McIDAS-X Software Development and Demonstration

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25 September 2023

Overview

- McIDAS-X 2020.1, 2021.1, 2022.1
- Software development and plans for 2023 and beyond…

Plans from last MUG meeting September 2019

- ✓ Investigate replacement environment for McIDAS-X for Windows 10:
  - ✓ Windows Subsystem for Linux (WSL)
  - ~~✓ Linux Virtual Machine~~
- ✓ Support for VIIRS EDR data
- ✓ Support Python ADDE servers
- ~~✓ Promote from -XRD: GLMIMG~~

GOES Satellites
GOES-R Series ABI

- Support GOES-17 fusion imagery
- Calculate actual data resolution
- Support for Level 2 CMIP
- Corrected 1x1 pixel shift with upper left corner is off image
- New Level 2 products: Aerosol detection of smoke and dust. Level 3 Vlab GLM

GOES Satellites

GOES-R Series ABI with Database

- Database support for archive datasets
- Servers are capable for use with database with GOES-18 and -19
- Fixed error when database is used with a DAY range

Polar Satellites
VIIRS

- Fixes to shortwave IR (band 18; M13) data interrogation (IMGPROBE)
- Improve data output precision for NREF and REF (visible, near IR, SW IR)
- Ability for server to read both SDR and EDR data files

Other Geostationary Satellites

Meteosat

- Added more precision in output of radiance
- New server for Meteosat Third Generation (MTG) Flexible Combined Imager (FCI). Python-based.
  - Added navigation and calibration modules

Other Geostationary Satellites
Himawari, pre-GOES-R

- Himawari
  - Updates for high-resolution band 7
  - EUMETCast version of HimawariCast support
- Electro-optical Infrared Weather System Geostationary (EWS-G1)
  - Updates needed for GOES-13 to EWS-G1
  - EWS-G2 (formerly GOES-15) coming soon

Imagery

- IMGCONV
  - BNOR (blue channel normalization)
    - With Rayleigh scattering correction
  - IDT option to specify limb darkening
- IMGPROBE
  - NORM: histogram normalization
  - Increase BOX limit size to 30M pixels

Imagery

- IMGOPER
  - GAMMA keyword added for RGB images
- NEXR servers updated for super-resolution WSR products
- Improve RGBDISP performance

Display

- DIST updated to handle small distances (< 1km)
- BAR
  - Improvements to graphics, line width
  - BORDER keyword
  - Can handle up to 256 breakpoints from SU (stretch) table

Display

- CM
  - Updated to correctly circulate graphics levels on all supported platforms
- CUR
  - STAT option added to interactively output latitude/longitude/pixel value

Grid

- Grid server updated to handle larger grids (e.g., SST)
- Update to current and access to new models: LMP, NAM, NWPS, URMA, WRFE, MRMS
- Antarctica:
  - Add WRF parameters
  - Improve display over poles

Grid

- Updates to handle GRDIMG navigation and subsecting correctly for high-resolution grids
- GFS
  - New specification for potential vorticity levels
  - Add support for soil temperature
- Grid servers and GRD* commands
  - Handle decimal levels
  - Work with sigma levels (SIGM)

McIDAS-XCD

- Routine updates to STNDB.CORE with new and corrected METAR, TAF, and NAMMOS stations
- Needed updates for zone and county maps with current NWS shapefiles for the WW* commands

McIDAS-XRD

- GRAYLABEL: Label grayscale with brightness temperatures or albedo
  - IMGDISP with GRAY=YES
- RGB.MCB and RGB-VIIRS.MCB
- DAYNITE: Combines visible and IR images at terminator
- NOAA standard enhancement tables
- NOAA STAR enhancement tables

Miscellaneous

- ADDE servers honor the ADDETIMEOUT environment variable; overrides the 600 second default
- REDIRECT command accepts 72 characters for directory path
- Improve cut and paste behavior in McIDAS-X text window
- DATALOC, DSINFO: MATCH= and CASEMATCH= keywords added to list datasets that match conditions

Plans for 2023 and beyond

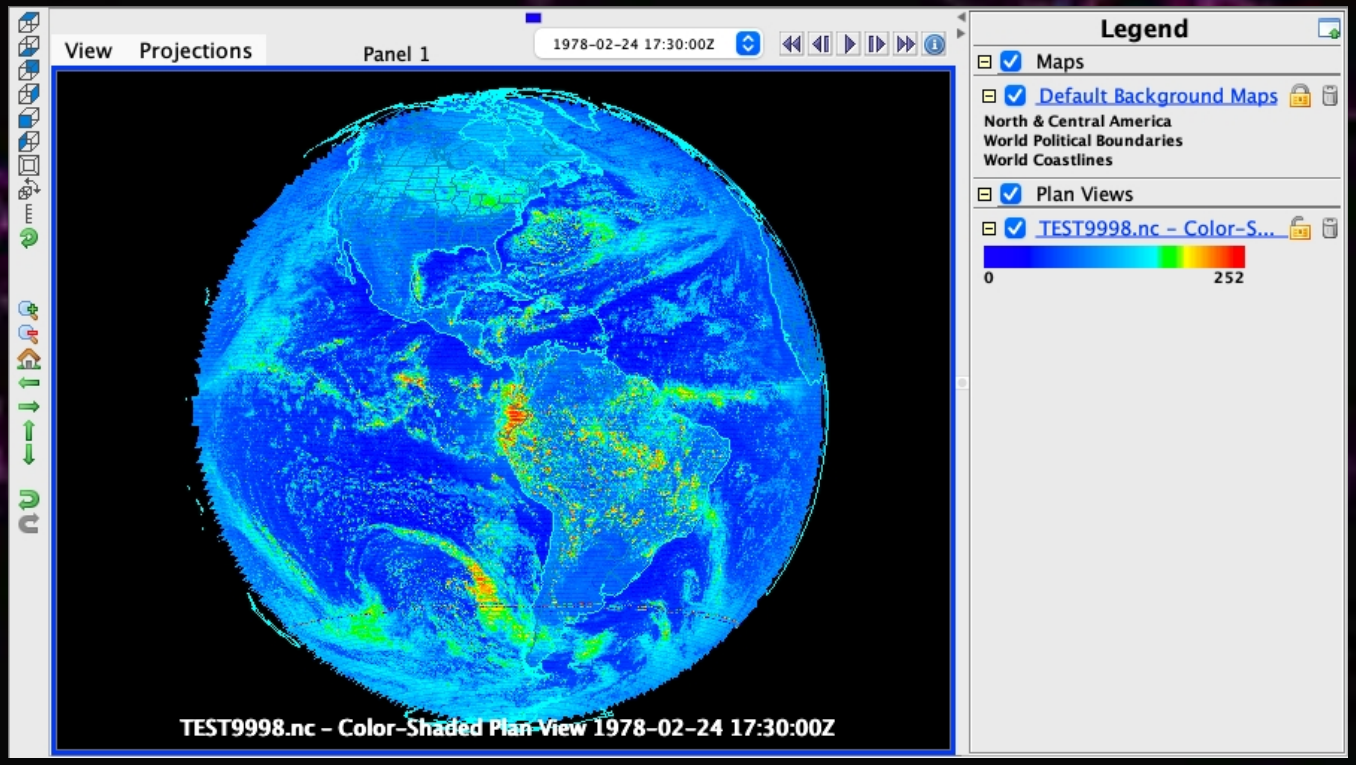
- IMGPROBE, IMGPARM: Add VIIRS scanline time
- GRDIMG: Include scaling for more precision with IMGPROBE
- Update VIIRS RGB recipes (Dust, cloud phase, sea spray, etc.)

Plans for 2023 and beyond

- DSSERVE: Solve race condition when multiple DSSERVE commands are running
- IMGOPER, IMGREMAP: Occasional data-dependent issue with latitude/longitude navigation by pixel

Plans for 2023 and beyond

ADDE netCDF write server: Off-Earth pixels are set to missing; displays correctly in McIDAS-V



Plans for 2023 and beyond McIDAS-XRD

- IMGEU: When used with COMBINE, paneled frames can display images with a seemingly different enhancement for each panel
- SUVI enhancement tables
- Adding ABI day/night rocket plume RGB recipes

New investigation
Python ADDE client

- Functionally the same as IMGCOPY, the Python code:
  - Constructs the ADDE request based on user-input specifications (server, ADDE dataset, subsecting, band, etc.)
  - Sends request to server
  - Returned data written to McIDAS Area

New investigation
Python ADDE client

- Original Python code written by Ioan Ferencik in 2019:
  - pyadde library is a Python 3 implementation of McIDAS ADDE client binary protocol
  - pyarea library is a Python port of McIDAS Area Java reader/writer from the edu.wisc.ssec.mcidas Java package

New investigation
Python ADDE client

- Sophia Reiner (current undergrad) has developed/prototyped additional functionality within the Python environment:
  - User input/Default output display
  - Navigation
  - Reprojecting
  - Output netCDF file

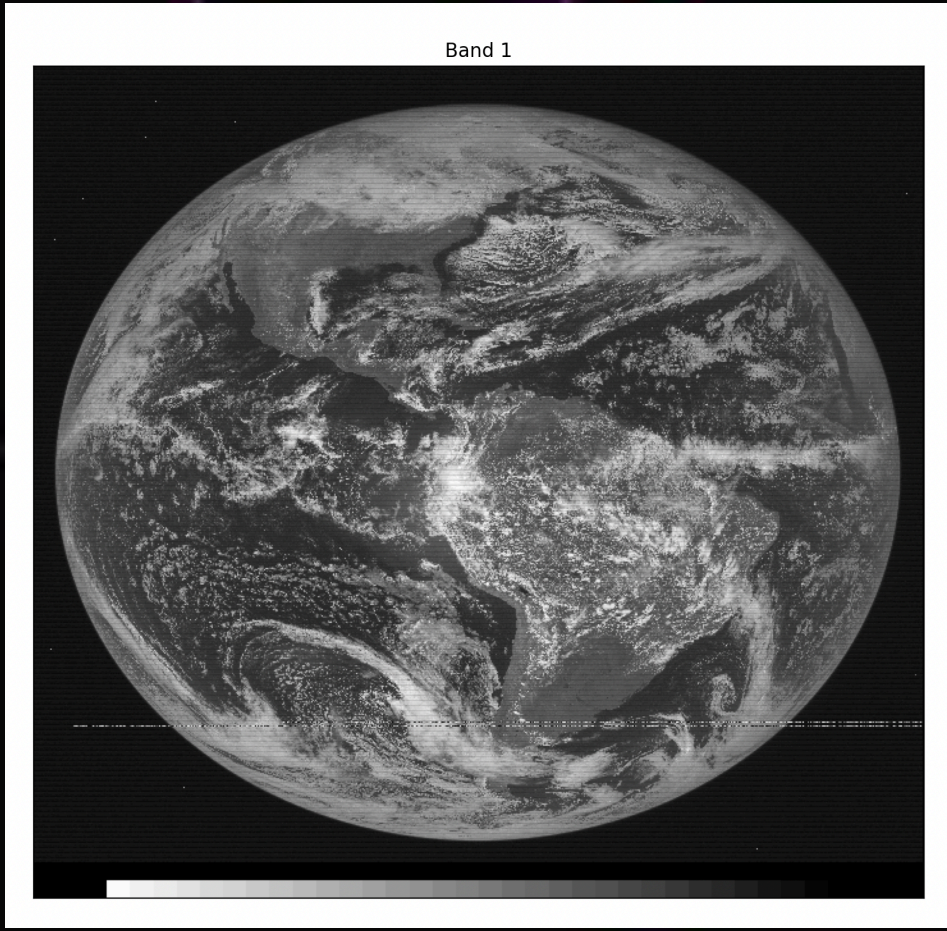
Python ADDE client
User input

- Command line interface to input specifications for retrieving data via ADDE:

```
./fetchfile.py host=archive.ssec.wisc.edu
group=AGOES02 descriptor=A-VIS
file=AREA9998 unit=BRIT nlines=700
nelems=700 lmag=-22 emag=-22 stime=17.5
etime=17.5 position=0 band=1 day=1978055
netcdf=ncdf9998.nc
```

Python ADDE client
Default output display

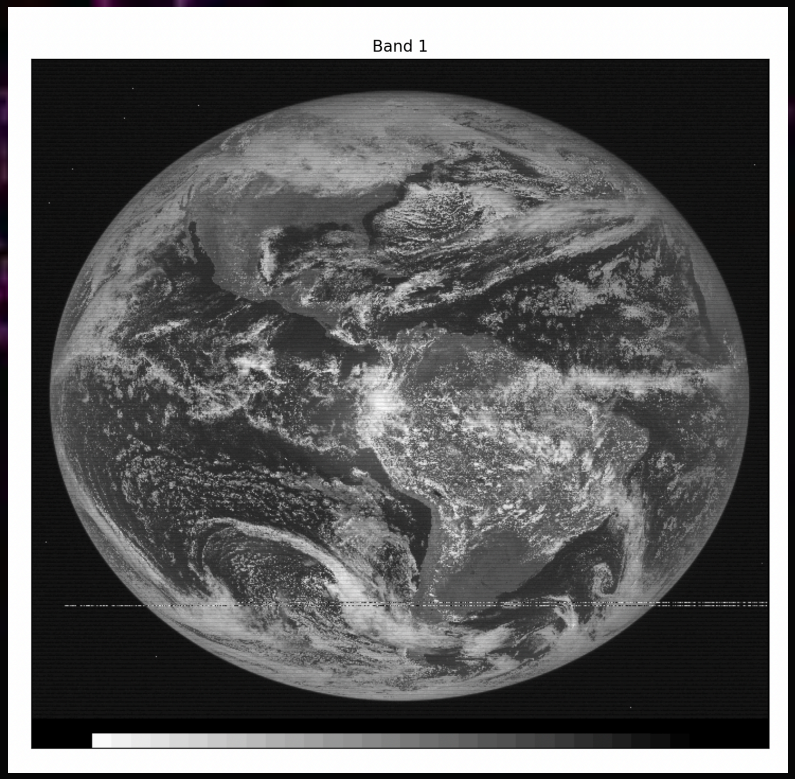
- Any data retrieved can be displayed
- Navigation information not needed for default display
- Calibration not needed (server converts units)



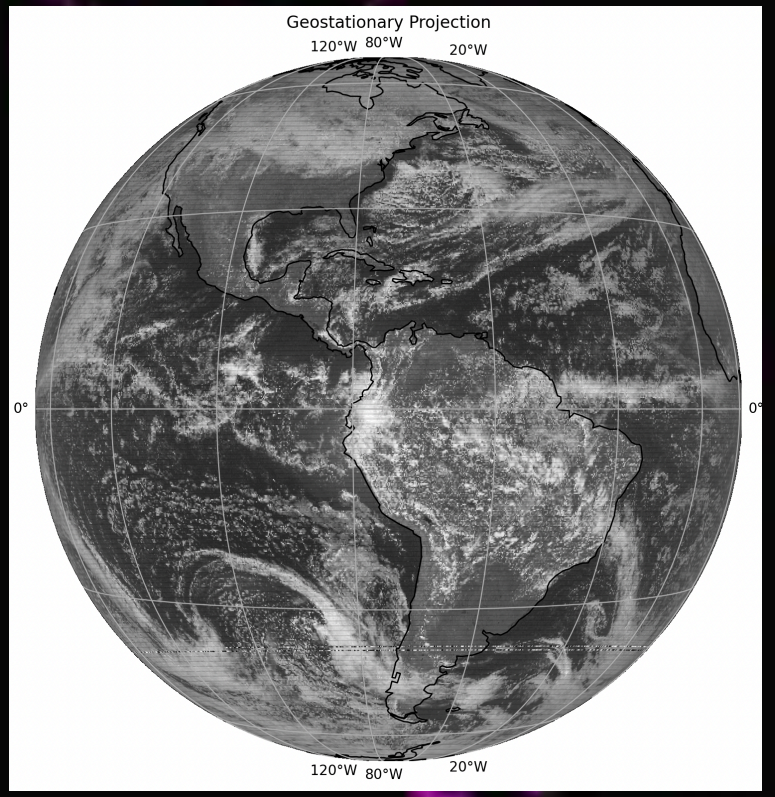
Python ADDE client Navigation

- To geolocate the data and reproject, navigation is needed:
  - ADDE server provides McIDAS navigation parameters
  - Used f2py to convert the McIDAS-X nvxgoes.dlm Fortran navigation module to a Python-callable library
  - nvxgoes.dlm is for GOES-1 to -7 satellites (1970s to 1990s)

Python ADDE client Navigation

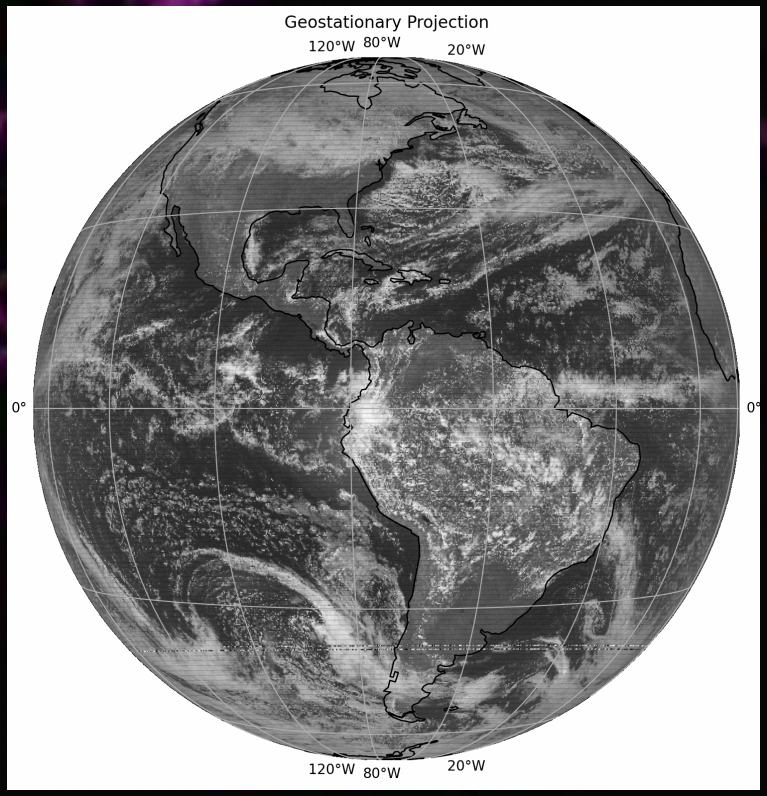


Original image

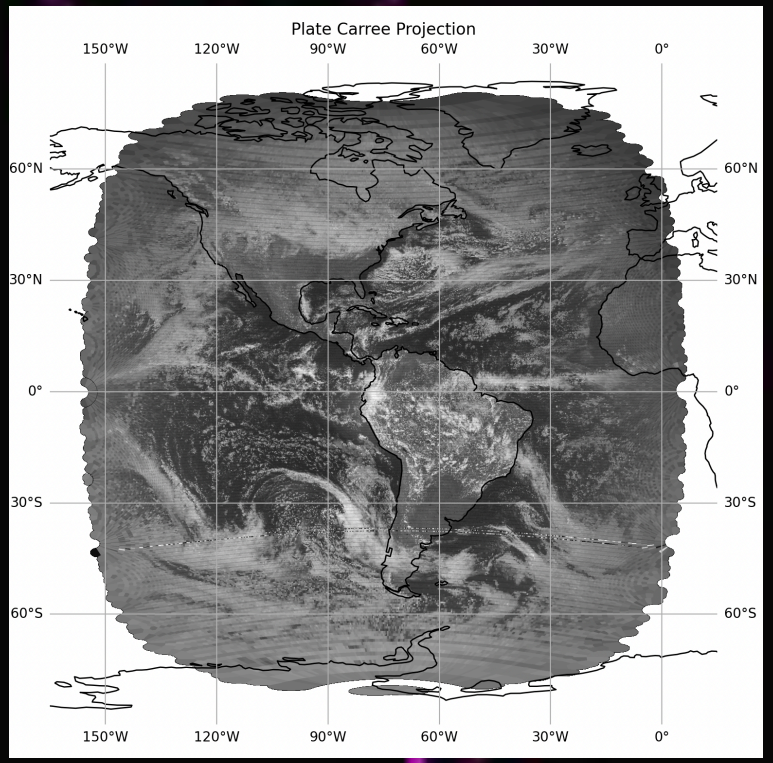


Reprojected to nominal geostationary view

Python ADDE client Reprojection



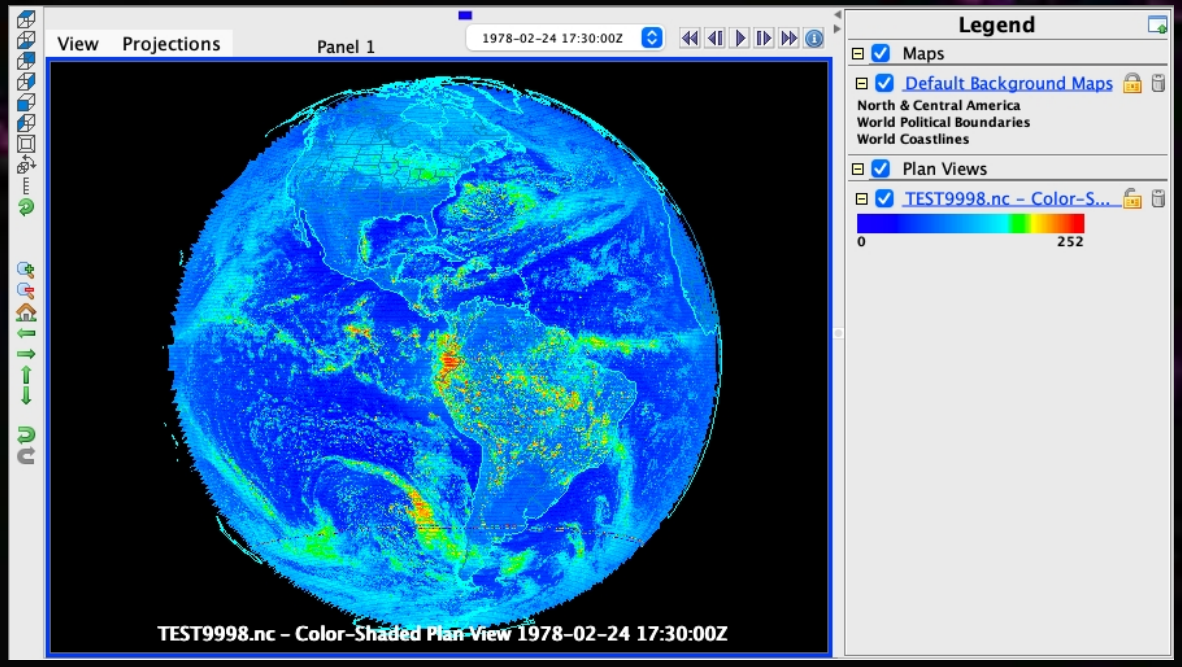
Nominal geostationary view



Latitude/Longitude projection

Python ADDE client
netCDF file output

Write out geostationary projected image to netCDF file
Displayable in McIDAS-V



Any questions for
Jay or Dave
on McIDAS-X Demo?

Any technical questions about
Python ADDE client:
Sophia should be at icebreaker