

Solar radiation and aerosols

Here, Paul Adams shows the effects of aerosols on atmospheric light.

To measure Atmospheric Optical Thickness (AOT) we use a photometer: you can find English and French instructions on the GlobeFrance site at the following address:

http://www.globe-france.org/IMG/pdf/protocoles_relatif_aux_aerosols.pdf

Hampton University has a Flash animation on its website

(<http://calipsooutreach.hamptonu.edu/arcade.html>) which shows students how to identify aerosols. Just click on 'Atmospheric Aerosols Book' to launch the animation.

Aerosols and light: a simple simulation showing the role of aerosols in diminished luminosity

The experimental protocol here is simple, we just need an overhead projector with two (or three) glasses placed on it, one filled with water representing an atmosphere free of aerosols, the second with a drop of milk added representing an atmosphere with aerosols: the light passes through the first glass and reaches the screen, but is blocked by the mixture of water and milk in the second glass.

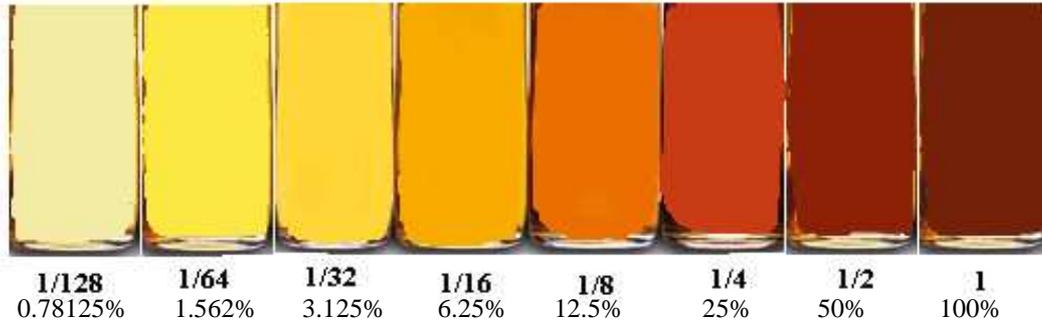


The third glass enables you to repeat the experiment on request

This can be explained as follows: solid particles such as proteins contained in the milk scatter the light in all spatial directions. Each time an incident beam of light meets a molecule it loses some energy, so when it leaves the mixture (at the surface) only a tiny fraction of the original light remains, which is why the object appears dark on the screen.

Aerosols and luminosity, a simple experiment for quantifying the effects of aerosols on luminosity

This uses a range of different dilutions of coloured water (using bromothymol blue, neutral red dye, food colouring or even a cola-type drink, as long as it is not sparkling): the original solution is watered down by 50% each time to obtain the range of tints. These solutions are then poured into a succession of containers with parallel edges, to be placed between the light source and the sensor, so that a light-meter can be used to measure the percentage of light transmitted and the students can plot the curve simulating how the atmosphere's transparency diminishes as the aerosol concentration (the colouring agent) increases.



One of the groups at work making up the dilutions ...

... and another taking measurements involving milk

