5.6: The Source Function (Die Ergiebigkeit)

This is the ratio of the emission coefficient to the extinction coefficient. A review of the dimensions of these will show that the dimensions of source function are the same as that of specific intensity, namely $\mathrm{W\ m^{-2}\ sr^{-1}}$ (perhaps per unit wavelength or frequency interval). The usual symbol is S. Thus

$$S_\nu = \frac{j_\nu}{\alpha(\nu)+\sigma(\nu)} = \frac{j_\nu}{\kappa(\nu)} \tag{5.6.1}$$

Imagine a slice of gas of thickness dx. Multiply the numerator and denominator of the right hind side of equation 5.6.1 by dx. Observe that the numerator is now the specific intensity (radiance) of the slice, while the denominator is its optical thickness. Thus an alternative definition of source function is *specific intensity per unit optical thickness*. Later, we shall evaluate the source function in an atmosphere in which the extinction is pure absorption, in which it is purely scattering, and in which it is a bit of each.