Application Library: Nighttime Microphysics RGB
Multi-Cloud Scene in New Mexico

Contributed by:
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Region:
CONUS West/Southwest

Office:
NWS Albuquerque, NM (ABQ)

Date:
3 January 2017

Product(s):
Nighttime Microphysics RGB
11-3.9µ Difference Fog Product

Application Area:
Aviation

Feature:
Fog, Low Stratus, Mixed Clouds

Instrument(s):
ABI, MODIS, VIIRS, AVHRR

Works well with:
Vis./Ceiling observations

Related Links:
Multispectral Imagery: RGBs Explained (UCAR/COMET)

Quick Guide: Nighttime Microphysics RGB (NASA SPoRT)

Event Description:
Northwest flow dominated the region of northern New Mexico with elevated winds. Fog and low clouds were identified in the Nighttime Microphysics RGB imagery, and verified by surface observations.

Product Impact:
The Nighttime Microphysics (NtMicro) RGB shows the full extent of the areas of low stratus and fog (aqua to gray respectively) in the right of the image, while the traditional 11-3.9 µ difference is harder to interpret (note similar coloring for both fog and low/mid clouds). The NtMicro RGB was used to analyze potential low ceiling hazards for TAF forecasts and it was mentioned in the ABQ Area Forecast Discussion.

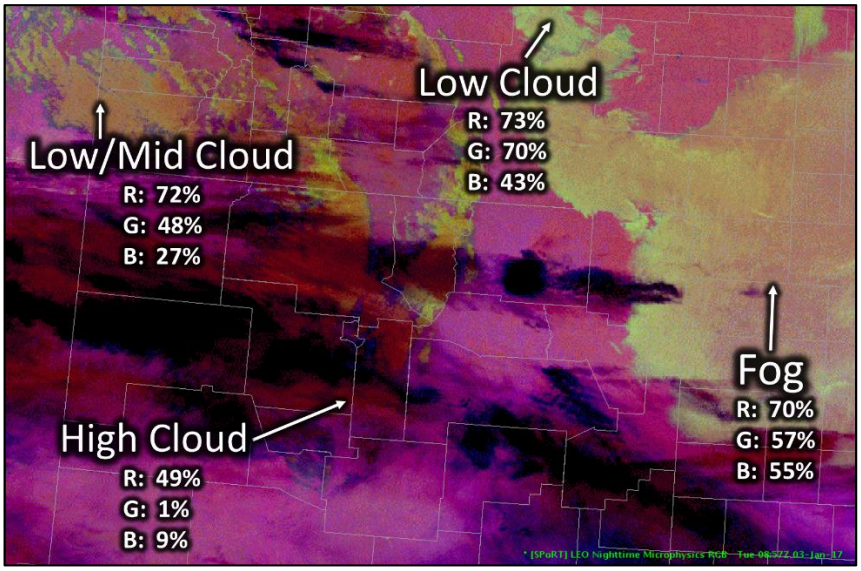

Figure 1. Annotated Nighttime Microphysics RGB valid at 0857 UTC, 3 January 2017 over northern New Mexico.

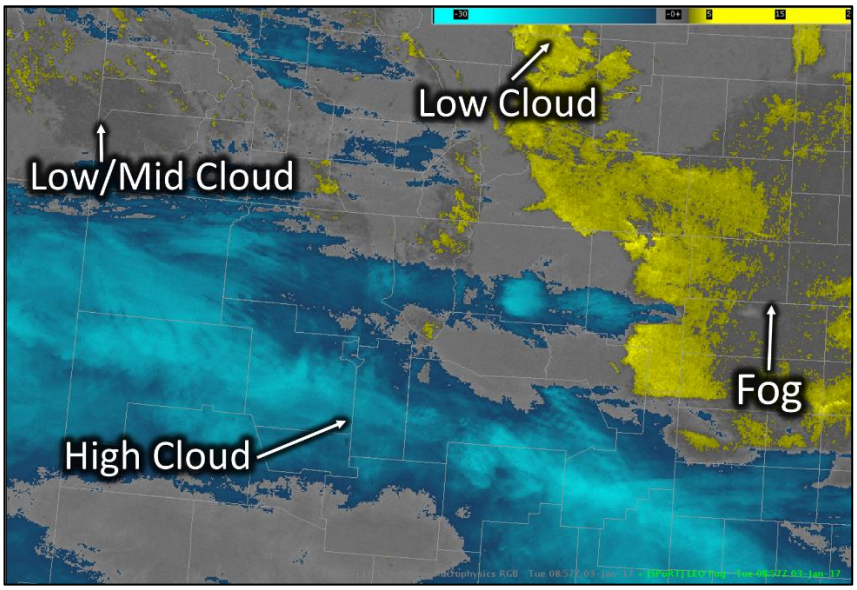

Figure 2. Annotated 11-3.9µ Difference Fog Product valid at 0857 UTC, 3 January 2017 over northern New Mexico.

Interpretation:

The fog and low clouds (gray to aqua) in the RGB imagery will have a greater blue contribution (i.e. warmer temperature of 11µ channel) than the mid-clouds (tan coloring), but pixels with thin or scattered fog are influenced by cold surface emissions that make it through/between the fog. The mix of emissions from the surface and fog means that the resulting "fog" pixel sometimes has less intense blue than warm, low clouds, and this results in more of a gray coloring. One can expect that the NtMicro RGB green color component of 11-3.9µ will have a high contribution for fog due to very small water particles. However, as previously stated above regarding the blue contribution, thin fog tends to allow some of the surface emissions to affect the 11-3.9µ difference. The cold surface emissions reduces the 11µ temperature, and thus the resulting difference. Therefore, thin fog tends to have a smaller green contribution to the NtMicro RGB than very low, thick clouds with small water particles. The higher clouds shown in purple and red/black have a much smaller green contribution than the fog and low clouds, indicating their larger particle size, typical of ice.