Outline

• Current use of RGBs in NWS WFOs
• New/Future Multispectral Imagery Products
• Additional RGB Thoughts

Goal (as I see it): Condense useful information from multiple sources into a single intuitive image
Most Used and Useful RGBs for a CONUS NWS WFO

- Based on personal experience, interaction with forecasters across NWS, Area Forecast Discussion (AFD) analytics, social media observations
  - Forecasters will use a new product if they see that it is useful and adds information not available in other currently used products
  - 2021 AFDs: 497 “RGB” mentions

- Routine use
  - Day Cloud Phase Distinction RGB
    - >80 AFD mentions in 2022
  - Nighttime Microphysics RGB
    - >600 AFD mentions in 2021
  - Geocolor
    - >83 AFD mentions in 2021

- Situational Use
  - VIS/IR Sandwich
  - Dust RGB
DCPD RGB – General Cloud Analysis

• GOES-East over Colorado
DCPD RGB – Snow Squall

- GOES-East over New York

DCPD RGB – Convective Initiation

• GOES-East over central Texas

GOES-16 DCPD RGB (10.35, 0.64, 1.61)

https://satelliteliaisonblog.com/2021/04/09/texas-supercell-4-8-2021/
DCPD RGB - Frost

- GOES-East over southeast Colorado

GOES-16 DCPD RGB (10.35, 0.64, 1.61)

Go to https://satelliteliaisonblog.com/2019/02/06/goes-16-detects-fresh-frost-across-eastern-colorado/
DCPD RGB – Hail Swaths

- GOES-East over southeast Colorado

https://satelliteliaisonblog.com/2022/06/08/high-plains-accumulating-hail-07-june-2022/
NightMicro RGB – Low Clouds and Fog

- GOES-East over Colorado

NightMicro RGB – Low Clouds and Fog

- GOES-East over southeast North Dakota

GOES-16 NightMicro RGB (12.3 – 10.35, 10.35 – 3.9, 10.35)

A forecaster issued an update to the Area Forecast Discussion that read: “GOES Nighttime Microphysics shows extent of fog in southwest North Dakota, possibly nudging into the south central this morning. Based on cameras and coverage depicted on satellite imagery, coverage is somewhat patchy, but has lowered visibility at Hettinger down to 1/4 mile. An SPS was issued to address fog this morning for this area. Fog will gradually dissipate mid-morning as boundary layer mixing increases after sunrise.”

NightMicro RGB – Convective Initiation

• GOES-East over Kansas

GOES-16 NightMicro RGB (12.3 – 10.35, 10.35 – 3.9, 10.35)

https://satelliteliaisonblog.com/2022/05/31/memorial-day-2022-severe/
VIS/IR Sandwich RGB (Manual) – Storm Top Analysis

Dust RGB – Blowing Dust Detection

GOES-East Dust RGB (12.3-10.35, 11.2-8.5, 10.35)

GOES-16 over southern High Plains

GOES-16 over southeast Colorado

Foresters at NWS Pueblo anticipated the potential for blowing dust early in the day, and had issued a High Wind Warning for the SLV with mention of Blowing Dust reducing visibility. As such, forecasters were monitoring the “Dust RGB” imagery, in addition to webcams, throughout the day. By early afternoon, widespread and dense blowing dust had developed in the northern portion of the San Luis Valley. Per the NWS, the satellite data gave them the nudge to call AILS patrol and find out what was going on up there. Nearby webcams were also utilized to confirm reduced visibilities. Based on information from satellite, webcams, and law enforcement, a Dust Storm Warning followed by a longer duration Blowing Dust Warning, was issued for much of the northern San Luis Valley (Fig


https://satelliteliaisonblog.com/2021/04/08/southern-colorado-blowing-dust-4-6-2021/
GoES-East over west Texas

RGBs on NWS Social Media

The East Troublesome Fire, in Grand County, has exploded this afternoon in Fire Imagery. Those in mandatory evacuation areas should evacuate immediately. #cofire #EastTroublesomeFire

Winds are gusting as high as 55 mph this afternoon following an Arctic cold front, with blowing snow across large portions of the region. Blizzard conditions will alternate with nearly clear skies through the rest of the afternoon, significantly reducing visibility. #ndwx #nwx

Satellite imagery can be very useful for monitoring where we may see storm initiation. Here is a Day Cloud Phase Image with some areas we are watching. Mainly to our SW where the CAP looks to be eroding. Storms could develop here in the next few hours.

High pressure continues to strengthen across the Southwest and is pulling smoke into the region. You can see the high level smoke in satellite as well as outside your window.

Check out this morning’s satellite view over the central US. While it might be difficult to determine different cloud types or even snow on a visible image, satellites can determine the difference by looking at different wavelengths!
NWS/Future RGBs/Multispectral Imagery Products

- Dust RGB Alternative
- Dust-Fire RGB
- Natural Fire Color RGB (Day Land Cloud Fire RGB edit)
- Snowmelt RGB
- Blowing Snow RGB
- Sea Spray RGB
- Geocolor Combinations
- RGBs with DNB
- RGBs with GLM
Traditional Dust RGB vs Dust RGB Alt

- GOES-East over southern high plains

GOES-East Dust RGB (12.3-10.35, 11.2-8.5, 10.35)

GOES-16 Dust Alt RGB (10.35-8.5, 10.35-12.3, 10.35)

Blowing Dust Satellite Book Club Webinar: https://www.youtube.com/watch?v=mVyaJaAXRE&list=PLizC8w9vPV3kIBVNmQYzIfHO6vGZeNhN&index=24
Dust-Fire RGB

GOES-East Dust-Fire RGB (3.9, 12.3-10.35, 10.35)

Natural Fire Color RGB

- Day Land Cloud Fire RGB (2.2 um, 0.86 um, 0.64 um)
- Natural Fire Color RGB (3.9 um, 0.86 um, 0.64 um)
  - The recipe is applied to VIIRS for “Day Land Cloud Fire RGB” in AK

https://satelliteliaisonblog.com/2020/06/16/magnum-fire-and-fire-smoke-scar-rgb/
Snowmelt RGB

VIIRS (1.6 um, 1.24 um, 0.64 um)

ABI (1.6 um, 2.25 um, 0.64 um)

suggest, while satellite imagery suggests the most significant blowing snow is related to well-defined plumes that are occurring in Horizontal Convective Roles (HCRs). For the most part, those HCRs are relatively widely-spaced, leading to the variability in visibilities spatially, and temporally as the HCRs shift slightly with the background flow. Satellite imagery does suggest the most widespread blowing snow plumes are centered over Burke County and vicinity, where impacts are...
Sea Spray RGB

SWIR – CWIR, Veggie Band, Red VIS

GOES-West Sea Spray RGB (3.9-10.3, 0.86, 0.64)

VIIRS Sea Spray RGB (3.7-11.4, 0.87, 0.64)

Publication: https://journals.ametsoc.org/view/journals/wefo/37/3/WAF-D-21-0137.1.xml
Additional Geocolor Layers

Traditional Geocolor + Dust Layer + Fire Hot Spot Layer + GLM layer

https://satelliteliasonblog.com/2021/12/21/mid-dec-2021-blowing-dust/
VIIRS RGBs with DNB?

VIIRS Geocolor includes DNB layer at night
RGBs with GLM

GLM RGB (MFA, FED, MFA)
- yellow = many small flashes
- red = fewer small flashes
- cyan = many large flashes
- blue = fewer large flashes

Max FED values vary geographically, seasonally, storm mode, etc.
Additional RGB Ideas

- Dynamic RGB Thresholds
- RGB Recipe Modifications by End-User
- Combined Day/Night RGBs
- RGB/L2+ Product Combos
Dynamic RGB Thresholds

- Reflectance changes based on Solar Zenith angle to improve display at near sunrise/sunset, at high latitudes, in wintertime
- Example: Day Cloud Phase Distinction RGB

Traditional DCPD RGB over WI

Dynamic DCPD RGB over WI
RGB Recipe Modifications

- DCPD – High Reflectance Situations

https://satelliteliaisonblog.com/2019/09/18/responsible-rgb-modifications/
RGB Recipe Modifications

- DCPD RGB – Low Reflectance Situations

https://satelliteliaisonblog.com/2018/11/20/goes-17-imagery-over-alaska/

https://satelliteliaisonblog.com/2019/09/18/responsible-rgb-modifications/
RGB Recipe Modifications

Traditional NightMicro RGB over PA

Modified NightMicro RGB over PA

Traditional NightMicro RGB over TX

https://satelliteliaisonblog.com/2019/09/18/responsible-rgb-modifications/
• Nighttime Microphysics RGB transition to Day Cloud Phase Distinction RGB

https://satelliteliaisonblog.com/2020/03/26/low-clouds-on-the-high-plains-26-march-2020/
• Efficiently broaden the use of quantitative derived products in AWIPS
• Strengthen user understanding of multispectral imagery products (RGBs)

Satellite Book Club Webinar: https://www.youtube.com/watch?v=VLBKdh3_M78&list=PLJzZC8w9vPV3kBVNmQYzZfHO6vGZeNhN&index=34
RGB/L2+ Product Combos

• Blend RGB with L2+ Product Quantitative Information
RGB/L2+ Product Combos

- Now Available in NWS/AWIPS
- Quantitative Derived Products matched with appropriate Multispectral Imagery Product
- Leverages imagery/products already in AWIPS

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Thank you!

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Many more examples: www.satelliteliaisonblog.com