W18

Comparison of the GOES-R ABI and the VIIRS Cloud Masks

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Goals of this Poster

- The ACM and VCM will both be available to customers of NOAA Satellite Imager Data.
- It is important to explore the consistency of these GOES-R and JPSS products.
- This poster will highlight some of major differences and how they impact the usage of the ACM and VCM
- This poster will demonstrate an initial application of the ACM to the NPP/VIIRS data.
- The VCM data is from the IDPS (the official processing system for NPP/JPSS). ***Known issues with the IDPS and VCM make any performance estimates preliminary***.
- VCM post-launch tuning is on-going and making improvements.
- The ACM as of yet, is not properly modified for VIIRS.

GOES-R ABI Cloud Mask (ACM) Overview

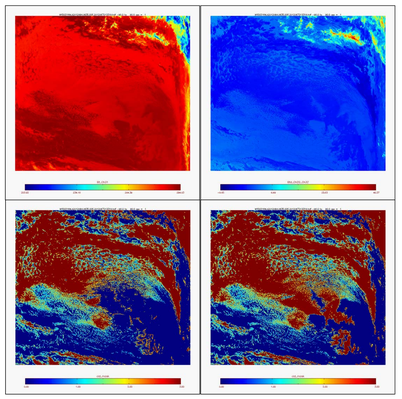
- The ACM serves as the cloud detection scheme made available to all AWG algorithms.
- It is designed to generate a 4-level mask (clear, prob. clear, prob. cloudy and cloudy) for which the official binary clear-sky mask is generated.
- The yes/no decisions of all test are included in the output
- ACM logic allows for any number of tests to be turned off and for the cloud mask to be regenerated easily.
- The goal is flexibility for the various AWG algorithms and to provide a mask that is useful to all algorithms.
- For example, the SST algorithm selects certain tests from the ACM and applies additional screening to their requirements.

VIIRS Cloud Mask (VCM) Overview

- VCM was developed by Northrop Grumman, the prime contractor for JPSS.
- The VCM also serves as the cloud detection scheme made available to all IDPS VIIRS algorithms.
- It is designed to generate the same 4-level mask as the ACM.
- The yes/no decisions in the output are diagnostic but the actual logic of the VCM prevents the regeneration of the cloud mask by simply turning off tests.
- VCM started from the NASA Goddard MODIS Cloud Mask circa 2002 but has evolved separately since then.
- MODIS Cloud Mask developed at UW/CIMSS.

Preliminary Tuning

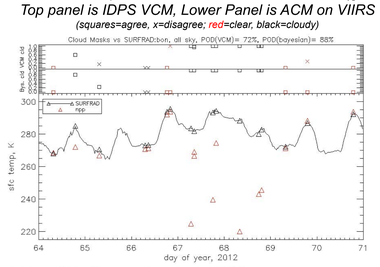
- Some VIIRS bands are significantly different than those on ABI.
- One example is the 3.75 vs 3.9 μm channels.
- The images on the right show the impact on the ACM by adjusting thresholds appropriately.
- This work requires long-periods of VIIRS data over multiple seasons.



Validation of VIIRS Cloud Mask from UW/SSEC DB

- UW/SSEC now provides VIIRS sdr data in real-time from Direct Broadcast (DB) site.
- The SURFRAD sites provide ground-based measurements of radiation.
- One parameter we can derive is skin temperature which can be compared to satellites.
- Clouds should gives values less than seen by SURFRAD.
- We use this to track VCM/ACM performance.

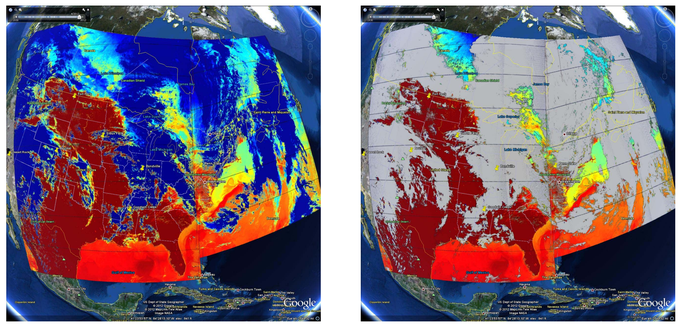
Time series of VIIRS and SURFRAD Skin Temperature
Results show departures occur when cloud detected (good)
Top panel is IDPS VCM, Lower Panel is ACM on VIIRS
(squares=agree, x=disagree; red=clear, black=cloudy)



Skin Temperature from VIIRS w/o any cloud mask

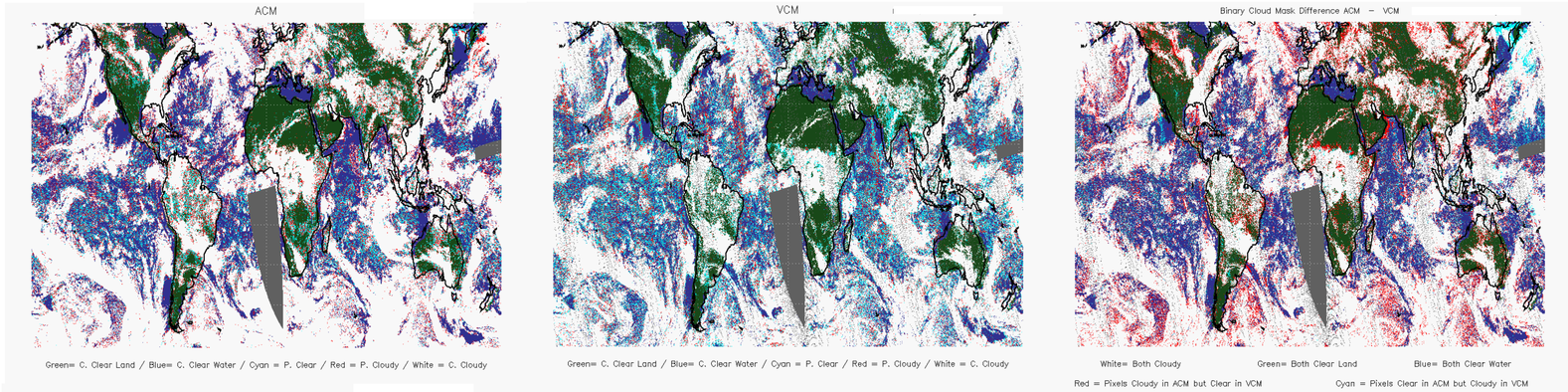
ACM overlaid on Skin Temperature from VIIRS

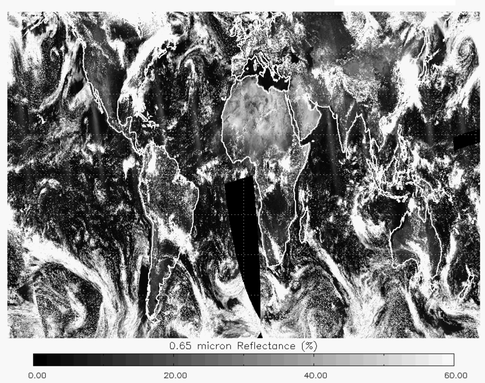
Pins show SURFRAD Sites

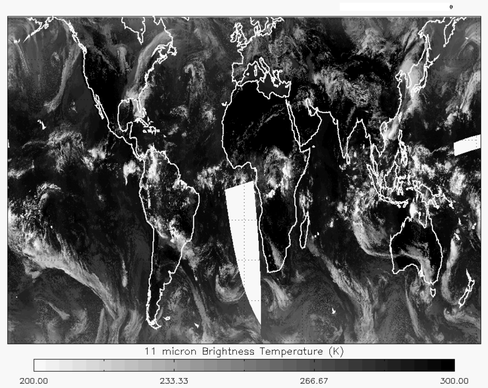


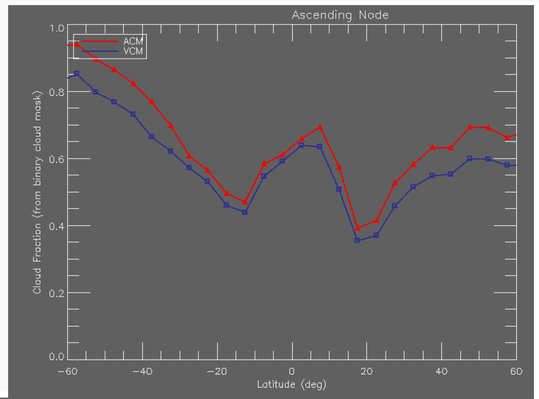
Global Comparison

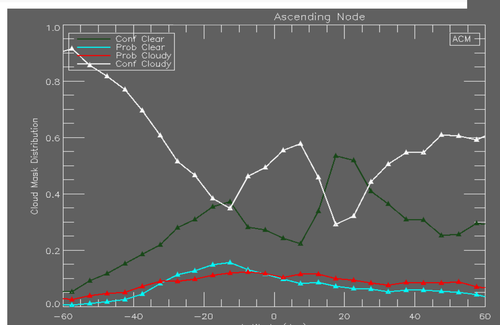
- The data below show a comparison of the ACM and VCM for the ascending node (April 21, 2012). Data provided by UW/SSEC NPP Atmospheric PEATE
- Zonal cloud amount are similar with ACM providing roughly 5% more per zone.
- Overall, VCM has more probably-cloudy (cyan) over most zones. Distributions of clear and cloudy are similar.

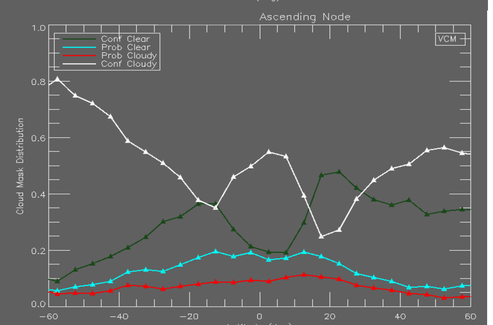












Conclusions

- A preliminary version of the ACM is running on VIIRS and in real-time from UW/SSEC DB data
- VCM tuning on VIIRS will commence soon once a sufficient amount of VIIRS data co-located with CALIPSO is available.
- Initial analysis of the ACM on VIIRS indicates that performance suffers from lack of water vapor bands on ABI. This may warrant inclusion of additional tests.
- JPSS RR proposal to use DNB submitted. I-bands will be explored.
- ACM being prepared for VIIRS as part of JPSS Risk Reduction
- Once VCM achieves provisional status, quantitative comparisons can be done.