## Why is the Cloud Optical Depth important?

The GOES-R Cloud Optical Depth provides valuable information on the radiative properties of clouds. It is a fundamental product to determine liquid and ice water content of clouds and impacts numerical weather and climate prediction by characterizing the effect of clouds on the Earth's radiation budget given the scattering and absorption properties based on the cloud thickness and particle size. In addition, inclusion of the cloud optical depth is important for the derivation of precipitation, aircraft icing, and fog depth estimates.
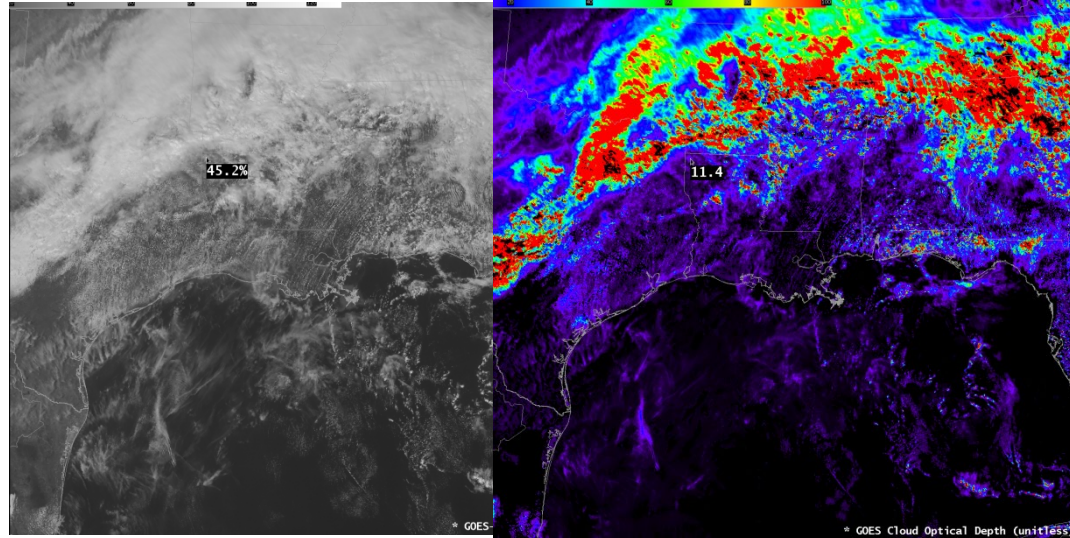
Visible Imagery (left; for comparison) and Cloud Optical Depth (right) from GOES-16 ABI at 1902 UTC, 28 February 2018

Cloud Optical Depth Product Characteristics

ABI Bands Used for Product Creation	AWIPS Image Interpretation	Cooperative Product Usage
2 (0.64 µm; visible) 6 (2.2 µm; near infrared)	Identifies effective cloud thickness per pixel responsible for the given radiance measured; increasing values with time can denote vertical cloud growth	Optical depth (cloud thickness) and cloud particle size can be combined to estimate cloud water content in the form of Liquid or Ice Water Path, depending on cloud phase

Product Limitations

- The current algorithm used to create the AWIPS product uses visible (and near-IR) band information: the product is daytime-only. Nighttime products may be available in the future.
- This product describes cloud properties; it is only available where clouds are present. A cloud mask and phase is employed; therefore, missed or falsely identified clouds can impact performance. Multi-layer cloud fields also reduce product effectiveness, and very thick clouds saturate the cloud optical depth field.
- Snow covered surfaces affect product accuracy.
- Only satellite pixels with a solar zenith angle of ≤65° are considered for cloud optical depth calculation.
- Optical Depth measures the extinction of a ray of light as it passes through the cloud. As Optical Depth increases, the rate of extinction by the cloud increases.

Resources

ATBD Documentation

Cloud Optical Depth

Hyperlinks will not work in AWIPS, but they will work in VLab

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February, 2018