

Blue Skies

In lecture 3 one of the points was that the atmosphere is a fluid and another discussion topic was how colour of the sky is determined by the scattering of visible light in the atmosphere.

Terms included

1. "Rayleigh scattering" that takes place when incoming radiation from the Sun encounters small particles in the atmosphere
2. Frequency and wavelength:

The amount of scattering from air molecules is much higher for short wavelengths (blue and violet) than for longer waves (yellow and red).

Why the sky is blue

Light, as we know, is a wave motion. If one watches water and waves on a lake or river you will notice that rocks and other obstructions change the original wave flow and result in wavelets in various directions. Light waves in the fluid of the atmosphere respond in a similar way to molecules and aerosols in a process known as "Rayleigh scattering".

Light acquires its colour from its wavelength. Blue light, for example, has a very short wavelength, whereas the wavelength of red light is relatively long. The "white" light from of the Sun contains all colours of the spectrum from violet then blue, through yellow, green and orange to red. Some of the red and orange is scattered but the proportion is small compared to the amount of blue.

When you look at a part of the sky away from the sun you see sunlight which was originally heading in a different direction, but which has been scattered/deflected towards you by the atmosphere. Because the short blue waves are most affected, one sees the scattered light, and most of the sky, as blue.

Near the horizon, because of the very shallow angle, the sunlight scattered in our direction approaches us almost horizontally through the air, and travels through more air than usual before it reaches our eyes. With this increased distance, the scattered blue light is subject to further scattering by the "increased" atmosphere, "rescattered", most of the blue disappears. Orange and red light were originally scattered in our direction and undergoes little further interference.

Notes

- ✚ If planet Earth had no atmosphere (yes, life would not be as we know it) to scatter light, the sun would appear as pure white and all the rest of the sky would be a dark and inky black.
- ✚ The "Golden hour" (approximate) takes place when the Sun is from 6° above the horizon to 4° below
- ✚ The "Blue hour" takes place after sunset (Sun -2° to -6°) and varies in timing – less than 30 minutes usually.