Homework 5

1. A seven-channel sun photometer is used to measure the aerosol optical depth. The measured optical depths corresponding to the following wavelengths are: $k_a(0.382\ \mu m) = 0.645$, $k_a(0.451\ \mu m) = 0.562$, $k_a(0.501\ \mu m) = 0.513$, $k_a(0.526\ \mu m) = 0.491$, $k_a(0.778\ \mu m) = 0.338$, $k_a(0.861\ \mu m) = 0.306$ and $k_a(1.060\ \mu m) = 0.249$. Plot the $\ln k_a$ as a function of $\ln \lambda$. With a linear regression model, determine the aerosol parameters β and α.

   R: 0.2656, 0.9391

2. Plot the spectral transmittance due to aerosol attenuation, represented for various parameter combinations (the Ångström turbidity coefficient (β), Ångström exponent (α)) describing the properties of atmospheric aerosols, as a function of wavelength in μm. Use two different values for turbidity (β=0.05) for clean atmosphere and (β=0.6) for a more turbid one. In each case take three values for Angstrom exponent (α=0.5,1.3,2.3).