A Radiation Course based upon Numerical Methods

08.12.2016

Exercise No. 3 – Line shape

1. Choose an individual line and perform calculations over a restricted frequency range for a number of different pressures. Keep the temperature and constituent mixing ratio constant.

   How does the shape of the spectral lines change?

   By now we investigated absorption in terms of the absorption cross-section σ. Another widely used unit is the absorption coefficient α. It takes the number concentration n of the absorber into account.

   $$\alpha = n \cdot \sigma$$

   How does the absorption coefficient in the line centre change, if pressure is changed?

2. A measure of the line width is the full-width at half maximum. Make a plot of this as a function of altitude (pressure). Do this for a microwave line and an infrared line.