

Offered Title: The Sky is Blue, Isn't it?

Here I am at home minding my own business, eating dinner, and my wife is on the phone with a neighborhood friend. She turns to me and asks; did you know the Moon is orange tonight? Being the utmost knowledgebase of things astronomical, I said Oh, OK. I didn't know. Our friend had just arrived home and saw a beautiful orange full Moon coming up over hill country ridges. She wondered how this happens and what does it mean?

The *how it happens* is easy enough. The meaning...I cannot speak to that.

Our atmosphere is colorless, water vapor and droplets are virtually colorless, so why do objects mostly outside our atmosphere, oh yeah and the sky take on color? Most of the colors of our sky are due to what is called Rayleigh Scattering. Molecules of gas such as nitrogen and oxygen are bigger than the photons hitting them, and they scatter the shortest wavelengths most easily. Guess what, blue is a short wavelength, so our sky is usually blue. Other wavelengths (colors) get scattered also, but to a much lesser extent. The more atmosphere light passes through the greater the scattering. See a pretty Sunset? The Sun's light is going through a lot more atmosphere, so much so even long wavelengths get scattered more, and even polarized. So, Sunsets are a bounty of color.

Our sky is beautifully blue on clear days, but can morph into some kind of evil twin when severe weather is afoot. I have seen the green, yellow, and brownish colors of nasty weather and it is kind of scary. It means take cover, unless you are nuts and want to capture the colors, just before you get pummeled by hardball sized hail. All of these colors are mostly caused by...drum roll...the air, oh boring. Water vapor appears to play a role in those thunder banger storms with green skies, but it's mostly caused by atmospheric Rayleigh scatter. Some research indicates water vapor and droplets contribute by absorbing some wavelengths, and combined with extreme turbulence render the sky green-yellow-brown. Jury's still out. Atmospheric dust can play a role too, even with beautiful sunsets.

Rainbows, are always fun. They are cause by water droplets refracting, reflecting, and dispersing light hitting the droplets. If you happen to be 42° opposite the light source (e.g. the Sun) you see the rainbow. Otherwise no rainbow. They can be photographed but are not objects. It's kind of like using a projection screen. The screen is an object but the image is not, water droplets are objects but the rainbow is not.

Oh yes, the orange Moon? Atmosphere. Sometimes dust is involved because it scatters blue light too. As the Moon rises higher it loses the orange color. Less light scatter.

What's in the Sky?

Jupiter in Virgo, Saturn in Ophiuchus

July20: 30 minutes before sunrise. Look east. Brilliant Venus and a crescent Moon await.