Let’s look at water vapor imagery and see what kinds of insights we can get from it. This particular image is from 1215Z on October 11, 2017, and to get your bearings, keep in mind that what’s being displayed here is really temperature.

The color key is along the bottom. Higher temperatures are toward the right of the key, and are represented by the warm colors – the oranges and reds. Lower temperatures are shown in increasingly bright shades of gray and white, and the really low temperatures are shaded in cool colors – the purples, blues, and greens.

So, from this image, we can see the temperature of the effective layer, that’s the highest layer in the troposphere with appreciable water vapor. This big streak across the center of the country has a relatively warm effective layer, as indicated by the orange and red coloring. The relative warmth of the effective layer means it lies in the middle troposphere, which means that the upper troposphere in this region must be particularly dry.

Just to the northwest, on the other hand, the effective layer is colder over Montana and Wyoming, where there’s bright white and purple shading. The colder effective layer in this area means that it’s higher in the troposphere, so we can conclude that the upper troposphere has more water vapor in this region compared to our large orange and red streak. The coldest areas in purple represent temperatures below -46 degrees Celsius, and likely correspond to emissions from high-topped clouds composed of ice crystals.

Perhaps the greatest use of water vapor imagery comes from the fact that emissions from water vapor in the middle and upper troposphere allow us to track wind flow aloft, even in areas with no clouds. Let’s loop these water vapor images over a 6-hour time period, and we can track air movements in the middle and upper troposphere.

For example, it’s easy to see this broad area of flow from the southwest in this zone with a dry upper troposphere. We can also see a notable counterclockwise swirl along the Pacific Coast here. Meteorologists need to keep tabs on such circulations, as they can sometimes lead to inclement weather – note the signature of high cloudiness on the eastern flank of the swirl, as well as some indication of speckled high-topped clouds here over Washington and Oregon in the purple areas.

So, hopefully you now have a basic idea of the types of observations and insights that we can get from water vapor imagery.