

HSRL deployment in StromVex
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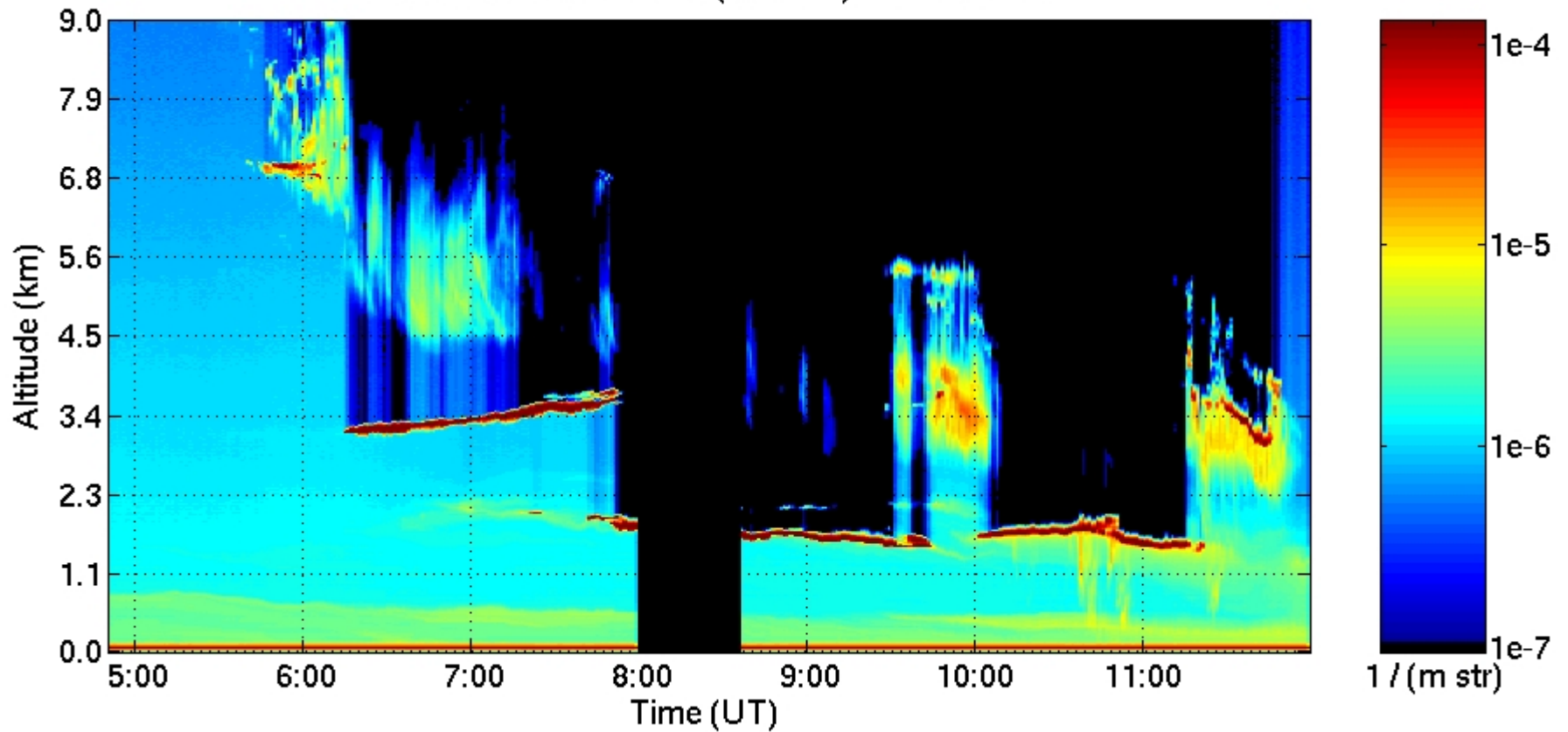
DOE HSRL on Mt. Werner, Colorado, Jan. 2011 by Igor Razenkov



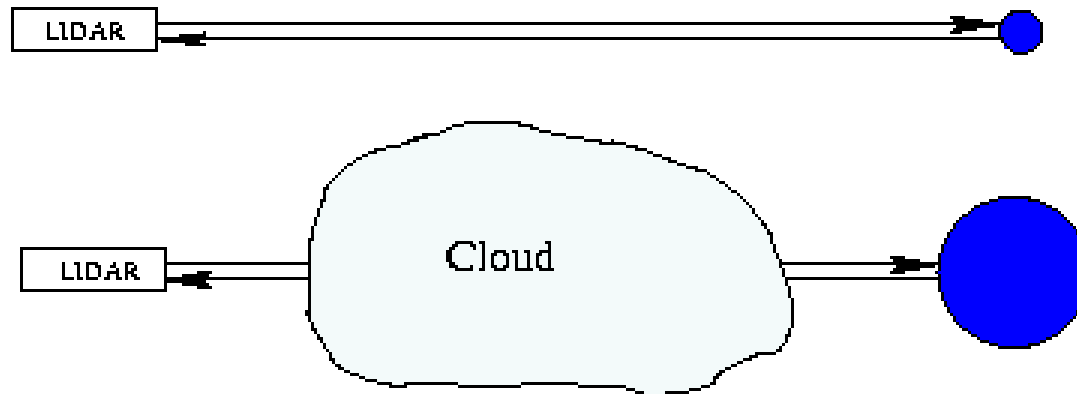
DOE HSRL on Mt. Werner, Colorado, Jan. 2011 by Igor Razuikov



Attenuated backscatter ($\text{m}^{-1} \text{str}^{-1}$) 14-Jan-2004



$$P(r) \sim \beta_s(r) \frac{\mathcal{P}(180, r)}{4\pi} \exp(-2 \int_0^r \beta_e(r) dr)$$



Traditional aerosol lidar can not distinguish between changes in target reflectivity and attenuation between the lidar and the target

$$p_a(r) \sim \frac{1}{r^2} \cdot \frac{P(180,r)}{4\pi} \beta_a(r) \cdot \exp(-2 \int (\beta_a(r) + \beta_m(r)) \cdot dr) - \text{aerosol return,}$$

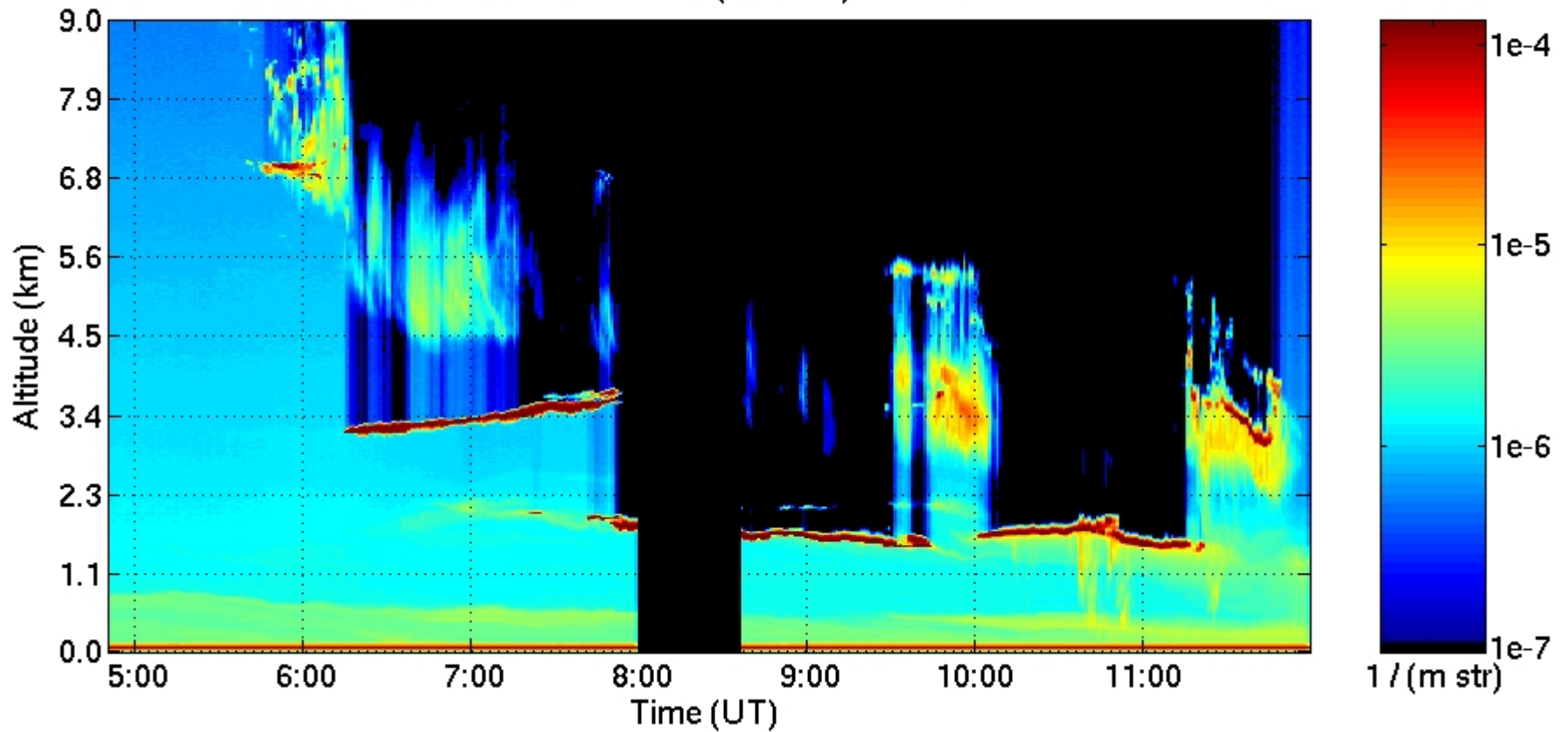
$$p_m(r) \sim \frac{1}{r^2} \cdot \frac{3}{8\pi} \beta_m(r) \cdot \exp(-2 \int (\beta_a(r) + \beta_m(r)) \cdot dr) - \text{molecular return}$$

$$\beta'_a(r) = \frac{P(180,r)}{4\pi} \cdot \beta_a(r) = \frac{3}{8\pi} \cdot \beta_m(r) \cdot \frac{p_a(r)}{p_m(r)}$$

The optical depth between r_1 and r_2 is derived by comparing the molecular return to that expected from a purely molecular atmosphere:

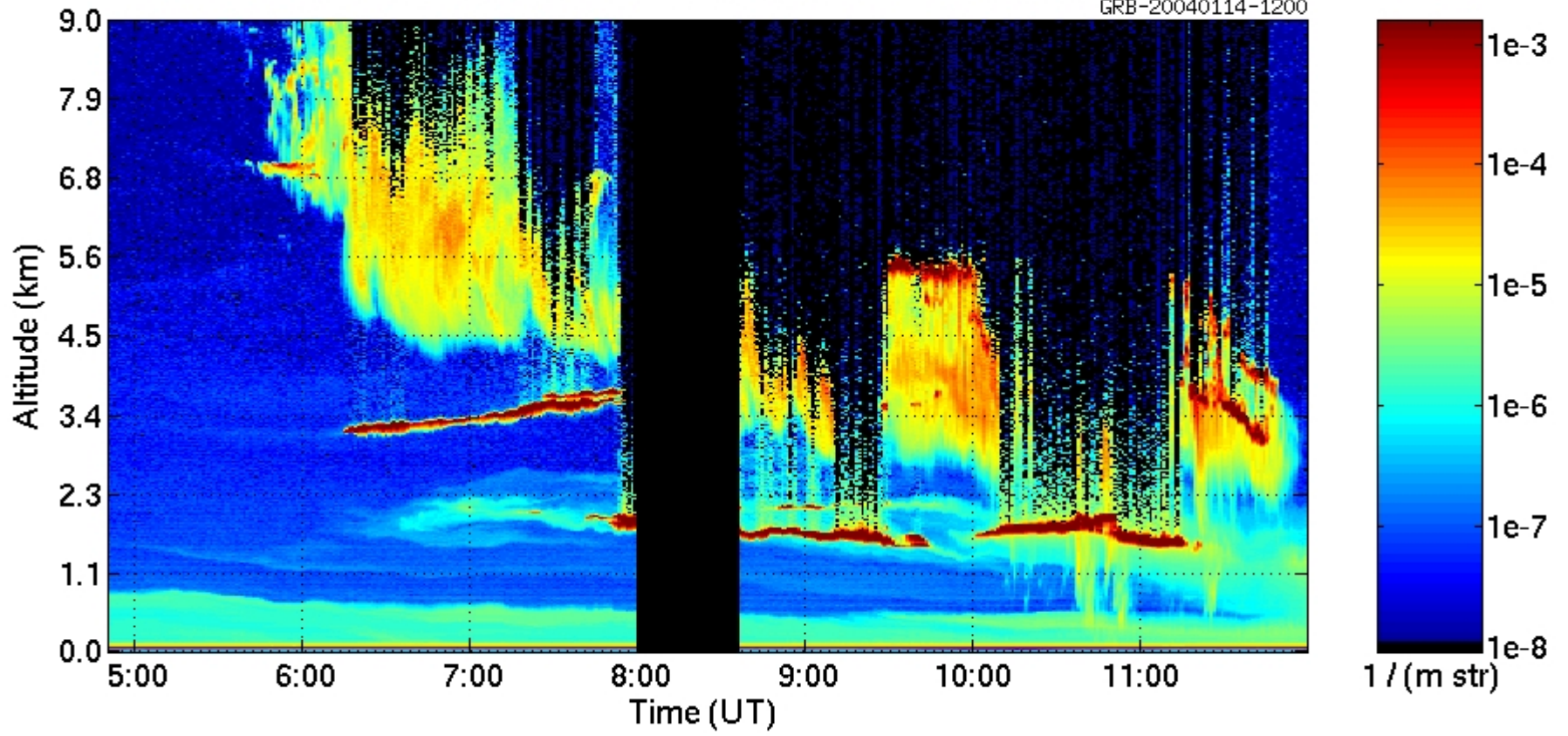
$$\tau(r_1, r_2) = \frac{1}{2} \cdot \log\left(\frac{r_1^2 \rho(r_2) \cdot p_m(r_1)}{r_2^2 \rho(r_1) \cdot p_m(r_2)}\right)$$

Attenuated backscatter ($\text{m}^{-1} \text{str}^{-1}$) 14-Jan-2004

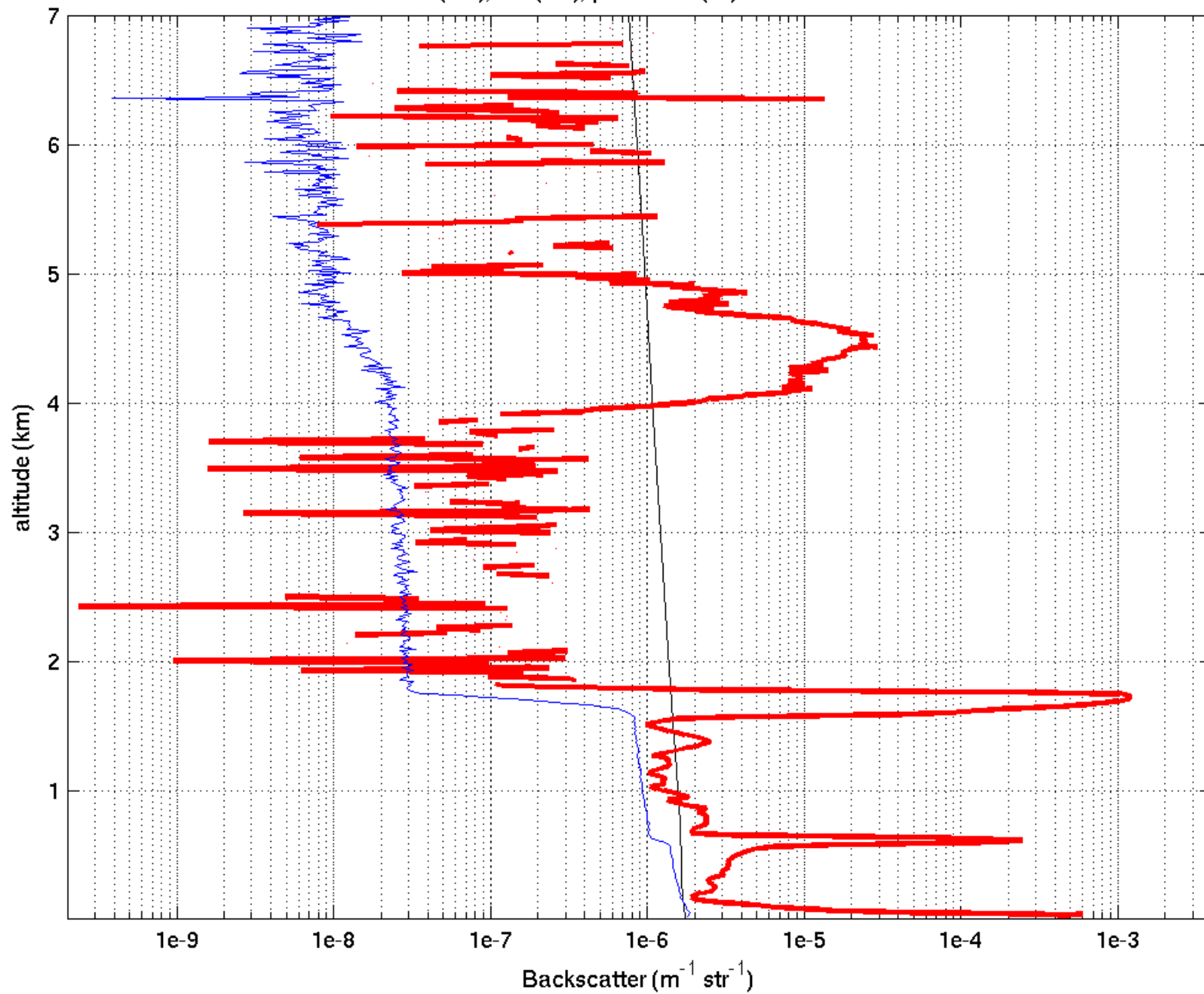


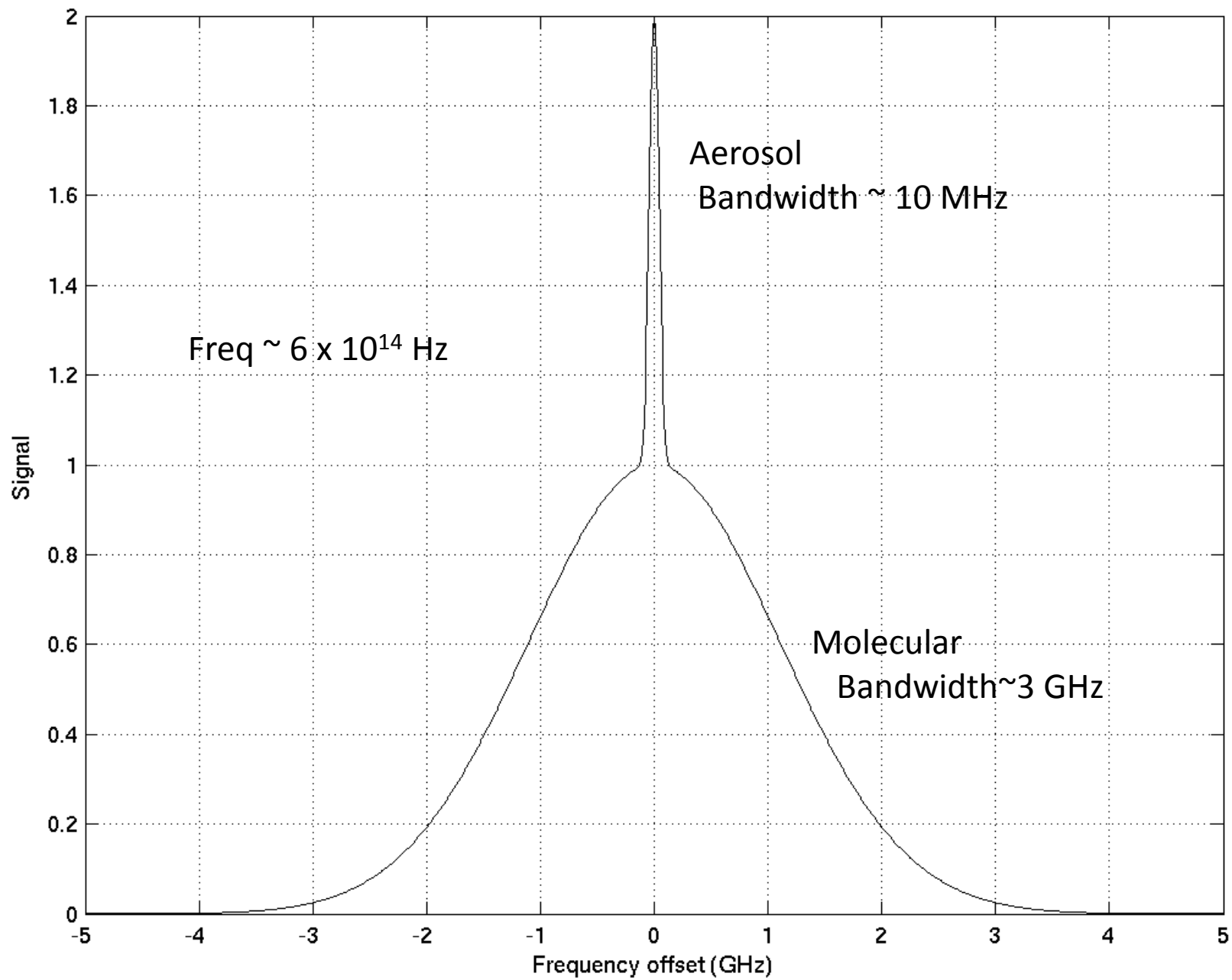
Aerosol backscatter cross section $\text{m}^{-1} \text{str}^{-1}$ 14-Jan-2004

GRB-20040114-1200

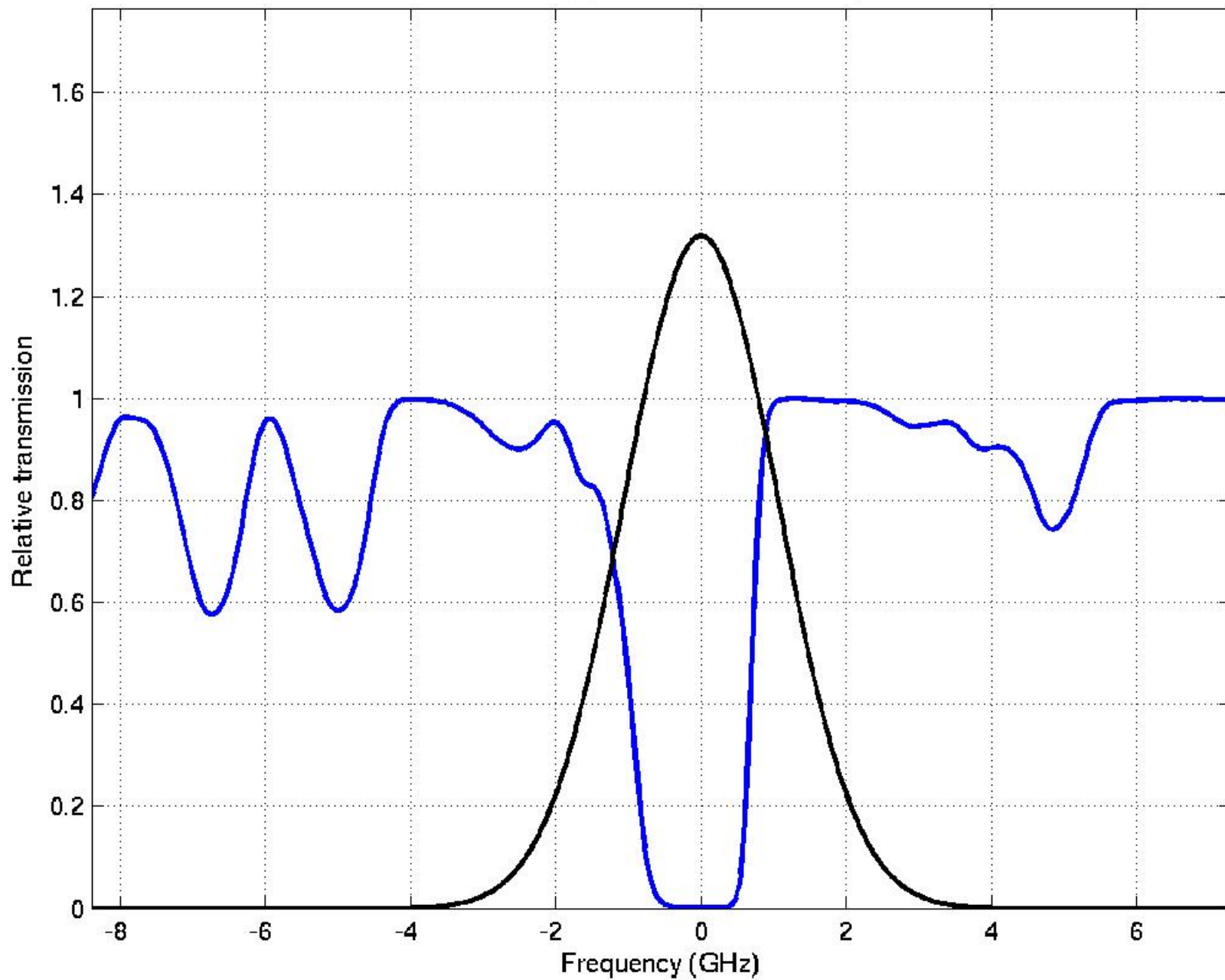


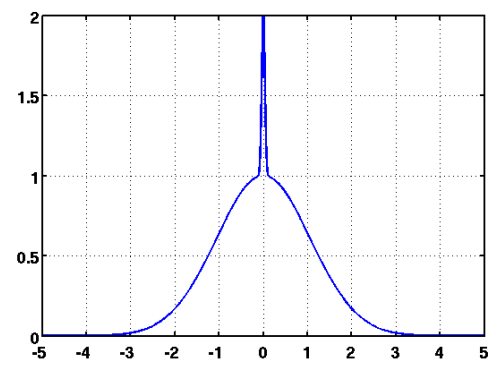
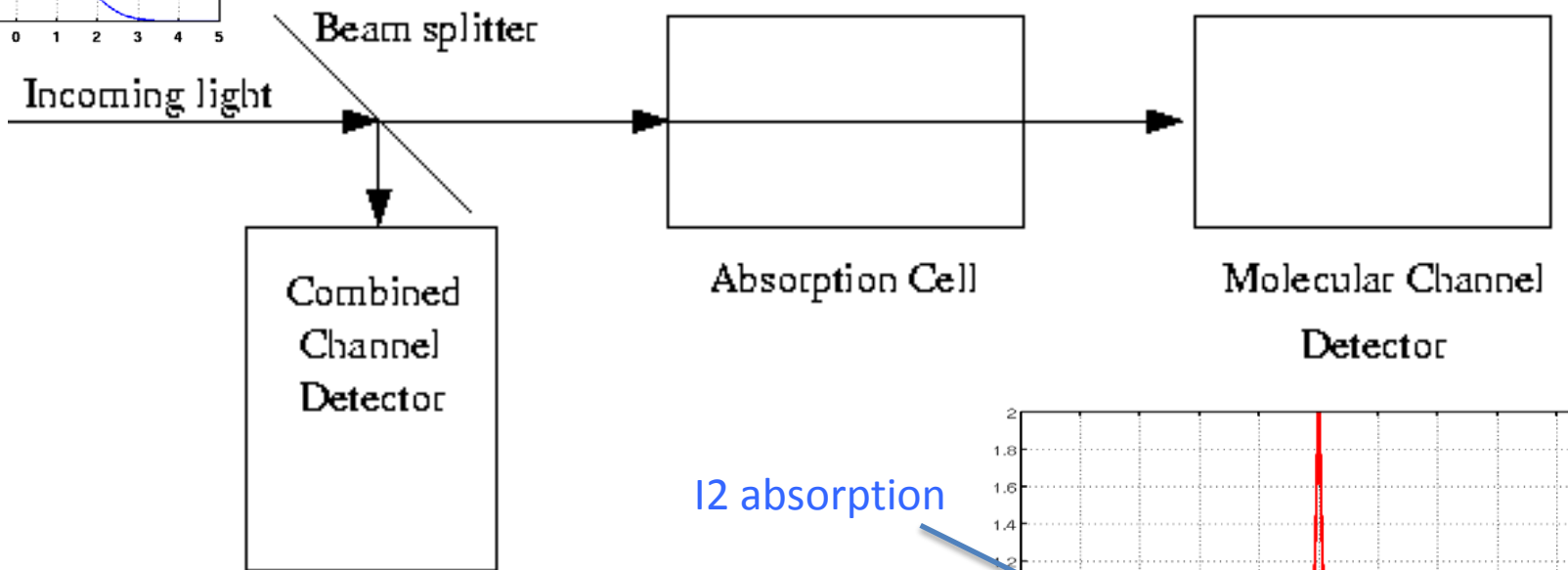
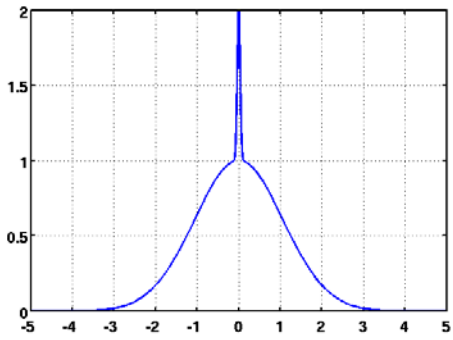
attenuated mol(blue), mol(blk), particulate(rd) 05-Nov-04 19:59->20:02



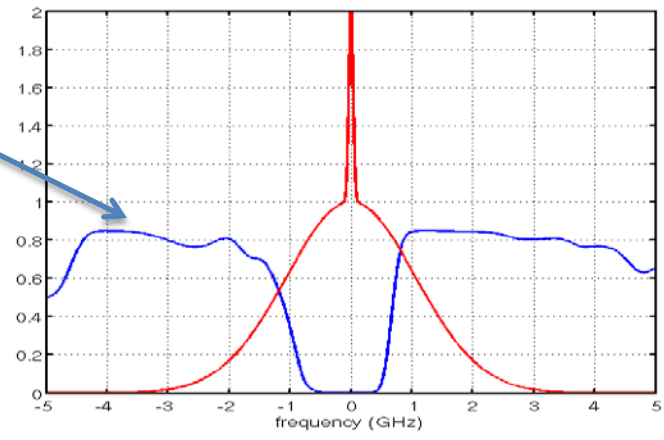


12 cell transmission and Doppler broadened Atmospheric Backscatter

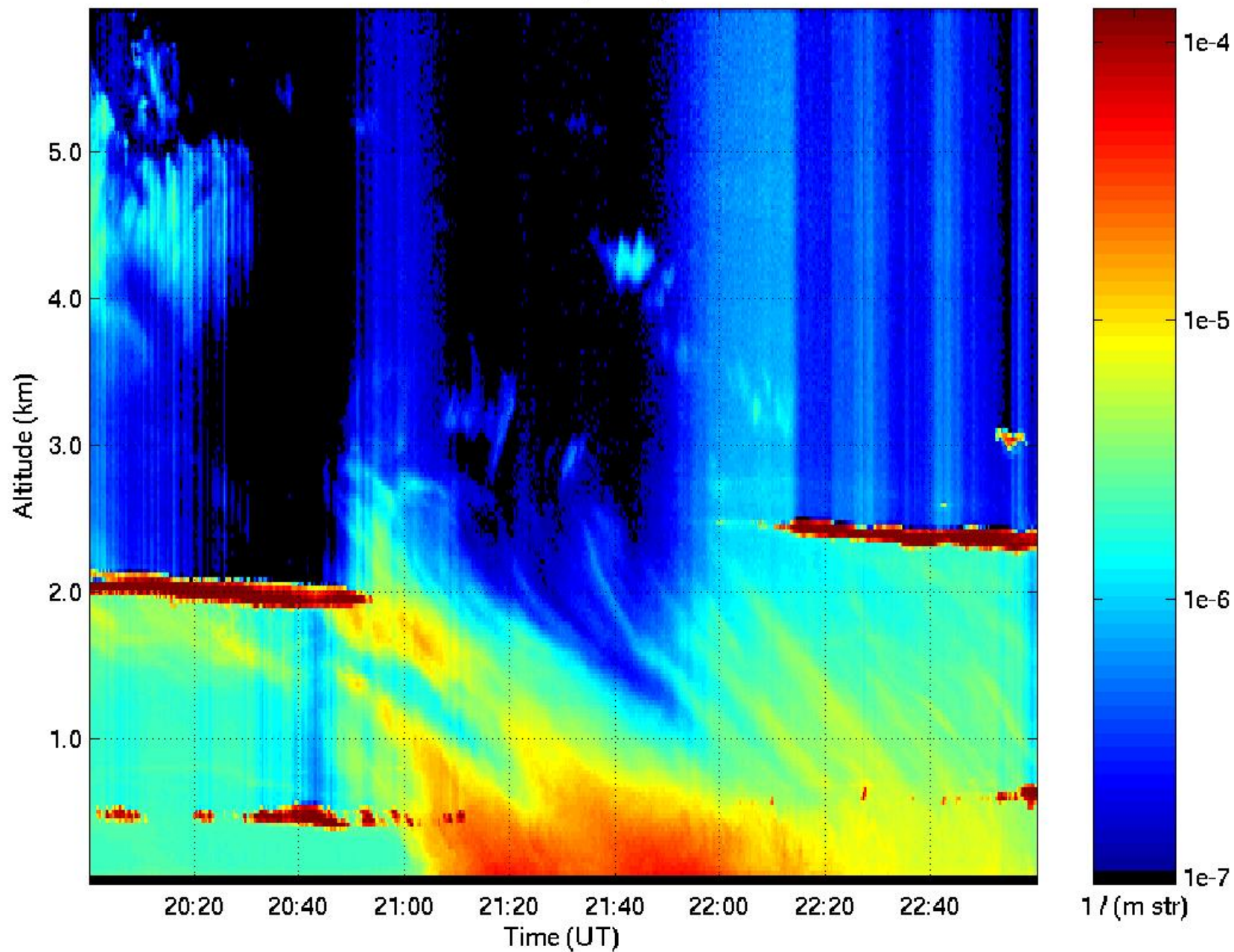




12 absorption

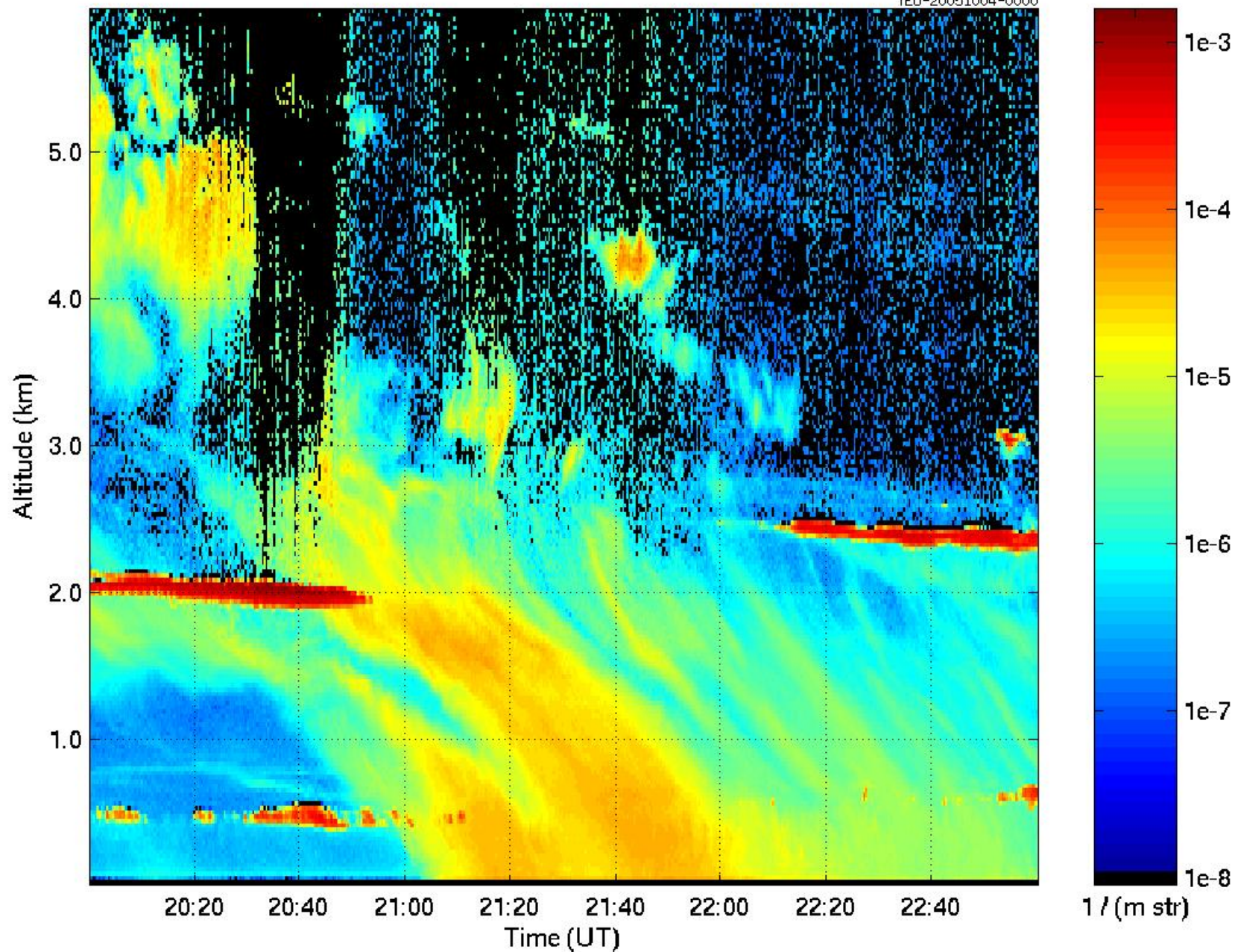


Attenuated backscatter ($\text{m}^{-1}\text{str}^{-1}$) 03-Oct-2005



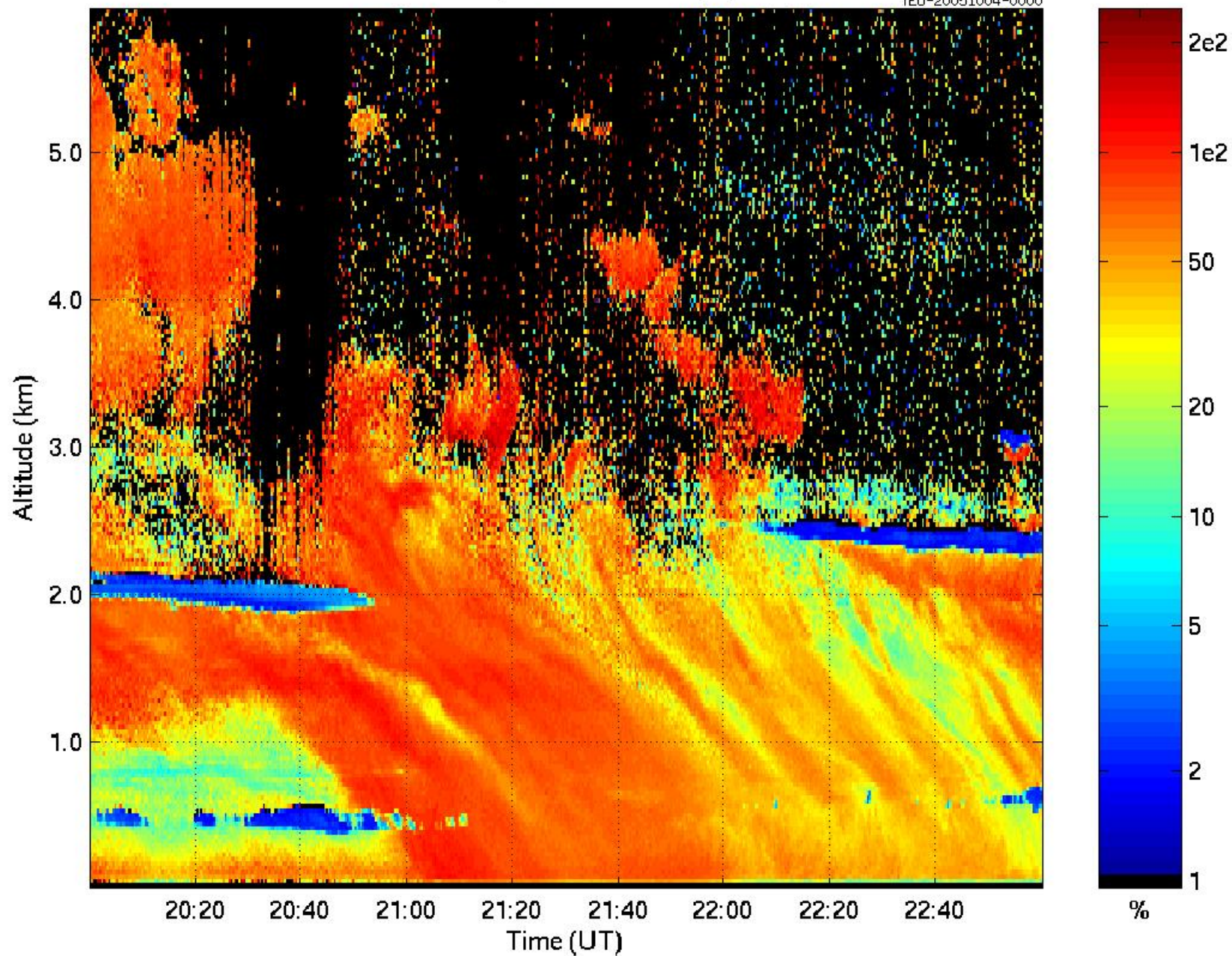
Aerosol backscatter cross section $\text{m}^{-1}\text{str}^{-1}$ 03-Oct-2005

YEU-20051004-0000

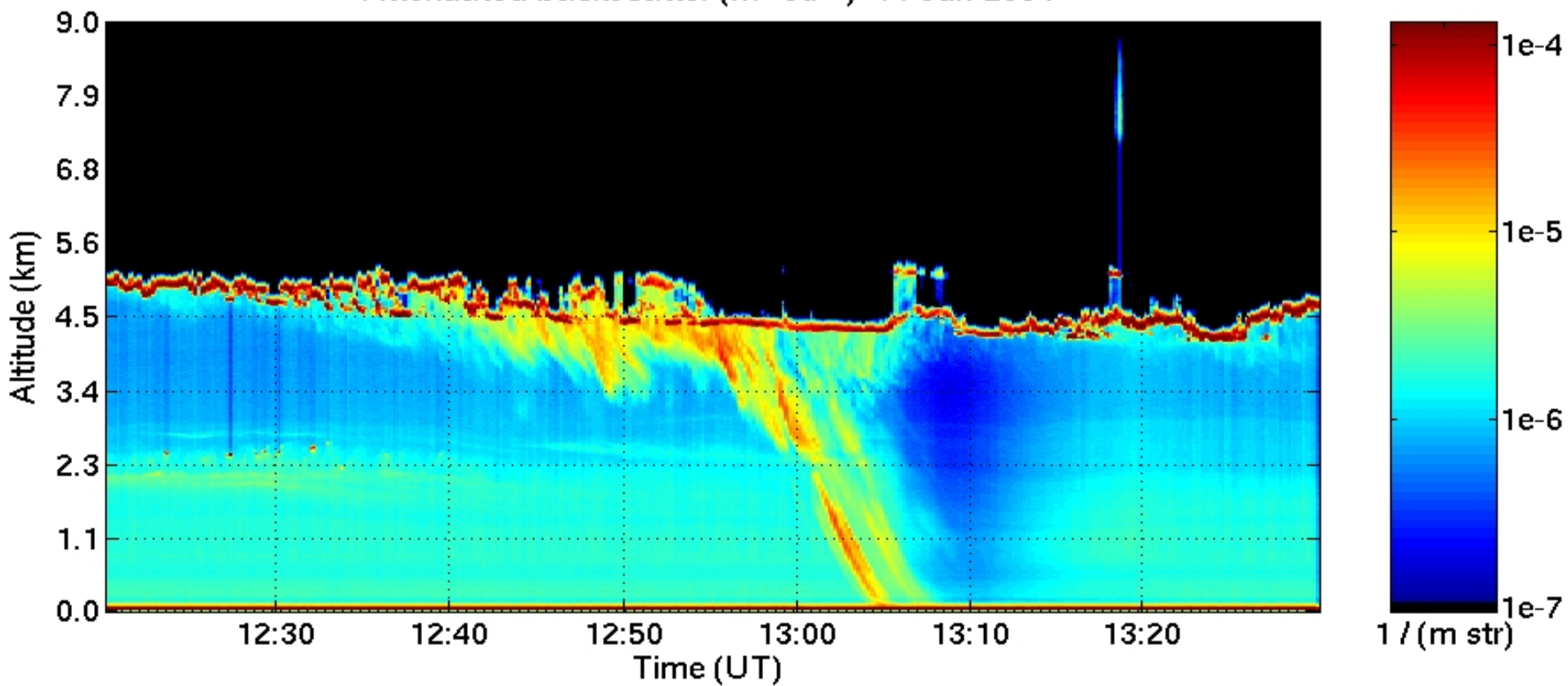


Particulate circular depolarization ratio(%) 03-Oct-2005

YEU-20051004-0000

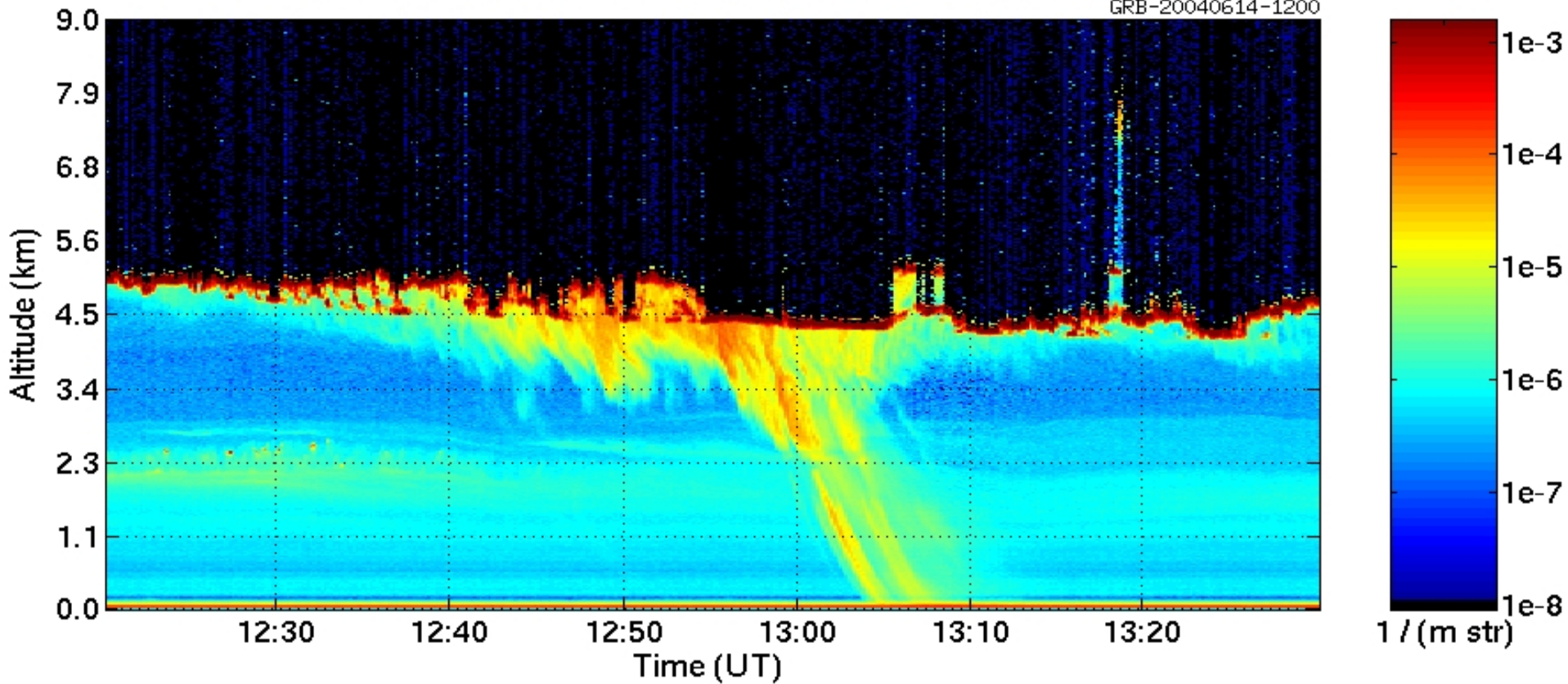


Attenuated backscatter ($\text{m}^{-1} \text{str}^{-1}$) 14-Jun-2004

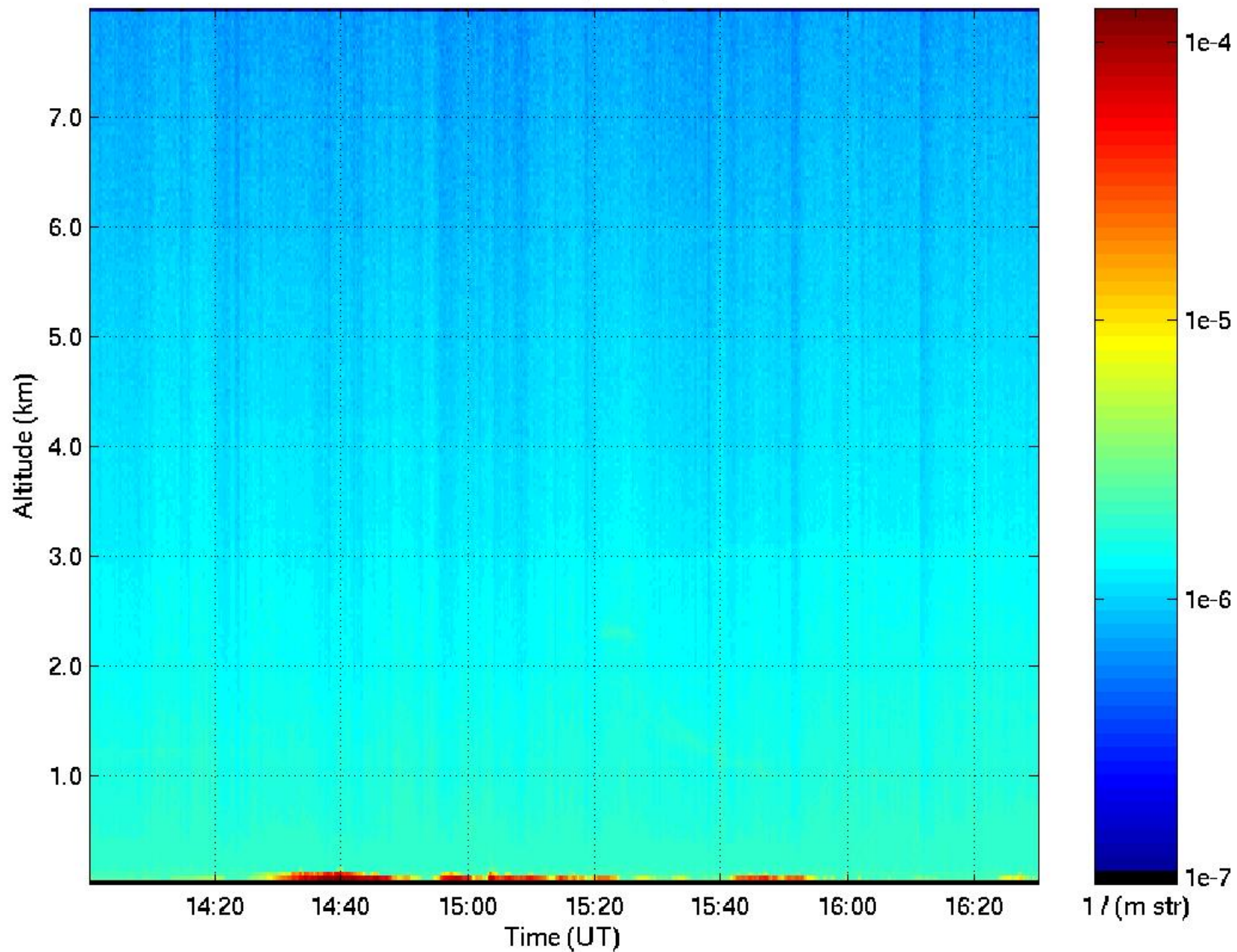


Aerosol backscatter cross section $\text{m}^{-1} \text{str}^{-1}$ 14-Jun-2004

GRB-20040614-1200



Attenuated backscatter ($\text{m}^{-1}\text{str}^{-1}$) 10-Oct-2005



Aerosol backscatter cross section $\text{m}^{-1}\text{str}^{-1}$ 10-Oct-2005

YEU-20051010-1200

