/CNES
Processed by LOA/LSCE

Global Cloud Properties and Water Vapor

Small changes in clouds can lead to major changes in the climate. POLDER's contribution to cloud studies is to improve knowledge of clouds by better characterizing their physical and radiative properties.

For the first time ever, polarization observations in the near infrared (at wavelength 865 nm) allow the discrimination of cloud droplets and cloud ice crystals on a global scale (Fig. 1).

The cloud level pressure is derived using two original methods: on Fig. 2, the "Rayleigh" pressure is derived from polarization in the blue (at wavelength 443 nm) due to scattering by molecules above the cloud; on Fig. 3, the "oxygen" cloud pressure is derived by measuring oxygen absorption in the red (around wavelength 763 nm). Significant differences between the Rayleigh and the oxygen pressures provide information on the cloud structure. For the sake of clarity, the monthly mean pressures (November 1996) are shown as altitudes.

The cloud water content, expressed in precipitable (not precipitated) mm, is derived from visible (wavelength 670 nm) reflectance measurements. To simplify matters, the clouds are assumed to be composed of water droplets with a radius of 10 µm (Fig. 4).

POLDER provides the integrated water vapor contents above land surfaces from the measured atmospheric absorption between wavelengths 910 nm and 865 nm. Its accuracy is comparable with that of radiosonde measurements (Fig. 5).