Impact of Clouds on a Sunset

While a sunset can be beautiful without clouds, the presence of clouds spreads the color of the setting sun throughout the nearby sky.

Why is that? And ... what types of clouds produce the most-spectacular sunsets?

NOAA (the National Oceanic and Atmospheric Administration) gives us the reasons:

> *Although the twilight sky can certainly inspire awe even when it is devoid of clouds...the most memorable sunsets tend to be those with at least a few clouds. Clouds catch the last red-orange rays of the setting sun and the first light of the dawn like a theatre screen, and reflect this light to the ground. But certain types of clouds are more closely associated with eye-catching sunsets than others. Why?*
>
> *To produce vivid sunset colors, a cloud must be high enough to intercept "unadulterated" sunlight...i.e., light that has not suffered attenuation and/or color loss by passing through the atmospheric boundary layer. (The boundary layer is the layer near the surface which contains most of the atmosphere's dust and haze).*
>
> *This largely explains why spectacular shades of scarlet, orange, and red most often grace cirrus and altocumulus layers, but only rarely low clouds such as stratus or stratocumulus. When low clouds do take on vivid hues, as they often do over the open ocean in the tropics, it is a clue that the lower atmosphere is very clean and therefore more transparent than usual.*
>
> *Some of the most beautiful sunrises and sunsets feature solid decks of middle or high clouds that cover the entire sky except for a narrow clear strip near the horizon. In the middle latitudes, skies like these often are associated with a passing jet stream disturbance; i.e., they mark the zone of transition between west-to-east moving regions of atmospheric ascent (cloud cover) and descent (clear skies).*
>
> *When viewed at sunrise, a sky of this type implies that the weather is likely to deteriorate as the mid- and upper-level moisture continues eastward. At sunset, of course, the opposite is true, hence the saying "Red sky at night, traveler's delight; Red sky in morning, traveler take warning."*

Sometimes a sunset makes the entire area look as though it's "bathed in red." Is there a cause for that effect?

> *Sunsets like the* [following] *are perhaps most notable for the "bathed in red" effect that they produce. The entire landscape takes on a surreal saffron hue as the clouds reflect the fading sun's red and orange glow, allowing very little blue (scattered) light from the upper levels of the atmosphere to reach the ground.*

This particular example also illustrates how large particles - in this case rain drops falling from the departing upper level cloud deck in [view "a"] *tend to mute sunset colors. The overall coloration at this point is a dusky brownish-orange.*

Minutes later, once the rain has cleared the area, vibrant shades of red and orange overspread the scene [images b and c].

Does a change in the wind's speed or direction impact how clouds appear at sunset? In other words, does wind shear play a role in creating a beautiful view?

> *Certain cloud forms also characteristically assume shapes and textures that add interest. For example, altocumulus layers typically occur at inversions, where the wind often changes speed and/or direction with height. This change in the wind (known as wind shear) can give rise to wave-like or roller motions that are manifested as cloud "ripples" or "billows."*
>
> *The grazing illumination of the low sun on such formations can create spectacular cloud scapes that change over time as the angle of illumination changes. Elevated cumuliform clouds such as those in* [pictures a, b and c] *also add interest, as the vertical extent of the clouds and their trailing precipitation cascades (fallstreaks) result in gradations of lighting that are not as easily realized in more uniform cloud decks.*

Does the cloud itself, and how it has formed, have anything to do with the view we see when the sun sets?

> *Another reason some cloud forms more commonly are associated with memorable sunrises and sunsets than others is a bit more complex; it is related to the mode of formation of the cloud and, in particular, the processes responsible for the base of the cloud.*
>
> *Most middle and upper-level clouds are associated with the juxtapositioning of two distinct air streams, a more moist (cloudy) layer surmounting a drier one.*
>
> *Low clouds such as cumulus and stratus, on the other hand, more often are associated with generalized uplift through the cloud base. This uplift leads to a gradual increase in relative humidity below cloud base and, consequently, to an increase in the size of natural and man-made pollutants. These enlarged particles diminish the intensity and spectral purity of incoming sunlight below the clouds.*

So ... with this help from NOAA ... the next time we witness a beautiful sunset, like those depicted in these images, we can better understand how the sky is appearing so majestic.

Click on the top image for a great view.

Credits:

Images and quotes from NOAA / National Severe Storms Laboratory (in Norman, Oklahoma); article ("The Colors of Sunset and Twilight") and pictures by Stephen F. Corfidi.

See Alignments to State and Common Core standards for this story online at:
http://www.awesomestories.com/asset/AcademicAlignment/Impact-of-Clouds-on-a-Sunset

See Learning Tasks for this story online at:
http://www.awesomestories.com/asset/AcademicActivities/Impact-of-Clouds-on-a-Sunset

Media Stream

Sunset NOAA View A
View this asset at: http://www.awesomestories.com/asset/view/

Sunset NOAA View B
View this asset at: http://www.awesomestories.com/asset/view/

Sunset NOAA View C
View this asset at: http://www.awesomestories.com/asset/view/

Impact of Clouds on a Sunset
View this asset at:
http://www.awesomestories.com/asset/view/Impact-of-Clouds-on-a-Sunset0