Poster 568

GOES-R ABI True-Color Capability

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Abstract

True-color imagery, which is formed via a weighted combination of Red, Green, and Blue (RGB) spectral information, has important operational applications for qualitative environmental characterization, including the detection of smoke plumes, volcanic ash, and other aerosols that are not as easily discerned in conventional visible or infrared imagery, but may be more readily characterized via color properties. Despite its popularity, true-color is currently unavailable from geostationary satellites, and the next-generation GOES-R Advanced Baseline Imager (ABI) will fall one band (Green; 0.55 µm) short of doing so. However, approximations exist, and a process for simulating true-color imagery representative of capabilities anticipated from the ABI is presented and assessed here. High-resolution atmospheric model simulations are used to produce the ABI reflective band imagery required for true-color imagery. Those simulations are then rendered at ABI spatial (2 km) and temporal (5 min) resolution, to provide realistic data, long before the anticipated 2015 launch of GOES-R. An additional analysis, a color-space transformation is used to assess the true-color (RGB) ABI images. The resulting Hue images verify the less-green bias in the synthetic-Green band and synthetic-RGB images created on ABI simulated data. Assessing the deficiencies in the RGB process will hopefully lead to an improved and standard means for generating an RGB product from the ABI data stream. Finally, as one of the many product applications of true-color imagery, an example of synthetic true-color imagery with added smoke is presented. The incorporation of aerosols properties into simulated imagery may help reveal the limits of detectability for atmospheric aerosols with future ABI.

Acknowledgements

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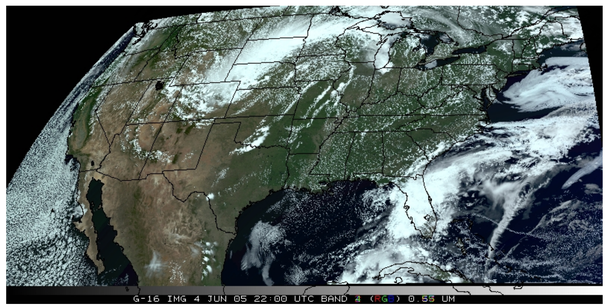
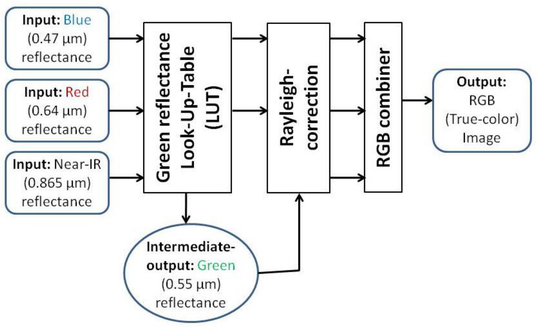
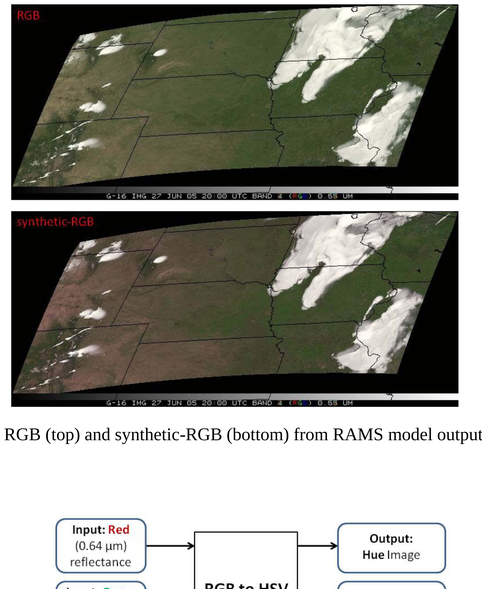


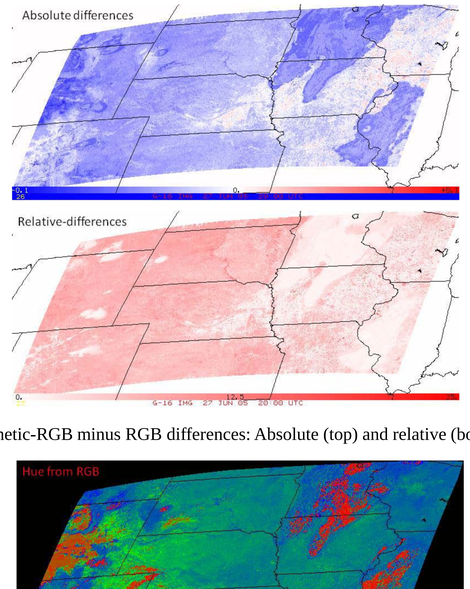
True-color (RGB) image created from WRF model output generated at CIMSS.



Flowchart of Green-LUT and Rayleigh-correction steps



ABI RGB (top) and synthetic-RGB (bottom) from RAMS model output



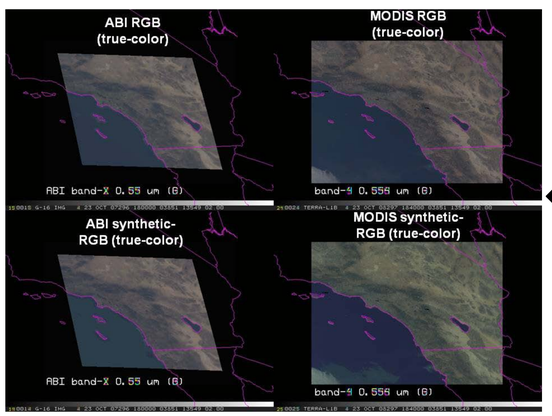
Synthetic-RGB minus RGB differences: Absolute (top) and relative (bottom)

HSV is one of several similar color-space transformations, among which the definition of **Hue** is generally common, but the definitions of Saturation and Value (or intensity, or brilliance or luminance) can vary.

Hue is the main attribute of a color that distinguishes it from other colors

RGB to HSV color-space transformation, used to get the images to the right.

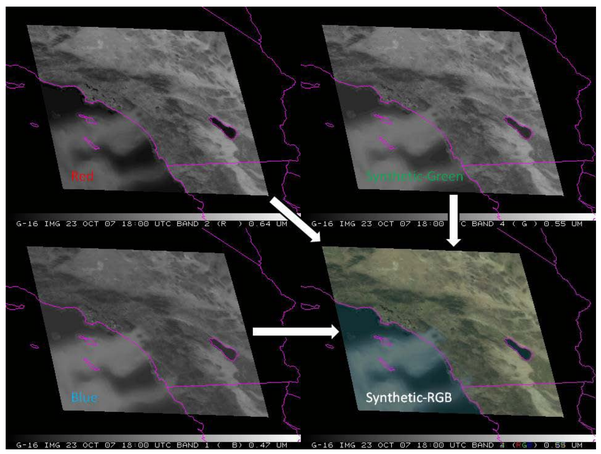
Hue image from simulated ABI: RGB (top) and synthetic-RGB (bottom)



An **initial** comparison of simulated ABI true-color (RGB) imagery, both directly-simulated (top-left) and synthetically-generated (bottom left), to MODIS true-color (RGB) images, using both the MODIS Green band (top-right), and a synthetically-generated MODIS Green band (lower-right).

Color	Wavelength	MODIS band	MODIS 16-day albedo	ABI band	Simulated ABI reflectance	MODIS reflectance
	(µm)		(average %)		(average %)	(average %)
Blue	0.47	3	**7.2**	1	**11.9**	**10.2**
Red	0.64	1	**12.8**	2	**12.4**	**11.8**
Near-IR	0.86	2	**18.9**	3	**16.7**	**16.7**
Green	0.55	4	**10.7**	-	**11.6**	**10.4**
synthetic-Green	0.55	-	-	-	**11.2**	**13.0**

Initial reflectance statistics for simulated ABI vs. MODIS (land pixels only). Yellow-highlighted values show Green vs. synthetic-Green differences.



Preliminary addition of smoke to simulated ABI true-color (RGB) imagery

References

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Future References

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