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Space Administration

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California Institute of Technology
Pasadena, California

Quality Flags for Version 4.0

AIRS Science Team Meeting Greenbelt, Maryland

December 1, 2004

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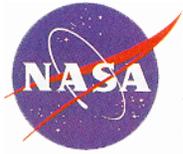
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December, 2004
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Summary

- New set of quality flags for version 4.0
 - Flags for three layers of T(p)
 - Quality Flag for cloud cleared radiances
 - Flag for surface skin temperature and emissivities
 - Flags for H₂O, ozone, CO
 - Flag for cloud and OLR
 - Flags for MW only T(p) (strat and trop) and water (vapor and liquid)
- These flags have three possible values
 - Zero means best quality used in statistics
 - One means good quality used in level 3 processing
 - Only total is good for MW only quality flag for water
 - Surface pressure estimated from topography for P_{surf} Qual Flag
 - Two means poor quality
- The level 3 PGE and statistics package respect these new quality flags
- The RetQAFlag for version 3.6 still exists under slightly different definition
- The retrieval type from version 3.0 still exists



Version V4.0 Status

- All validation data processing is finished/finishing with V4.0.3
 - All focus days including matchup files
 - retrievals on complete set of existing matchup files (some as early as v2.x)
 - May 1- 16, 2004
 - Dec 25, 2002 - Jan 9, 2003 with HSB
- DAAC Delivery is scheduled later in December
- Additional Items before V4.0 delivery
 - Cij update
 - Validation bit for RetQAFlag
 - Cloud clearing parameter (η) fix
 - AMSU calibration update concerning noisy PRT's (?)
 - Precipitation estimate from Suskind (?)



New Quality Flags for Version 4.0 (1)

Qual_Guess_PSurf	<p>Quality flag for surface surface pressure guess input. The possible values are 0 (good surface pressure guess from valid forecast), 1 (surface pressure guess estimated from topography), and 2 (do not use).</p> <p>Practically always 0. 1 only if retrieval was run without NCEP forecast.</p>
Qual_Cloud_OLR	<p>Overall quality flag for cloud parameters and clear and cloudy OLR</p> <p>Mostly 0 when retrieval type equals 0. Cld/OLR retrieval is attempted even when MW algorithm is rejected, in which case Qual_Cloud_OLR is set to 1. It is rarely 2.</p>
Qual_MW_Only_Temp_Strat	<p>Overall quality flag for MW-Only temperature fields for altitudes above 201 mbar</p> <p>0 about 95% of all retrievals</p>
Qual_MW_Only_Temp_Tropo	<p>Overall quality flag for MW-Only temperature fields for altitudes at and below 201 mbar, including surface temperature.</p> <p>0 about 94% of all retrievals</p>
Qual_MW_Only_H2O	<p>Overall quality flag for MW-Only water (both vapor and liquid) fields. The possible values this flag are 0(H2O retrieval fully valid, 86% with HSB), 1(only total precipitable water vapor is valid, 0% with HSB), 2(H2O invalid, 14%with HSB)</p>

- **Without HSB Qual_MW_Only_H2O can be 1(mostly over water) or 2**



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New Quality Flags for Version 4.0 (2)

Qual_H2O	Overall quality flag for water vapor fields Zero 87% over water, 83% over land, never 1
Qual_CO	Quality flag for CO
Qual_Ozone	Quality flag for ozone Zero 87% over water, 83% over land, never 1
Qual_Temp_Profile_Top	Quality flag for temperature profile at and above Press_mid_top_bndry mbar (currently 200 mb) Zero 88% over water, 86% over land, never 1
Qual_Temp_Profile_Mid	Quality flag for temperature profile between Press_mid_top_bndry mbar and Press_bot_mid_bndry mbar (currently 3 km above surface) Zero 58% over water, 68% over land, never 1
Qual_Temp_Profile_Bot	Quality flag for temperature profile below Press_bot_mid_bndry mbar, including surface air temperature Zero 45%, one 13% over water Zero 20%, one 47% over land
Qual_Surf	Overall quality flag for surface fields including surface temperature, emissivity, and reflectivity 0 or 1 about 20% of all retrievals over water. 1 about 67% over land

- Possible values: 0 (Highest quality), 1(good quality, use in level 3, but not in statistics), 2(poor quality)



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RetQAFlag for Version 4

Bit 15	Spare, set to zero
Bit 14	Ozone retrieval rejected(Qual_Ozone>0)
Bit 13	Water Vapor retrieval rejected (Qual_H2O>0)
Bit 12	Top part of temperature profile quality check failed or not attempted. (Qual_Temp_Profile_Top >0)
Bit 11	Middle part of temperature profile quality check failed or not attempted. (Qual_Temp_Profile_Mid >0)
Bit 10	Bottom part of temperature profile quality check failed or not attempted. (Qual_Temp_Profile_Bot >0)
Bit 9	Surface retrieval is suspect or rejected. (Qual_Surf >0)
Bit 8	This type of retrieval not yet validated.
Bit 6,7	Spare, set to zero
Bit 5	Cloud and OLR rejected or not attempted
Bit 4	Final retrieval rejected or not attempted
Bit 3	Final cloud clearing rejected or not attempted
Bit 2	Initial regression rejected or not attempted
Bit 1	Initial Cloud Clearing rejected or not attempted
Bit 0	MW retrieval rejected or not attempted

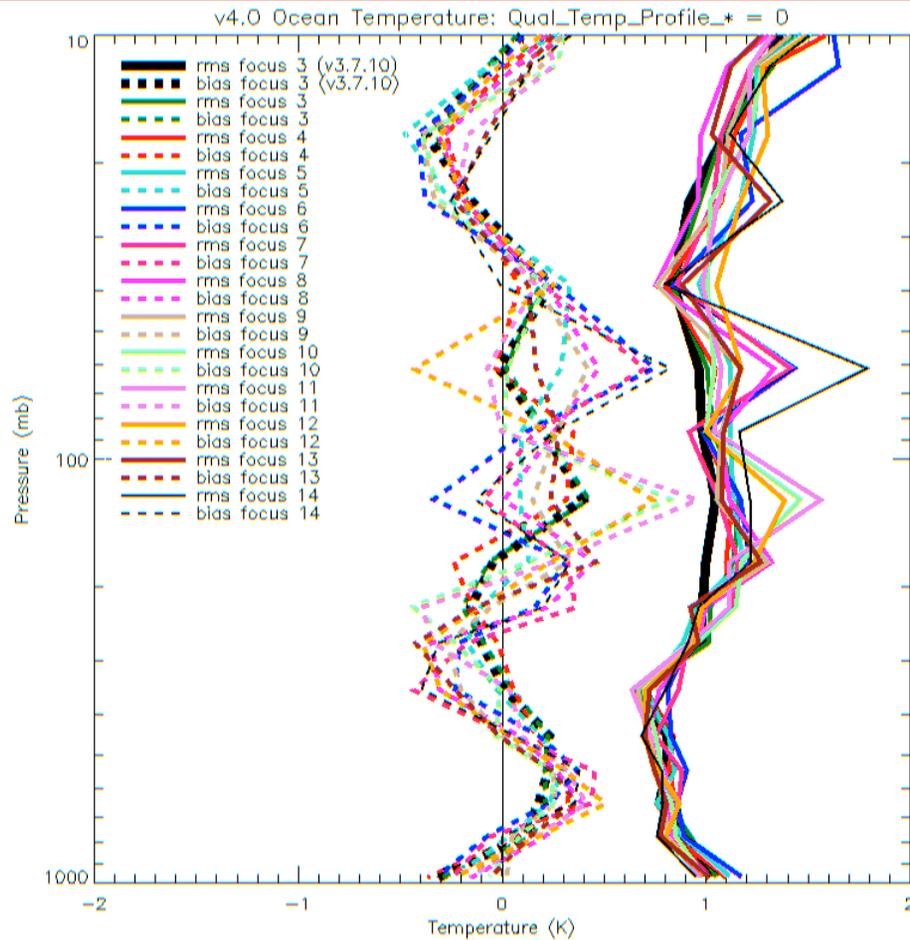


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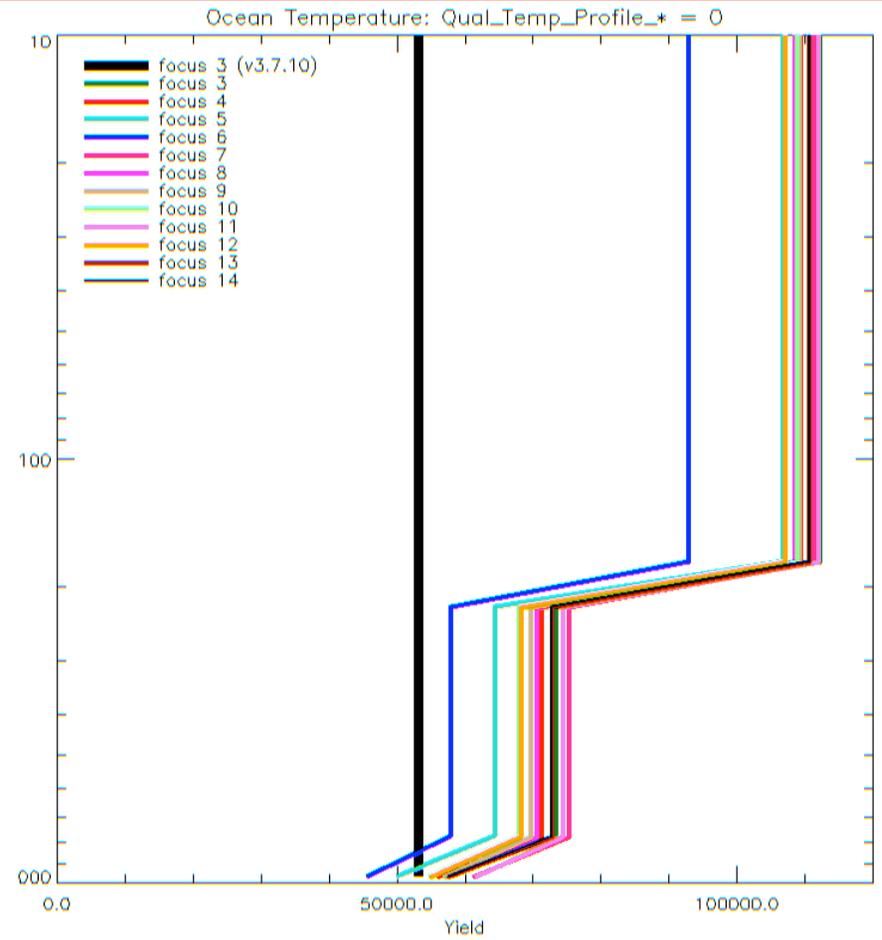
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Temperature Statistics and Yields

V4.0 on all focus days and V3.7 on Focus3



Temperature Bias and RMS wrt ECMWF



Number of Accepted Retrievals

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• Focus6(Jan 3 2003) is not full

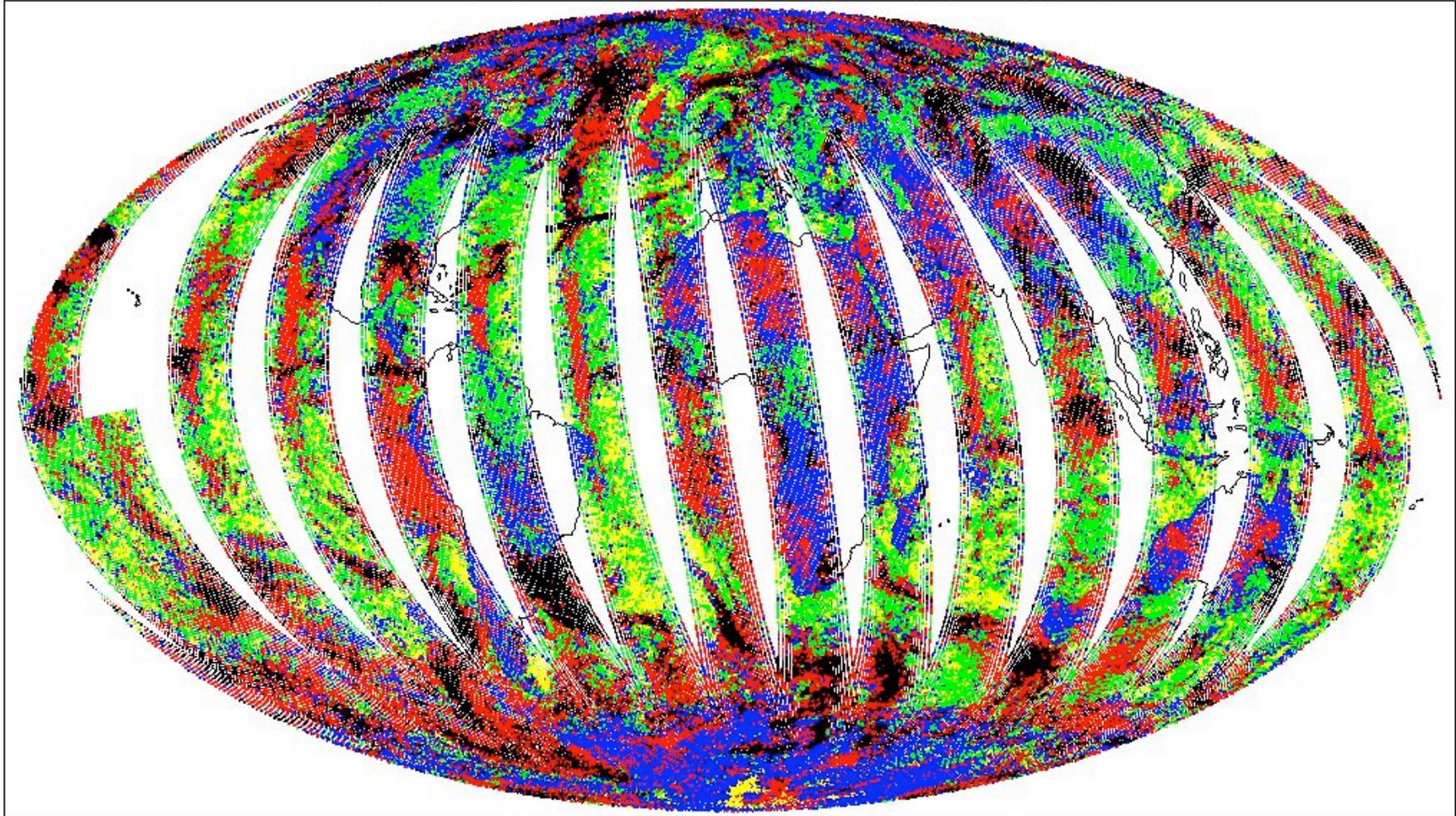


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Map of Temperature Quality Flags Ascending Orbits, Sept 6, 2002

Map of Quality Flags: Yellow{Surf}, Green{Bot}, Blue{Mid}, Red{Top}, Black{RType>0}



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• Only zero value is checked

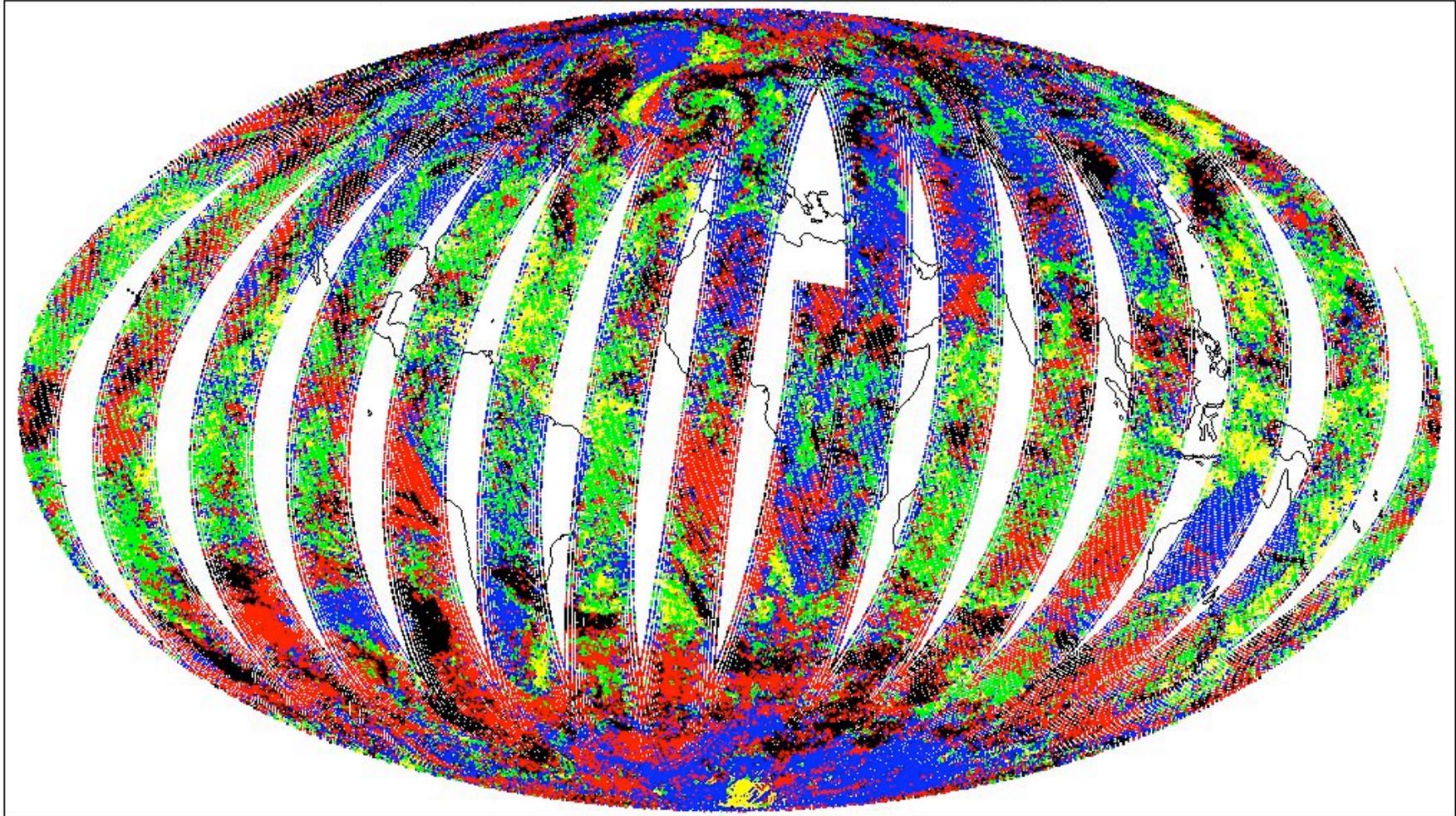


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Map of Temperature Quality Flags Descending Orbits, Sept 6, 2002

Map of Quality Flags: Yellow{Surf}, Green{Bot}, Blue{Mid}, Red{Top}, Black{RType>0}



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• Only zero value is checked

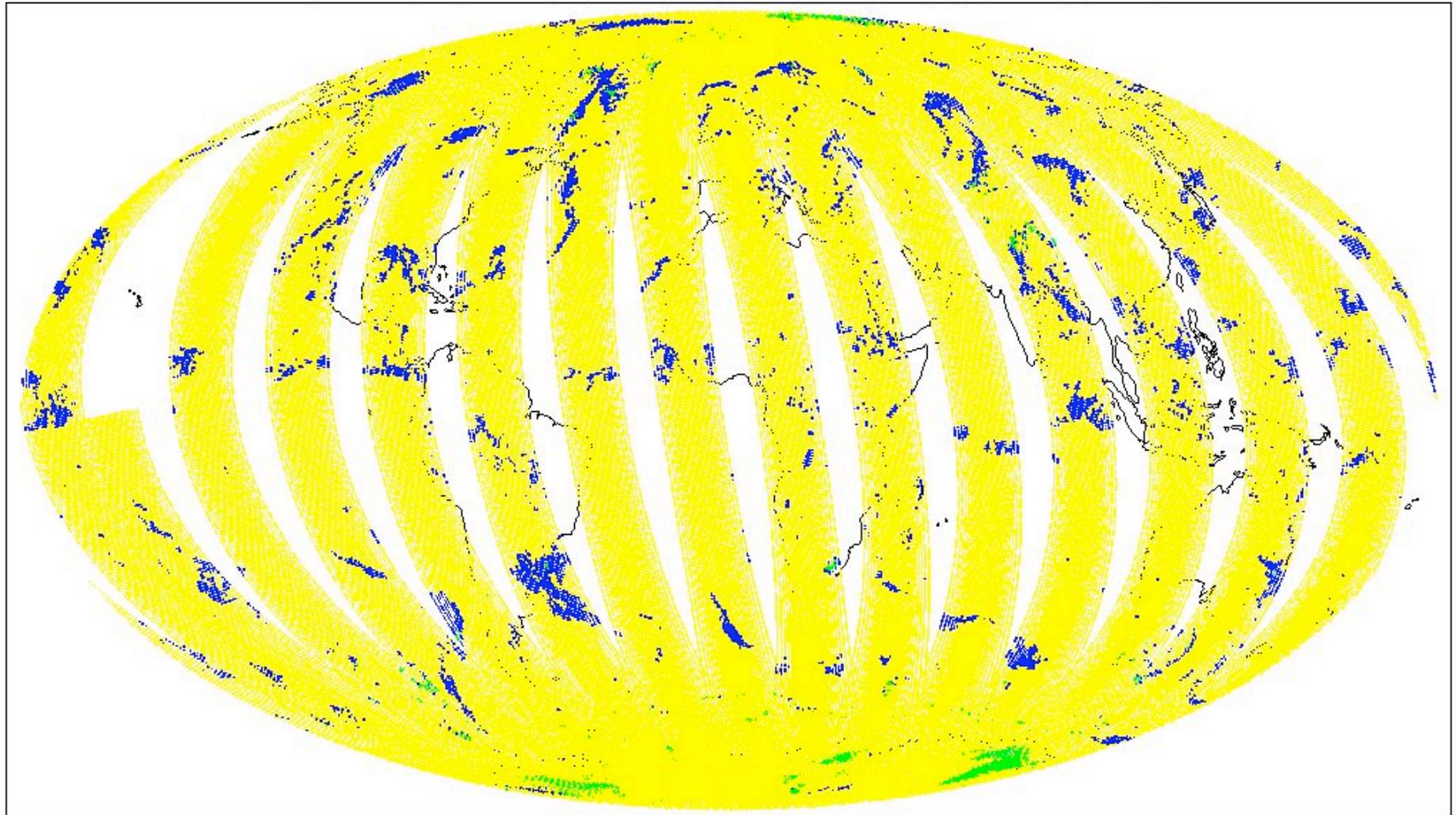


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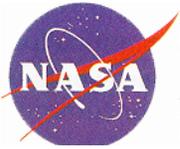
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MW Only Quality Flags with HSB

Map of Quality Flags: Yellow(MWQ), Green(MWTrop), Blue(MWStrat), Red(RType), Black(Cld/OLR>0)



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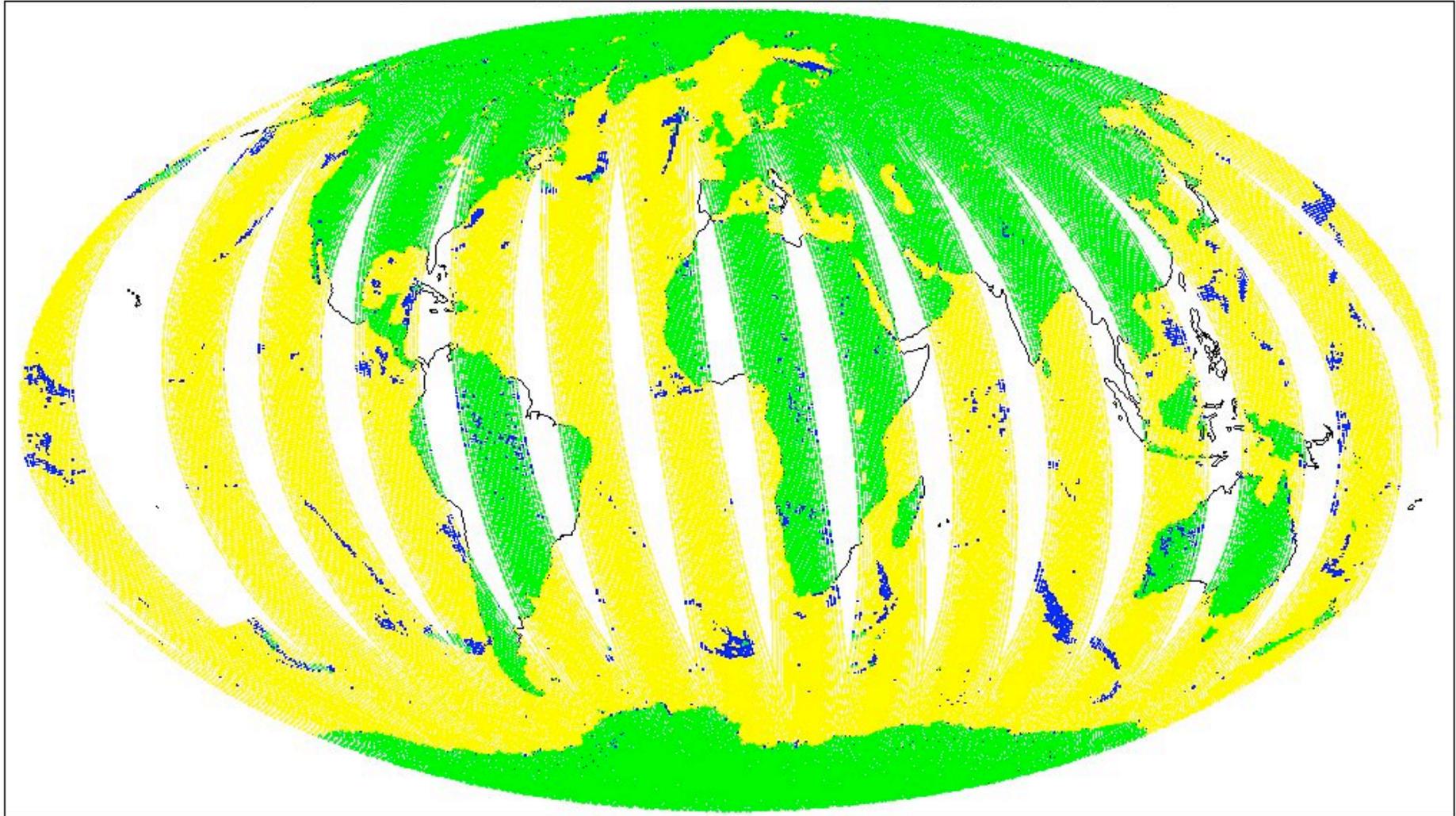


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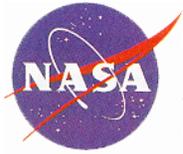
MW Only Quality Flags without HSB

Map of Quality Flags: Yellow(All), Green(MMWQWTrop), Blue(MWStrat), Black(Cld/OLR>0)



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• MW only total precipitable water vapor is valid only over ocean without HSB¹¹



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Summary

- One needs to understand and use the flags correctly
- Casual users can use RetQAFlag for quality control
- Retrieval Type should not be used as overall quality indicator in version 4.