

5.7 SOME NEW RESULTS IN THE INVESTIGATION OF THE MIDDLE ATMOSPHERE FROM SPACE USING THE DAYTIME HORIZON SCANNING METHOD

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The results of the restoration of the optical parameters of the El Chichon aerosol cloud at $\lambda 2.2 \mu\text{m}$ are presented. The eight-channel teleradiometer FAZA for visible and near-infrared spectral regions is described in some detail. Mathematical aspects of data processing for the ill-posed problems are discussed. The results of the restoration of the volume emission rate of the molecular oxygen on $\lambda 1.27 \mu\text{m}$ in the middle atmosphere and of the aerosol on $\lambda 0.84 \mu\text{m}$ are presented.

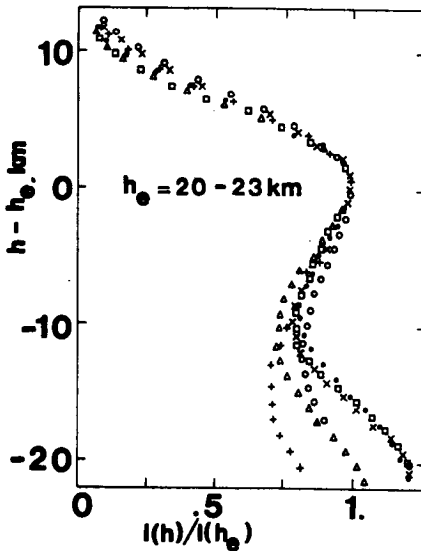


Figure 1. The daytime horizon radiance above the Sahara, 6 July 1982 at the wavelength $2.2 \mu\text{m}$ in relative units. h_0 - the height of the aerosol-caused radiance maximum in the stratosphere. The stratospheric aerosol layer at the wavelength $2.2 \mu\text{m}$ has the optical thickness 0.04.

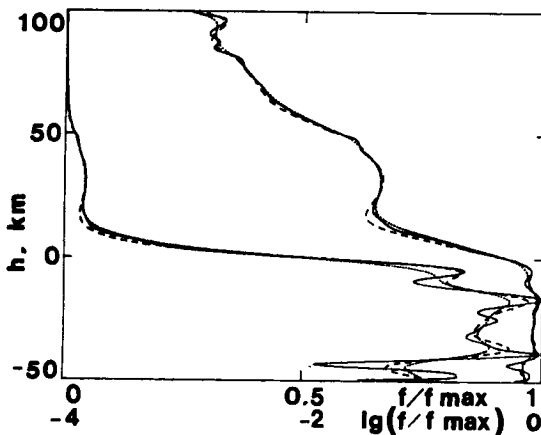


Figure 2. The modeling of the smooth and restoration processes. The standard deviation of the field response function of the teleradiometer is 3.0 km. The continuous line presents the nonsmoothed, the dotted line the smoothed and the dashed line the restored radiance of the daytime horizon. The left-hand curves are in the linear scale. The right-hand lines present the same curves, but in the logarithmic scale.

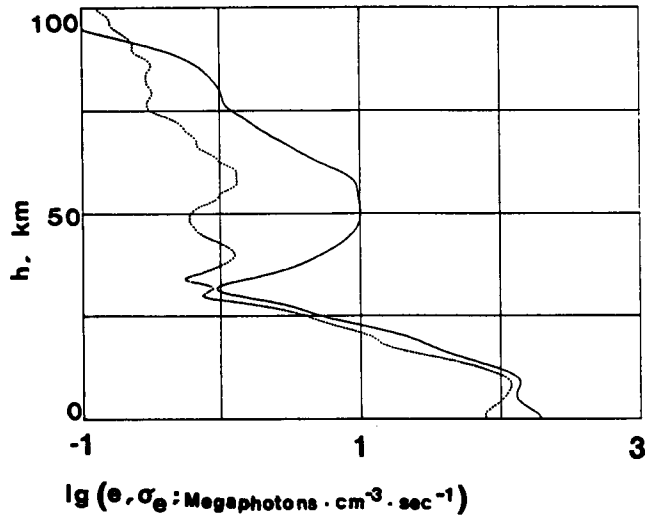


Figure 3. The mean volume emission rate e of the molecular oxygen at the wavelength $1.7 \mu\text{m}$ (continuous line) and its standard deviation σ_e (dotted line), as the functions of height h in the latitude interval $0 - 50^\circ \text{S}$ on 22 October 1985.

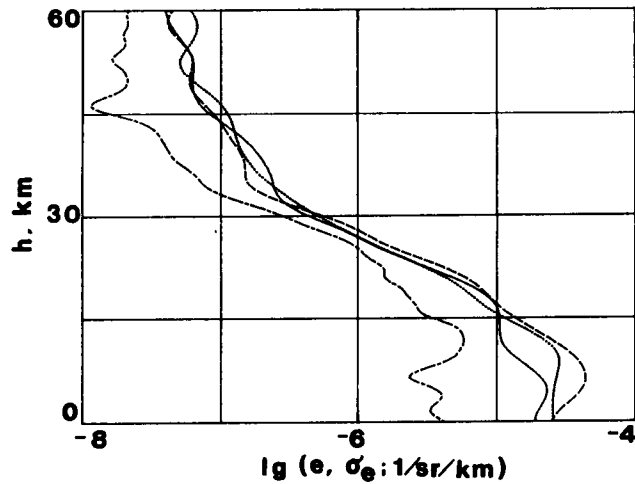


Figure 4. The relative volume emission rate $e_\lambda(h) = E_\lambda(h)/C_\lambda$ (E_λ is the volume emission coefficient, C_λ is the spectral solar constant) at the wavelength $0.84 \mu\text{m}$ on 22 October 1985. — - $0-5^\circ\text{S}$; - $10-15^\circ\text{S}$; - - - - - $20-25^\circ\text{S}$; - . - . - the standard deviation of the relative volume emission rate for $20-25^\circ\text{S}$.