

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 $\text{W m}^{-2} \text{sr}^{-1}$ (perhaps per unit wavelength or frequency interval). The usual symbol is S . Thus

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

Imagine a slice of gas of thickness dx . Multiply the numerator and denominator of the right hand 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.

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