

McIDAS-X Software Development and Demonstration

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Overview

- McIDAS-X 2015.2, 2016.1, 2016.2
- McIDAS-XCD 2015.2, 2016.2
- Software development and plans for 2017 and beyond...

Imagery

GOES-R ABI

- ABI ADDE servers released
 - Level 1B
 - Level 2+ products
- Navigation routines support satellite and sun angles through NAVCALC

Imagery

Himawari

- HimawariCast ADDE server (*WARC*)
 - Himawari AHI data reshaped as MTSAT and broadcast by JMA in HRIT format
- Updates for Himawari data (*WARI*)
 - Correct time for Japan and Target sectors
 - *SIZE=SAME* with *MAG=* specification
 - Displays partial images

Imagery

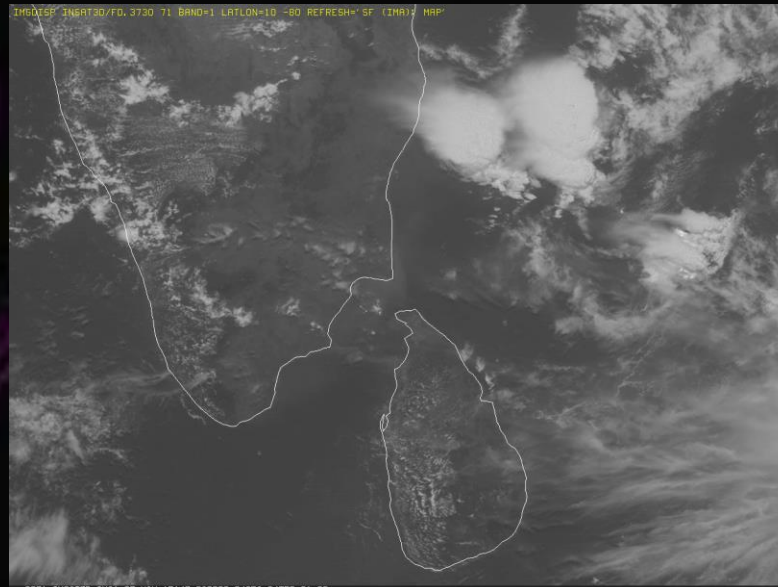
Meteosat

- Updates to ADDE servers for Meteosat-11
- MSG Level 1.5 support (*MSGs*)
 - First release of ADDE server for native format of current Meteosat data broadcast by EUMETSAT

Imagery

India

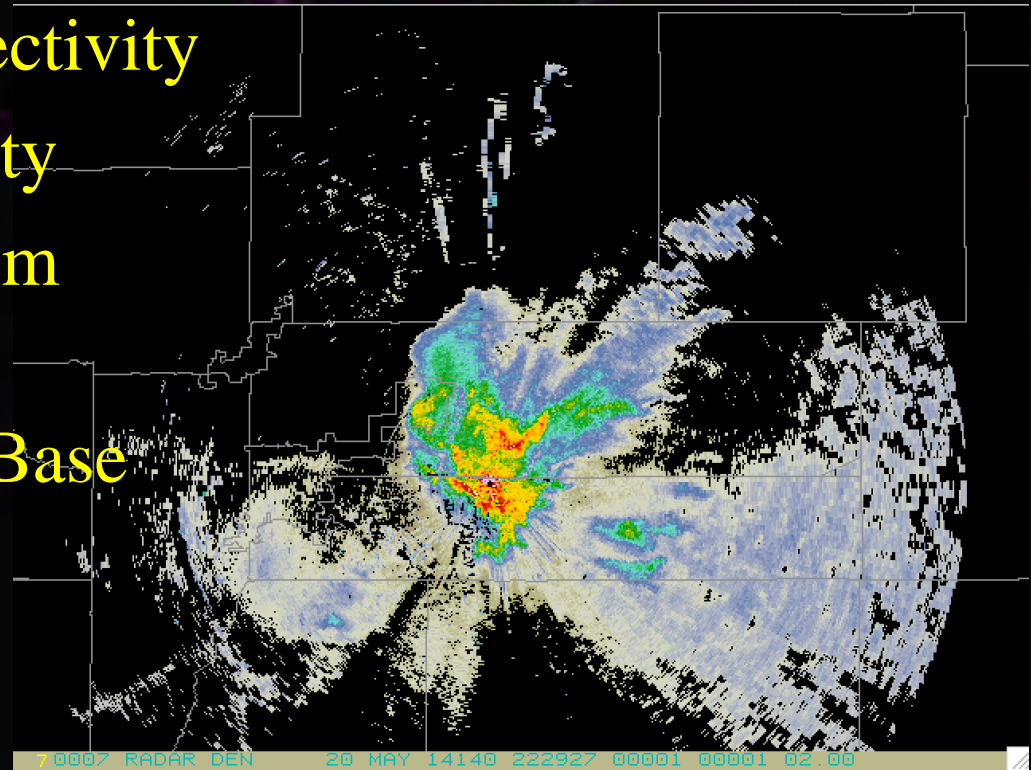
- Kalpana (KPH5) ADDE server released
- Updates for calibration for INSAT-3D Imager and Sounder ADDE servers



Imagery

TDWR radar products

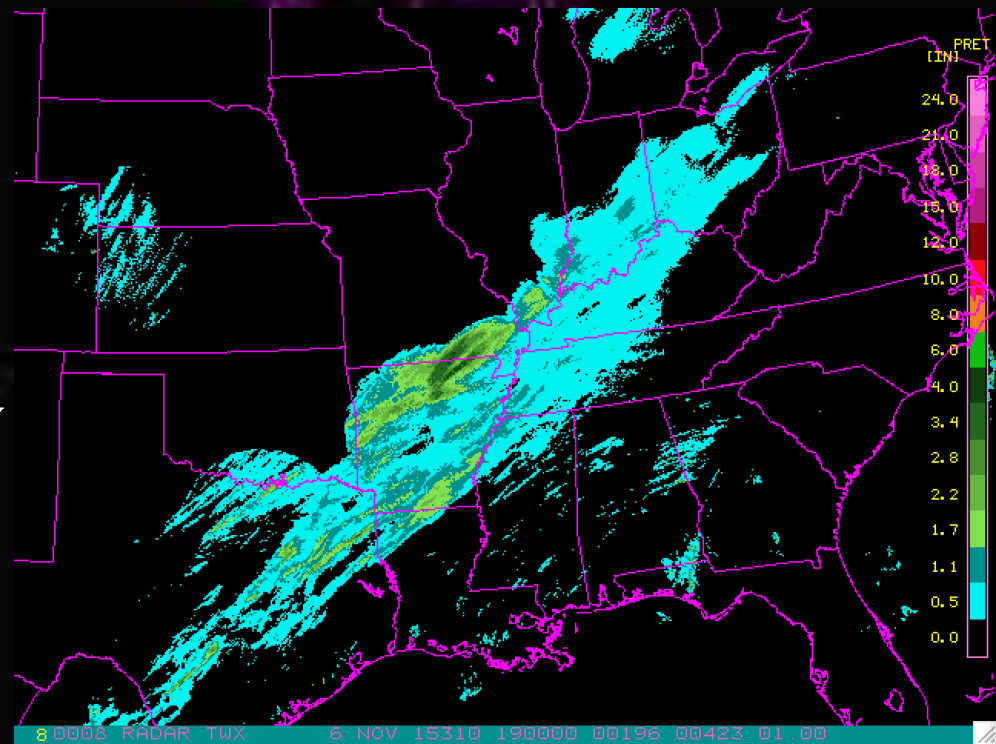
- 256-level Base **Reflectivity**
- 16-level Base **Velocity**
- 8-level Base **Spectrum Width**
- 16-level long range Base **Reflectivity**



Imagery

NEXRAD Level III

- GINI server updated for NEXRAD Level III composite imagery



Imagery

Meteosat-7

- *MSAT* and *OMTP* ADDE servers

IMGLIST INDOEX/FD FORM=ALL

Image file directory listing for:INDOEX/FD

Pos	Satellite/ sensor	Date	Time	Center		Res (km)		Image_Size	
				Lat	Lon	Lat	Lon		
1560	METEOSAT7	2 JUN 16154	12:00:00	0	-57				
	Band: 1	0.75 um	VIS Cloud and Surface Features	2.26	2.25	5000	x	5000	
	Band: 8	11.5 um	IR Surface/Cloud-top Temp	4.52	4.49	2500	x	2500	
	Band: 10	6.9 um	IR Mid-level Water Vapor	4.52	4.49	2500	x	2500	
	proj:	0	created: 2016154 120000	mem:	Open MTP Format corrected time				
	type:MSAT	cal	type:RAW						
	offsets:	data=	768	navigation=	256	calibration=	0	auxiliary=	0
	doc length:	0	cal length:	0	lev length:	0	PREFIX=	0	
	valcod:	0	zcor:	1	avg-smp:	A			
	start yyddd:	2016154	start time:	120000	start scan:	1			
	lcor:	1	ecor:	1	bytes per pixel:	1	ss:	58	
	Resolution Factors (base=1):	Line=	2.0	Element=	2.0				

IMGLIST: done

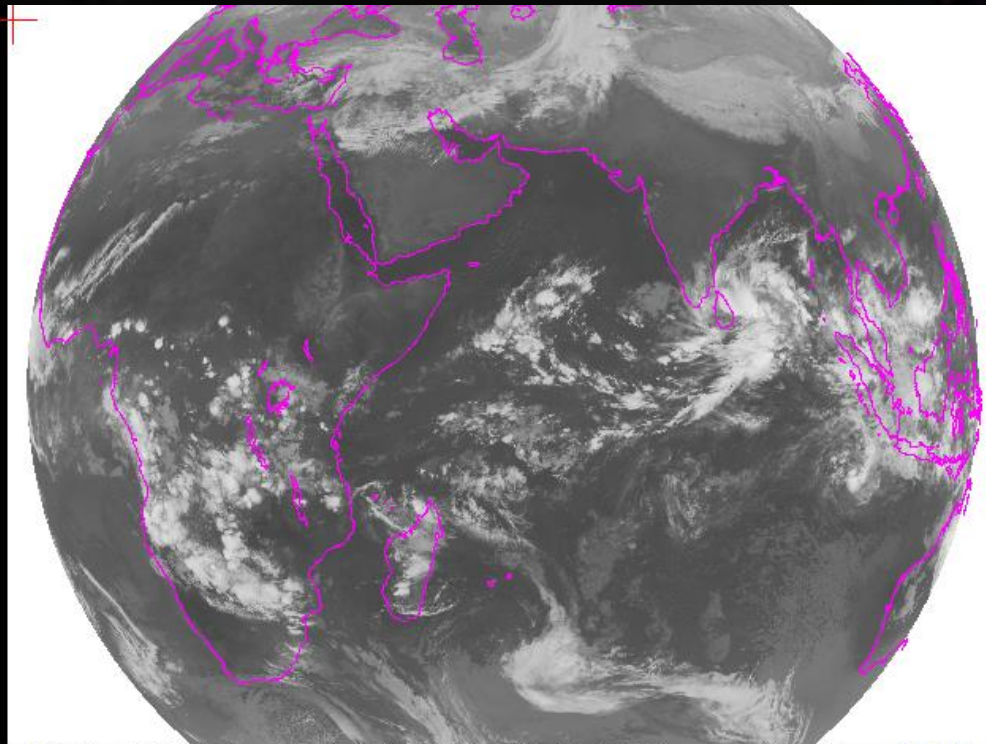
FSD (LRIT) server update

MET7

```
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/MET 7/*	

DSSERVE: done



Imagery

Multi-day requests GOES archive

- **IMGLIST** can span days for GOES archive requests

```
IMGLIST AGOES13/FD.ALL DAY=310 311 TIME=8 15
```

```
Image file directory listing for:AGOES13/FD
```

Pos	Satellite/ sensor	Date	Time	Center		Band(s)
				Lat	Lon	
3	G-13 IMG	5 NOV 16310	08:45:00	0	80	1-4,6
4	G-13 IMG	5 NOV 16310	11:45:00	0	80	1-4,6
5	G-13 IMG	5 NOV 16310	14:45:00	0	80	1-4,6
11	G-13 IMG	6 NOV 16311	08:45:00	0	80	1-4,6
12	G-13 IMG	6 NOV 16311	11:45:00	0	80	1-4,6
13	G-13 IMG	6 NOV 16311	14:45:00	0	80	1-4,6

```
IMGLIST: done
```

Imagery

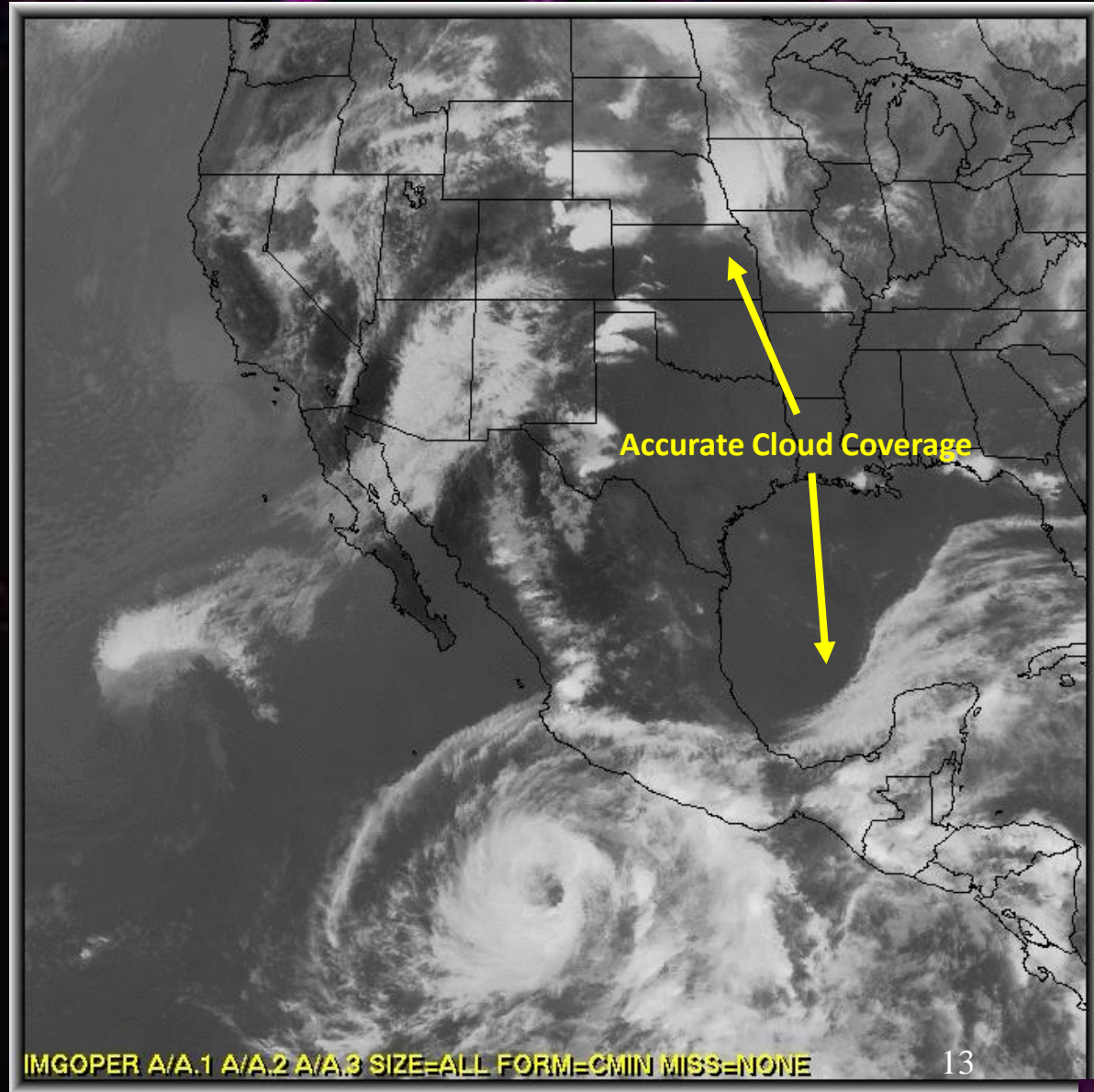
- **IMGPROBE**: Scan line time available for COMS and Himawari
 - Time are approximate; rectified images
- **IMGCOPY SIZE=SAME MAG= -N**
 - Example: 2500x2500 image MAG=-5 results in 500x500 image

SATCOMP (-XRD)

Customize overlap region
– reduces parallax errors



GOES-West/East
5km Parallax Overlap



Imagery (XRD)

IMGCHECK

- Statistics on entire image (1-byte BRIT values)
- Average, standard deviation, variance, histogram

```
IMGCHECK EASTL/CONUS.-1 BAND=4
```

```
Beginning Image Data transfer, bytes= 6755408
```

```
Beginning Image Data transfer, bytes= 6755408
```

```
Image Statistics
```

```
-----
```

```
Date:      2016320
```

```
Time:      221500
```

```
Number of Pixels = 6328728
```

```
Average = 116.2
```

```
Standard deviation = 49.8
```

```
Variance = 2482.5
```

```
Below minimum ( 0) = 0.0 %
```

```
Above maximum ( 255) = 0.0 %
```

```
Bin 1 ( 0 - 15) = 0.0 %
```

```
Bin 2 ( 16 - 31) = 0.0 %
```

```
Bin 3 ( 32 - 47) = 0.0 %
```

```
Bin 4 ( 48 - 63) = 0.5 %
```

```
Bin 5 ( 64 - 79) = 30.8 %
```

```
Bin 6 ( 80 - 95) = 21.2 %
```

```
Bin 7 ( 96 - 111) = 11.2 %
```

```
Bin 8 ( 112 - 127) = 7.2 %
```

```
Bin 9 ( 128 - 143) = 6.4 %
```

```
Bin 10 ( 144 - 159) = 4.8 %
```

```
Bin 11 ( 160 - 175) = 3.8 %
```

```
Bin 12 ( 176 - 191) = 5.3 %
```

```
Bin 13 ( 192 - 207) = 2.6 %
```

```
Bin 14 ( 208 - 223) = 0.9 %
```

```
Bin 15 ( 224 - 239) = 0.1 %
```

```
Bin 16 ( 240 - 255) = 5.3 %
```

```
TMGCHCK: Done
```

Grids

New models support

- Updates for HRR, GFS, NDF, PSS
- GRIB2 tables updated for RAP, NWPS, WPC, MOS, NAEF, NBGR
- Recognize MOS GRIB2 files from Storm Prediction Center

Grids Updates

- PUNIT keyword
 - Preferred Unit when mixed mb and hPa
- CONTOUR.DEF
 - Handle grids correctly with units of Pa
- Native units
 - More Pa and hPa checking

Point Cloud cover

- Use of cloud cover symbols with PTDISP and SFCPLOT:
 - Symbols using parameters CIGC, CC1, CC2 with FORMAT=SYMB
 - Default for station location
 - Open circle for no clouds reported

Point Upper Air

- Correction to upper air calculations
 - When LFC is below the LCL, it is made equal to LCL
 - Precipitable water (PW) calculation from SFC to 300 hPa (previously it was 500 hPa)
- Update to all upper air commands to use all significant level data

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:

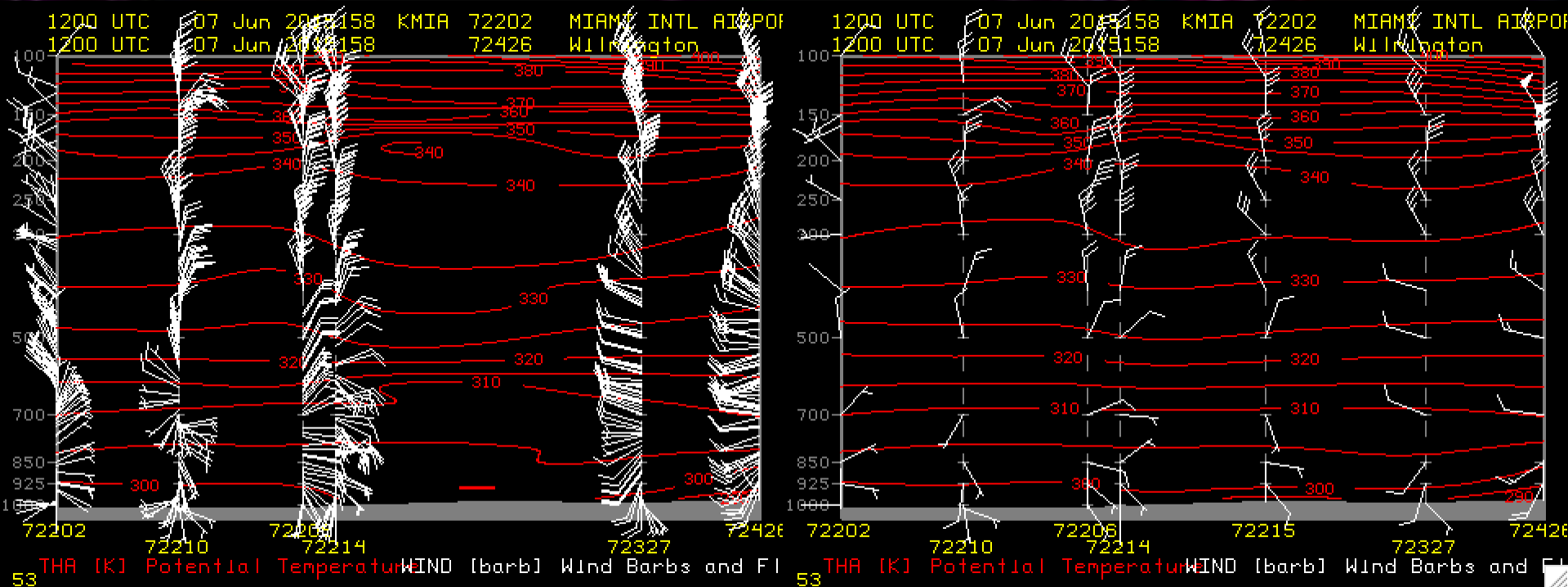
Helicity (HELI)	=	600 m**2/s**2
Convective Available Potential Energy (CAPE)	=	591 J/kg
Convective Inhibition (CIN)	=	34 J/kg
Theta-E for Forecast Maximum Temperature	=	340 K
CAPE for Forecast Maximum Temperature	=	1100 J/kg
Maximum Theta-E at or below 300 mb	=	345 K
Pressure Level of Maximum Theta-E	=	1016 mb
CAPE for Maximum Theta-E	=	2042 J/kg

UACROSS with more than 100 levels

UACROSS KMIA KGRB SIG=YES PARAM=THA WINDB

New -XCD

Current -XCD



Point Updates

- Correctly interpret missing grid points with math calculations and contouring
- DAY= keyword added to RAOBPLOT, RAOBCON, SFCPLOT, SFCCON to access archive server

PTLIST computed parameters with missing values

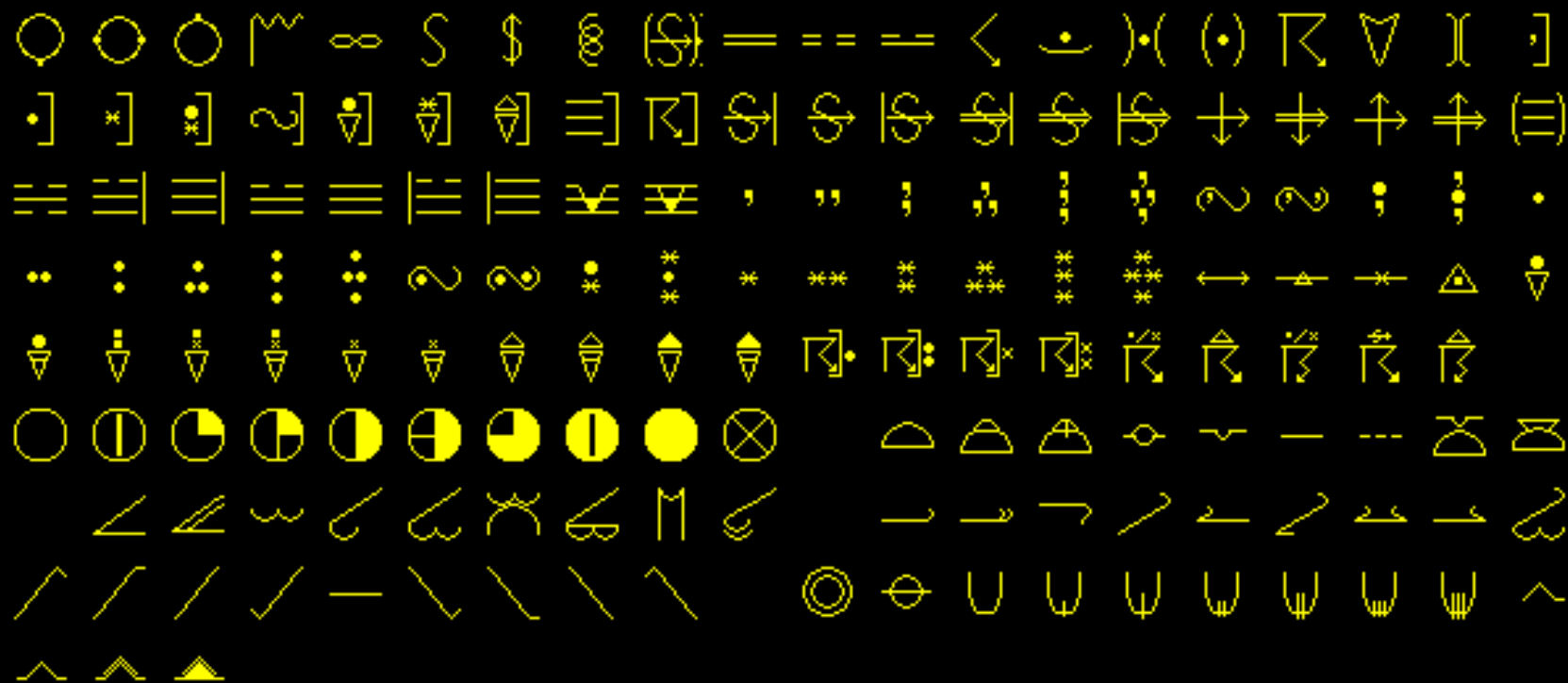
```
PTLIST RTPTSRC/SFCHOURLY PAR=ID ST TIME CIGC CC1 CC2 'TCOV=P1+P2+P3'
  ID   ST TIME[HMS]      CIGC      CC1      CC2  TCOV
-----
KMSN  WI      100000      2              8
KMSN  WI      110000              5      1      8
KMSN  WI      120000              5      1      8
KMSN  WI      130000      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
```

Miscellaneous

- **WWDISP/WWLIST: Blizzard Watch** enabled
- **FRMLABEL/ZA: DESC** placeholder added to list band description of an image

WXSYMB (-XRD)



Miscellaneous

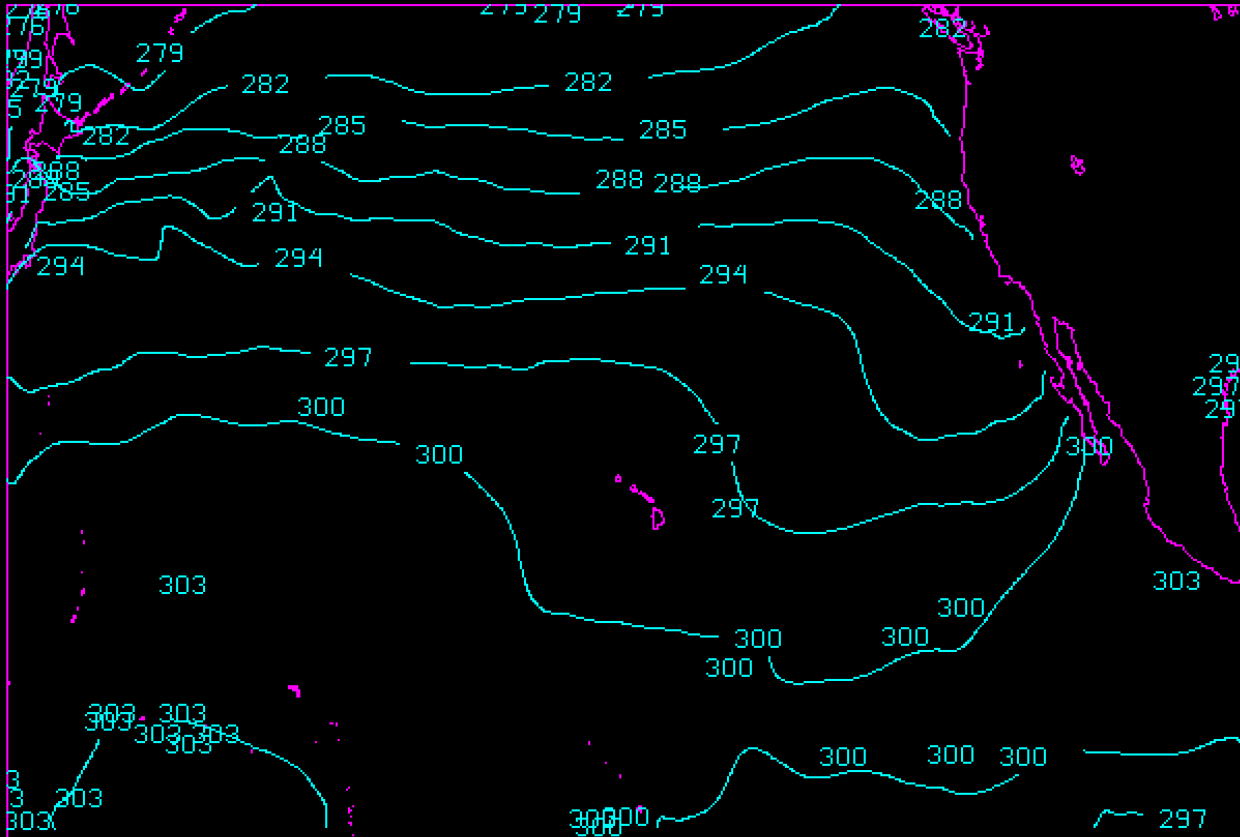
- GZIP/GUNZIP included for ADDE
- Updated AWIPS servers for north pole projection
- Update to maps and station database (NOAA sources)
- Increased maximum number of points for PTCON to 10,000,000

Miscellaneous

- Improved handling of large grids
- Added display swath width to NAVDISP for Fengyun and Metop satellites

Access to large grids

Change in g2clib code vs. Using `-ulimit`



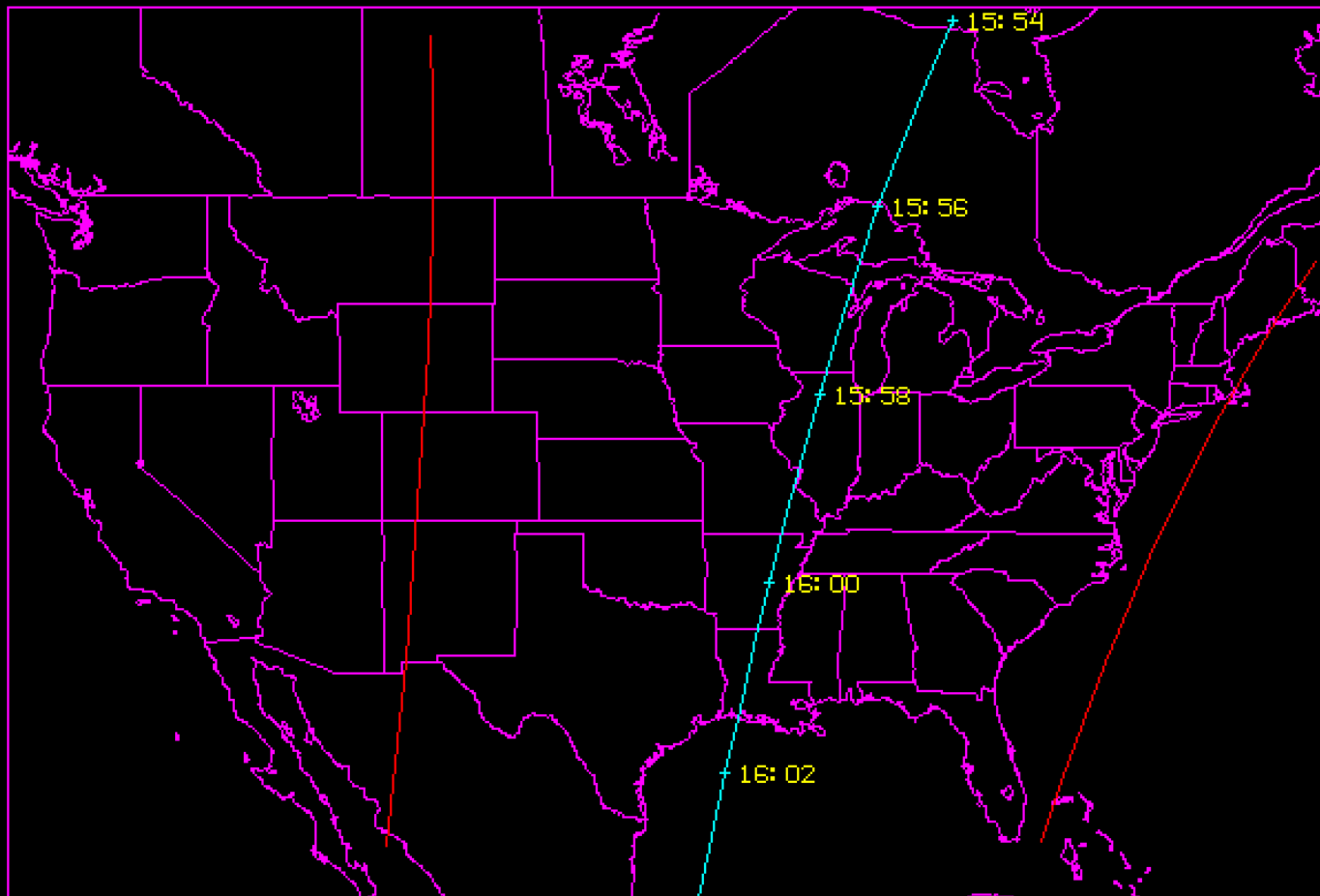
T (K) SFC TIME 0Z DAY 2012326 VALID 2012326/00Z

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

NAVDISP of Metop AVHRR

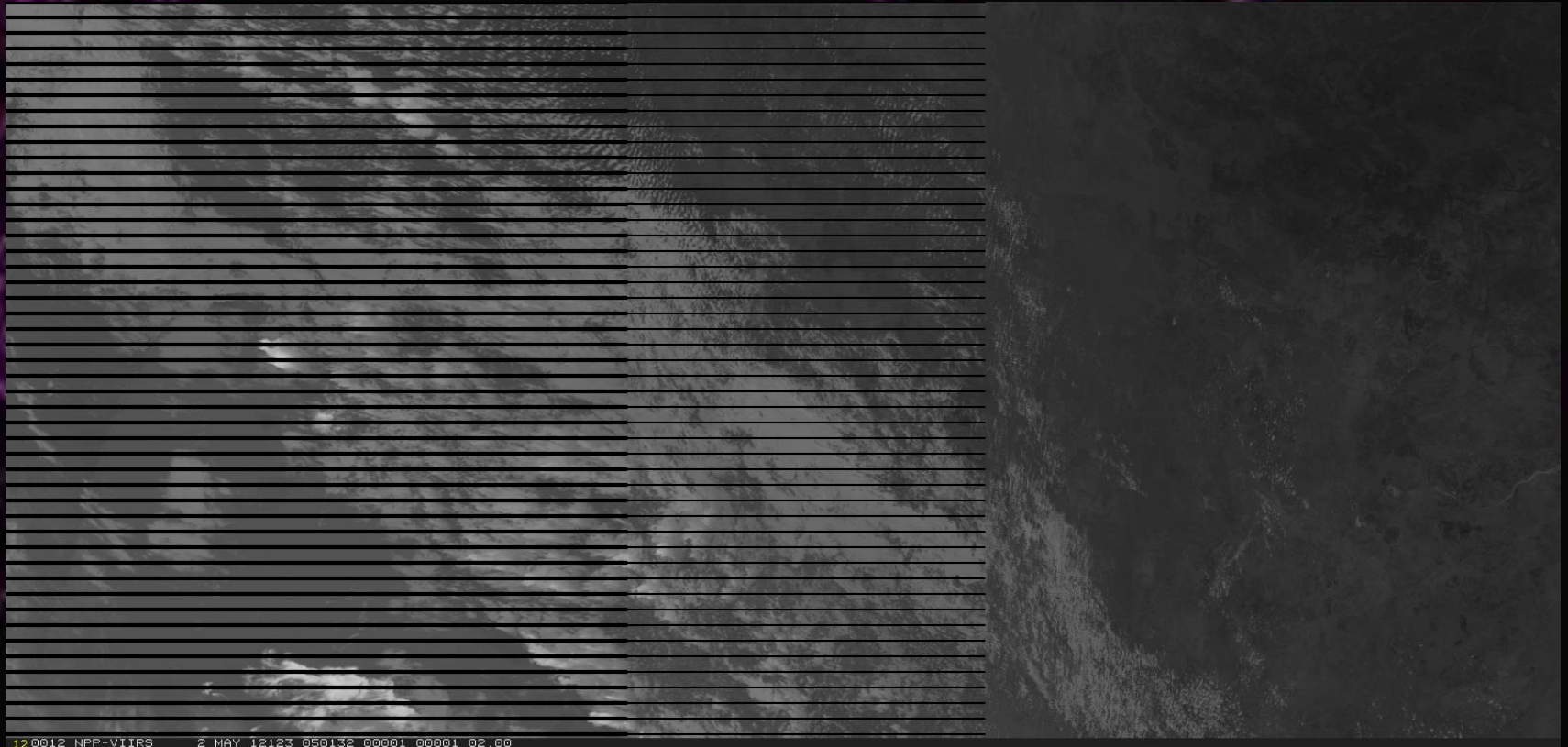


METOP-A AVHRR 2016/11/16

.....and beyond

- VIIRS ADDE Server to –XRD planned
 - Limited functionality
- Multi-band transfers for GOES-R ABI
- Increase maximum image size beyond 4096 elements (graphics limitation)
- Next generation ADDE servers

VIIRS ADDE Server



Left half of VIIRS granule with bowtie deletion