

# McIDAS-X Software Development and Demonstration

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9 September 2013

# Overview

- McIDAS-X 2012.1 through 2013.1
- McIDAS-XCD 2012.1
- Software development and plans for version 2013.2 and beyond...

# McIDAS-X 2012 & 2013

## Imagery

- Tracking real-time satellite data
- Access pre-KLM AVHRR Level 1b files
- NAV=LALO for AVHRR Level 1b files
- Level 1b server updated for Metop-B
- MODIS with bow tie correction
- Updates for COMS data
- MSG compressed files

# McIDAS-X 2012 & 2013

## Imagery

- Meteosat 10 & 11 updates
- Calibration coefficients for FY2D & FY2E
- GEO and LEO updates
- GINI server updated for new products
- Core files include Megha-Tropiques info

# McIDAS-X 2012 & 2013

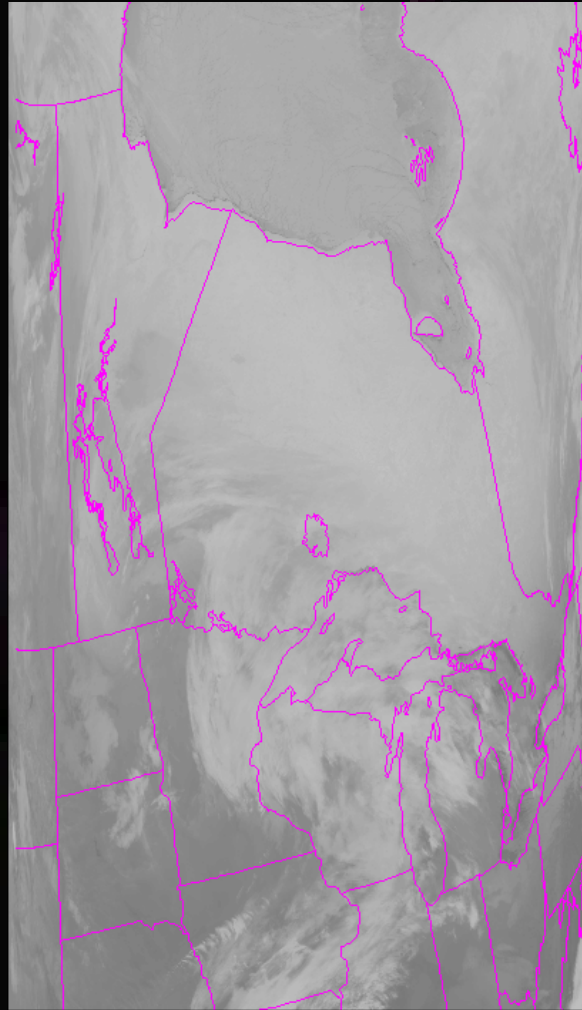
## Miscellaneous

- ADDE with ssh tunneling
- Updated map files
- GUI fixes
- WXTLIST EXCLUDE=
- ADVDISP (-XRD)
- STNDB.CORE – station database additions
- Memory leak fixed on Linux: mcimage

# Tracking

- User configurable for GVAR and MTSAT
  - Only from SDI-104 ingestor or when reading raw files locally
  - TRACKING= YES/NO; default is set by server administrator with MCTRACK environment variable
  - Initially done for McIDAS-V

# Pre-KLM AVHRR Level 1b



NOAA-11  
3 January 1989

23

NOAA-11 11.0 UM 3 JAN 89 08:10:07 UTC

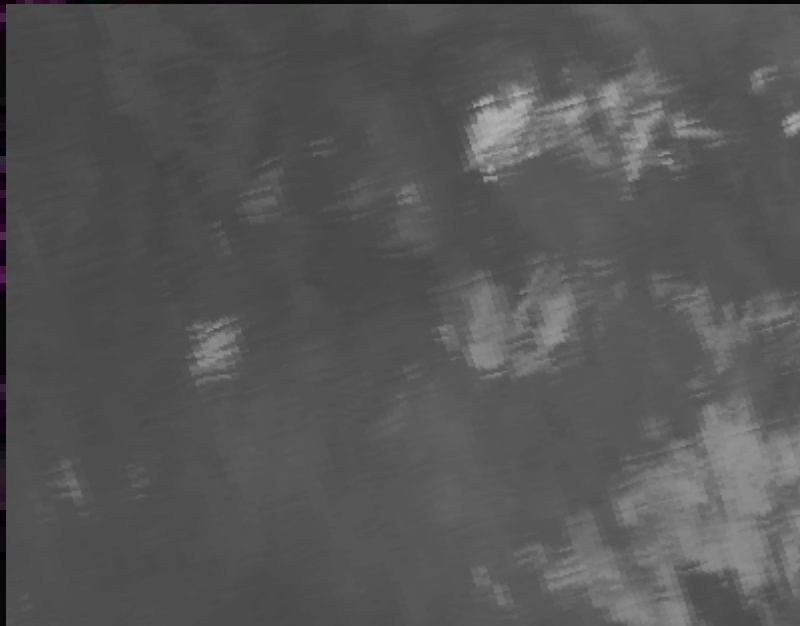
# NAV=LALO for Level 1b files

- NAV=LALO keyword is valid in IMG\* commands to access the lat/lon navigation of AVHRR Level 1b files
  - Previously, this was only possible with a server setting (INFO=LALO)

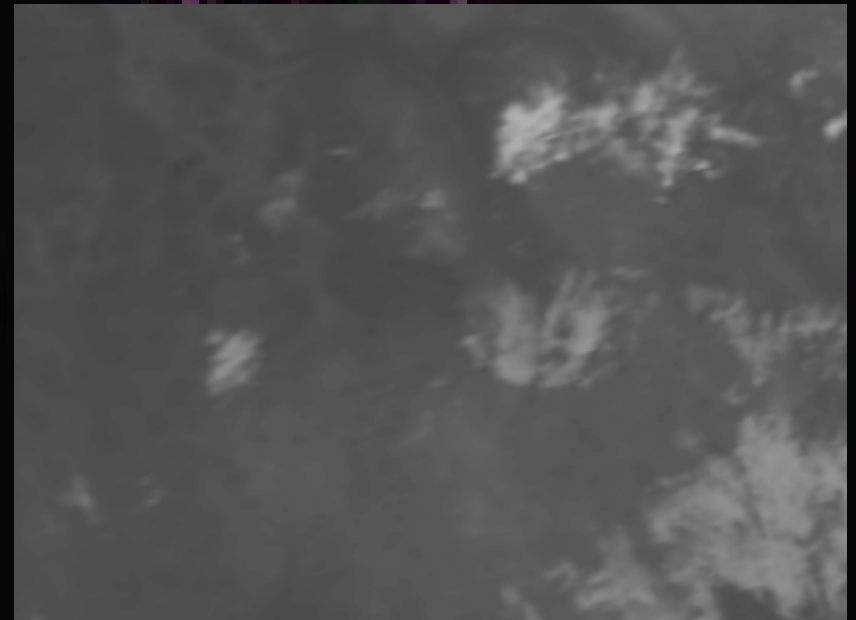


# Bow Tie Correction

(correction for MODIS scanning using MRTSwath)



IMGREMAP



Bow tie corrected



# MSG compressed files

```
H-000-MSG2__-MSG2_____ -IR_087___-000006___-201202012345-C_
H-000-MSG2__-MSG2_____ -IR_087___-000006___-201202020000-C_
H-000-MSG2__-MSG2_____ -IR_087___-000006___-201202020015-C_
H-000-MSG2__-MSG2_____ -IR_087___-000006___-201202291216-C_
```

```
MSGCOMP/FD          IMAGE MSGT
                    DIRFILE=/Users/mcuser/mcidas/data/compressed_msgt/H-
                    000-MSG*EPI*
MSGCOMP/HRV        IMAGE MSGT
                    DIRFILE=/Users/mcuser/mcidas/data/compressed_msgt/H-
                    000-MSG*PRO*
```

## IMGLIST MSGCOMP/FD.1 FORM=BAND

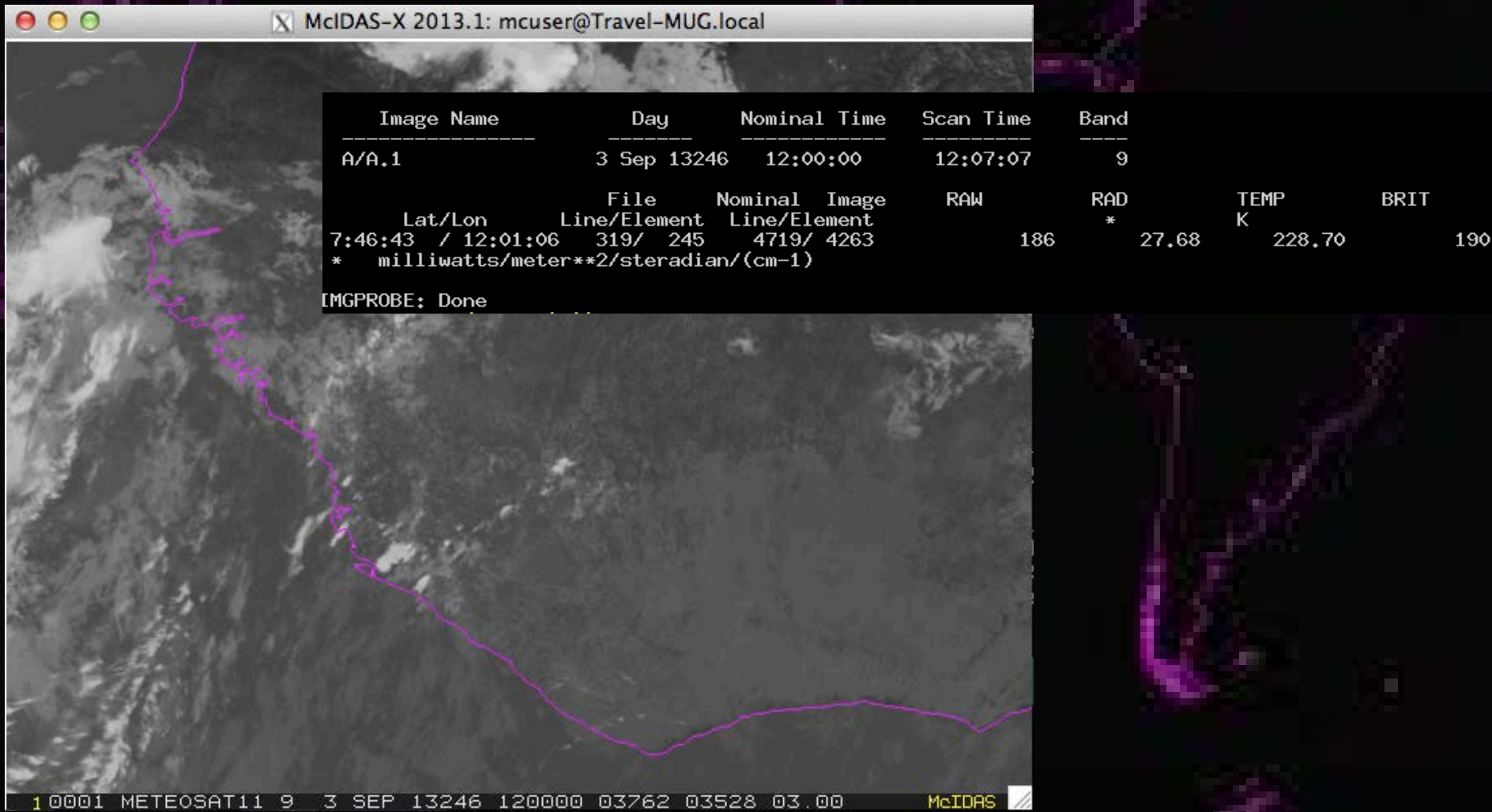
Image file directory listing for:MSGCOMP/FD

Pos	Satellite/ sensor	Date	Time	Center Lat Lon	Res (km) Lat Lon	Image_Size
1	METEOSAT9	17 JAN 12017	17:45:00	0 0		
Band: 1	0.6 um	VIS Cloud and Surface Features		3.02	3.00	3712 x 3712
Band: 2	0.8 um	VIS Aerosols over Water, Veg		3.02	3.00	3712 x 3712
Band: 3	1.6 um	Near IR - Surface, cloud phase		3.02	3.00	3712 x 3712
Band: 4	3.9 um	IR Low Cloud/Fog,Fire Detection		3.02	3.00	3712 x 3712
Band: 5	6.2 um	IR Upper-level Water Vapor		3.02	3.00	3712 x 3712
Band: 6	7.3 um	IR Mid-level Water Vapor		3.02	3.00	3712 x 3712
Band: 7	8.7 um	IR Total Water,Cloud Phase,Dust		3.02	3.00	3712 x 3712
Band: 8	9.7 um	Ozone		3.02	3.00	3712 x 3712
Band: 9	10.8 um	IR Surface/Cloud-top Temp		3.02	3.00	3712 x 3712
Band: 10	12.0 um	IR SFC/Cloud Temp, Low-level WV		3.02	3.00	3712 x 3712
Band: 11	13.4 um	IR CO2, Cloud Heights		3.02	3.00	3712 x 3712

IMGLIST: done

# Meteosat 10 & 11

Updated VIS and IR coefficients for Meteosat 10 and 11



# FY2D & FY2E calibration

Calibration coefficients were added for calculating radiance values based on temperature

McIDAS-X 2013.1: mcuser@Travel-MUG.local

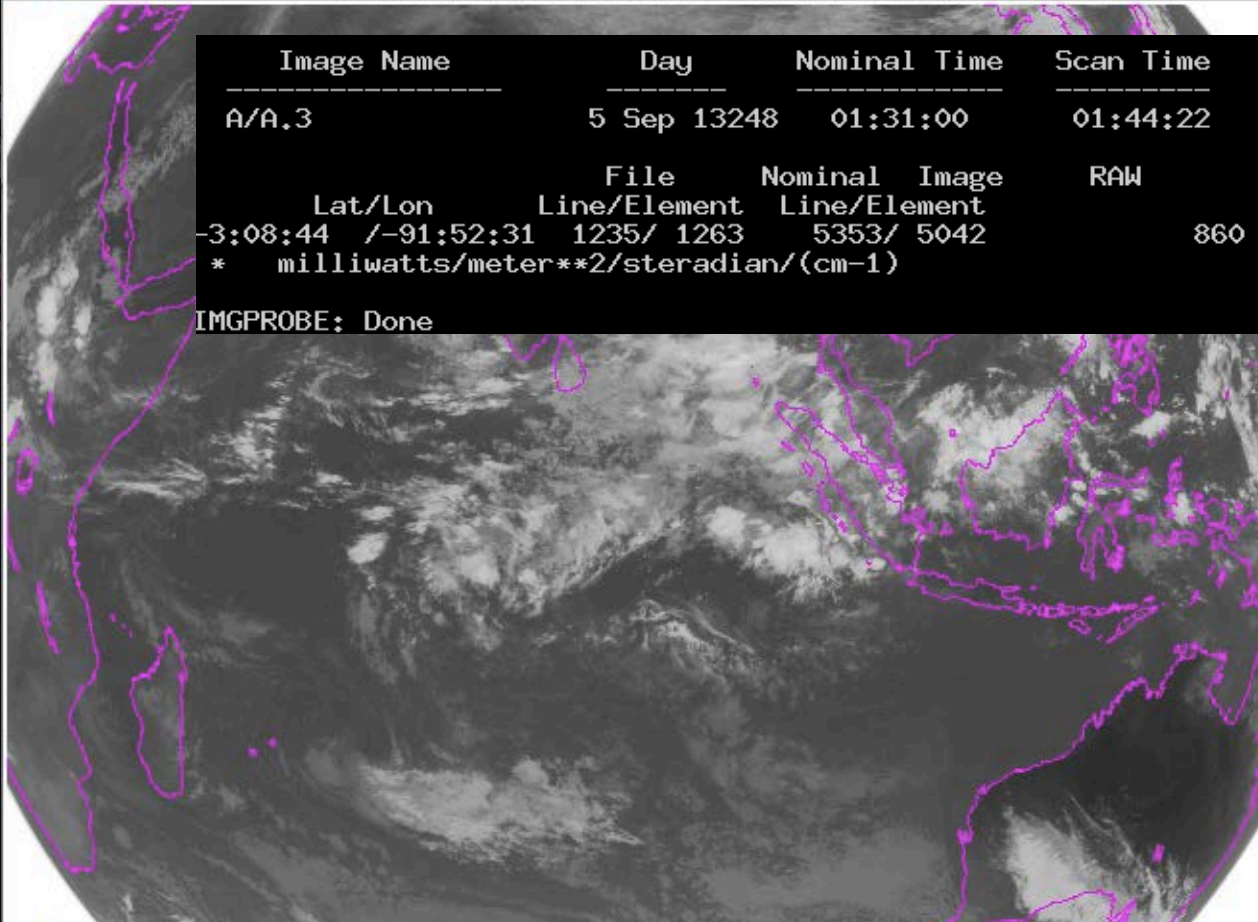
Image Name	Day	Nominal Time	Scan Time	Band
A/A.3	5 Sep 13248	01:31:00	01:44:22	2

Lat/Lon	File	Nominal Image	RAW	RAD	TEMP	BRIT
-3:08:44 / -91:52:31	Line/Element	Line/Element		*	K	
	1235/ 1263	5353/ 5042	860	26.760	226.68	192

\* milliwatts/meter\*\*2/steradian/(cm-1)

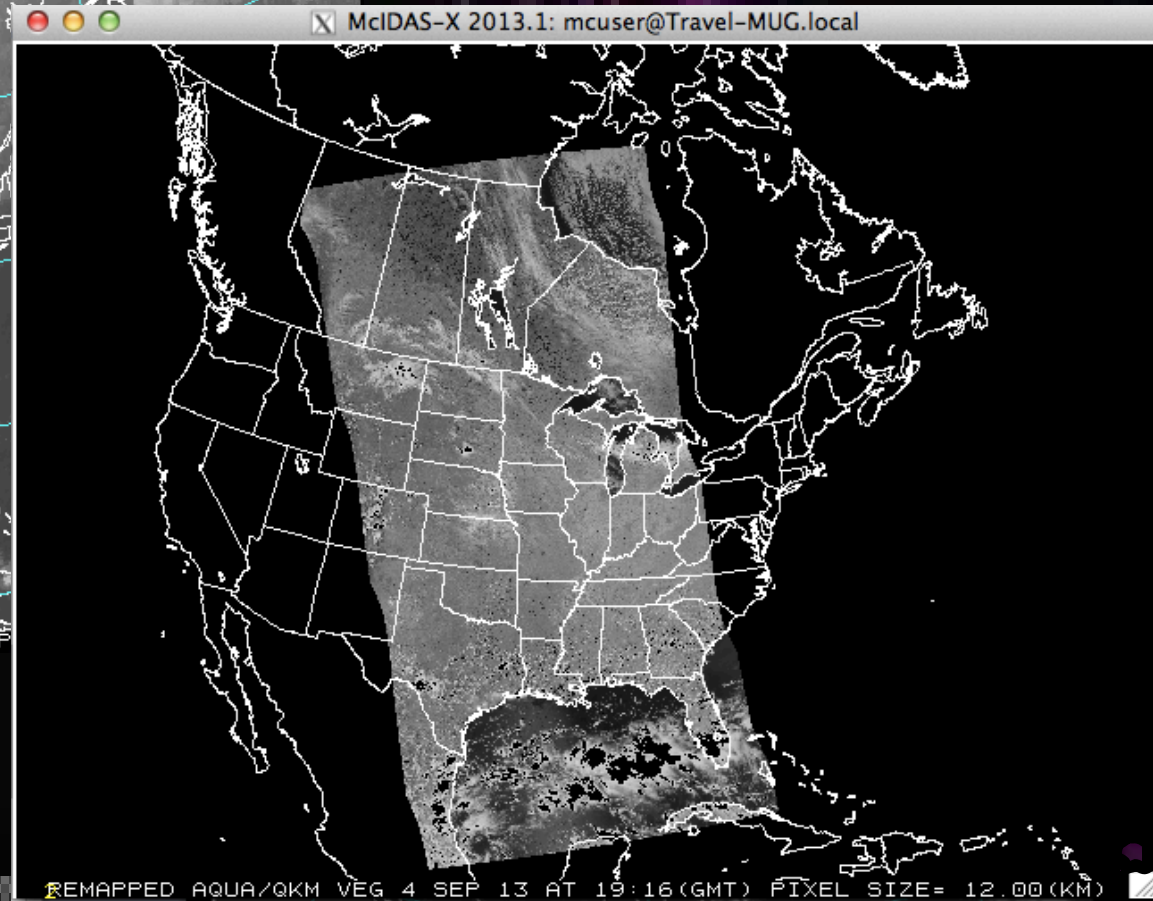
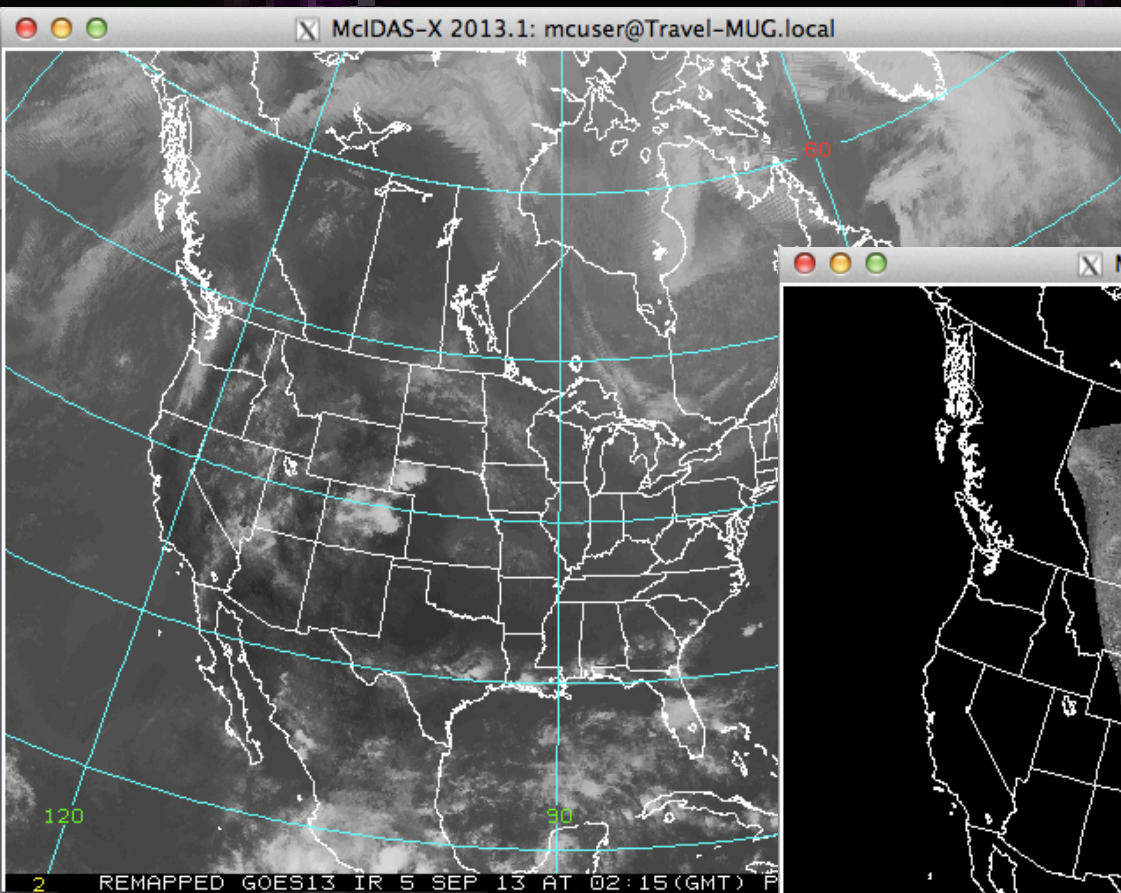
IMGPROBE: Done



20002 FY-2E 2 5 SEP 13248 013100 02197 00710 12.00



# GEO & LEO dataset update



# New GINI server products

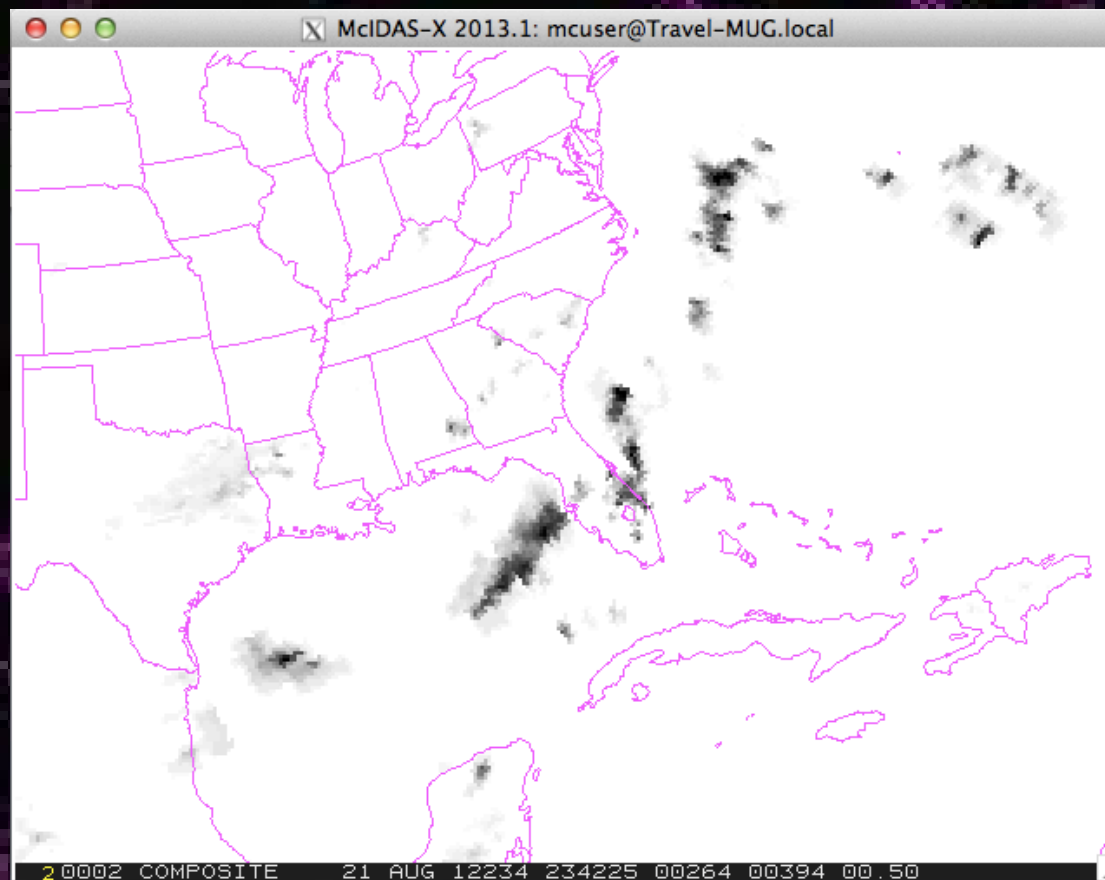


Image Name	Day	Nominal Time	Scan Time	Band		
BLEND/SUN	21 Aug 12234	23:42:25	MISSING	29		
	File	Nominal Image	RAW	BRIT	RATE	
Lat/Lon	Line/Element	Line/Element			MMHR	
28:31:45 / 79:45:52	380/ 571	381/ 572	166	166	22.4	

IMGPROBE: Done

# Megha-Tropiques

```
Sat 410
Cal SRB
BRes 1.0 1.0
1 DESC='0.65 um VIS Cloud and Surface Features' WL=0.65 um WN=15385 cm-1
2 DESC='0.2-4 um Solar Energy' WL=2.1 um WN=4761.90 cm-1
3 DESC='0.2-100 um Total Energy' WL=50.1 um WN=199.60 cm-1
4 DESC='11.5 um IR Surface/Cloud-top Temp' WL=11.5 um WN=869.56 cm-1
Cal MADR
BRes 1.0 1.0
1 DESC='18.7 GHz Ocean Rain and SFC Wind' FREQ=18.7 GHz
2 DESC='23.8 GHz Integrated Water Vapor' FREQ=23.8 GHz
3 DESC='36.5 GHz Cloud Liquid Water' FREQ=36.5 GHz
4 DESC='89.0 GHz Convective Rain Areas' FREQ=89.0 GHz
5 DESC='157.0 GHz Cloud Top Ice' FREQ=159.0 GHz
Cal SAPH
BRes 1.0 1.0
1 DESC='183.31 +/- 0.20 GHz' FREQ=183.31 GHz
2 DESC='183.31 +/- 1.10 GHz' FREQ=183.31 GHz
3 DESC='183.31 +/- 2.70 GHz' FREQ=183.31 GHz
4 DESC='183.31 +/- 4.00 GHz' FREQ=183.31 GHz
5 DESC='183.31 +/- 6.60 GHz' FREQ=183.31 GHz
6 DESC='183.31 +/- 11.0 GHz' FREQ=183.31 GHz
EndSat
SEE: Done...EOF Encountered.
```



# SSH Tunneling with ADDE

- Funded by JSC who has a two factor authentication requirement
- User configurable through DATALOC
- Keywords SSHADD, SSHLIST, SSHDEL used when servers are in a secure environment
- GATEWAY= keyword

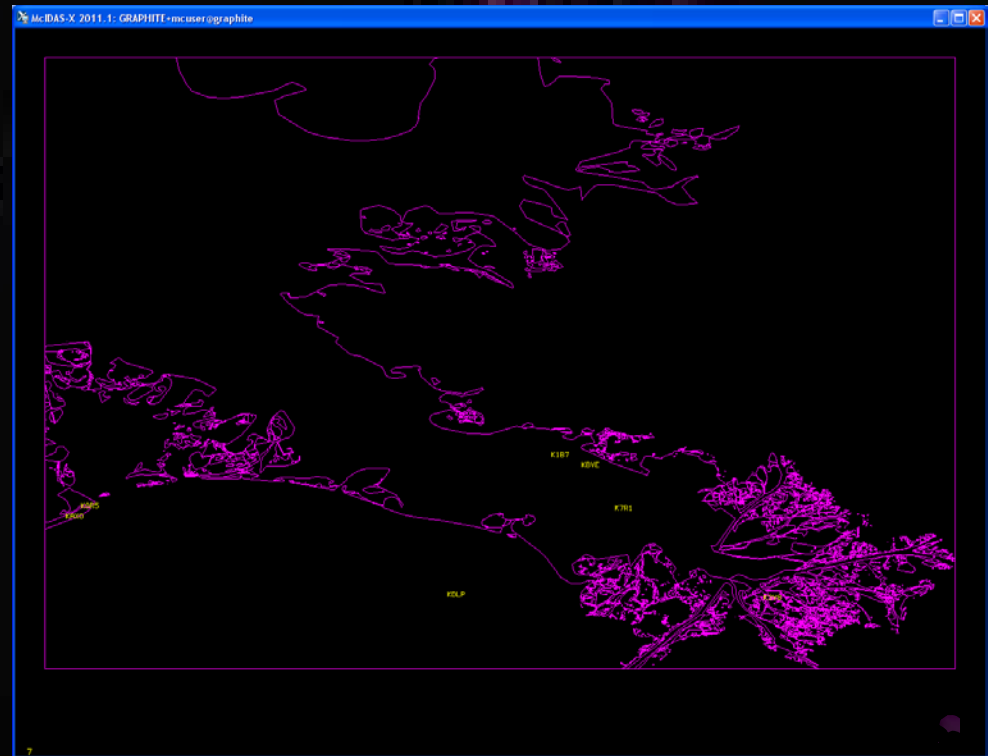
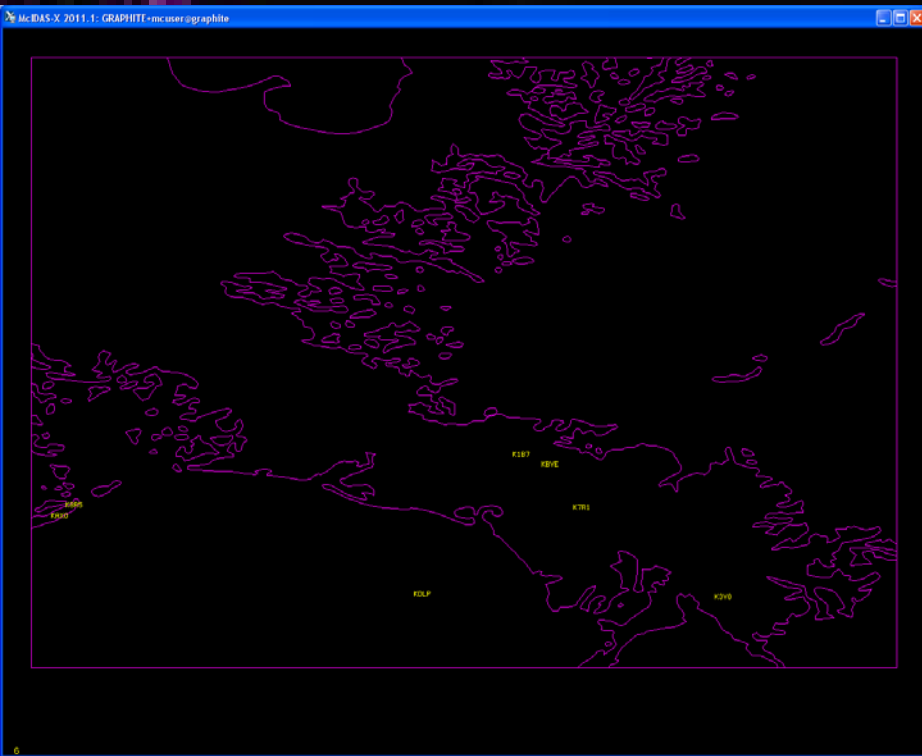
## DATALOC SSHLIST

Server IP Address	User Name	SSH Key File
JEEP.SSEC.WISC.EDU	mcuser	/Users/mcuser/.ssh/id_rsa
PAPPY.SSEC.WISC.EDU	jayh	/Users/mcuser/.ssh/id_rsa
Gateway = ASH.SSEC.WISC.EDU		

<LOCAL-DATA> indicates that data will be accessed from the local data directory.  
DATALOC -- done

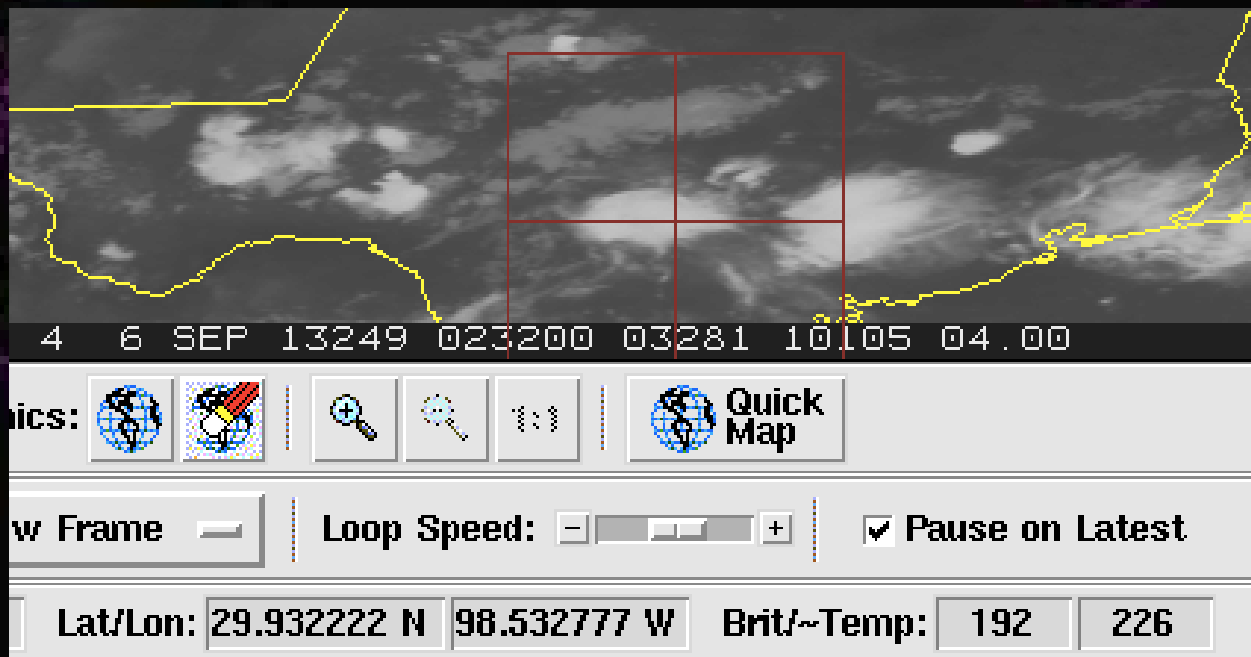
# Updated Map Files

- USCOUNTY.MAP, USZONE.MAP, USSTATE.MAP
  - Better WWDISP & WWLIST performance



# GUI fixes

- GUI now supported on OSX
- TERM DMS OFF – GUI readout now works



# WXTLIST EXCLUDE=

WXTLIST SFC\_HOURLY WSTN=EIDB NUM=3

SAIE32 EIDB 060330 2013249 0336

METAR EICM 060330Z NIL=

METAR EIDL 060330Z NIL=

METAR EIKY 060330Z NIL=

METAR EIME 060330Z NIL=

METAR EISG 060330Z NIL=

METAR EIWF 060330Z NIL=

SAIE31 EIDB 060330 RRA 2013249 0334

METAR EINN 060330Z 35007KT 9999 -SHRA FEW020 SCT034 BKN050 09/08

Q1014 NOSIG=

SAIE31 EIDB 060330 2013249 0333

METAR EIDW 060330Z 31004KT 9999 FEW026 04/03 Q1012=

METAR EINN 060330Z NIL=

METAR EICK 060330Z 33011KT CAVOK 07/06 Q1012 NOSIG=

METAR EIKN 060330Z NIL=

WXTLIST: done

WXTLIST SFC\_HOURLY WSTN=EIDB NUM=3 EXCLUDE=NIL

SAIE31 EIDB 060330 RRA 2013249 0334

METAR EINN 060330Z 35007KT 9999 -SHRA FEW020 SCT034 BKN050 09/08

Q1014 NOSIG=

SAIE31 EIDB 052330 RRA 2013248 2334

METAR EIDW 052330Z 28006KT 9999 FEW026 SCT050 BKN090 08/06 Q1013=

SAIE32 EIDB 051930 RRA 2013248 1957

METAR EISG 051930Z 32007KT CAVOK 12/06 Q1014=

WXTLIST: done



# McIDAS-XCD 2012.1

- NWS has renamed the Rapid Update Cycle (RUC) forecast model to the Rapid Refresh (RAP) Analysis and Forecast System
- Since RAP and RUC have same model ID numbers, current versions of -XCD will continue to work
- There is an update to the navigation parameters to allow data to be correctly filed into the RTGRIB2/RAP-USLC20KM dataset

# RUC -> RAP

## GRDLIST LOCAL/RUC FORM=ALL PARAM=HELI

Dataset position 1 Directory Title= /RUC-USLC20KM.105.2007142.1800.0

PAR	LEVEL	DAY	TIME	SRC	FHR	FDAY	FTIME	GRID	PRO
HELI	SFC	22 MAY	07142 18:00:00	RAP	0	22 MAY	07142 18:00:00	926	LAMB
Total pts=		67725	Num rows=	225	Num columns=	301	received:	0	000000Z

Storm relative helicity

GRIB ID numbers: Geographic = N/A ; PAR =N/A; Model ID =105;

Units of gridded variable are M2S2 Scale of variable is: 2

Lambert Conformal Tangent Cone Projection

Row num of pole= -476.45 Col num of pole= 165.00 Col spacing (m)= 20318.0

Standard Latitudes= 25.00 25.00 Standard Longitude= 95.00

Number of grids listed = 1

GRDLIST - done

## GRDLIST RTGRIB2/RAP-ALL FORM=ALL PARAM=HELI

Dataset position 1 Directory Title= /RAP-USLC13KM.105.2013241.300.0.

PAR	LEVEL	DAY	TIME	SRC	FHR	FDAY	FTIME	GRID	PRO
HELI	3000 M	29 AUG	13241 03:00:00	RAP	0	29 AUG	13241 03:00:00	N/A	LAMB
Total pts=		151987	Num rows=	337	Num columns=	451	received:	2013241	034646Z

Storm relative helicity

GRIB ID numbers: Geographic = N/A ; PAR =N/A; Model ID =105; Level type =103

Units of gridded variable are M2S2 Scale of variable is: 0

Lambert Conformal Tangent Cone Projection

Row num of pole= -715.20 Col num of pole= 247.01 Col spacing (m)= 13545.0

Standard Latitudes= 25.00 25.00 Standard Longitude= 95.00

Number of grids listed = 1

GRDLIST - done

# McIDAS-XCD 2012.1

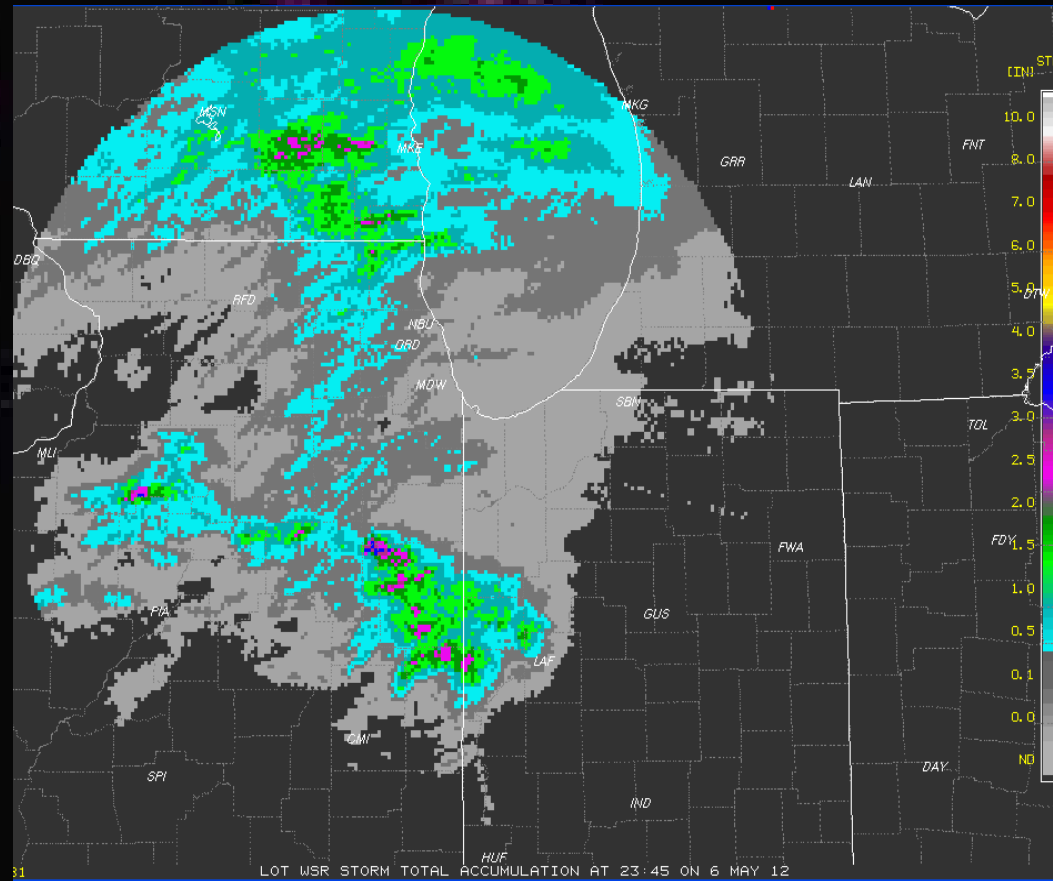
- Added new levels for GFS global 1-degree GRIB1 data (geographic ID 3)
  - 215 Cloud Ceiling (CEIL)
  - 216 Cumulonimbus base (CBB)
  - 217 Cumulonimbus top (CBT)
  - 220 Planetary Boundary Layer (PBLR) (from Richardson number)
  - 241 Ordered sequence of data (OSEQ)
- Dual Polarization Radar



# NEXRAD Level III Dual Polarization

TABLE 1: WMO HEADINGS FOR WSR-88D RADAR PRODUCT ADDITIONS

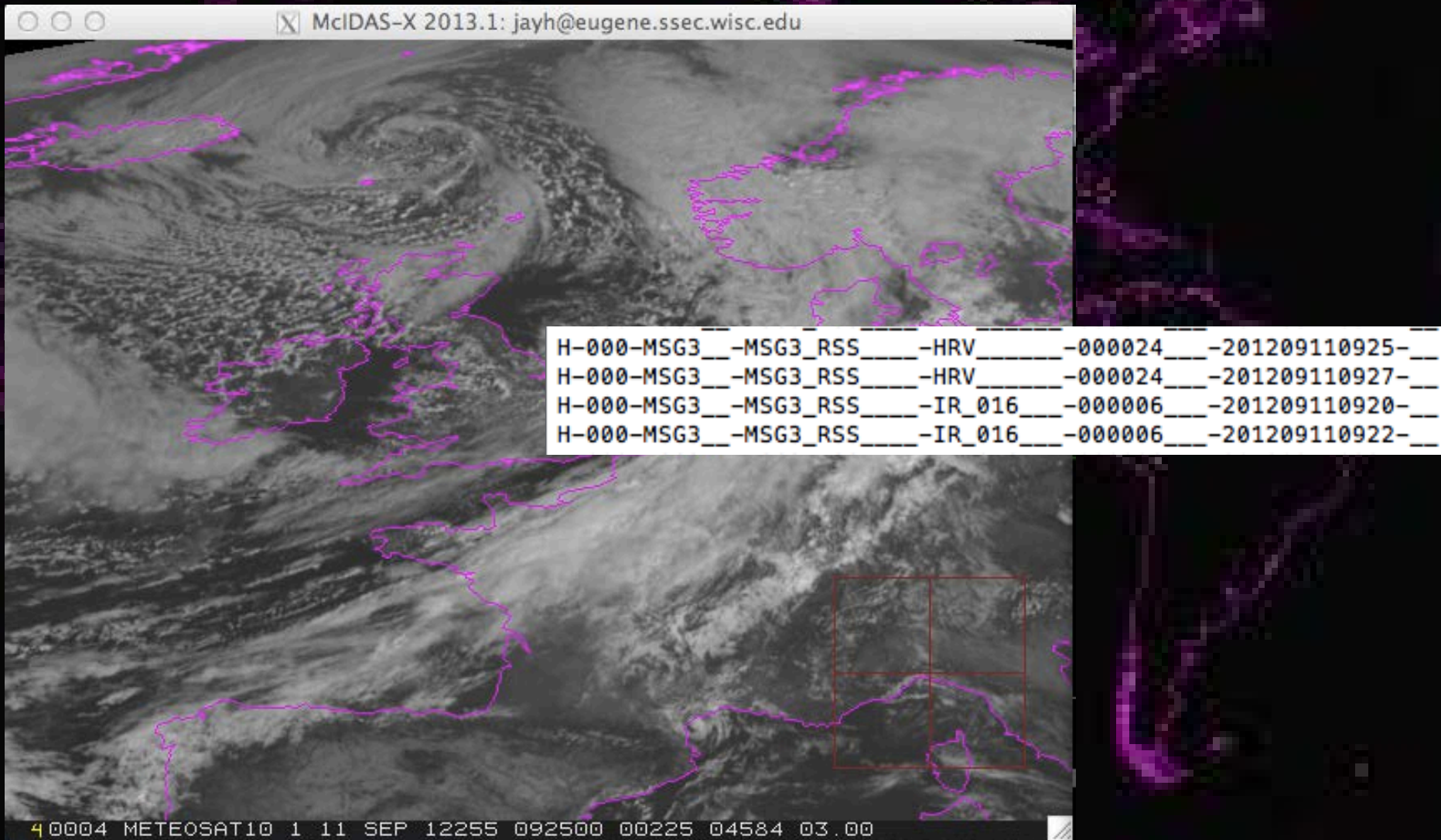
#	TTUSII MNM PRODUCT DESCRIPTION	DIRECTORY
1	SDUS8I NOX DIFFERENTIAL REFLECTIVITY 159/DZD 0.5DEG	DS.159X0
2	SDUS8I NAX DIFFERENTIAL REFLECTIVITY 159/DZD 0.9DEG	DS.159XA
3	SDUS8I N1X DIFFERENTIAL REFLECTIVITY 159/DZD 1.5DEG	DS.159X1
4	SDUS8I NBX DIFFERENTIAL REFLECTIVITY 159/DZD 1.8DEG	DS.159XB
5	SDUS8I N2X DIFFERENTIAL REFLECTIVITY 159/DZD 2.4DEG	DS.159X2
6	SDUS8I N3X DIFFERENTIAL REFLECTIVITY 159/DZD 3.4DEG	DS.159X3
7	SDUS8I NOC CORRELATION COEFFICIENT 161/DCC 0.5DEG	DS.161C0
8	SDUS8I NAC CORRELATION COEFFICIENT 161/DCC 0.9DEG	DS.161CA
9	SDUS8I N1C CORRELATION COEFFICIENT 161/DCC 1.5DEG	DS.161C1
10	SDUS8I NBC CORRELATION COEFFICIENT 161/DCC 1.8DEG	DS.161C8
11	SDUS8I N2C CORRELATION COEFFICIENT 161/DCC 2.4DEG	DS.161C2
12	SDUS8I N3C CORRELATION COEFFICIENT 161/DCC 3.4DEG	DS.161C3
13	SDUS8I NOK SPECIFIC DIFFERENTIAL PHASE 163/DKD 0.5DEG	DS.163K0
14	SDUS8I NAK SPECIFIC DIFFERENTIAL PHASE 163/DKD 0.9DEG	DS.163KA
15	SDUS8I N1K SPECIFIC DIFFERENTIAL PHASE 163/DKD 1.5DEG	DS.163K1
16	SDUS8I NBK SPECIFIC DIFFERENTIAL PHASE 163/DKD 1.8DEG	DS.163KB
17	SDUS8I N2K SPECIFIC DIFFERENTIAL PHASE 163/DKD 2.4DEG	DS.163K2
18	SDUS8I N3K SPECIFIC DIFFERENTIAL PHASE 163/DKD 3.4DEG	DS.163K3
19	SDUS8I NOH HYDROMETEOR CLASSIFICATION 165/DHC 0.5DEG	DS.165H0
20	SDUS8I NAH HYDROMETEOR CLASSIFICATION 165/DHC 0.9DEG	DS.165HA
21	SDUS8I N1H HYDROMETEOR CLASSIFICATION 165/DHC 1.5DEG	DS.165H1
22	SDUS8I NBH HYDROMETEOR CLASSIFICATION 165/DHC 1.8DEG	DS.165HB
23	SDUS8I N2H HYDROMETEOR CLASSIFICATION 165/DHC 2.4DEG	DS.165H2
24	SDUS8I N3H HYDROMETEOR CLASSIFICATION 165/DHC 3.4DEG	DS.165H3
25	SDUS8I NOM MELTING LAYER 166/ML 0.5DEG	DS.166M0
26	SDUS8I NAM MELTING LAYER 166/ML 0.9DEG	DS.166MA
27	SDUS8I N1M MELTING LAYER 166/ML 1.5DEG	DS.166M1
28	SDUS8I NBM MELTING LAYER 166/ML 1.8DEG	DS.166MB
29	SDUS8I N2M MELTING LAYER 166/ML 2.4DEG	DS.166M2
30	SDUS8I N3M MELTING LAYER 166/ML 3.4DEG	DS.166M3
32	SDUS8I HHC HYBRID SCAN HYDROMETEOR CLASSIFIC. 177/HHC	DS.177HH
33	SDUS8I OHA ONE HOUR ACCUMULATION 169/OHA	DS.169OH
34	SDUS8I DAA DIGITAL ACCUMULATION ARRAY 170/DAA	DS.170AA
35	SDUS3I PTA STORM TOTAL ACCUMULATION 171/STA	DS.171ST
36	SDUS8I DTA DIGITAL STORM TOTAL ACCUMULATION 172/DSA	DS.172DT
39	SDUS8I DOD DIGITAL ONE HOUR DIFFERENCE 175/DOD	DS.174OD
40	SDUS8I DSD DIGITAL STORM TOTAL DIFFERENCE 175/DSD	DS.175SD



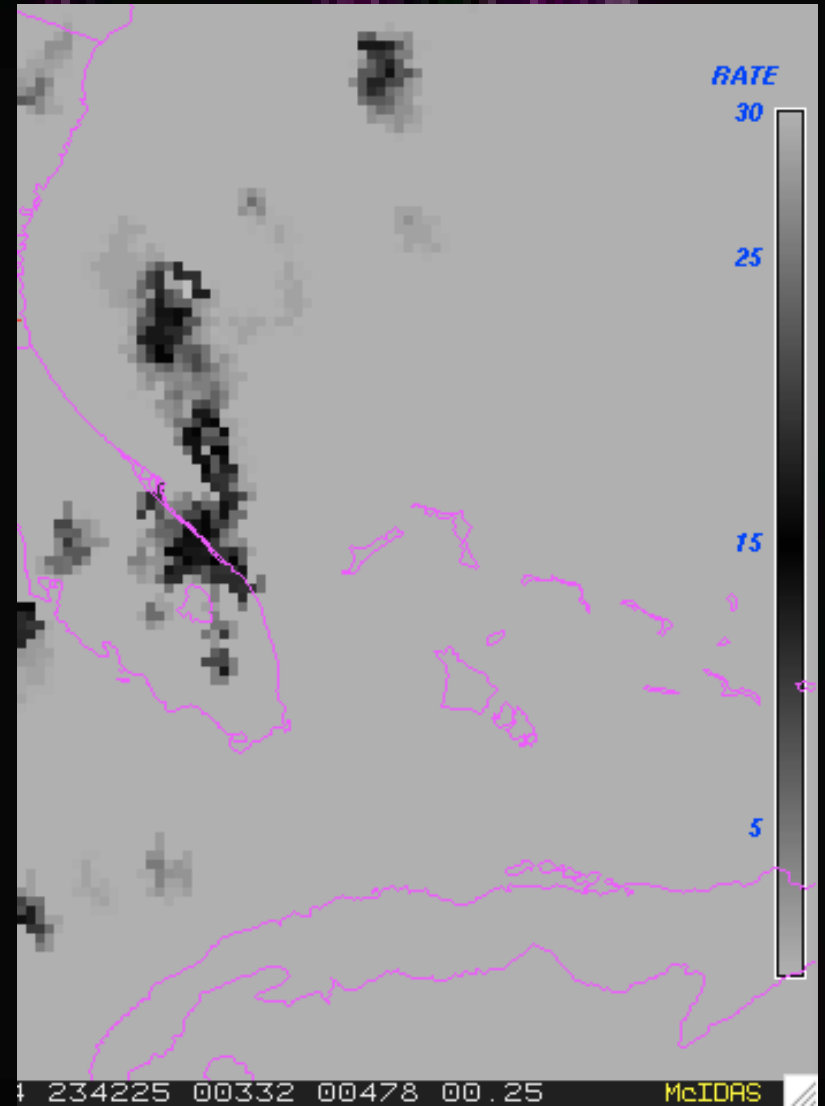
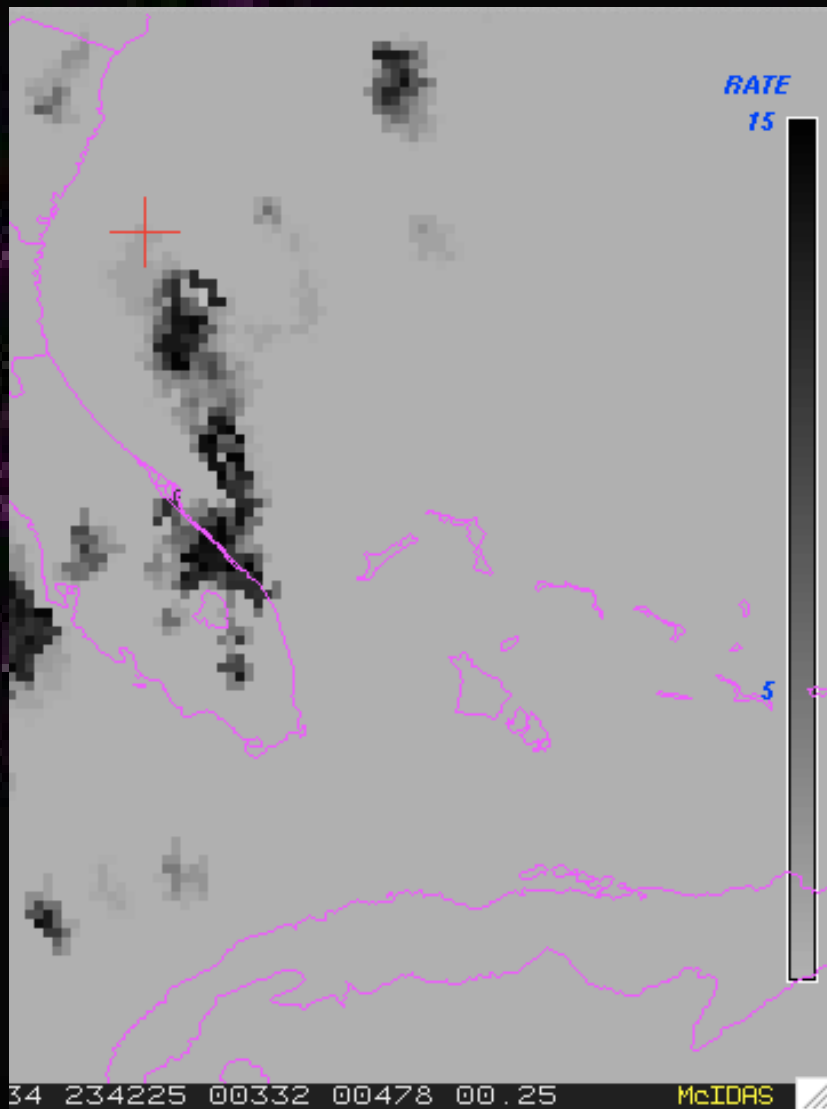
# Currently in testing

- MSG Rapid Scan
- BAR with SU table bug fix
- PIREP/AIREP decoding improvement (XCD)
- Level 1B server update for Metop C
- GRDLIST bug fix with TRO level
- GUI resize and scrolling issue with tcl/tk 8.5.9

# MSG Rapid Scan



# BAR with SU=



# PIREP/AIREP in XCD

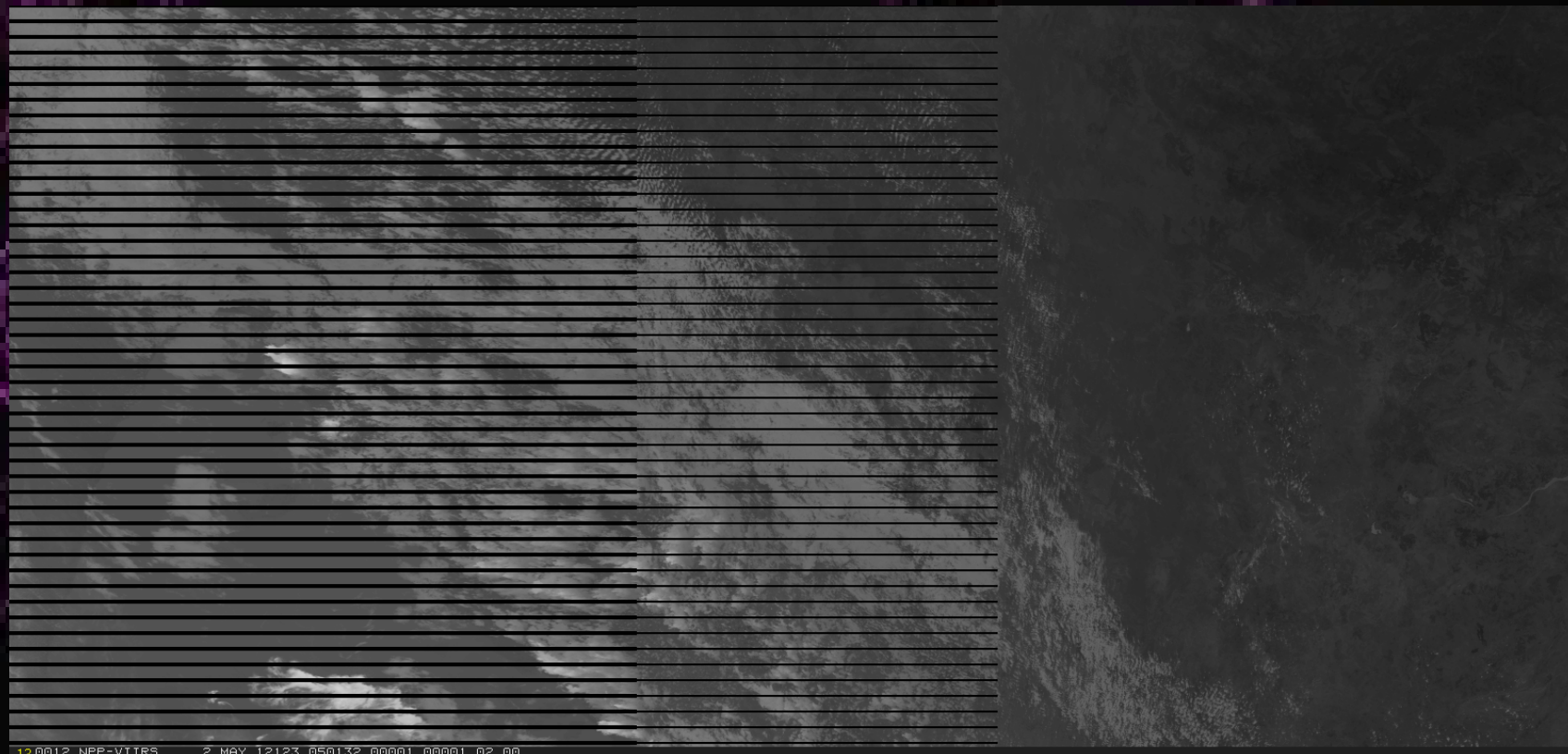
- Improvement to decoding icing and turbulence categories (moderate, extreme, lght, etc.)
- Better handling of stations and OV field (location of reports)
- Better decoding of Canadian flight information regions

# .....and beyond

- VIIRS ADDE Server
  - Prototype: very limited functionality
- polar2grid – fill in bowtie deletion
  - MS2GT (3<sup>rd</sup> party package) will be used to remove bow tie deletion and store in a reprojected Area file.
  - Next generation ADDE servers
- Future data – INSAT 3D, Himawari 8 & 9, GOES-R



# VIIRS ADDE Server

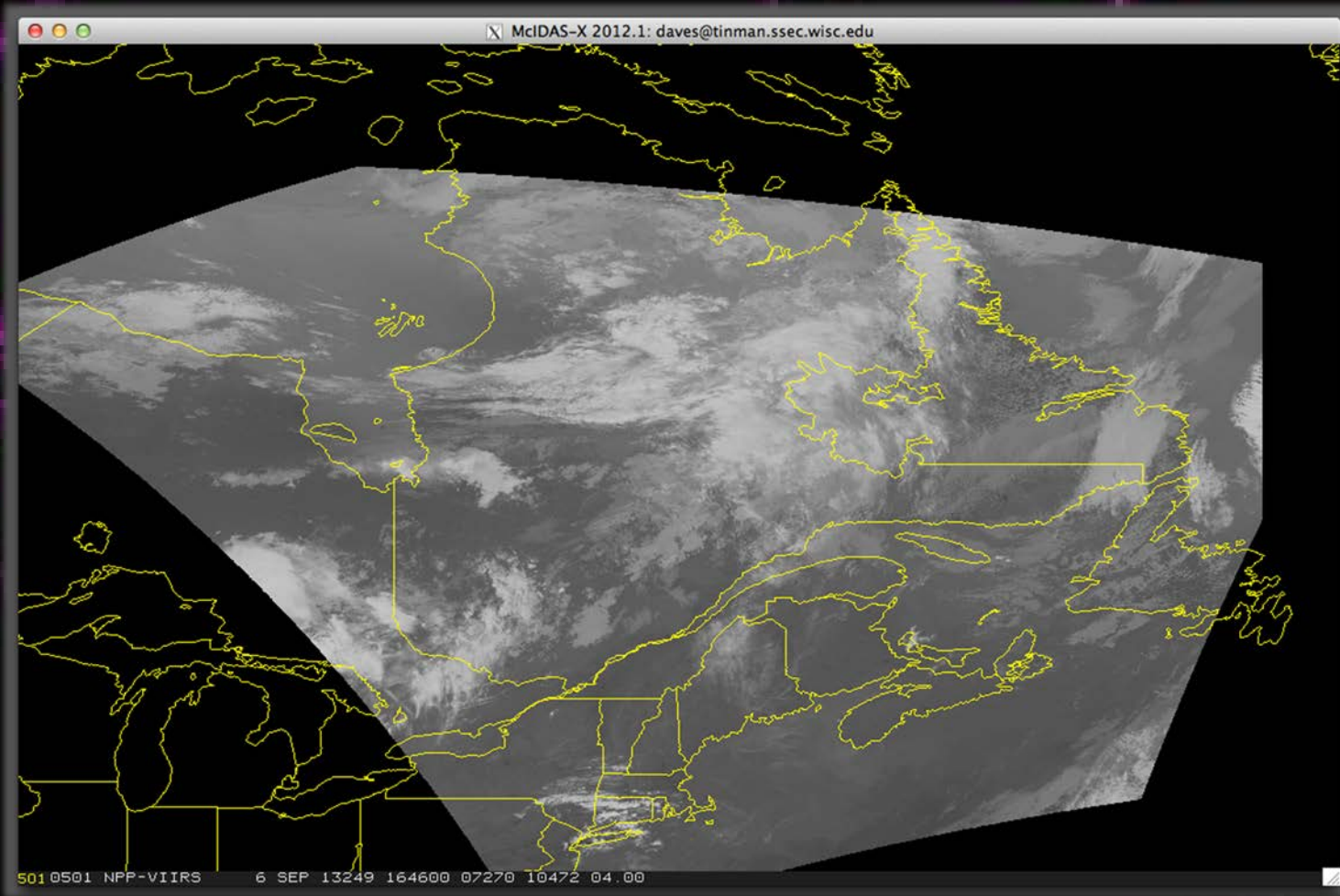


12 0012 NPP-VIIRS 2 MAY 12123 050132 00001 00001 02 00

Left half of VIIRS granule with bowtie deletion

# polar2grid

Bowtie removal for MODIS and VIIRS Images





# Next Generation ADDE

- Still in the planning stage
- Expecting the servers to be based on Java:
  - Make use of McIDAS-V file adapters
  - Interface to the netCDF 4 library
  - All data formats that McIDAS-V can read locally, will also work remotely