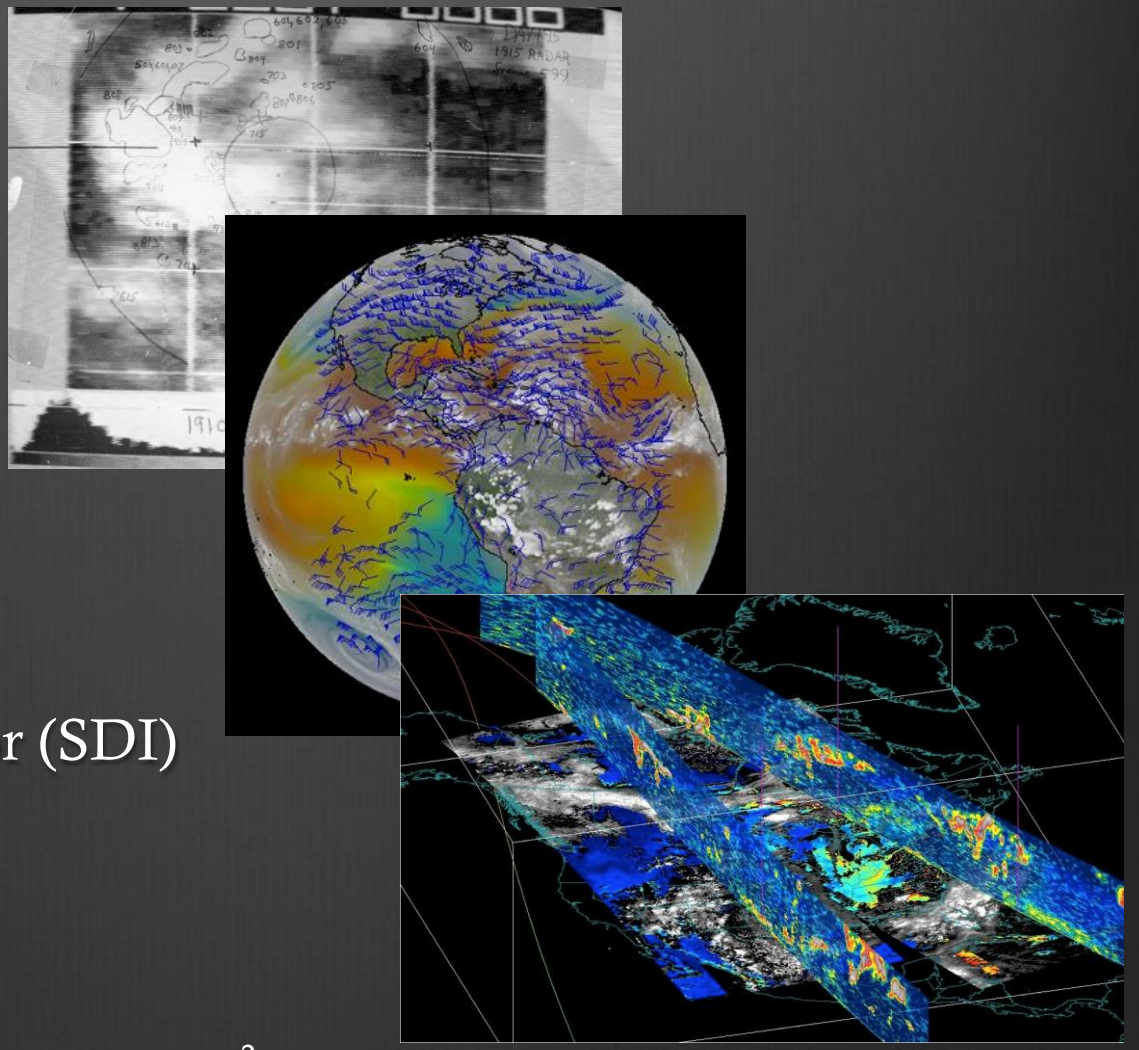
McIDAS Program Status

David Santek

2018 McIDAS Users' Group Meeting
22 May 2018

McIDAS Status

- SSEC Overview
- McIDAS-X
- McIDAS-XCD
- McIDAS-XRD
- McIDAS-V
- SSEC Data Ingestor (SDI)

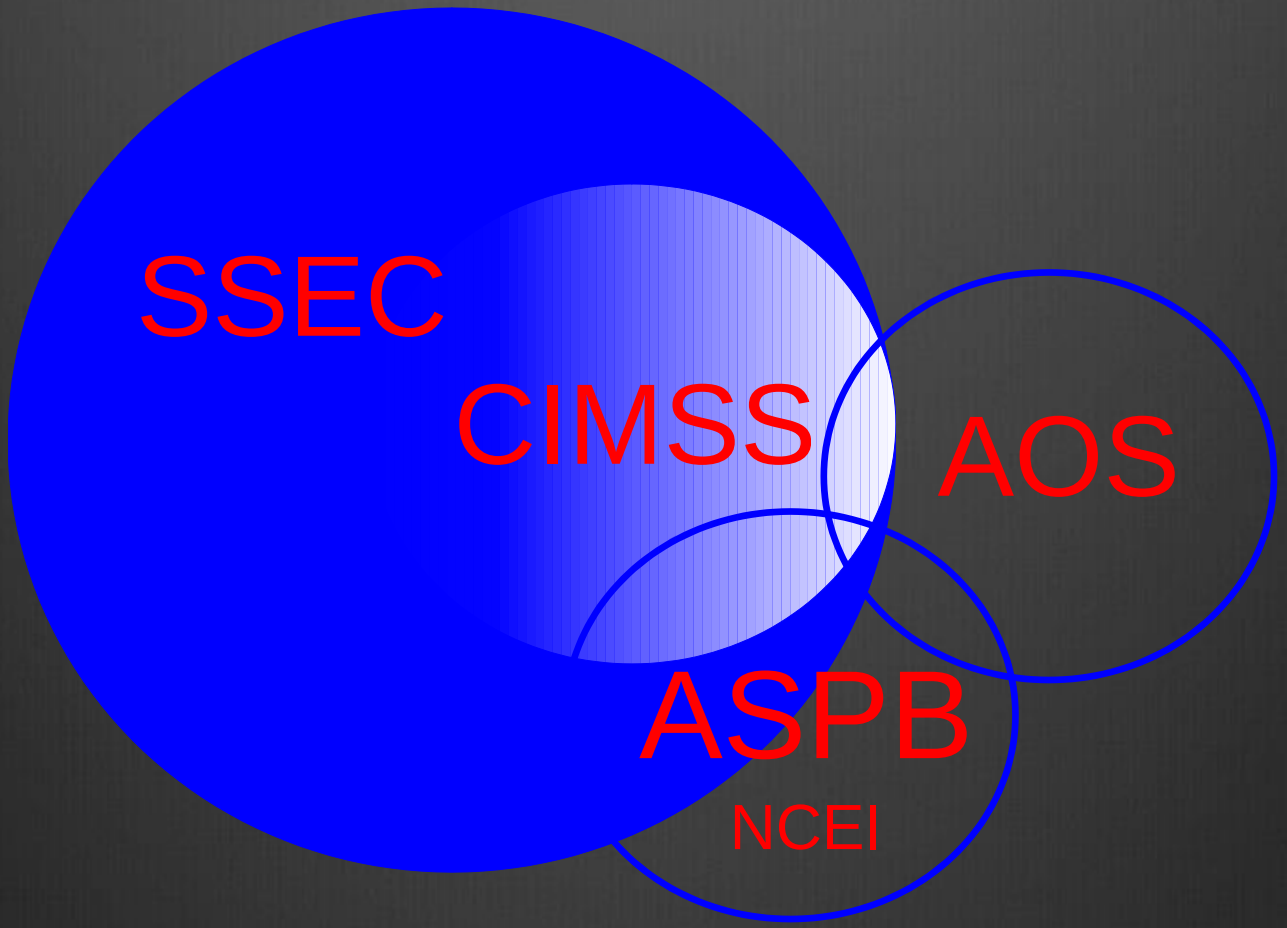


Space Science and Engineering Center

Graduate School, UW-Madison

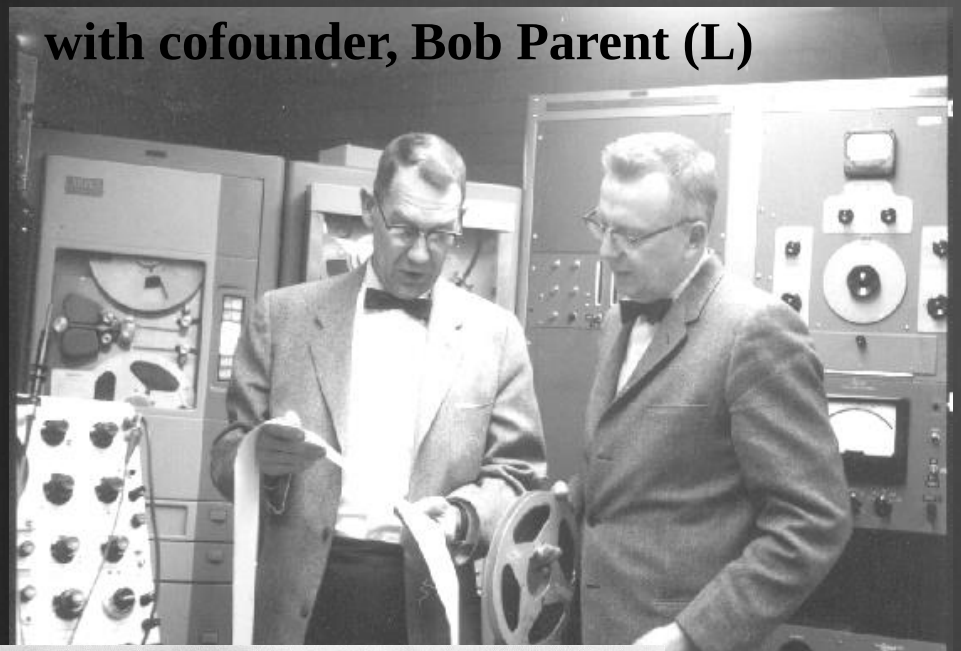
- Mission: To conduct atmospheric, oceanic, environmental, and astronomical research using space or space-age techniques to discover and apply the physical properties of our universe for the benefit of humanity
  From Idea, to Concept, to Implementation, to Information about the world
- Symbiotic relationship with Department of Atmospheric & Oceanic Sciences symbolized by shared building provided by NSF, NASA, & the State of Wisconsin

CIMSS/SSEC/AOS



Symbiotic relationship between CIMSS, SSEC and AOS

SSEC works to maintain the spirit of exploration of its founder, Verner E. Suomi (1915-1995)



with cofounder, Bob Parent (L)

1959: 1st Meteorological Satellite Experiment

Earth Radiation Balance Observations on Explorer VII

1966: 1st Earth Imaging from GEO

Spin-scan Camera on 1st Advanced Technology Satellite

1980: 1st Infrared Sounder from GEO

VISSR Atmospheric Sounder on GOES-4

"Father of Satellite Meteorology"

Weather Satellite renamed "Suomi NPP"

On 25 January 2012 NASA & NOAA renamed their newest Earth-observing satellite after UW-Madison space pioneer

Blue Marble
NPP VIIRS Image, GSFC

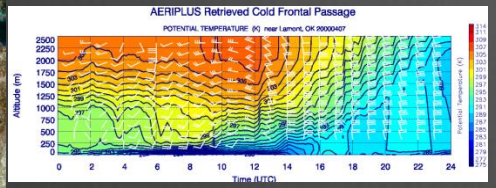
Nature of the Organization

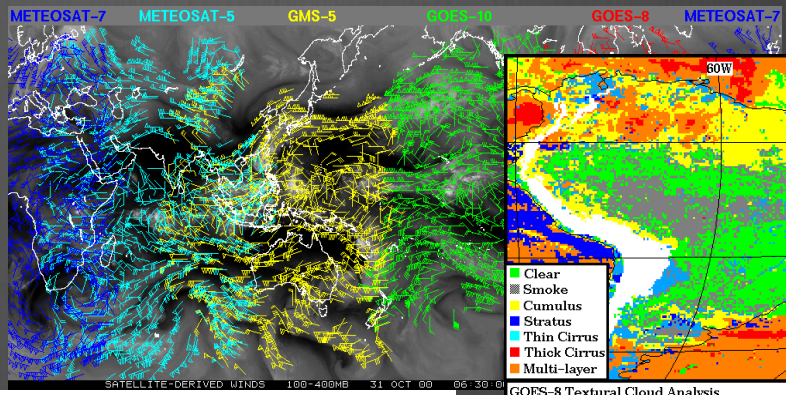
Space Science & Engineering Center

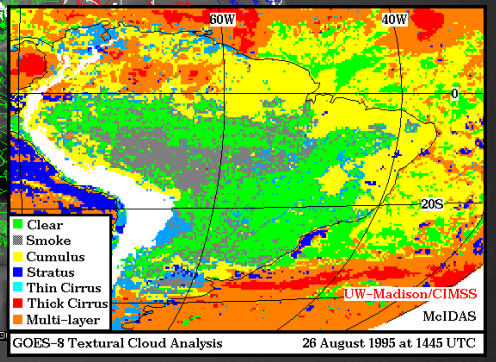
- Matrix Organization: PIs are the Cornerstone (about 30)
- Staff / Budget: About 250 staff members
- A diverse Center: support distributed among agencies, including NASA, NOAA, NSF, DoD, DoE, Private Sector
- Steve Ackerman –Director/Faculty is a scientist supported by 3 Executive Directors

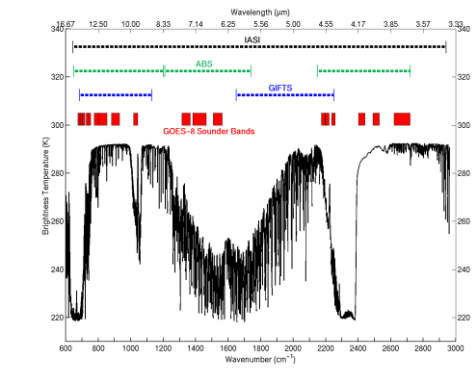
  - **Executive Director for Administration:** **Jenny Hackel**
  - **Executive Director for Science:** **Wayne Feltz**
    CIMSS Executive Director
  - **Executive Director for Technology:** **Fred Best**

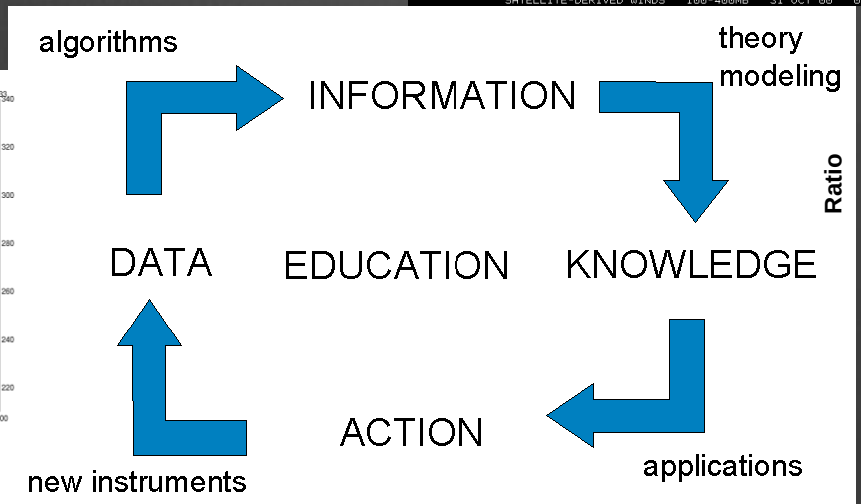
Cooperative Institute for Meteorological Satellite Studies (CIMSS)

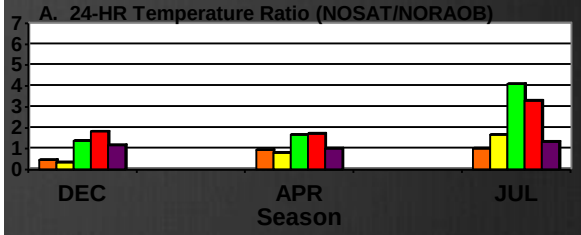


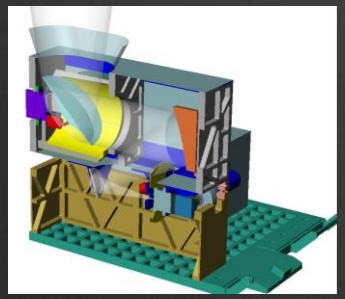


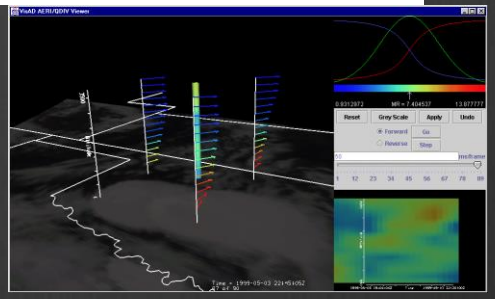


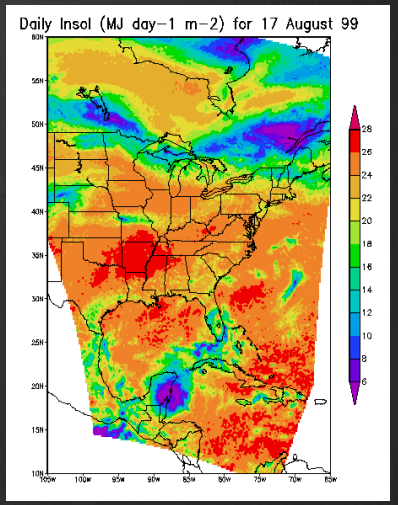












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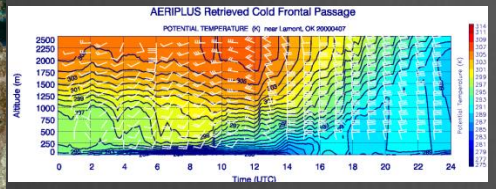
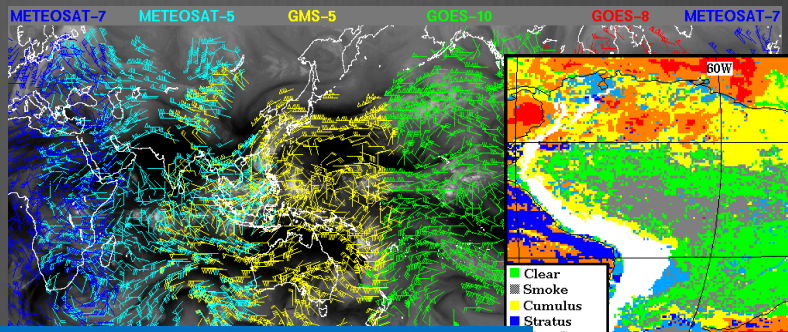
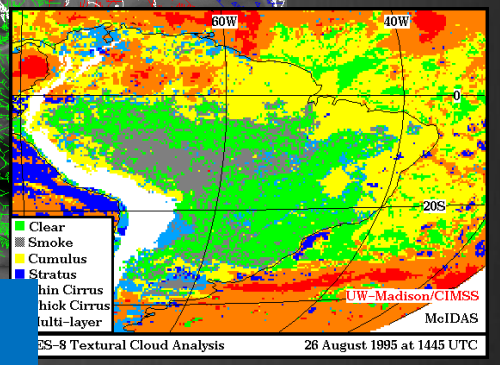
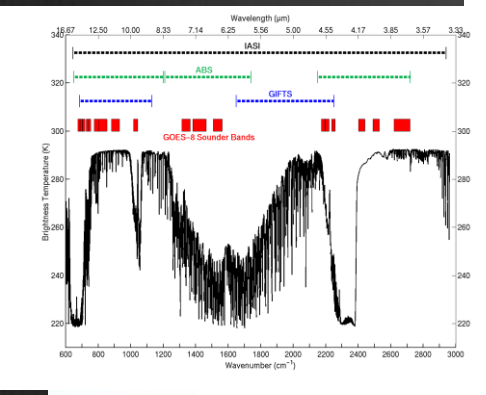
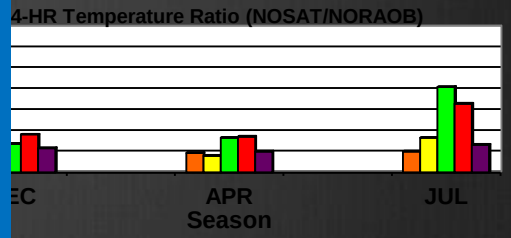


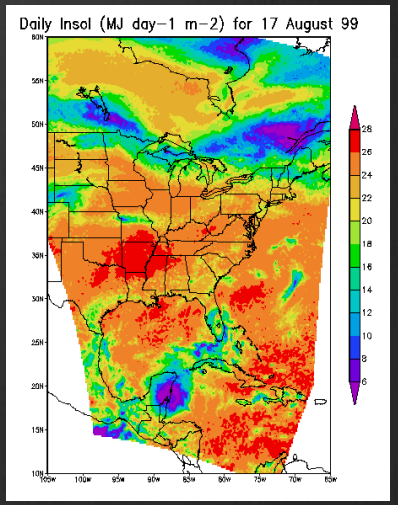


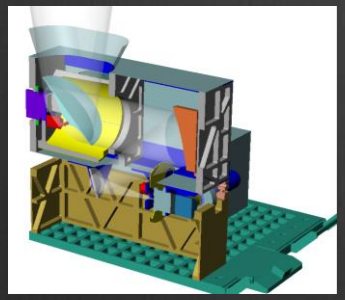


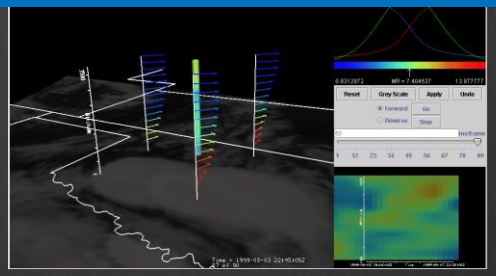
SSEC/CIMSS Legacy for over 90% of current GOES Operational Products











GOES-R ABI Baseline Products at CIMSS

Product	CIMSS Lead	ASPB Lead
Clear Sky masks	William Straka	Andy Heidinger
Cloud and Moisture Imagery	Mat Gunshor	Tim Schmit
Cloud Optical Depth	Andi Walther	Andy Heidinger
Cloud Particle Size Distribution	Andi Walther	Andy Heidinger
Cloud Top Height	Steve Wanzong	Andy Heidinger
Cloud Top Phase	Corey Calvert	Michael Pavolonis
Cloud Top Pressure	Steve Wanzong	Andy Heidinger
Cloud Top Temperature	Steve Wanzong	Andy Heidinger
Derived Motion Winds	Chris Velden	-
Derived Stability Indices	Jun Li	Tim Schmit
Fire/Hot Spot Characterization	Chris Schmidt	-
Hurricane Intensity Estimation	Chris Velden	-
Legacy Vertical Moisture Profile	Jun Li	Tim Schmit
Legacy Vertical Temperature Profile	Jun Li	Tim Schmit
Snow Cover	Xuanji Wang	Jeff Key
Total Precipitable Water	Jun Li	Tim Schmit
Volcanic Ash: Detection, Height	Justin Sieglaff	Mike Pavolonis

GOES-R ABI NOAT Priority Research Algorithms at CIMSS

Product	CIMSS Lead	ASPB Lead
Fog / Low Cloud Product	Corey Calvert	Mike Pavolonis
Turbulence ??	Tony Wimmers	Mike Pavolonis
SO2 Detection	Justin Sieglaff	Mike Pavolonis
Icing	Andi Walther	Andy Heidinger
Overshooting Top Detection	Sarah Griffin/Chris Velden	
GOES-R ProbSevere	John Cintineo	Mike Pavolonis
Cloud Cover Layers	Steve Wanzong	Andy Heidinger

SSEC areas of technical expertise

- **Observational Science**
  - Spacecraft system/mission design, instrumentation, field programs, spaceflight instrument fabrication, including campus science support to Physics, Astronomy, Botany, Geology
- **Computational & Visualization Science**
  - Hardware & software systems for information generation, data management, & communication
- **Analytical Science & Applications**
  - Satellite & conventional data analysis, technical development & analysis

McIDAS-X Current

- Periodic updates (1-2 times per year)
- Improvements to display
  - Larger number of frames
  - RGB display in main window
  - Expanded stretch of displayed data
- Capability with newest and future satellites:
  - Himawari-8, -9 AHI
  - GOES-R ABI and GLM (GOES-16, -17, etc.)
  - S-NPP and NOAA-20 (JPSS-1) VIIRS ADDE server (McIDAS-XRD)

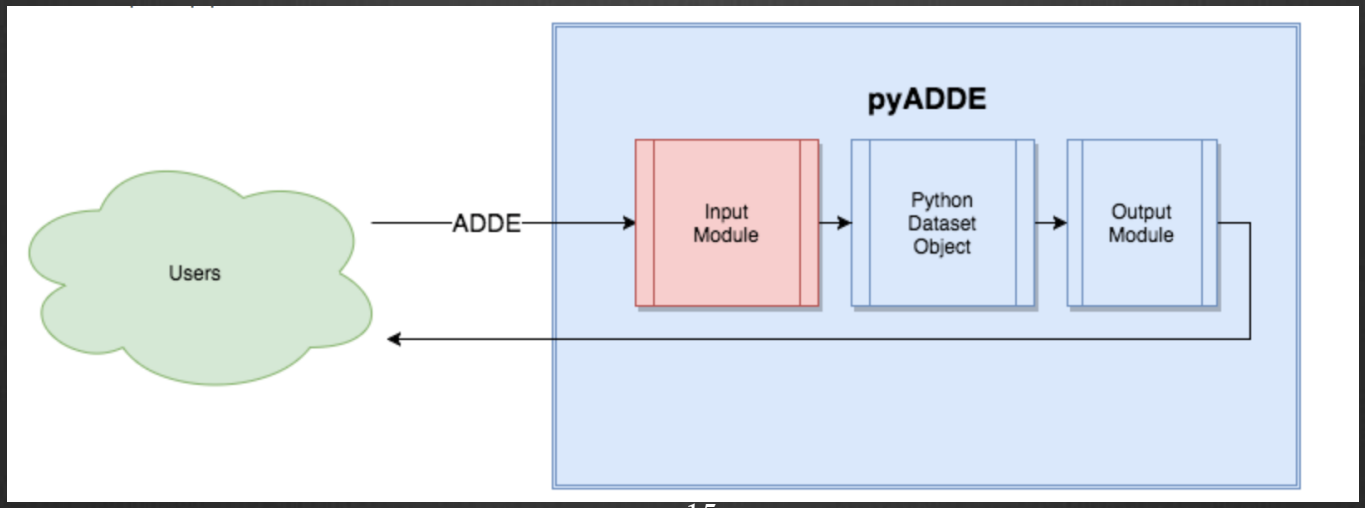
ADDE Servers

- Investigating Python-based ADDE servers
  - Easier for others to write servers
  - Will be compatible with McIDAS-X and -V

Python ADDE Servers

Why pyADDE:

- Write a new server without McIDAS-X knowledge
- Only *Input Module* will need to be written:
  - Read native file
  - Compute lat/lon for each n^{th} point
  - Reshape into Python Dataset Object
  - pyADDE does the rest



Python ADDE Servers

- Advantages:
  - Evolution rather than revolution
    - May make use of McIDAS-X Fortran and C library functions in the short-term
  - Extensions more easily implemented
    - Return other formats (e.g., netCDF), not only McIDAS-X Area
    - Perhaps additional geographic projections (using proj.4)
- Status:
  - Prototype server being developed
  - Plan is to have first version of pyADDE available by late 2018

McIDAS-X Future

- MUG responsible for general improvements, bug fixes, maintenance (updates for current and new satellites), and OS and external library updates
- Unique enhancements continue to be funded outside the MUG and code contributed by internal projects and external sites
- McIDAS-X is expected to be supported into the 2030s for the GOES-R series satellites. No sunset date in sight.

McIDAS-XCD
Conventional Data

- Ingest conventional weather data from NOAAPORT
- Current version to be supported for at least another year
- Beta of new version will be available in late 2018
  - Currently tested in parallel with XCD 2018.1
- More information in *McIDAS-XCD 2018.1 and Replacement Update*

McIDAS-XRD
Research and Development

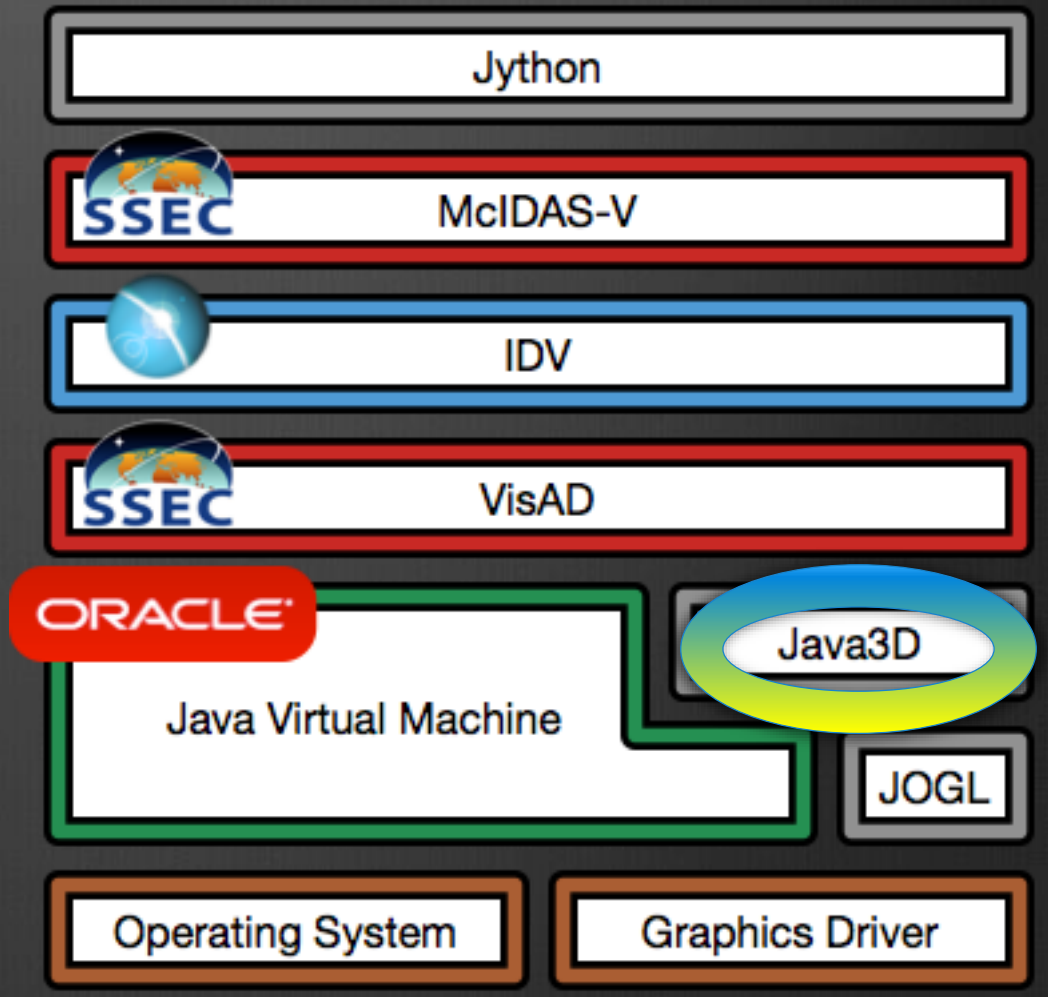
- A collection of R&D code that is not formally tested by McIDAS User Services:
  - Over 100 McIDAS commands
  - Over 15 ADDE servers
  - Testing is limited to ensuring code builds on supported platforms
  - Occasionally promote to core
- Status: Current support level continues
- Future: Coincides with McIDAS-X future

SDI
SSEC Data Ingestor

- SDI (SSEC Desktop Ingestor) 1997 - 2005
- SDI-104 (SSEC Data Ingestor) 2005 – ?
- SDI-GRB Appliance 2016 - ?
- Status: SDI-104 supported; SDI-GRB supported
- Future:
  - SDI-104: supported as long as GOES GVAR satellites are operational or backup
  - SDI-GRB Appliance: throughout the GOES-R era
- More details in *SSEC Data Ingestor (SDI)*

McIDAS-V Status

- Major components by Unidata, SSEC, Oracle, open source community
- Additional components include file format libraries, math libraries, packaging and build utilities; all open source
- OS vendors Linux,Windows, Mac
- Hardware drivers from manufacturers



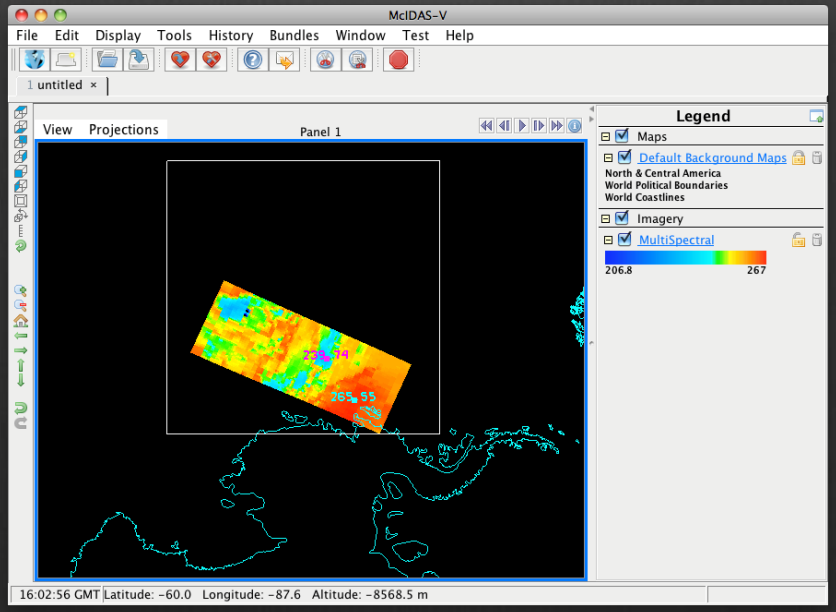
McIDAS-V
Java 3D Replacment

Effort begun to replace Java3D with Ardor3D:

- Ardor3D has a more general framework for both alternate windowing environments and 3D graphics APIs
- Started with Jogamp's JOGL; may move to a version based on LWJGL (Lightweight Java Game Library).
- A graphics-dependent sub package of VisAD core has been developed using only Ardor3D
  - Many of the VisAD basic unit tests functioning as expected

McIDAS-V Funding

- MUG
- Several CIMSS grants for S-NPP/JPSS and GOES-R
- NASA ROSES proposals (none funded, thusfar)

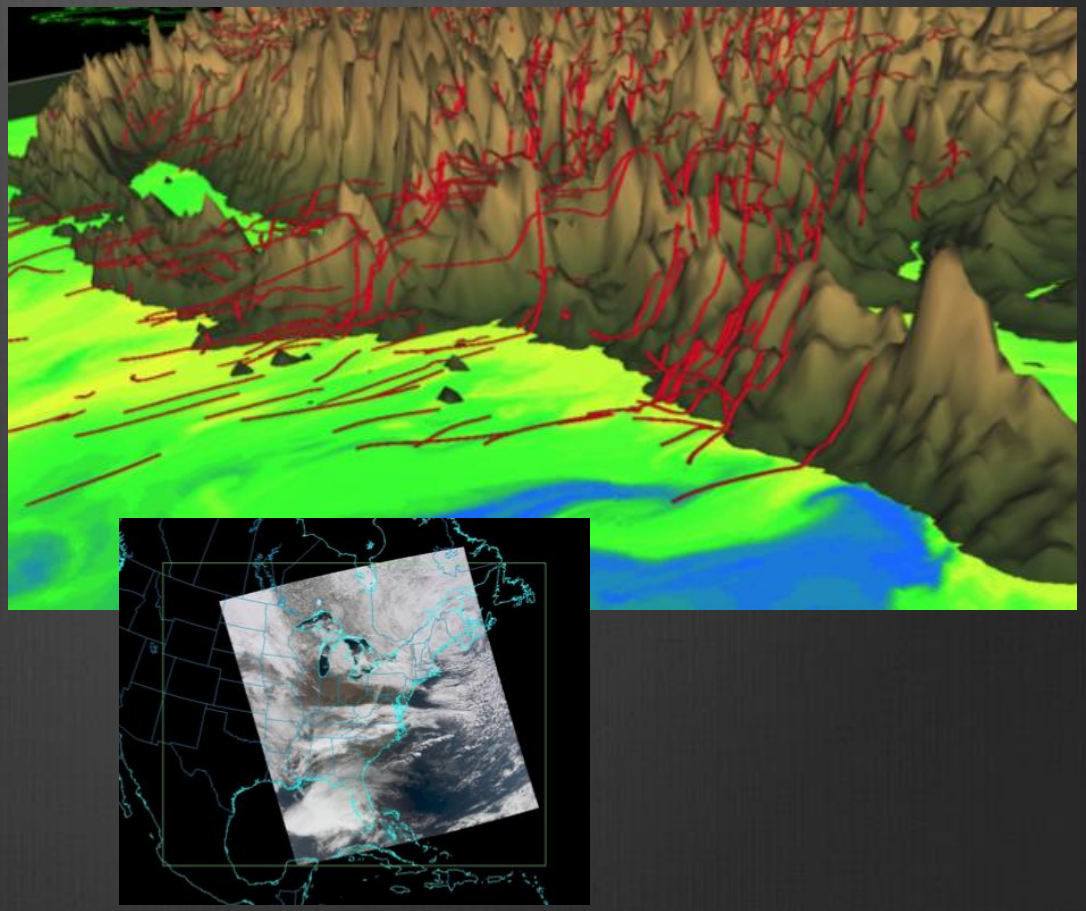


McIDAS-V
MUG Support

- User-level Infrastructure: User Interface, Scripting
- Bug fixes: Prioritize, coordinate internally and with Unidata
- Testing
- Documentation: Includes maintaining tutorials
- Help Desk: Includes maintaining forums

McIDAS-V
CIMSS Grants

- Improvements for trajectories (terrain-following)
- Handle S-NPP granules that span dateline
- Scripts to create VIIRS RGB images



McIDAS-V Priorities

- Fix Critical and Quick bugs (MUG, Unidata)
- Incorporate enhancements from CIMSS projects, especially those that are not possible in McIDAS-X (CIMSS, MUG)
- Ensure new data sources are usable (MUG, CIMSS)
  - Geo and Leo missions
  - Test with new data in standard formats (netCDF, HDF, BUFR, GRIB)
- Maintain compatibility with Unidata's IDV (Unidata, MUG)

McIDAS-V Future

- Continue to engage younger generation:
  - Workshops and training
  - Classroom
- Appeal to researchers:
  - Input/output data formats
  - Scripting
  - More data fusion