# Collection 6 Algorithm Updates

# MODIS Cloud Mask (MOD35) and Cloud Top Pressure (MOD06CT)

Rich Frey
Paul Menzel
Steve Ackerman

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# Cloud Mask Updates

**Status: Aqua delivered**
**Terra provisional pending final L1b calibration**

# Use of NDVI background maps

Global 5 year means of 16-day NDVIs (Moody, et al.)

Define “desert” processing path (NDVI background < 0.3)

Define bands 1, 8 cloud test thresholds as functions of scattering angle and NDVI background; use band 8 (0.413 µm) for NDVI < 0.25

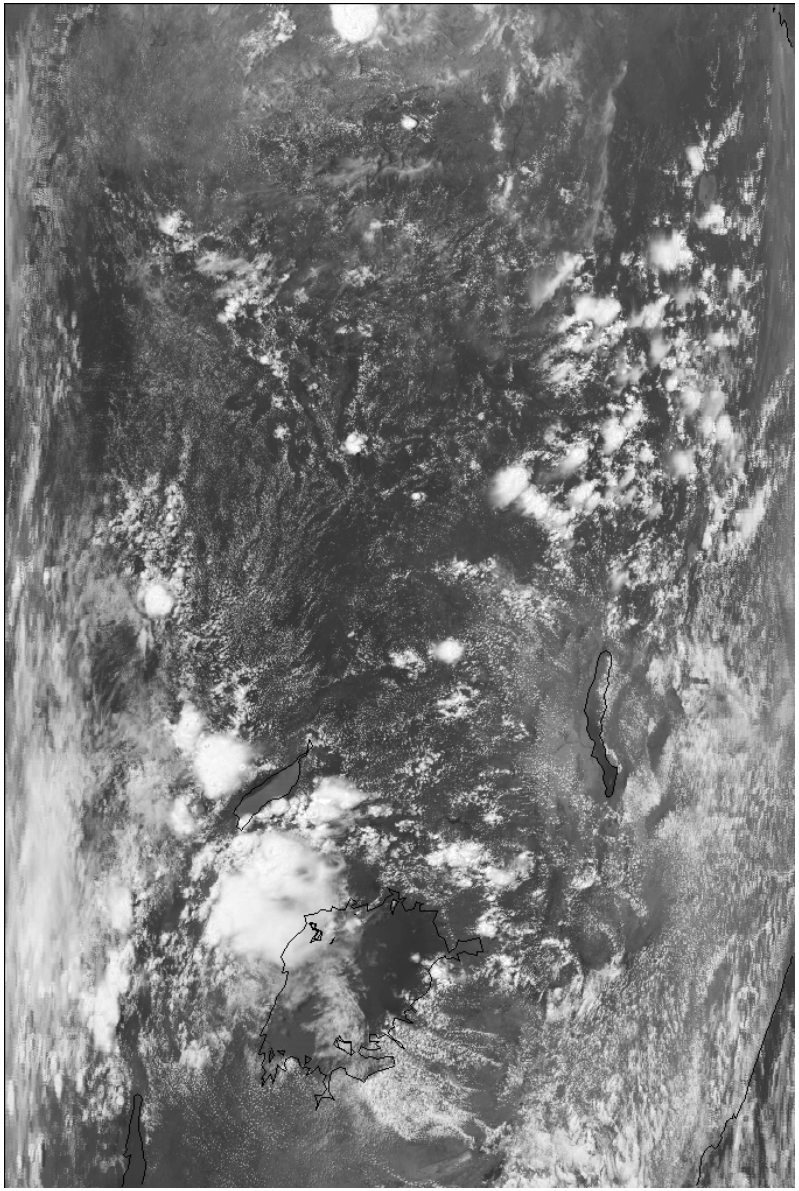
Define GEMI test thresholds as function of NDVI background in three ranges; use GEMI test for desert processing path only

**Impacts:**

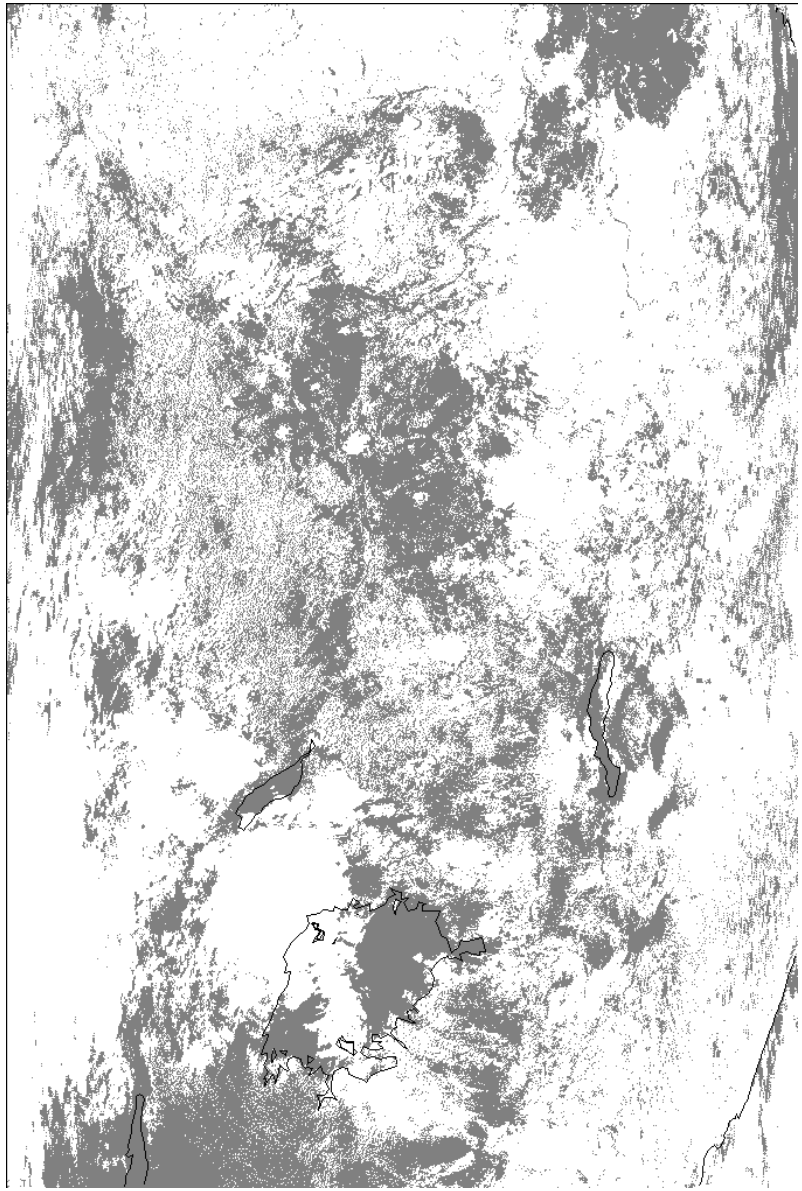
greatly reduces the fraction of pixels processed as “desert”

reduces the frequency of clear-sky restorals (cloudy -> clear); however, this means more “probably clear” results in very arid regions when conditions are actually clear; *users should consider both “confident clear” and “probably clear” to be clear*

decreases numbers of “probably cloudy” and “probably clear” results in vegetated regions under conditions of clear skies;

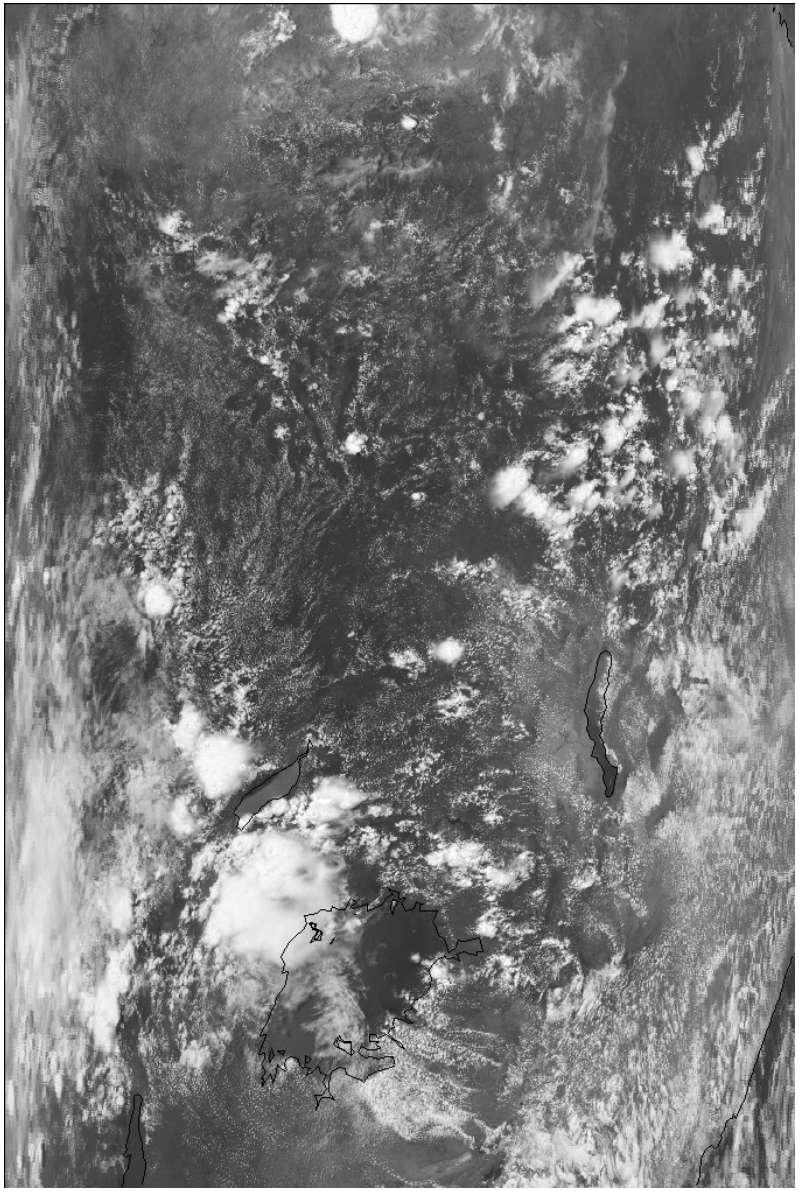


MODIS Band 1

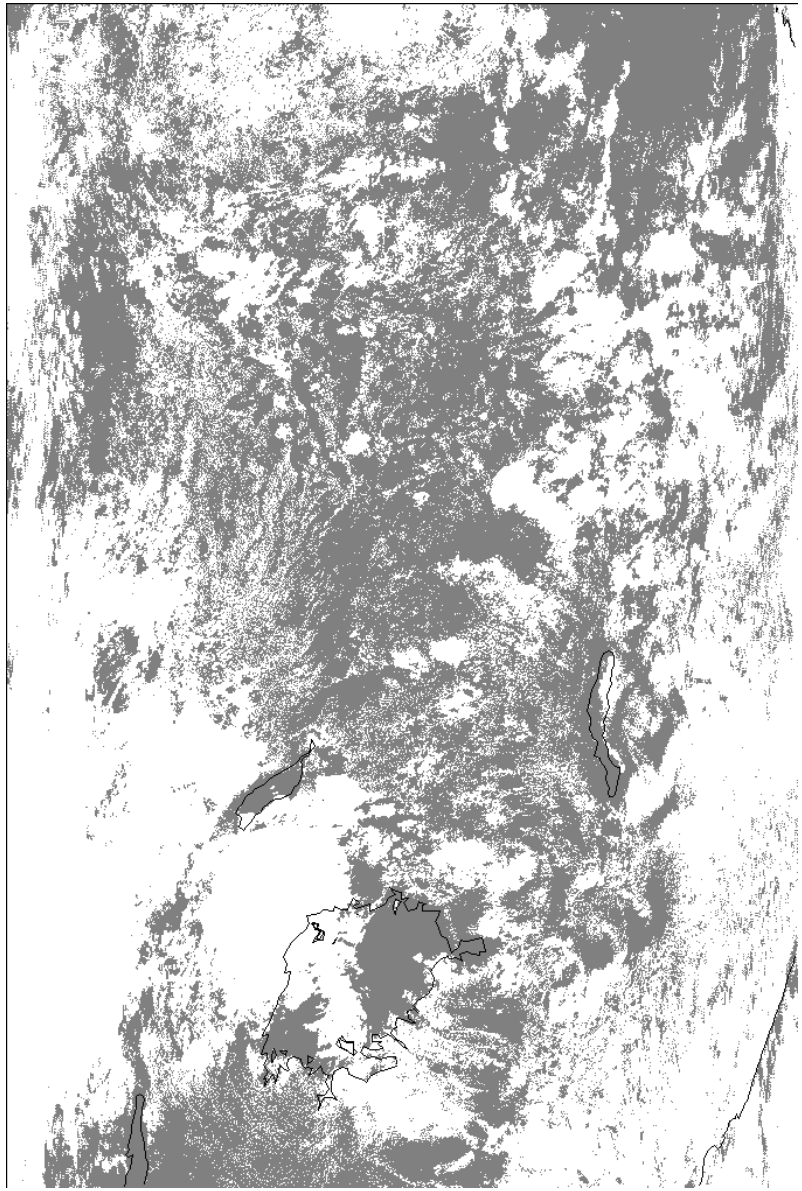


Collection 5 Visible Cloud Test

**Aqua MODIS 2006240 at 11:20 UTC**



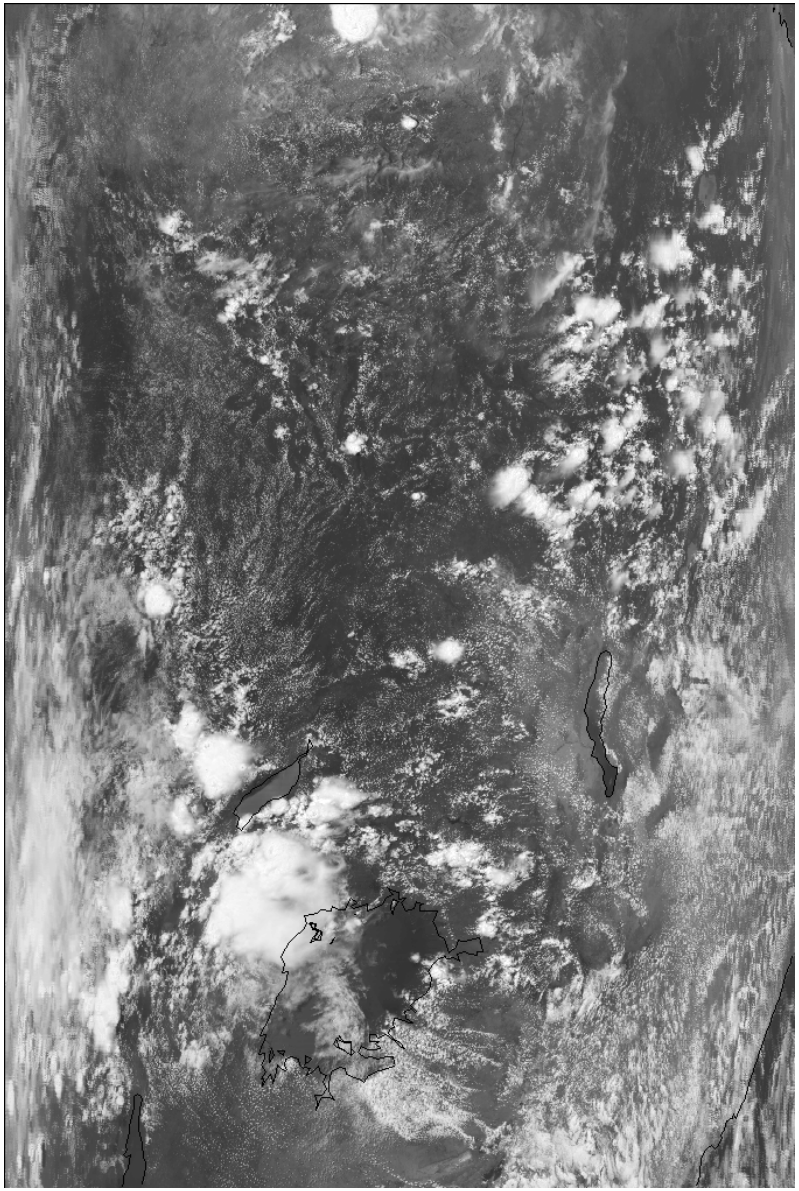
MODIS Band 1



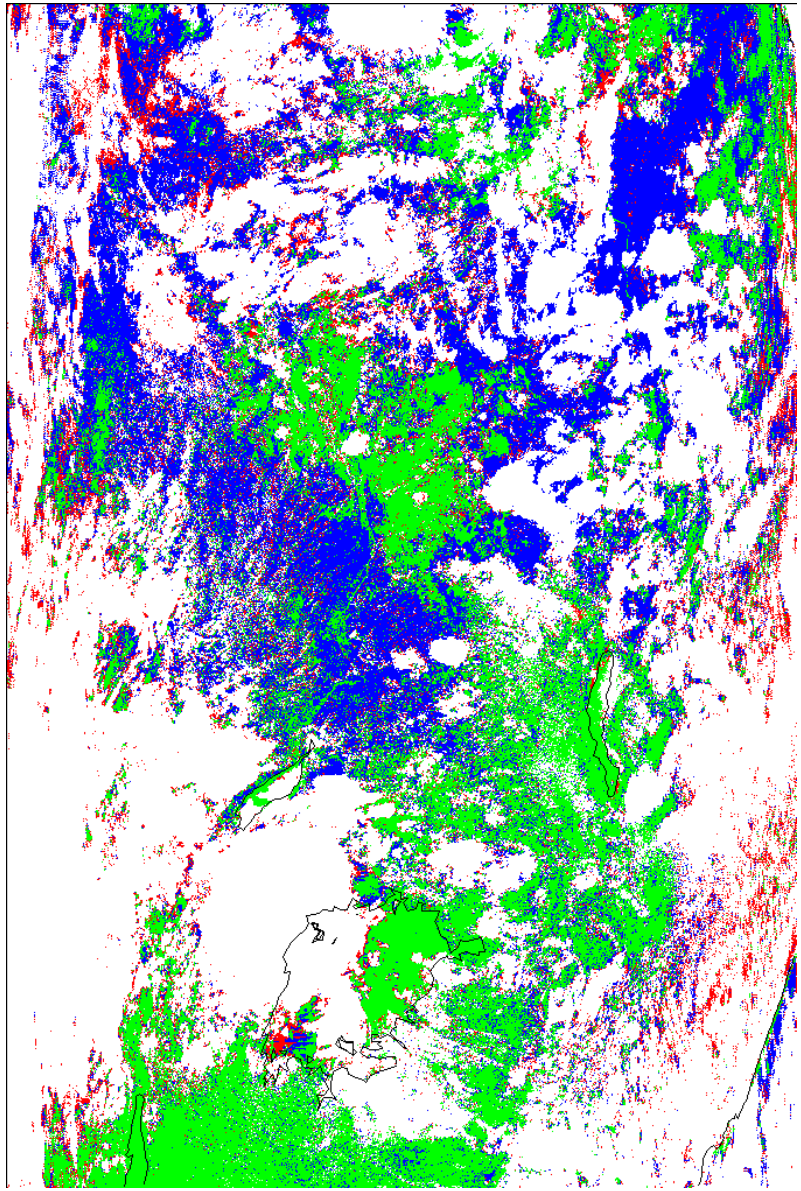
Collection 6 Visible Cloud Test

**Aqua MODIS 2006240 at 11:20 UTC**

G-conf. clear, B-prob. clear, R-prob. cloudy, W-conf.cloudy



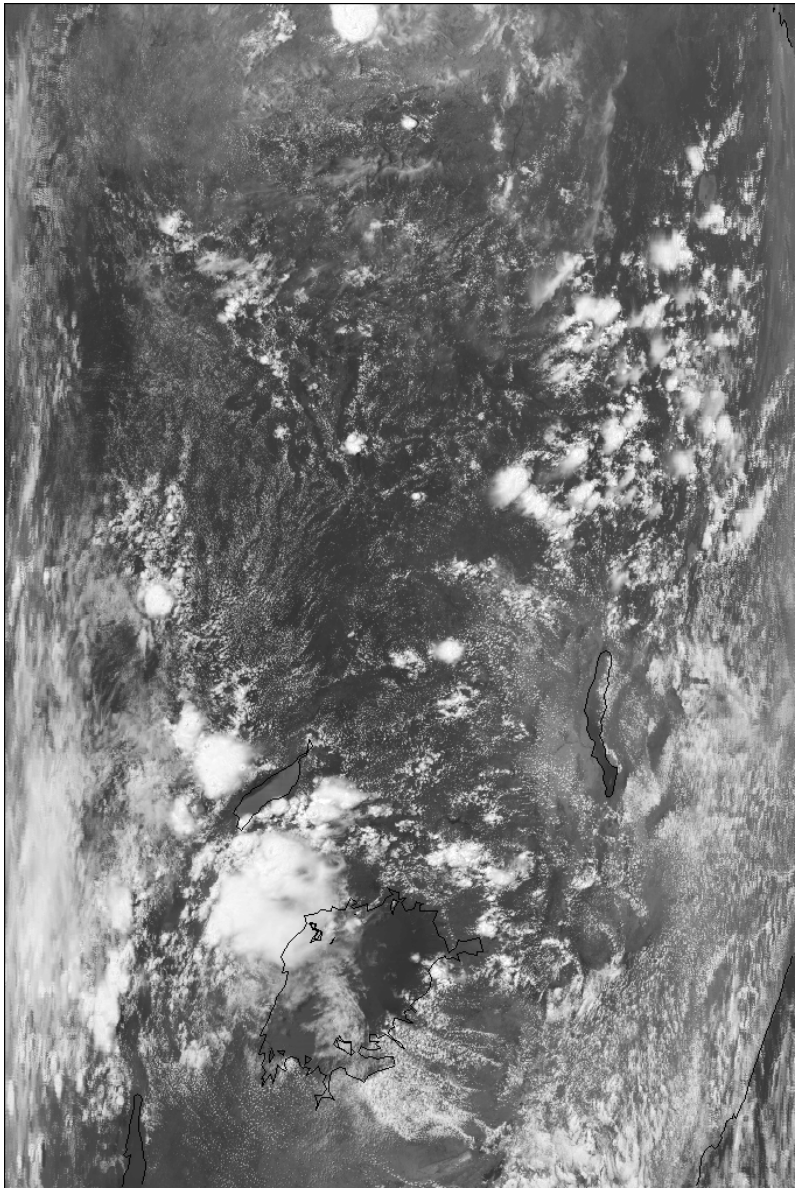
MODIS Band 1



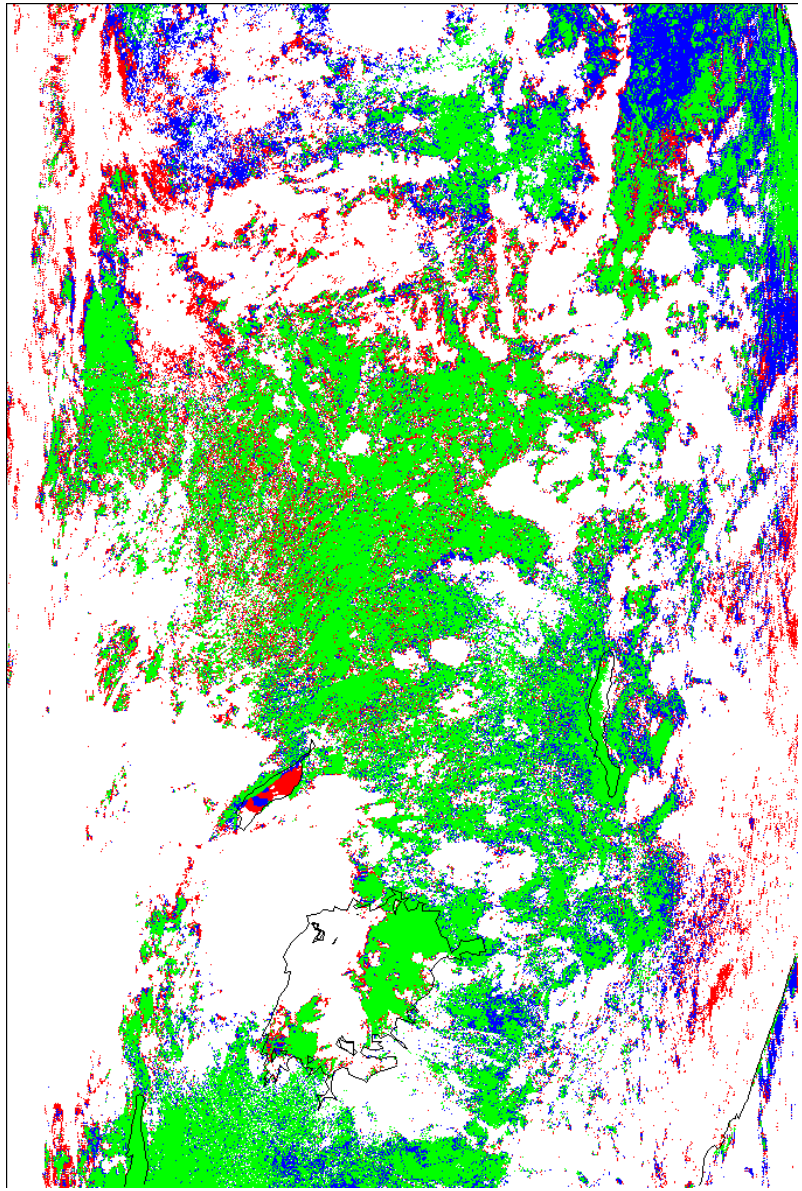
Collection 5 Cloud Mask

**Aqua MODIS 2006240 at 11:20 UTC**

G-conf. clear, B-prob. clear, R-prob. cloudy, W-conf.cloudy



MODIS Band 1



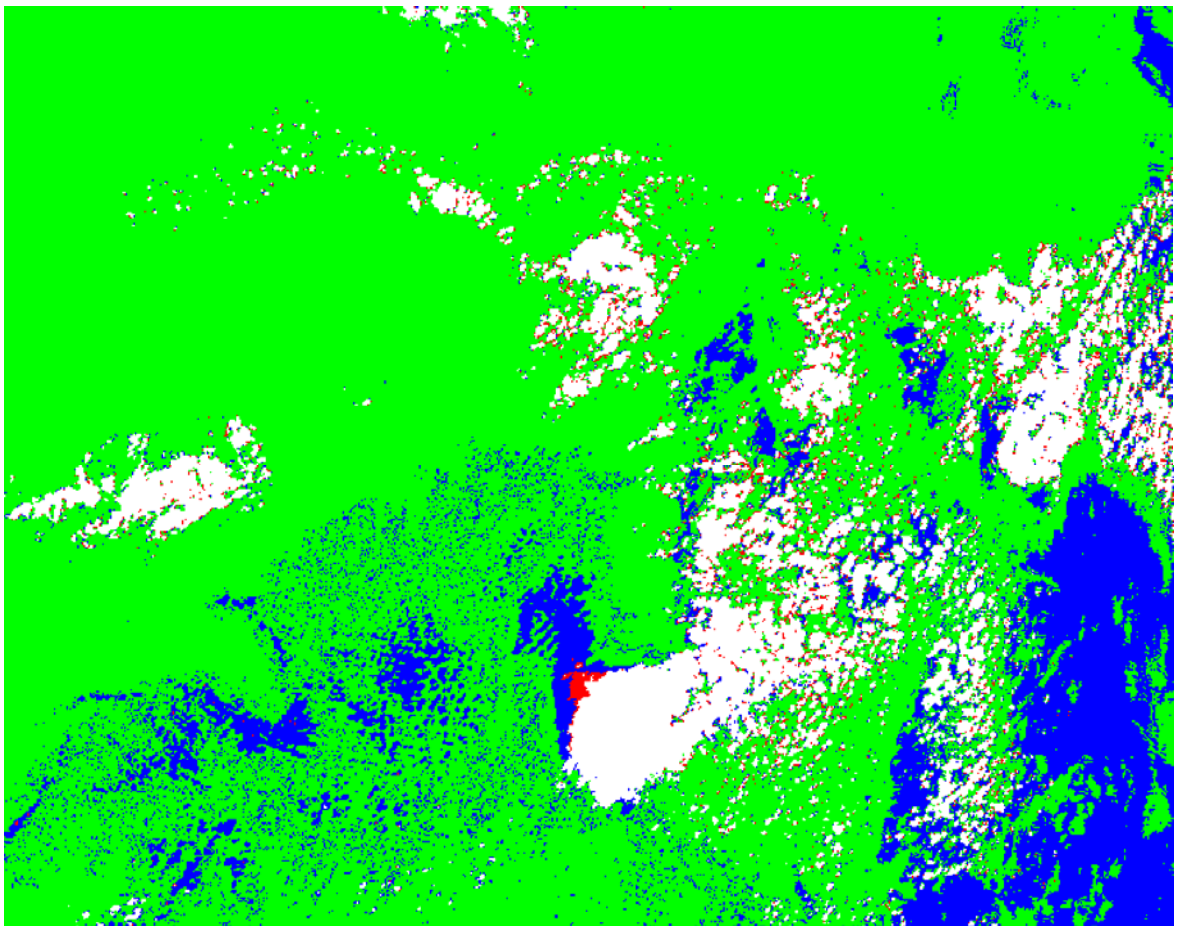
Collection 6 Cloud Mask

**Aqua MODIS 2006240 at 11:20 UTC**

# Added cloud adjacency flag

includes probably cloudy, cloudy, and adjacent pixels

**MODIS Collection 6 Cloud Mask**



**Aqua MODIS 2006240 at 13:05 UTC**

cloud mask bit #12 …
may be used as a “cloudy plus probably cloudy plus adjacent pixel mask”

**MOD35 Collection 6 Cloud Adjacency Flag**

**Aqua MODIS 2006240 at 13:05 UTC**

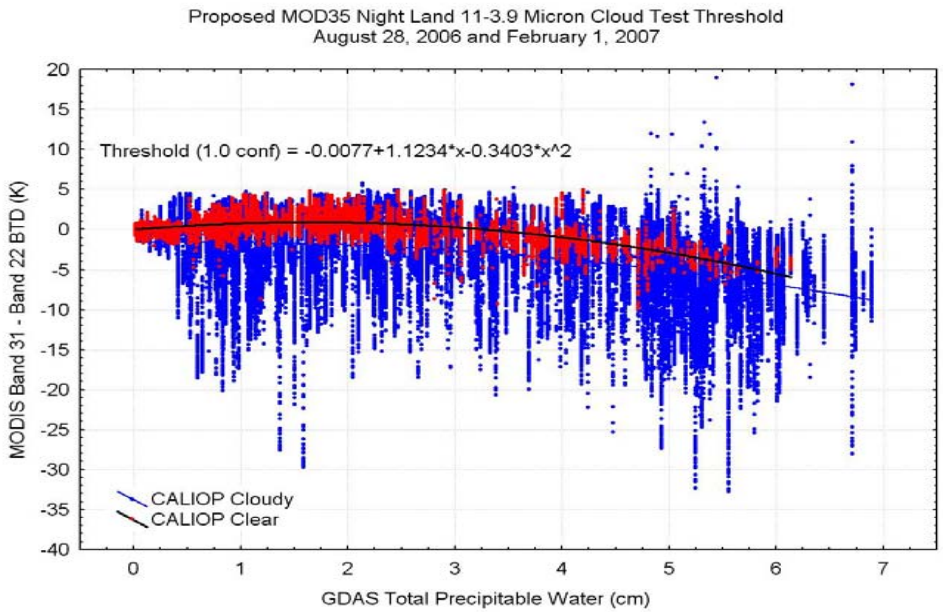
# Made land night 11-3.9 um BTD test thresholds a function of total precipitable water

Thresholds are from regression between MODIS BTDs and GDAS TPW, using CALIOP to define clear pixels

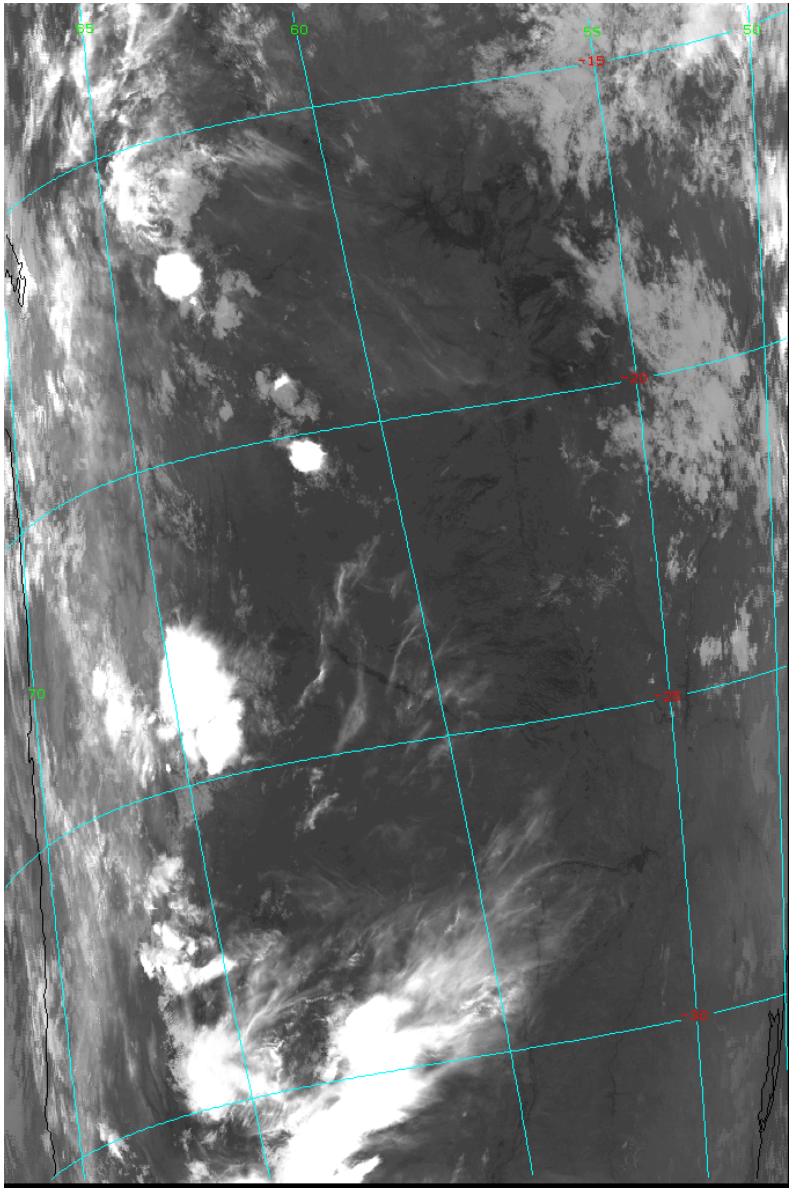
Impacts:

Reduces number of “probably cloudy” results in clear sky conditions especially in humid tropical locations such as the Amazon Basin

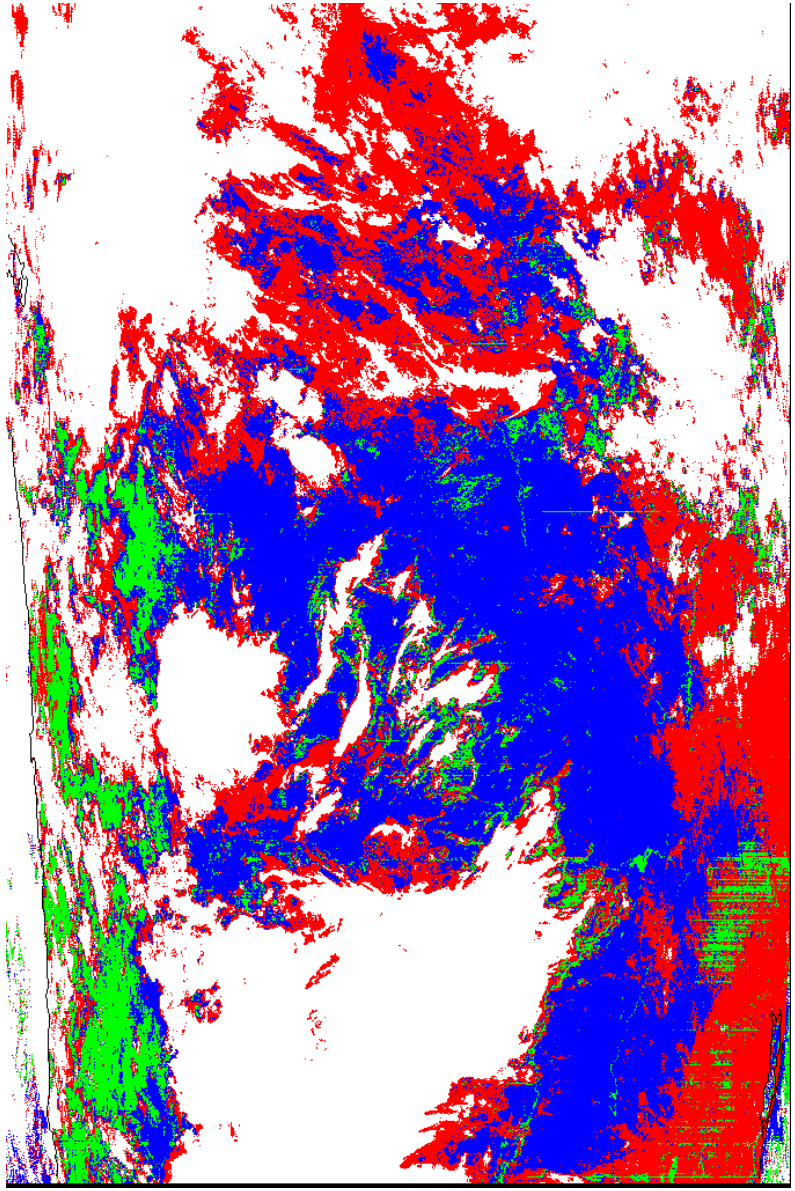
Enhances detection of transmissive cirrus



G-conf. clear, B-prob. clear, R-prob. cloudy, W-conf.cloudy



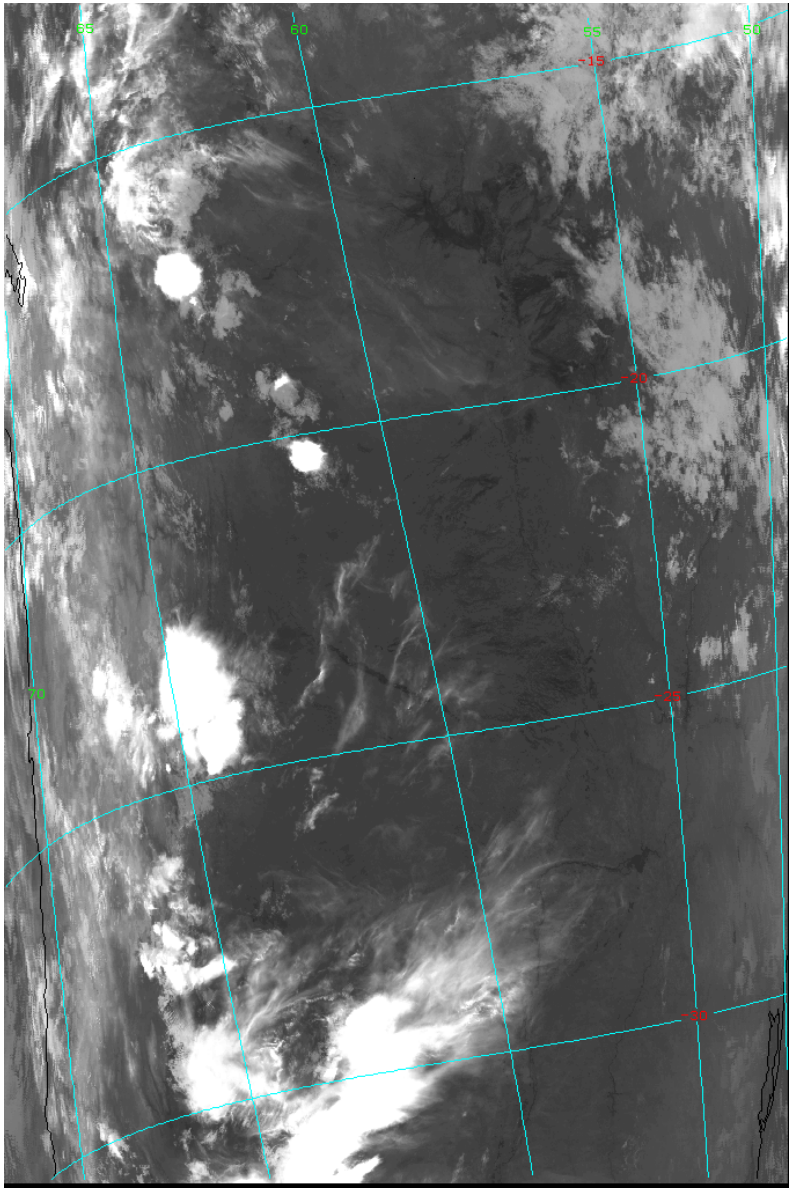
MODIS Band 20



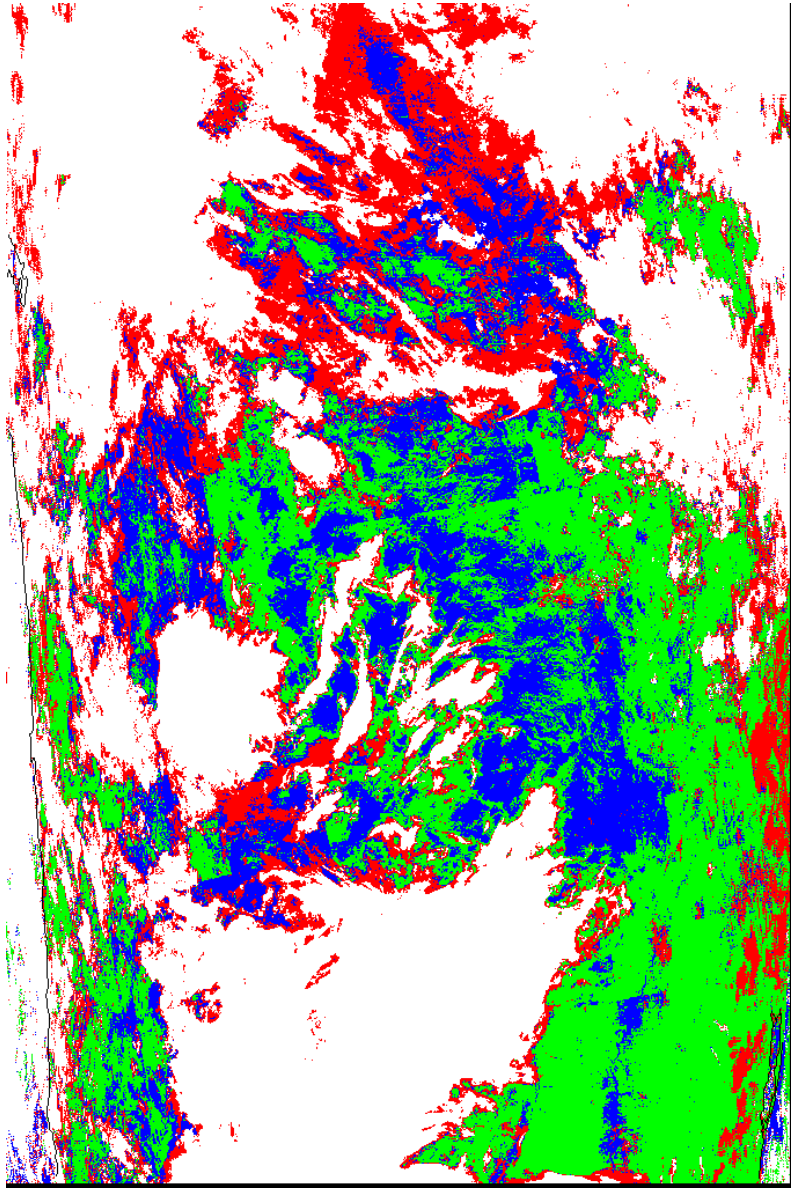
Collection 5 Cloud Mask

**Aqua MODIS 2008049 at 05:20 UTC  Brazil, Argentina**

G-conf. clear, B-prob. clear, R-prob. cloudy, W-conf.cloudy



MODIS Band 20



Collection 6 Cloud Mask

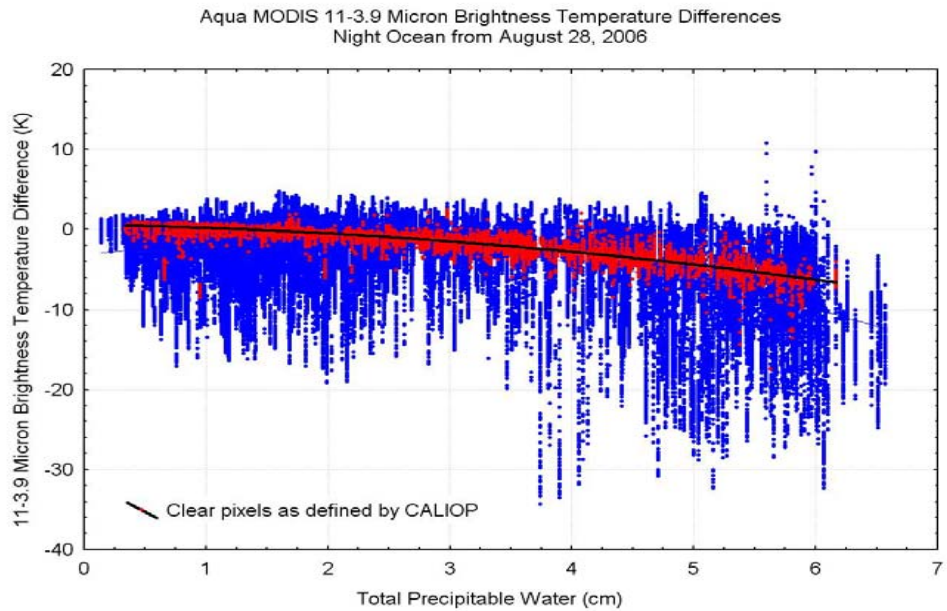
**Aqua MODIS 2008049 at 05:20 UTC**

# Added night ocean 11-3.9 um BTD test

Thresholds are from regression between MODIS BTDs and GDAS TPW, using CALIOP to define clear pixels

Impacts:

More clouds detected with new test as opposed to the old version; enhances detection of transmissive cirrus; kept old test to detect “low-emissivity” marine stratus;

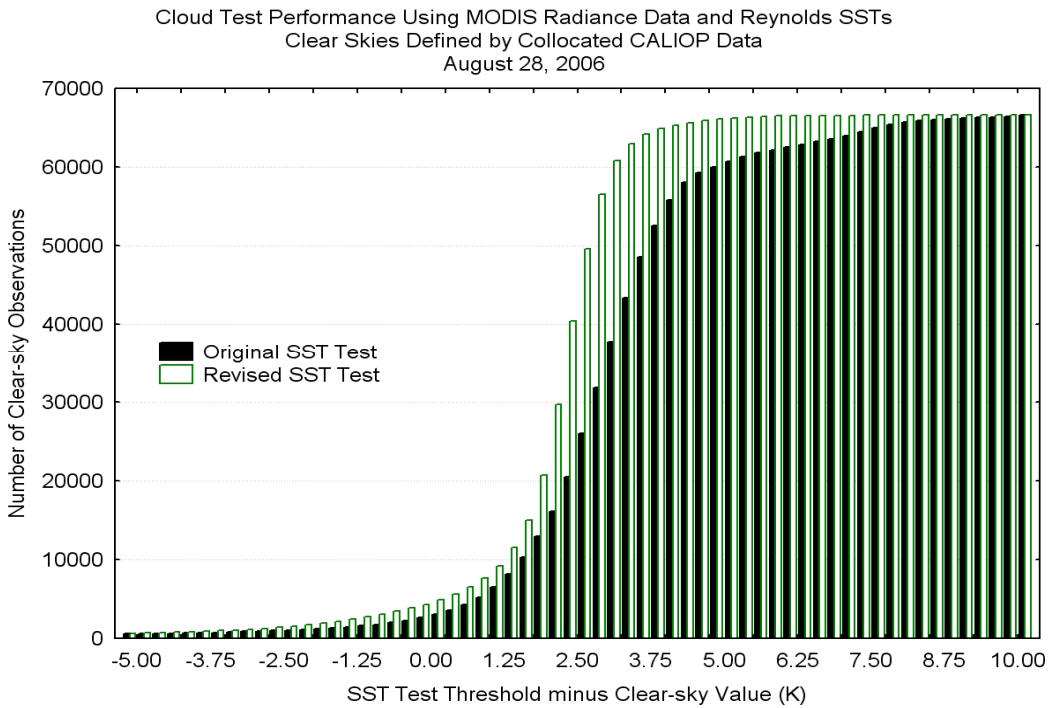


# New surface temperature test for oceans

Calculates bulk SST directly from observations, tests against ancillary data value

Impact:

Better discriminates between clear skies and low clouds in moist, tropical regions such as the tropical western Pacific



## Eliminated tri-spectral test in ocean scenes; replaced with simple 8.6-11 um BTD threshold test

Impact:

Eliminates many “probably cloudy” and “probably clear” results in clear-sky conditions, especially in moist tropical locations

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## Additional tests for non-cloud obstructions

“GOES_R” dust algorithm (day, night, land, water)

Thick smoke/aerosol test for daytime water surfaces

Impact:

More optically thick non-cloud obstructions are detected

## Shadows test (bit 10) has been eliminated; replaced with daytime ancillary snow cover (NISE) flag

Impact:

Intended for users needing an indication of surface snow/ice regardless of cloud coverage. The snow/ice background flag in bit 5 only indicates a processing path through the algorithm and does not indicate snow/ice in the presence of thick clouds.

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## Adjusted Terra polar night 7.2-11 μm and 11-3.9 μm BTD cloud test thresholds

Impact:

The Terra changes were necessary to account for changes in Terra L1b calibrated radiances.