

McIDAS-X Software Development and Demonstration

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8 June 2015

Overview

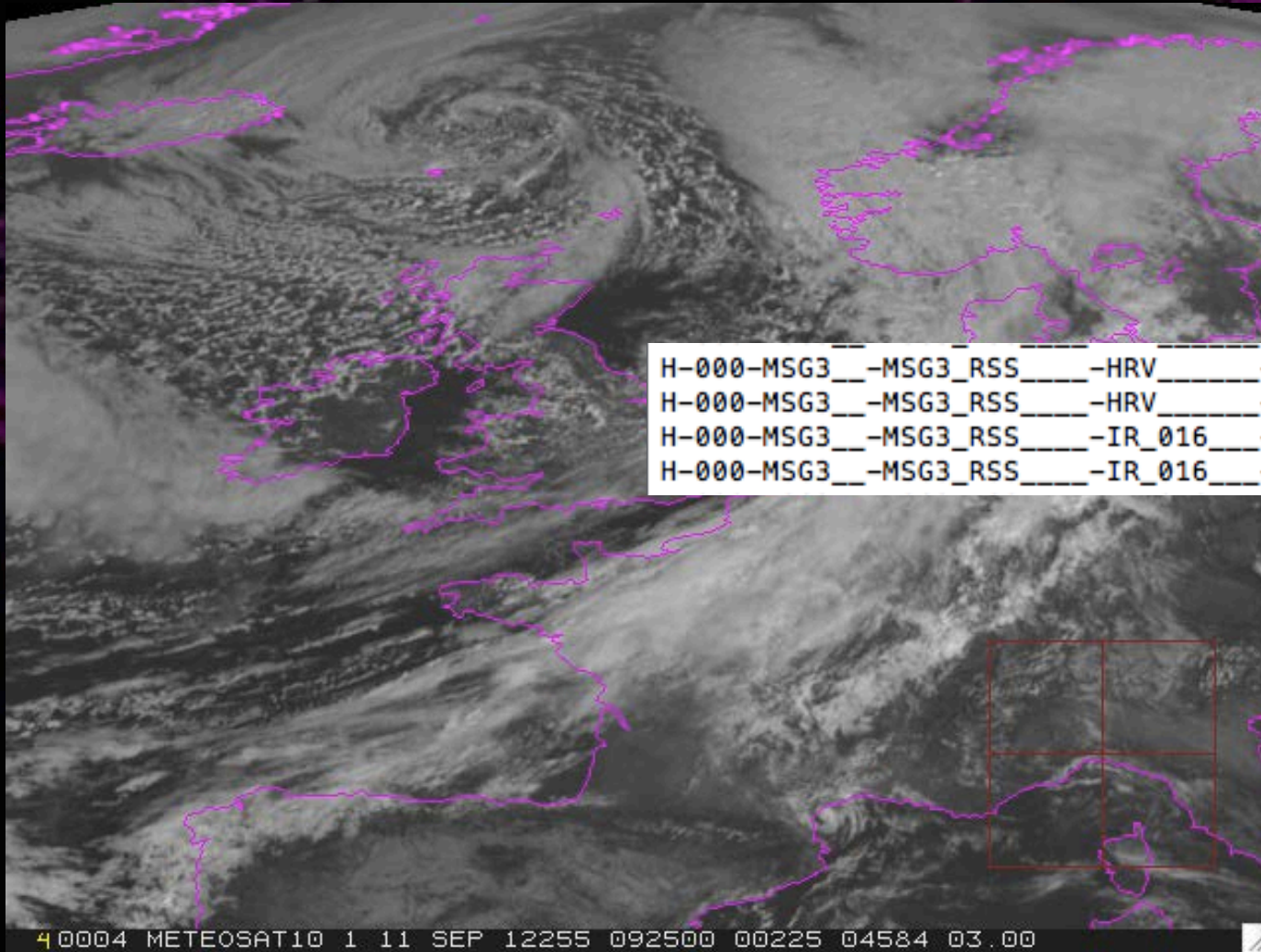
- McIDAS-X 2014.1 & 2015.1
- McIDAS-XCD 2014.1
- Software development and plans for version 2015.2 and beyond...

McIDAS-X 2014.1 & 2015.1

ADDE Servers

- MSG rapid scan data
- COMS updates
- Prep for Landsat
- MODIS server enhancement for cloud top products
- Himawari AHI (2015.1)

MSG Rapid Scan

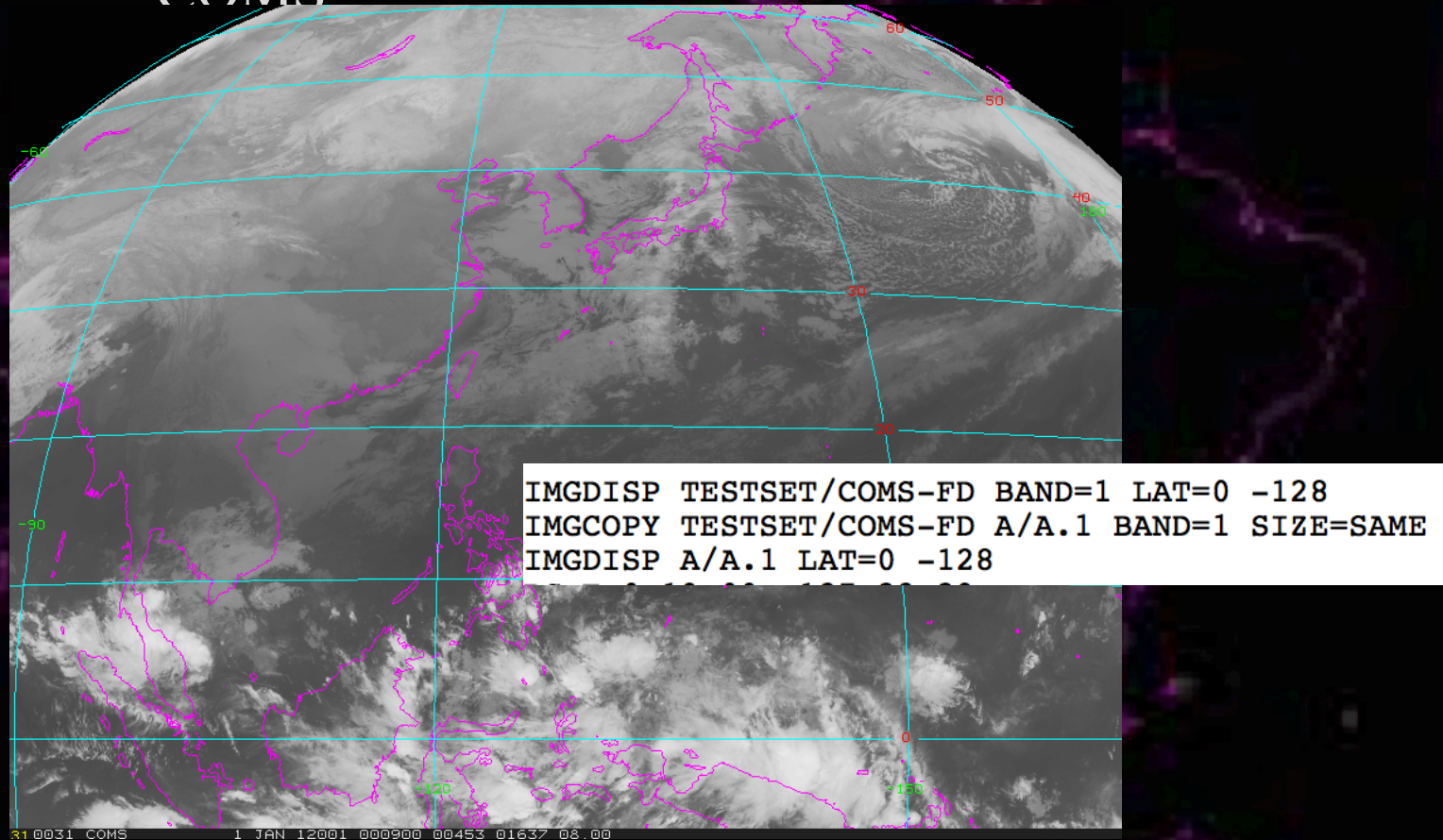


H-000-MSG3	-MSG3_RSS	-HRV	-000024	-201209110925-
H-000-MSG3	-MSG3_RSS	-HRV	-000024	-201209110927-
H-000-MSG3	-MSG3_RSS	-IR_016	-000006	-201209110920-
H-000-MSG3	-MSG3_RSS	-IR_016	-000006	-201209110922-

40004 METEOSAT10 1 11 SEP 12255 092500 00225 04584 03.00

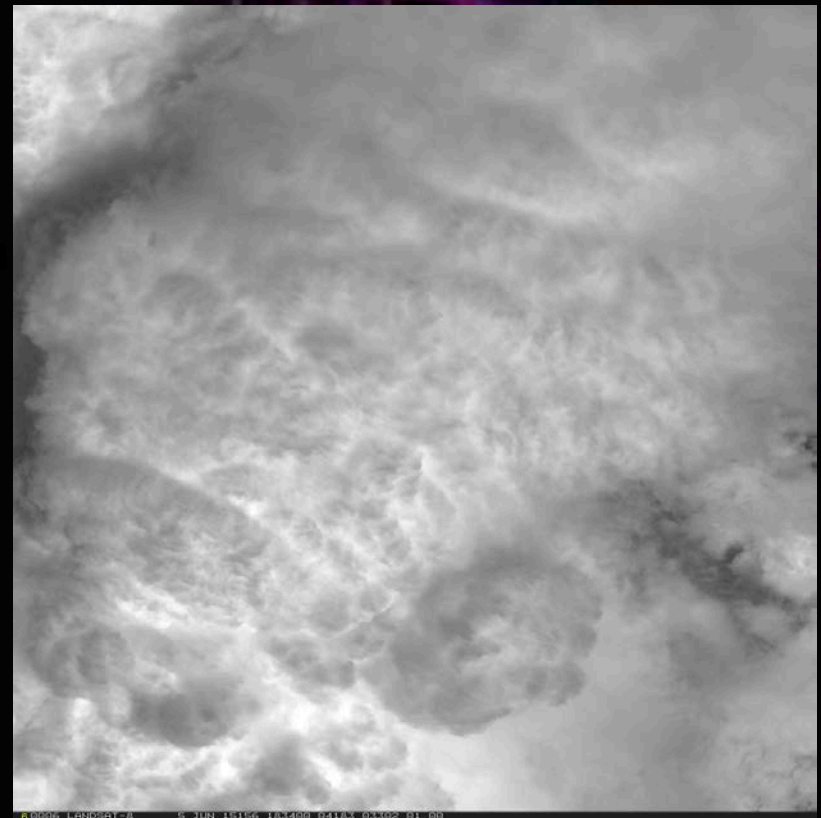
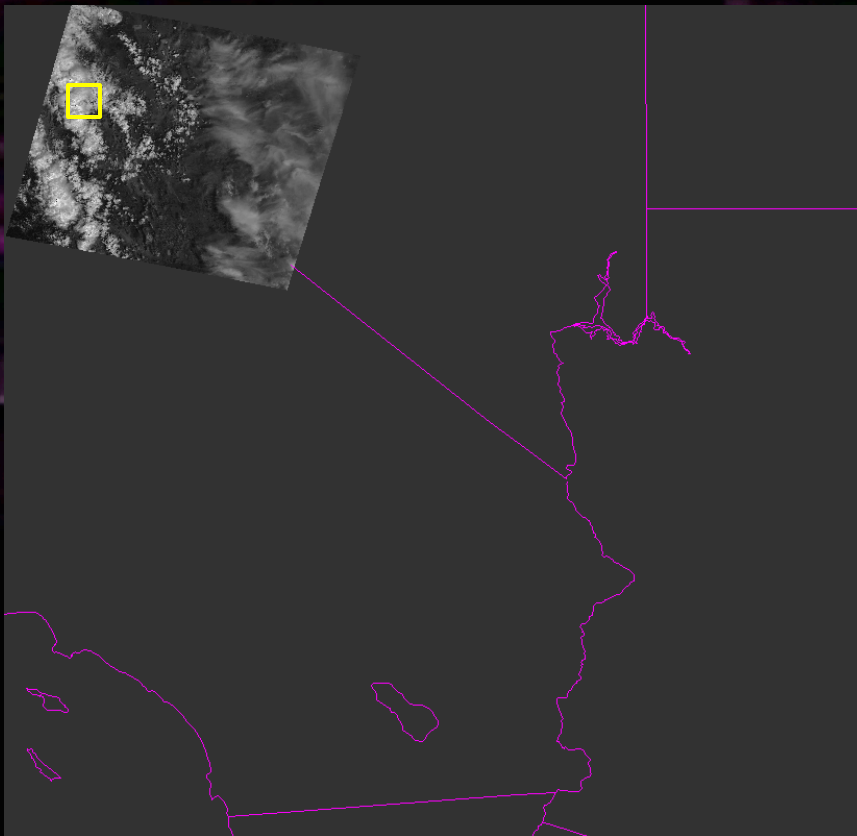
COMS ADDE Server

- Corrected line/element calculation with IMGCOPY commands
- Fixed directory server so -V can display COMS



Landsat preparation

- Currently use GDAL (Geospatial Data Abstraction Library) to read HDF file and reproject
- Convert to AREA using IMGMAKE



60006 LANDSAT-8 6 JUN 16166 183400 04183 03302 01.00

MODIS cloud top products

Cloud optical thickness

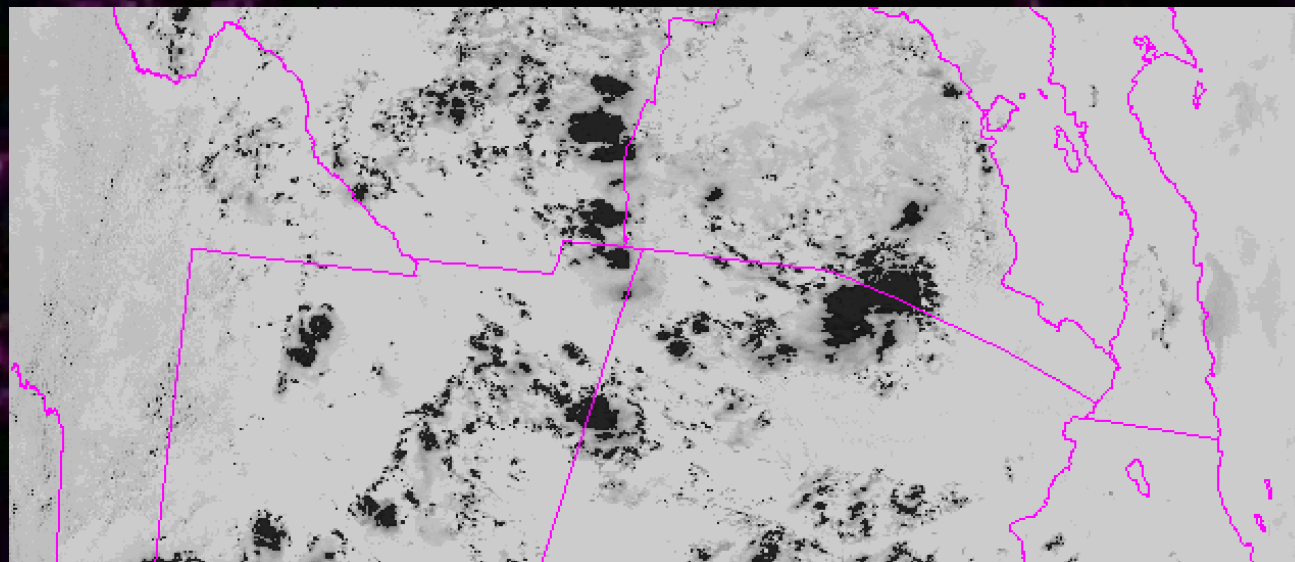
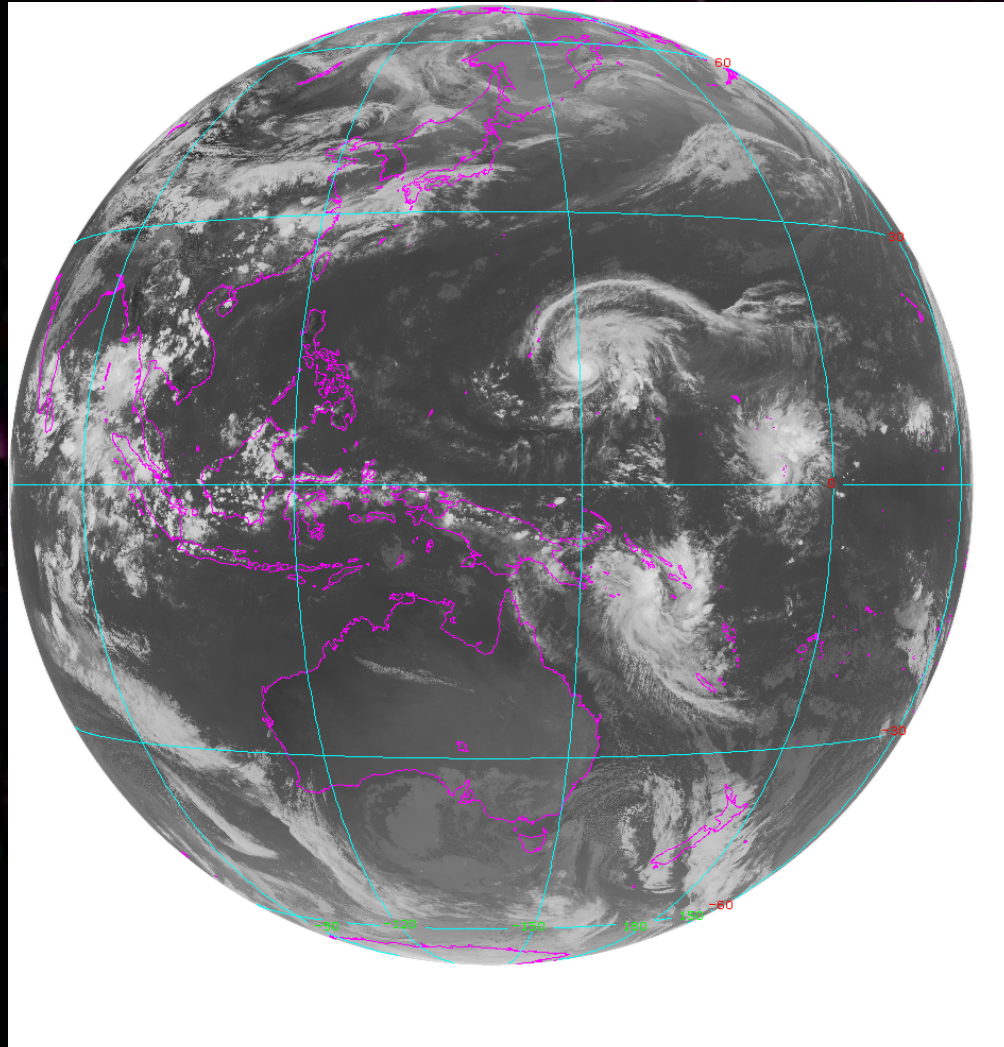


Image Name	Day	Nominal Time	Scan Time	Band			
TEST/MOD06	9 Aug 08222	20:34:00	MISSING	50			
	File	Nominal Image	RAW	PARM	BRIT		
Lat/Lon	Line/Element	Line/Element					
33:32:10 / 109:28:25	606/ 606	2425/ 2425	1870	18.70	14		

IMGPROBE: Done

Himawari-8 AHI



McIDAS-X 2014.1 & 2015.1

Imagery

- IMG* commands updated for large files
- IMGREMAP SIZE=ALL improvement
- BAR updates when using SU tables
- AREA files can now be renamed w/o issue

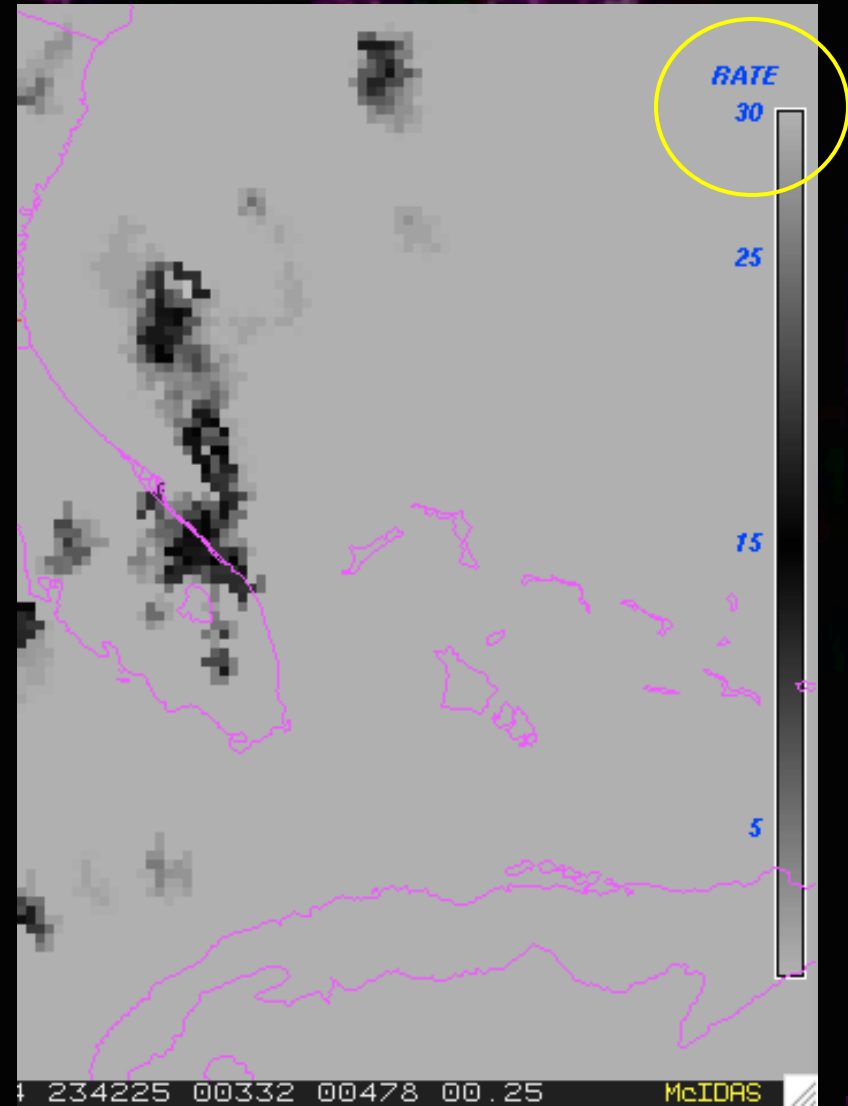
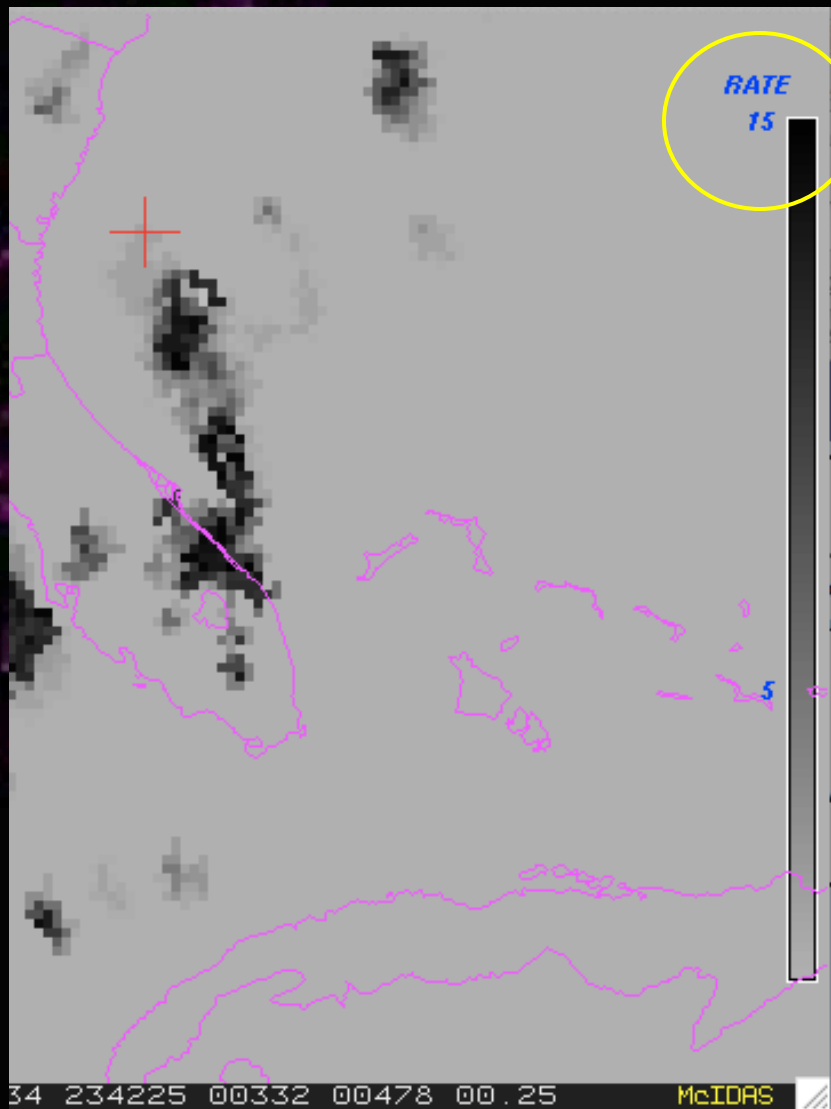
IMG* commands for large files

- Increased the maximum number of pixels per line to 43200

IMGREMAP SIZE=ALL

- Improved cases when some pixels are off the Earth edge

BAR with SU=



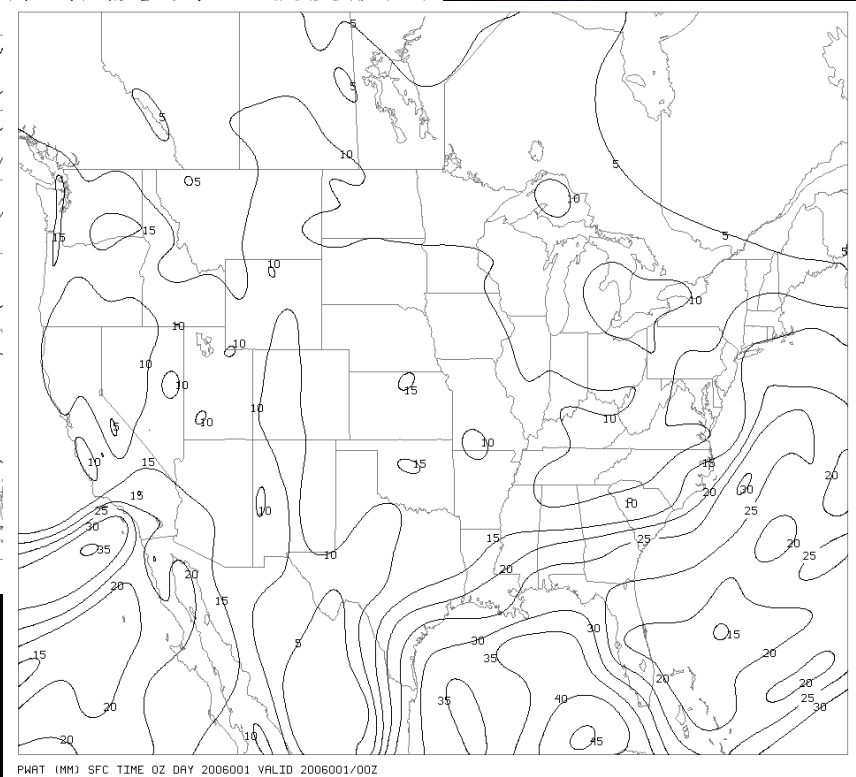
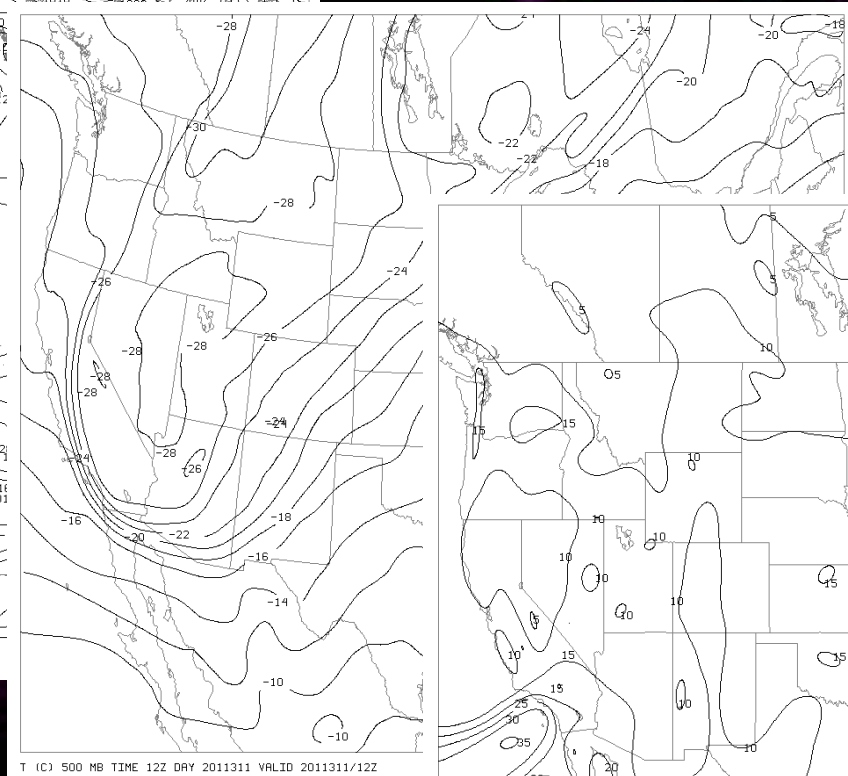
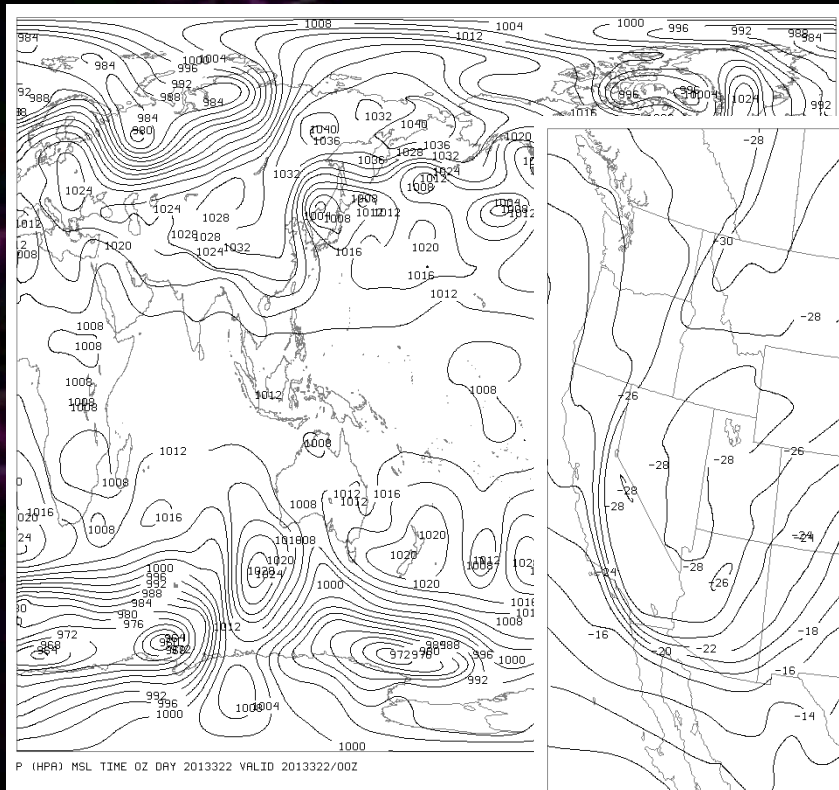
McIDAS-X 2014.1 & 2015.1

Miscellaneous

- Navigation added for more GRIB files: UK Met office, NOMADS, Precipitable water
- GRDLIST fix for SFC/TRO level grids
- New installation flag for the GUI for building with Tcl/Tk 8.5 (8.4 is the default)
 - Issues with resizing and scrolling – 8.5

Navigation for GRIB files

UK Met Office, NOMADS, Precipitable water grids



GRDLIST fix for SFC/TRO level grids

```
GRDLIST RTGRIDS/GFS-GLME PAR=T LEV=SFC NUM=ALL DAY=2015156 TIME=12 FHOUR=24 48
```

```
Dataset position 1 Directory Title= /GFS.96.2015156.1200.24.44.grib
```

PAR	LEVEL	DAY	TIME	SRC	FHR	FDAY	FTIME	GRID	PRO
T	SFC	MBAG 05 JUN 15156	12:00:00	GFS	24 06	JUN 15157	12:00:00	N/A	MERC
T	SFC	MBAG 05 JUN 15156	12:00:00	GFS	48 07	JUN 15158	12:00:00	N/A	MERC
T	SFC	MBAG 05 JUN 15156	12:00:00	GFS	48 07	JUN 15158	12:00:00	N/A	MERC

```
Number of grids listed = 3
```

```
GRDLIST - done
```

```
GRDLIST RTGRIDS/GFS-GLME PAR=T LEV=TRO NUM=ALL DAY=2015156 TIME=12 FHOUR=24 48
```

```
Dataset position 1 Directory Title= /GFS.96.2015156.1200.24.43.grib
```

PAR	LEVEL	DAY	TIME	SRC	FHR	FDAY	FTIME	GRID	PRO
T	TRO	05 JUN 15156	12:00:00	GFS	24 06	JUN 15157	12:00:00	N/A	MERC
T	TRO	05 JUN 15156	12:00:00	GFS	48 07	JUN 15158	12:00:00	N/A	MERC
T	TRO	05 JUN 15156	12:00:00	GFS	48 07	JUN 15158	12:00:00	N/A	MERC
T	TRO	05 JUN 15156	12:00:00	GFS	48 07	JUN 15158	12:00:00	N/A	MERC

```
Number of grids listed = 4
```

```
GRDLIST - done
```


McIDAS-XCD 2014.1

- RTGRIDS updates:
 - New models and parameters
 - New and deleted datasets
- PIREP decoder fixes and enhancements
- STNDB.CORE updates
 - Hundreds of stations added for PIREP reports
 - New TAF and MOS stations
 - Other minor corrections

RTGRIDS

New models

- WRF (Weather Research and Forecasting Model)
- NMMB (Non Hydrostatic Multiscale Model)
- URMA (Unrestricted Mesoscale Analysis)

RTGRIDS

New parameters

- Fire weather parameters
- Relative humidity wrt precipitable water
- Momentum parameters
- Forecast radar parameters

RTGRIDS

New datasets

- URMA-USLCDRS1
- URMA-USLCDRS2
- WRF-USLCSW
- WRF-PRME (Puerto Rico)
- RCM-EPME (Eastern Pacific)
- RCM-WAME (Western Atlantic)
- RCM-SWPME (Southwest Pacific)
- RCM-SCPME (South central Pacific)
- RCM-HIME (Hawaii)
- RCM-NEPME (North east Pacific)
- RCM-SAME (Southern Arctic)
- RCM-NAME (North Atlantic)
- RCM-NWPME (Northwest Pacific)
- RCM-NCPME (North Central Pacific)
- NMMB-FIRELONT (Lake Ontario)
- NDF-USLCAWI4

RTGRIDS

GRIB1 datasets removed

- GFS-AKPS
- GFS-AKPSLRES
- GFS-AKPSSSIF
- GFS-GLMELRES
- GFS-HIMELRES
- GFS-HIMESSIF
- GFS-NHPSLRES
- GFS-NHPSSSIF
- GFS-NWME170
- GFS-USPSLRES
- GFS-USPSSSIF
- WWF-GLME
- RAP-USLC
- RAP-USLC3
- RAP-USPS

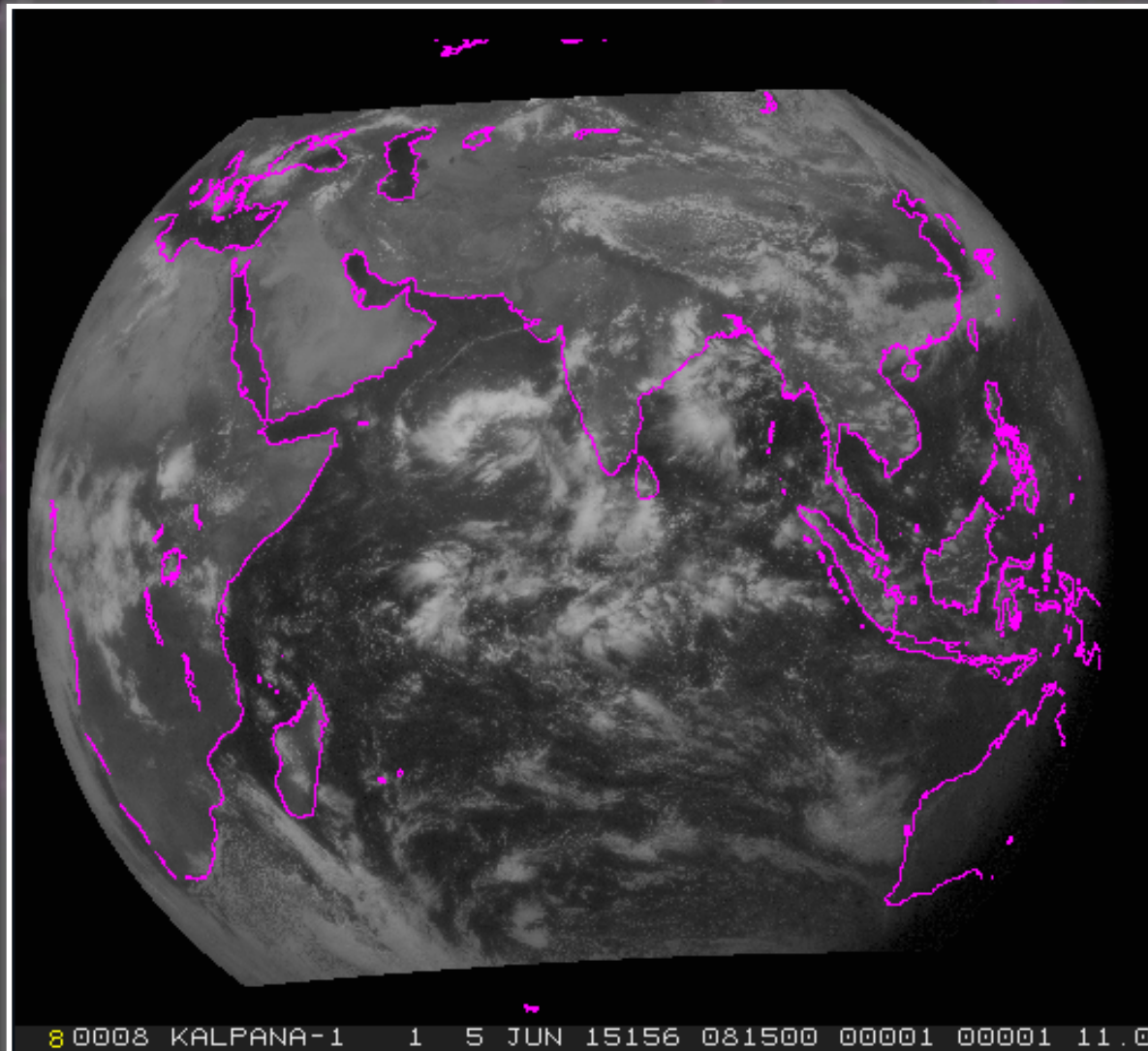
PIREP/AIREP in XCD

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

ADDE Servers currently in testing

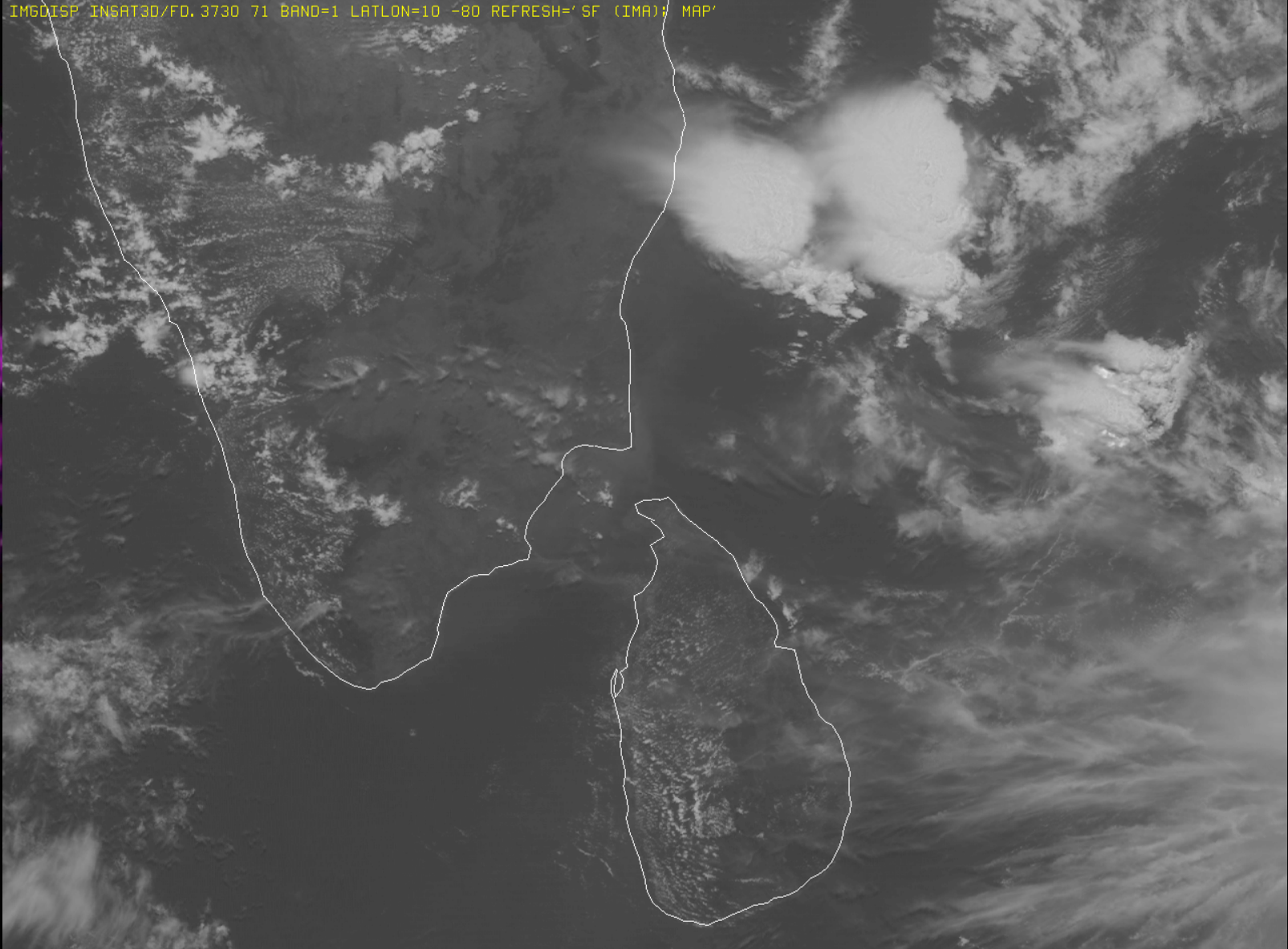
- Kalpana HDF5
- INSAT 3D
- Native format MSG L1.5
- Update FSD (LRIT) for current GOES and Meteosat satellites

Kalpana HDF5 server



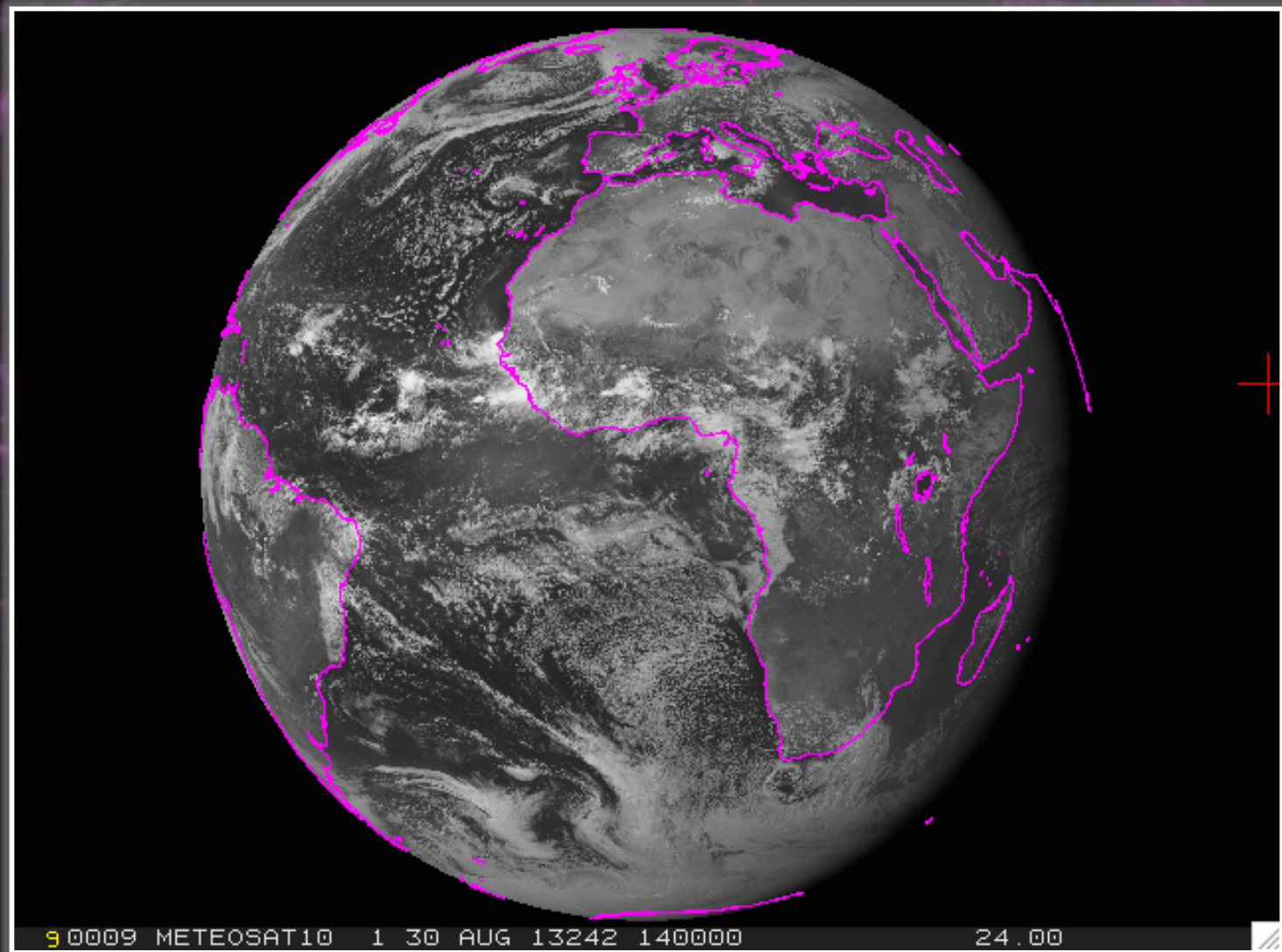
INSAT 3D server

IMGDISP INSAT3D/FD.3730 71 BAND=1 LATLON=10 -80 REFRESH='SF (IMA) MAP'



0071 INSAT3D-IMG1 27 MAY 15147 060000 04056 04752 01.00

Native MSG L1.5 server (MSGGS)



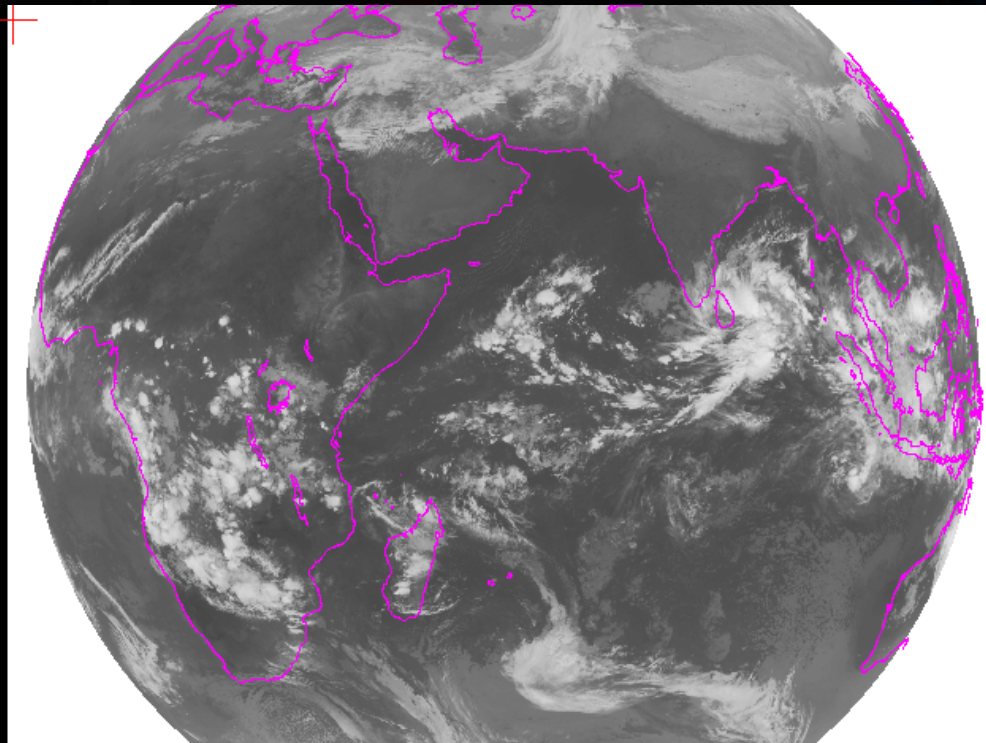
FSD (LRIT) server update

- GOES15, GOES13, MET7, MTSAT2

```
DSSERVE ADD FSD/MET7 FSDX TYPE=IMAGE DIRFILE=/home/mcuser/inquiry-data/mcidas-x/15564/MET7/*  
Adding the group FSD as a local dataset
```

Group/Descriptor	Type	Format & Range	RT Comment
FSD/MET7	IMAGE	FSDX DIRFILE=/home/mcuser/inquiry-data/mcidas-x/15564/MET7/*	

```
DSSERVE: done
```



Currently in testing – Grid, point, misc.

- FRANGE= keyword bug fix
- GRDLIST with LEV= using [MB] & [HPA]
- Access to large grids
- UACROSS with more than 100 levels
- LFC/LCL, Precipitable water calculation adjustments for UA* commands
- PTLIST computed parameters with missing values
- STNDB.CORE updated GFS/NAM MOS stations
- mctext fix to prevent crashing (JSC)

FRANGE= bug fix

- When you request too many FHOURLs, you will get an informative error message

```
-----  
ECHO "THE OLD CODE"  
THE OLD CODE  
GRDLIST RTGRIDS/GFS-USLC DAY=2015156 TIME=0 PAR=PCP NUM=ALL FRANGE=12 72  
GRDLIST: Server error -4 in Database query  
GRDLIST - done  
ECHO "THE NEW CODE"  
THE NEW CODE  
GRDLIST RTGRIDS/GFS-USLC DAY=2015156 TIME=0 PAR=PCP NUM=ALL FRANGE=12 72  
GRDLIST: Too many FHOURLS in request.  
GRDLIST - done  
GRDLIST RTGRIDS/GFS-USLC DAY=2015156 TIME=0 PAR=PCP NUM=ALL FRANGE=12 72 6  
Dataset position 1      Directory Title= /GFS.96.2015156.0.72.211.grib  
PAR  LEVEL      DAY      TIME      SRC  FHR  FDAY      FTIME      GRID  PRO  
-----  
PCP  SFC         05 JUN  15156  00:00:00  GFS   72  08  JUN  15159  00:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   66  07  JUN  15158  18:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   60  07  JUN  15158  12:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   54  07  JUN  15158  06:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   48  07  JUN  15158  00:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   42  06  JUN  15157  18:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   36  06  JUN  15157  12:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   30  06  JUN  15157  06:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   24  06  JUN  15157  00:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   18  05  JUN  15156  18:00:00  N/A  LAMB  
PCP  SFC         05 JUN  15156  00:00:00  GFS   12  05  JUN  15156  12:00:00  N/A  LAMB  
Number of grids listed = 11  
GRDLIST - done
```

GRD* commands with LEV= using [MB] & [HPA]

Old Server

GRDLIST RTGRIDS/GFS-GLME1POD DAY=157 TIME=12 PAR=U LEV=300[MB]

GRDLIST: No grid found matching search conditions

GRDLIST - done

GRDLIST RTGRIDS/GFS-GLME1POD DAY=157 TIME=12 PAR=U LEV=300[HPA]

Dataset position 1 Directory Title= /GFS-GLME1POD.96.2015157.1200.38

PAR	LEVEL	DAY	TIME	SRC	FHR	FDAY	FTIME	GRID	PRO
U	300 HPA	06 JUN	15157 12:00:00	GFS	384	22 JUN 15173	12:00:00	N/A	MERC

Number of grids listed = 1

GRDLIST - done

New Server

GRDLIST RTGRIDS/GFS-GLME1POD DAY=157 TIME=12 PAR=U LEV=300[MB]

Dataset position 1 Directory Title= /2015157152344.grib2.236ac82f-60

PAR	LEVEL	DAY	TIME	SRC	FHR	FDAY	FTIME	GRID	PRO
U	300 MB	06 JUN	15157 12:00:00	GFS	0	06 JUN 15157	12:00:00	N/A	MERC

Number of grids listed = 1

GRDLIST - done

GRDLIST RTGRIDS/GFS-GLME1POD DAY=157 TIME=12 PAR=U LEV=300

Dataset position 1 Directory Title= /2015157152344.grib2.236ac82f-60

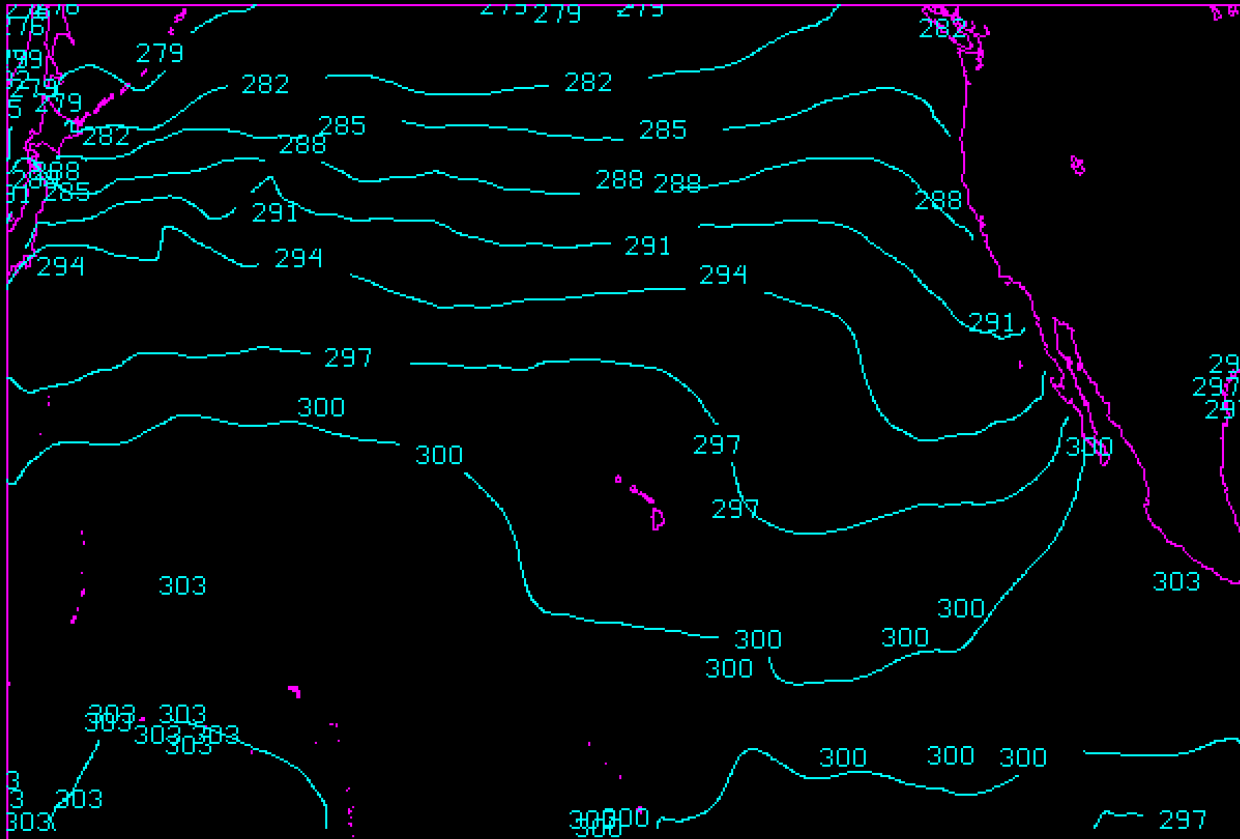
PAR	LEVEL	DAY	TIME	SRC	FHR	FDAY	FTIME	GRID	PRO
U	300 HPA	06 JUN	15157 12:00:00	GFS	0	06 JUN 15157	12:00:00	N/A	MERC

Number of grids listed = 1

GRDLIST - done

Access to large grids

Change in g2clib code vs. Using `-ulimit`



T (K) SFC TIME 0Z DAY 2012326 VALID 2012326/00Z

GRDLIST BIG/GRID FORM=ALL

Dataset position 1 Directory Title= /SST-#173.20121121_00_000.grib2

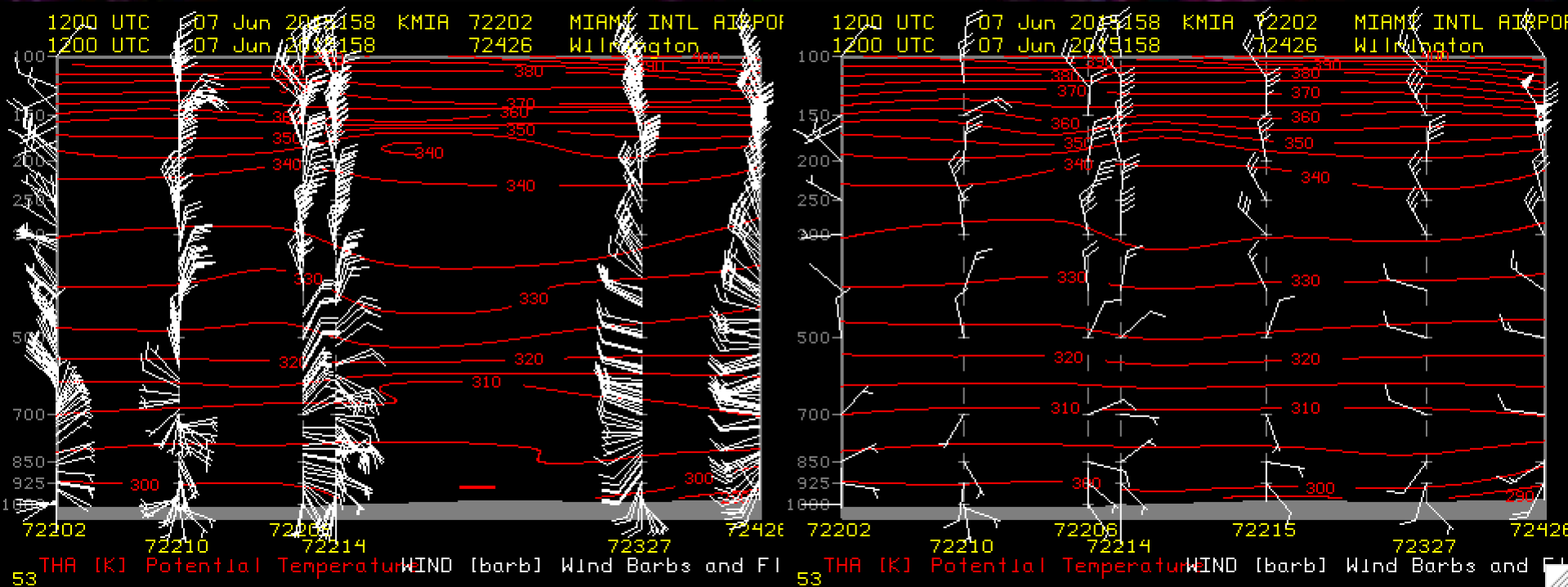
PAR	LEVEL	DAY	TIME	SRC	FHR	FDAY	FTIME	GRID	PRO
T	SFC	21	NOV 12326 00:00:00	SST	0	21	NOV 12326 00:00:00	1	MERC
Total pts=9331200		Num rows=2160		Num columns=4320		received:		0 000000Z	

UACROSS with more than 100 levels

UACROSS KMIA KGRB SIG=YES PARAM=THA WINDB

New -XCD

Current -XCD



LFC/LCL, Precipitable water calculation adjustments for UA* commands

Parcel Definition for 100 mb Boundary Layer: 1200 UTC 01 May 1989121

Dewpoint Temperature (TD) = 19.6 C
Potential Temperature (Th) = 296.9 K
Equivalent Potential Temperature (ThE) = 336.7 K
Mixing Ratio (MIX) = 15.0 g/kg

Stability Indices and Levels:

Lifted Condensation Level (LCL) = 946 mb
Temperature at LCL (TLCL) = 19.1 C
Level of Free Convection (LFC) = 946 mb
Equilibrium Level (EL) = 277 mb
Convective Temperature (CVT) = 22.4 C
Forecast Maximum Temperature (FMAX) = 28.5 C

K Index (KI) = 5.2
Lifted Index (LI) = -1.3
Severe WEATHER Threat Index (SwI) = 277.7
Showalter Index (ShI) = 12.6
Total Totals Index (TTI) = 25.9

Precipitable Water (PW) = 29.7 mm

Energy Analysis:

Helicity (HELI) = 600 m**2/s**2
Convective Available Potential Energy (CAPE) = 591 J/kg
Convective Inhibition (CIN) = 34 J/kg

Theta-E for Forecast Maximum Temperature = 340 K
CAPE for Forecast Maximum Temperature = 1100 J/kg

Maximum Theta-E at or below 300 mb = 345 K
Pressure Level of Maximum Theta-E = 1016 mb
CAPE for Maximum Theta-E = 2042 J/kg

PTLIST computed parameters with missing values

```
PTLIST RTPTSRC/SFCHOURLY PAR=ID ST TIME CIGC CC1 CC2 'TCOV=P1+P2+P3'
  ID   ST TIME[HMS]      CIGC      CC1      CC2  TCOV
-----
KMSN  WI      100000      2              8
KMSN  WI      110000              5      1      8
KMSN  WI      120000              5      1      8
KMSN  WI      130000      2              8
KMSN  WI      140000      2
KMSN  WI      150000              5      1
KMSN  WI      160000              5      1
KMSN  WI      170000      2      2
KMSN  WI      180000      2      2
Number of matches found = 9
PTLIST: Done
```

```
PTLIST RTPTSRC/SFCHOURLY PAR=ID ST TIME CIGC CC1 CC2 'TCOV=P1+P2+P3'
  ID   ST TIME[HMS]      CIGC      CC1      CC2  TCOV
-----
KMSN  WI      100000      2              8
KMSN  WI      110000              5      1      8
KMSN  WI      120000              5      1      8
KMSN  WI      130000      2              8
KMSN  WI      140000      2
KMSN  WI      150000              5      1
KMSN  WI      160000              5      1
KMSN  WI      170000      2      2
KMSN  WI      180000      2      2
Number of matches found = 9
PTLIST: Done
```

STNDB.CORE updated GFS/NAM MOS stations

DC - KDCA
MD - K2W6, KCBE, KCGS, KDMW, KFME, KNUI
NJ - K12N
NY - KPBG, KRME
PA - KLOM, KUKT
VA - K6V3, KEMV, KFYJ, KJGG, KRMN
VT - K1V4
WV - K48I, KI16, KW22, KW99
FL - K40J, KBCT, KSUA
GA - K3J7, K47A, KBGE, KBIJ, KDBN, KDQH, KHQU, KJYL, KLZU, KMGR
NC - K1A5, KCPC, KEHO, KEYF, KFFA, KGWW, KHNZ, KJQF, KLHZ, KONX
PR - TJBQ, TJMZ, TJPS, TJSJ
VI - TKPK, TNCM
IA - KIIB, KMPZ, KPEA, KVTI
SC - KHXD
IL - K3LF, KAJG, KCIR, KCUL, KM30, KRSV, KSFY
IN - KASW, KOKK
KS - KP28, KPTT
KY - K1A6, KGLW, KOWB
MI - KCFS, KFKS, KLWA, KP53, KP58, KP59, KPZQ, KRNP, KVLL
MN - KACQ, KCDD, KCFE, KFKA, KGDB, KHZX, KLYV, KSYN, KTKC
MO - KLXT
ND - KBWP, KN60
NE - KAFK, KBVN, KHJH, KIBM, KLCG, KMLE, KTIF
SD - K2WX, K8D3, K9V9, KD07, KICR
AL - K3A1, K4A9, K79J, KALX, KHUA
AR - KASG, KAWM, KMEZ
LA - KACP, KAQV, KDNK, KDRI, KIER, KP92
MS - KUTA
OK - K1F0, KAQR, KAVK, KAXS, KCLK, KCUH, KRQO
TX - K6R6, KAQO, KATT, KBBB, KBKS, KBPG, KBWD, KBYY, KCPT, KDKR, KDUX, KE38, KEBG, KECU, KERV, KF05, KFWS, KGDJ, KGNC, KGOP, KGPM, KGVV, KGYB, KHBV, KHHF, KHQZ, KINJ, KJAS, KJDD, KJSO, KJWY, KJXI, KLBR, KLHB, KLNC, KLUD, KMDD, KMKN, KORG, KOSA, KPEQ, KPKV, KPPA, KPSN, KPWW, KPYX, KRAS, KRBO, KRPH, KRWV, KSEP, KSLR, KSNK, KSOA, KSWW, KT65, KT82, KUVA, KXBP
AZ - KEGU, KSOW
CO - K04V, K20V, K4BM, K7BM, KFCS, KMYP
ID - KP69, KSZT
MT - KGPI
NV - KBJN, KHND, KINS, KP68
UT - K4BL, K4HV
WY - KP60, KPNA
OR - KBOK, KRDM
WA - KBVS, KORS
CA - K9L2, KAUN, KNKX, KVCV
AK - PAOH, PAHL, PPIZ

New XRD development

- WXSymb
- SATCOMP
- GVARINFO update

WXSYMB

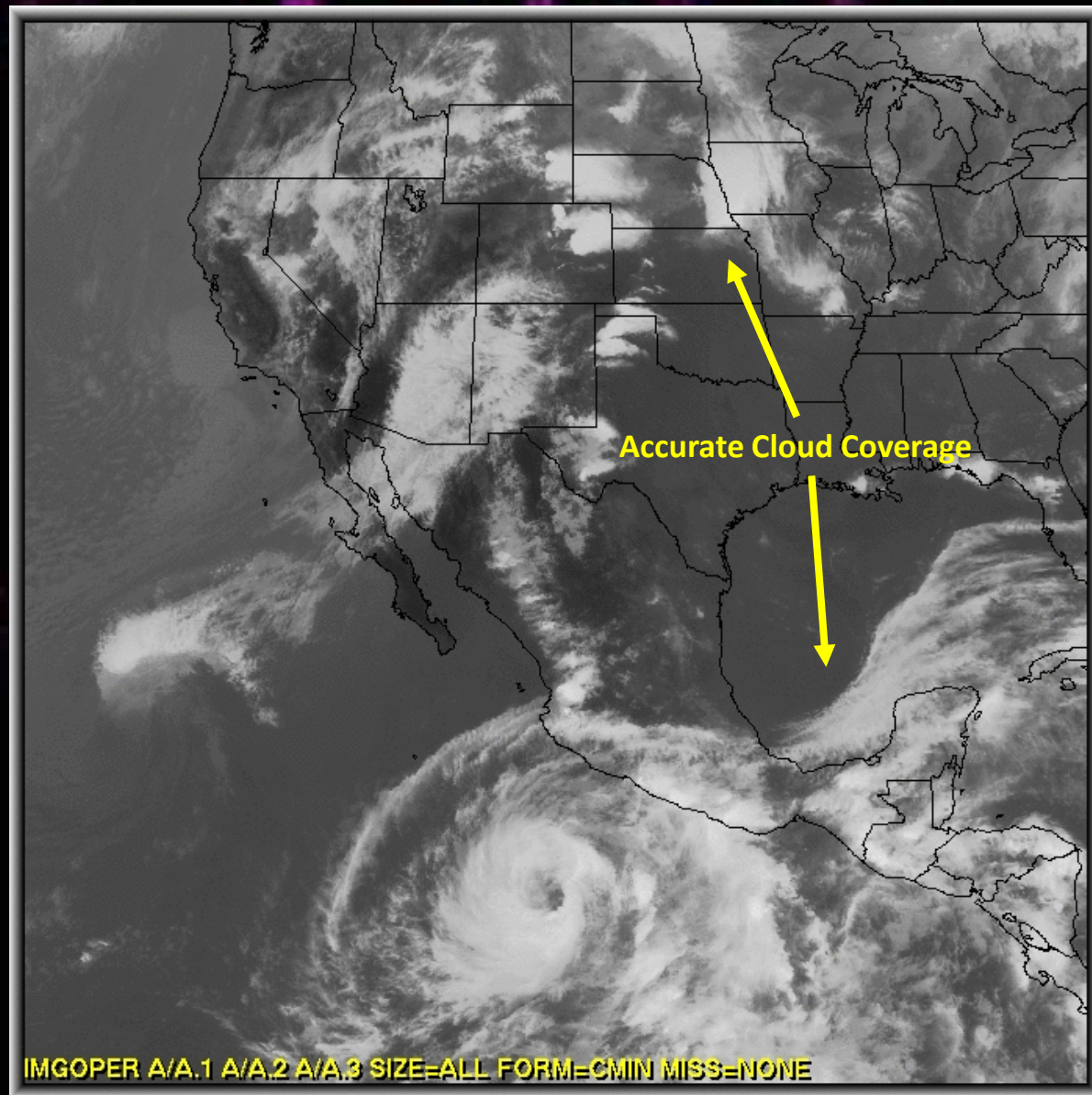


SATCOMP

Customize overlap region
– reduces parallax errors



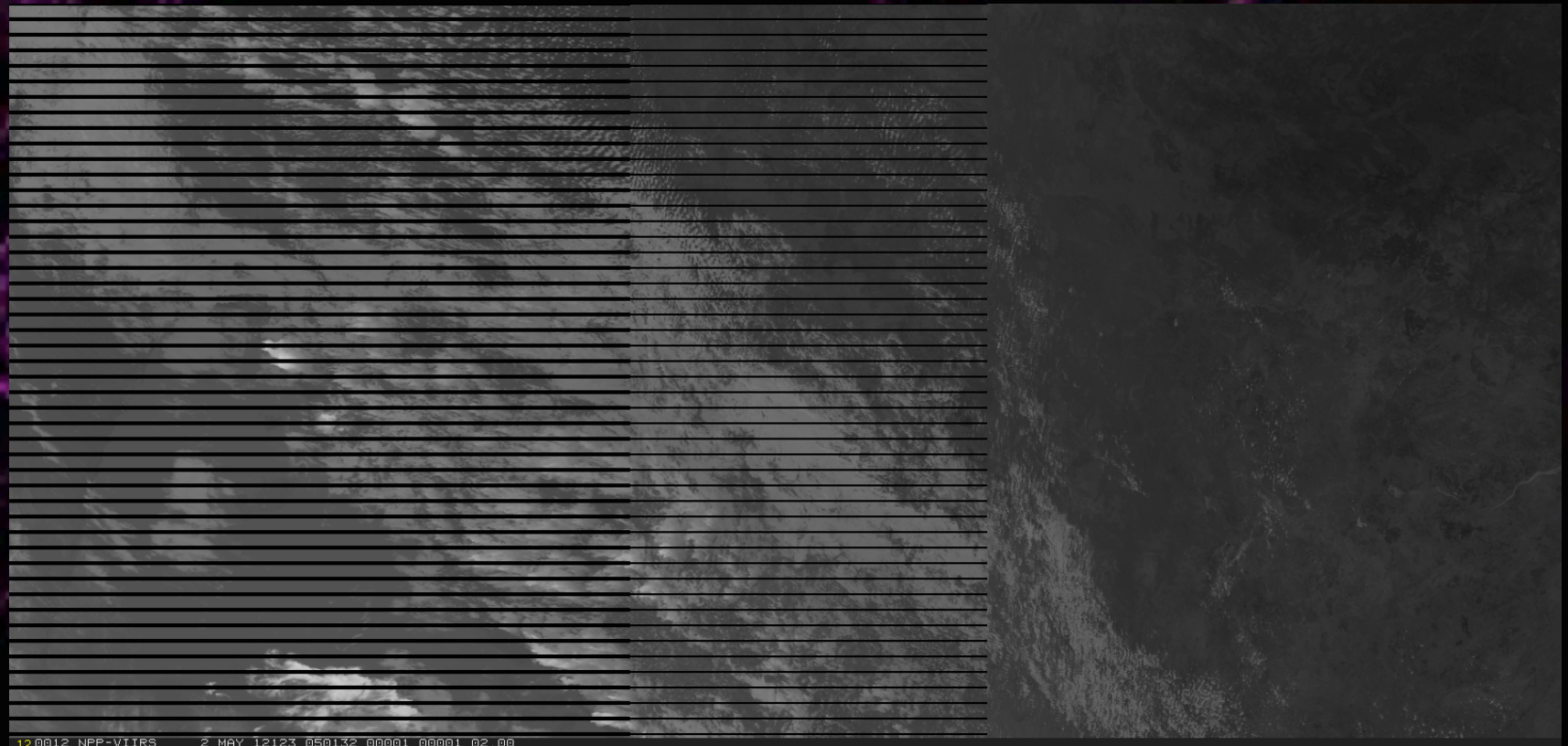
GOES-West/East
5km Parallax Overlap



.....and beyond

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

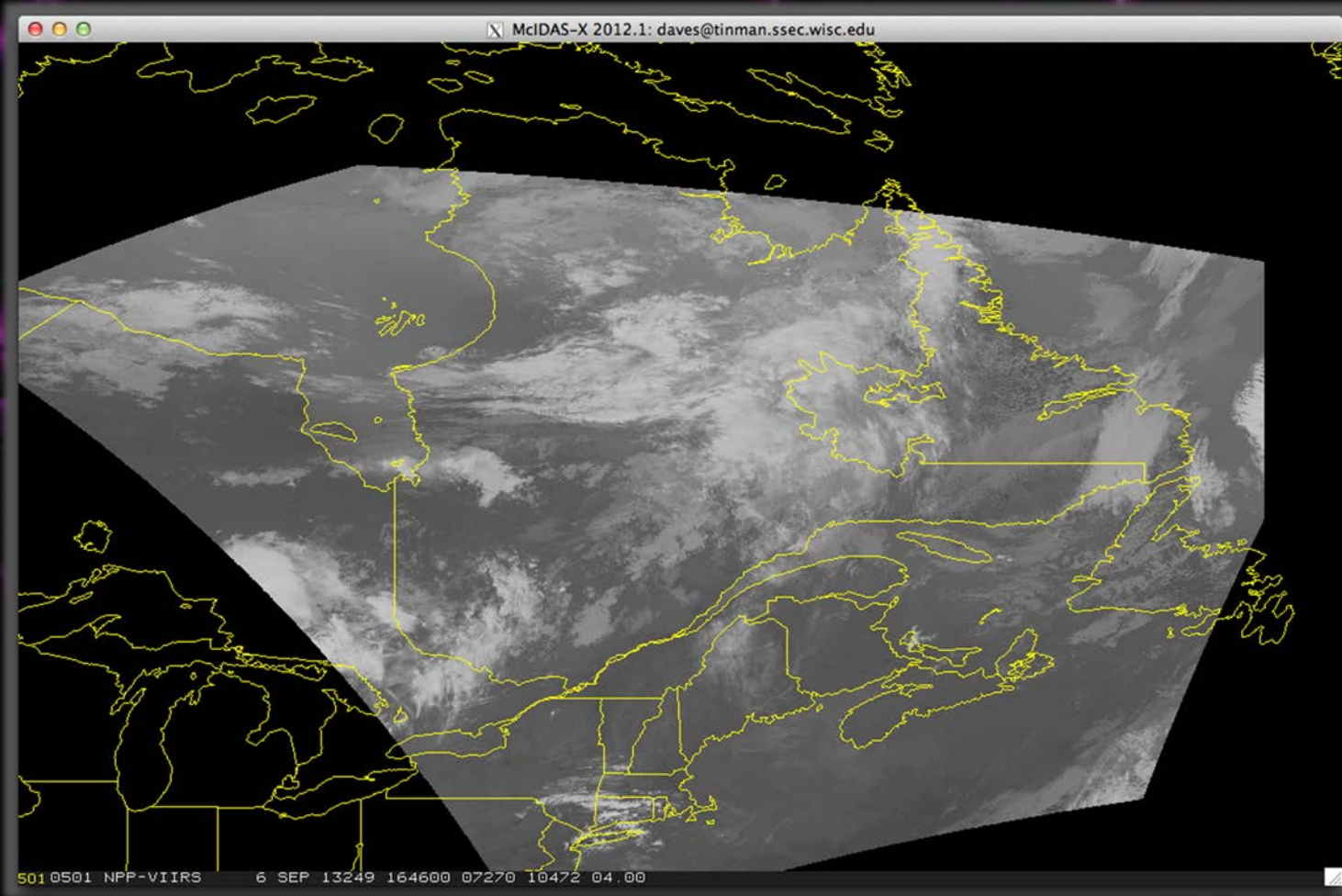
VIIRS ADDE Server



Left half of VIIRS granule with bowtie deletion

polar2grid

Bowtie removal for MODIS and VIIRS Images



Next Generation ADDE

- Still in the planning stage
 - Make use of McIDAS-V file adapters
 - Interface to the netCDF 4 Java library
 - Use Java or Python/Jython?
- All data formats that McIDAS-V can read locally, will also work remotely
- On hold, pending funding