

# Observational Data Tools

Mike Daniels

EOL/Computing, Data and Software Facility

June 10<sup>th</sup>, 2009



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**National Center for Atmospheric Research**



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# NCAR Earth Observing Laboratory Platforms



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# Who We Are

Jothiram  
Vivekanandam



Steve Cohn



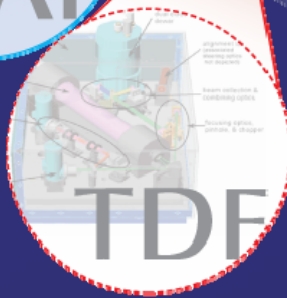
Jeff Stith



Jack Fox



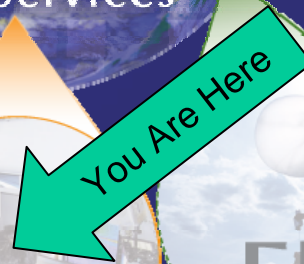
Alan Fried



Brigitte Baeuerle



Mike Daniels



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# Computing, Data and Software (CDS) Facility

Manager: Mike Daniels  
Administrator: Kathy Sharpe  
Administrative Assistant: Shelley Zucker

## Systems Infrastructure

William Haddon (StA)  
Santiago Newbery  
Ted Russ  
Brandon Slaten  
Jonathan Tsui (StA)  
Joe Vinson  
Jody Williams (GH)

## Data Management

Linda Cully (.9)  
Ben Golden (StA)  
Janine Goldstein (.5)  
Jean Hurst (.8)  
Scot Loehrer  
Pierce Martin (StA)  
Jose' Meitin (.25)  
Bob Rilling (.5)  
Don Stott  
Steve Williams (GH)

## Collaborative Technologies and Metadata

John Allison  
Mark Bradford (GH)  
Luke Przygocki (StA)  
Steve Roberts  
Janet Scannell  
Greg Stossmeister  
Susan Stringer

## Software Systems

Tom Baltzer  
Chris Burghart  
Jeff Cook (StA)  
Ling-Ling Dong  
Dennis Flanigan  
Gary Granger (.75)  
Gordon Maclean  
Charlie Martin (GH)  
Keith Romberg  
Joe VanAndel  
John Wasinger  
Chris Webster

### NOTES:

Numbers in ( ) indicate FTE level  
GH = Group Head  
StA = Student Assistant



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# CDS Systems Infrastructure Group (SIG)

Computing infrastructure and security  
in the office



In field operations centers



Aboard and inside observing platforms (ISS  
trailers, S-Pol radar, C-130, G-V, etc.)

*A secure and modern computing  
infrastructure geared to maximize  
scientific productivity*



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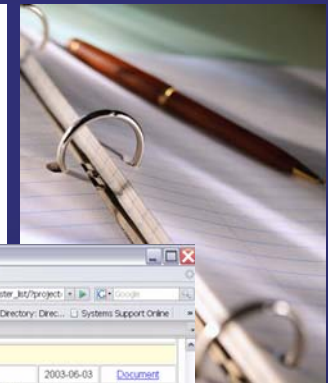
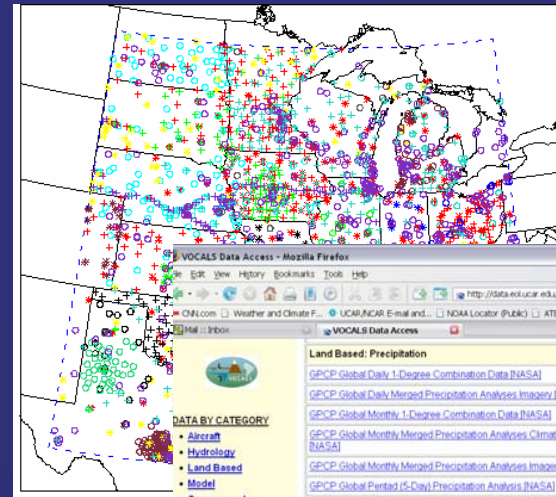
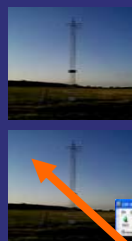
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# CDS Data Management Group (DMG)

Data management and QA services  
for the entire field campaign

Special Data  
Products

Data Plans and  
Policies



mesonets

model output



satellites



radars



NSF LAOFs

Master Lists of Field Project Data

*Comprehensive data management, distribution and  
stewardship from the planning stages to the research  
and publication phase and beyond*



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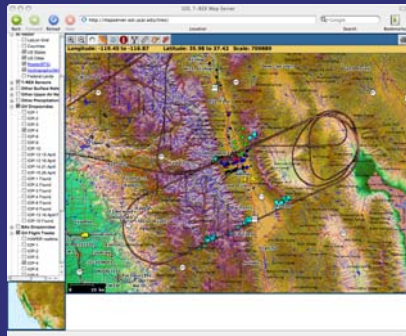


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# CDS Collaborative Technologies and Metadata (CTM) Group

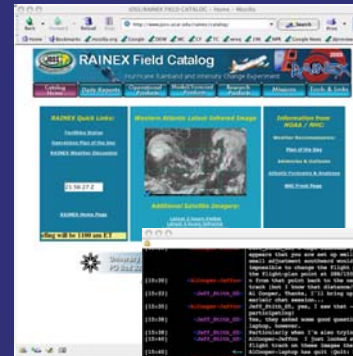
GIS Mapservers



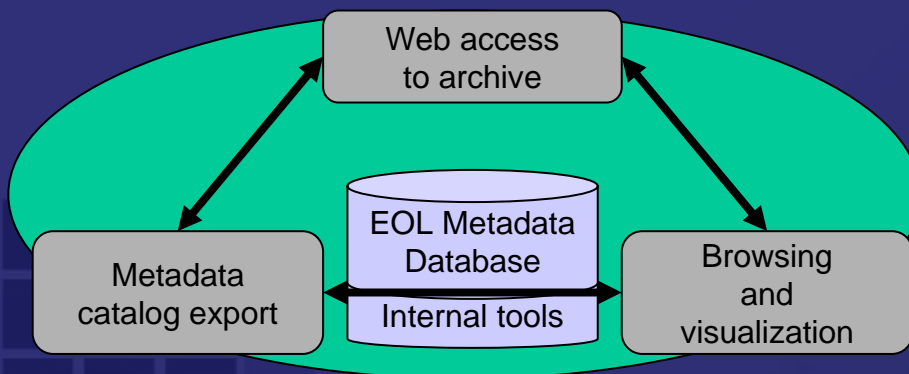
Web-based instrument control interfaces



Field Catalog



wikis



EMDAC Data Management System

CDS Chat System

*Collaborative tools, field catalogs, web applications and databases... core services and tools used to connect our community and facilitate access to data and information across the net*



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# CDS Field Catalog

Mission Summaries  
and S

Research Products

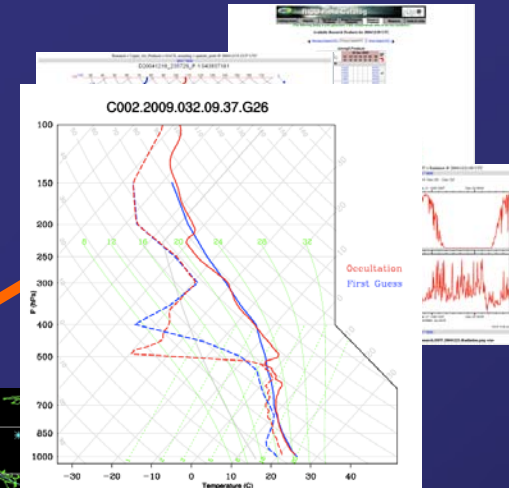
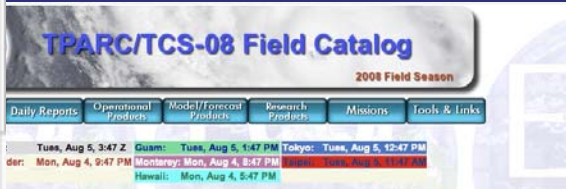
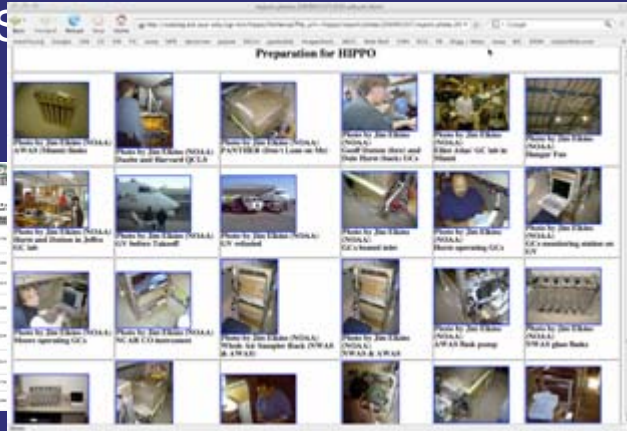
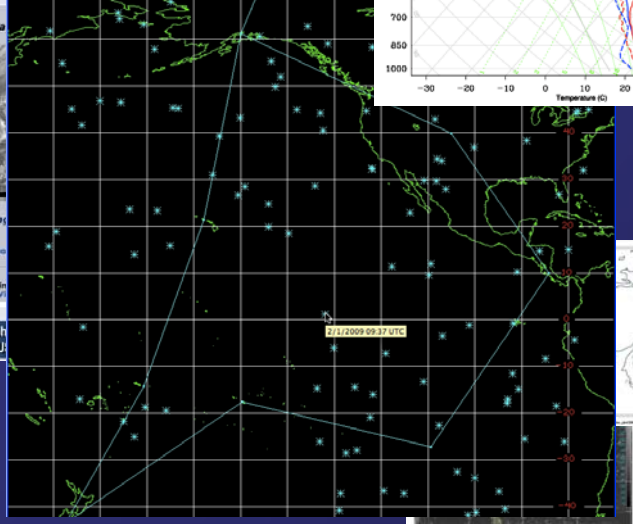
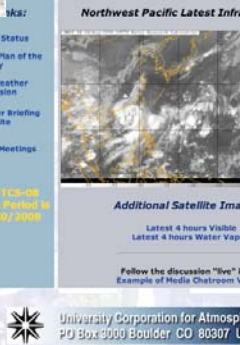
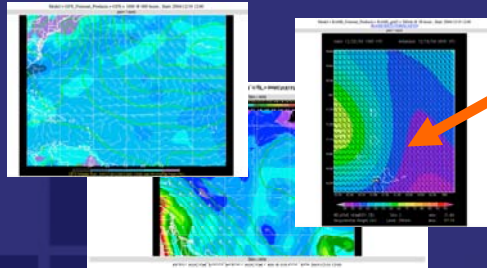


Photo Archive



Model and Forecast Products

Interactive COSMIC soundings Operational Products





# CDS Software Systems Group (SSG)

## Diverse Software Engineering:

- S-Pol Radar
- Integrated Sounding System
- G-V
- C-130
- Scanning Atmospheric Backscatter Lidar
- Electra Doppler Radar
- Python Environment for Radar Processing
- Reorder and translators
- Raman-Shifted Eyesafe Atmospheric Lidar
- Scientific Data Processing
- CP-2 signal processor
- NIDAS
- Aeros
- FORAY
- AVAPS
- Integrated Surface Flux System
- NIMBUS
- Multiple Antenna Profiling Radar
- Solo Radar Editor
- Driftsonde
- Ncplot,ncpp, xpm2d
- Rapid Dow
- Zebra
- NEXRAD
- Ka Band Radar
- TDLS
- GAUS
- Field-Programmable Gate Arrays

Data acquisition software, real-time displays, analysis software, communications (satcom/WAN) and QC tools for all of the EOL platforms

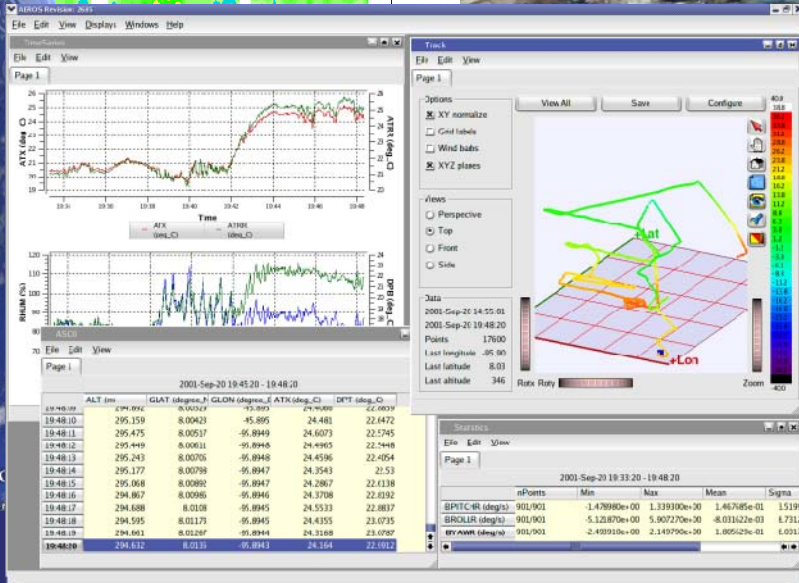
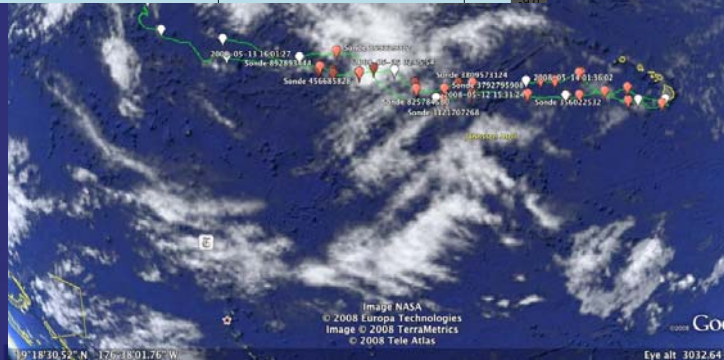
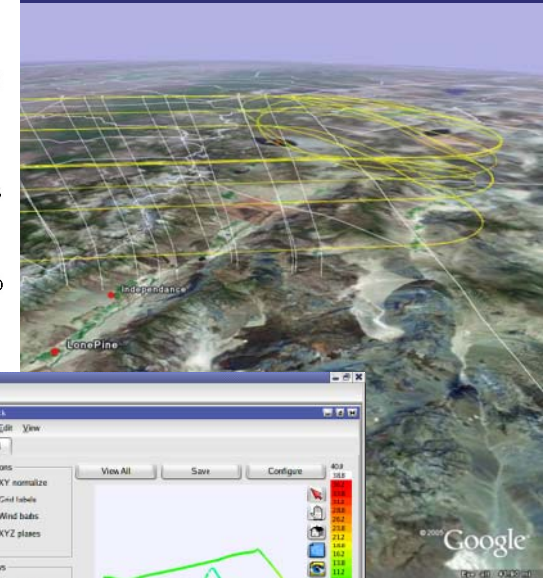
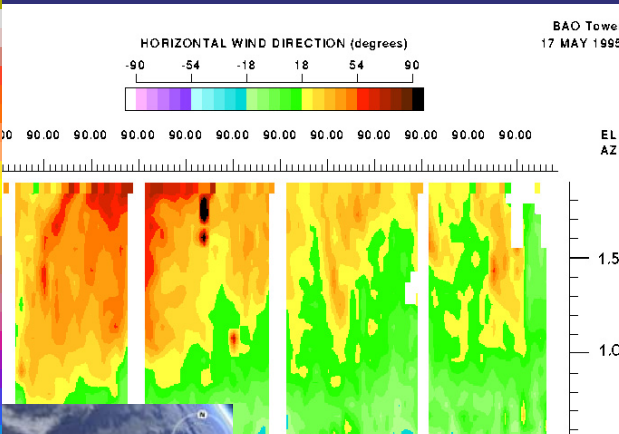
*Engineered software and data systems that are at the heart of state-of-the-art observing systems*



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# CDS Deployment Scales

- Micro Controllers
- Digital Signal Processors
- Embedded Systems
- Workstations
- Servers
- Mass Storage Archives
- Networks
- Web

*from data acquisition through  
final product delivery*



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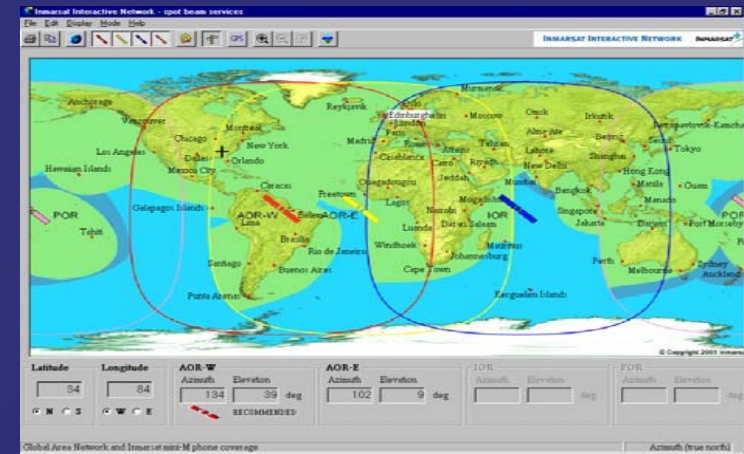


# Satellite Communications

Ground based



INMARSAT coverage



Aircraft based



Balloon based



Iridium coverage



# EOL's Zebra in RAINEX

NRL 587



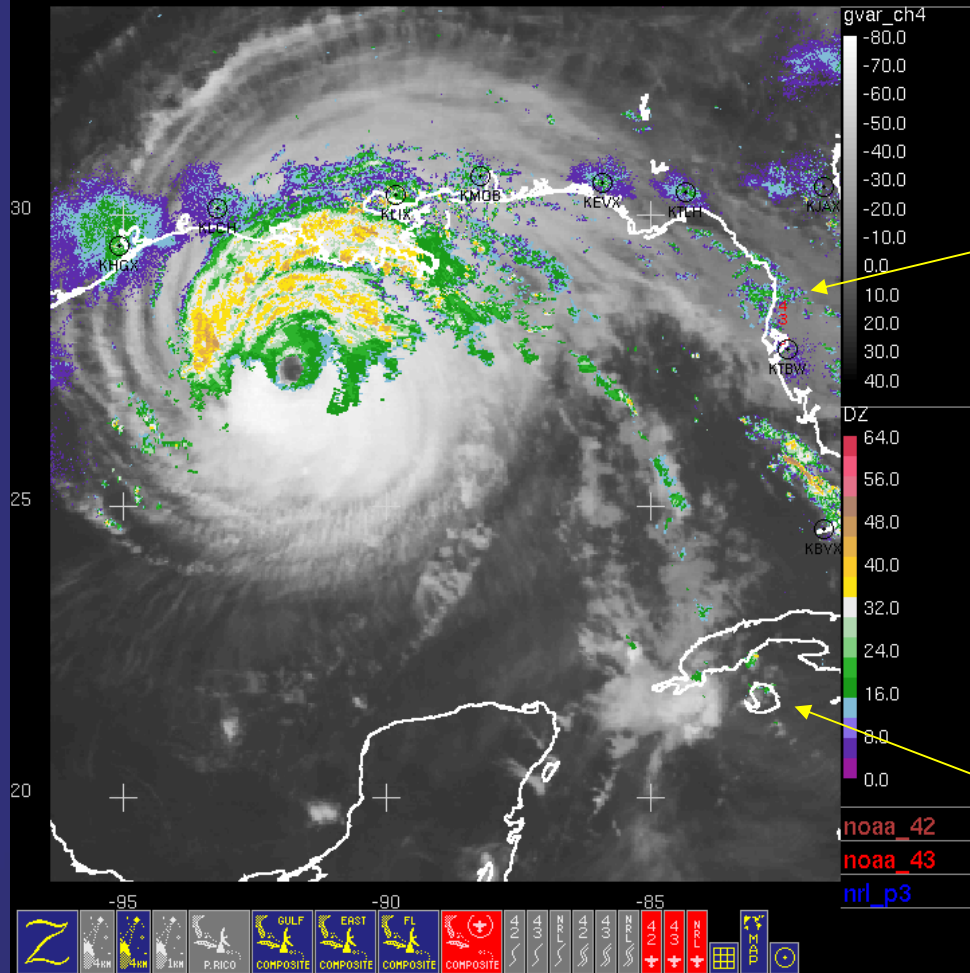
NOAA N42RF



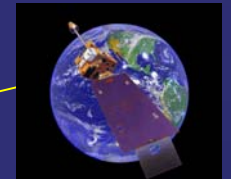
NOAA N43RF



23-sep-2005,15:00:00 Zebra projection: goes\_4km gvar\_ch4 plot. gulf\_composite DZ plot. east\_composite DZ plot. FL\_composite DZ plot. noaa\_lf\_composite DZ plot. noaa\_42 track. noaa\_43 track. nrl\_p3 track.



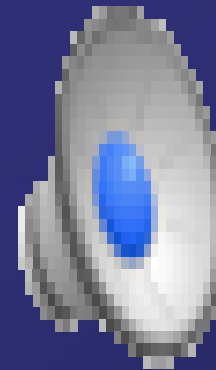
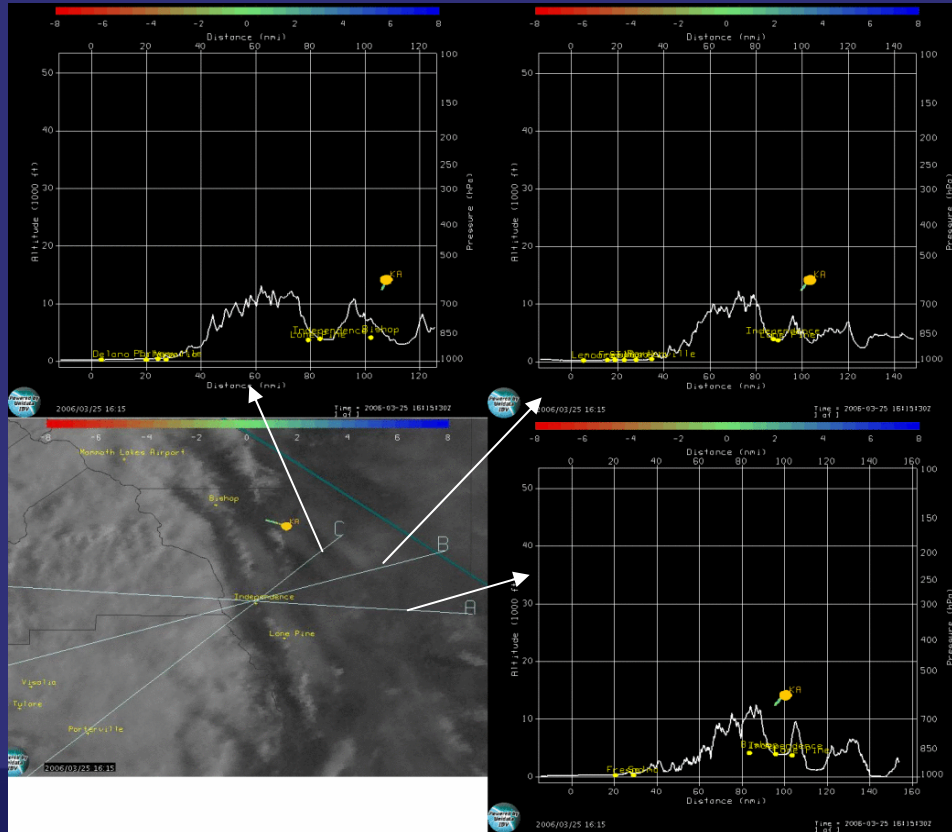
GOES 1Km vis



NEXRAD



# UNIDATA's IDV in T-REX



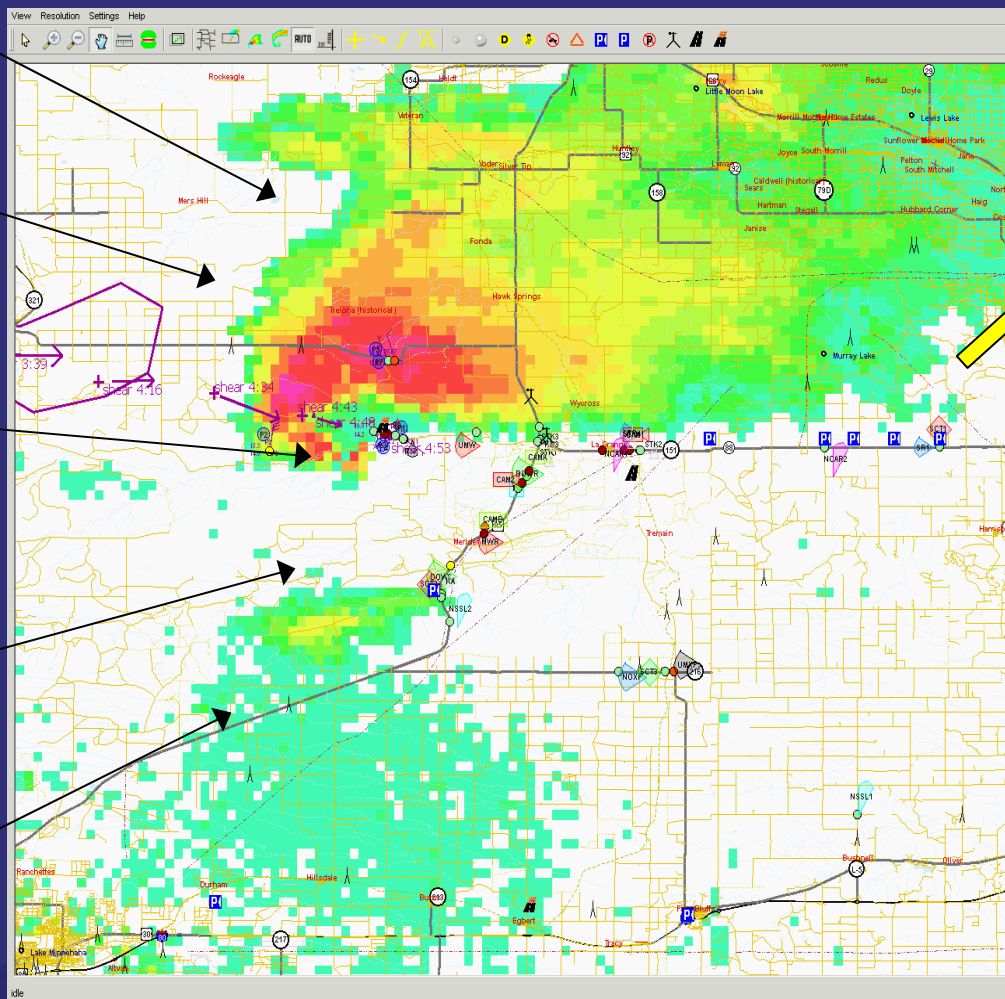
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# SASSI in VORTEX-2

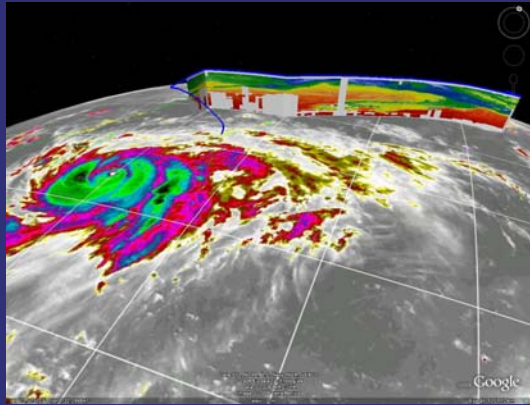


FC2	(2156:43) [To: COORDINATORS] 290 az seems to be holding ATTN
P2	(2152:31) [To: FC2ALL_TEAMS] golfballs west side of circulation
DOW6	(2152:27) [To: coordinators sct1] sct2 stronger near surface rotation!
DOW6	(2151:47) [To: coordinators sct1] sct2 rotation is 20 km from 85. strong aloft convergence and rotation at surface. heading directly towards dow7fc location
FC2	(2149:48) [To: ALL_TEAMS] Major reflectivity descending in hook attn...
FC	(2148:17) [To: ALLTEAMS] Tornado genesis likely next several minutes.
FC2	(2146:18) [To: ALL_TEAMS] 90 kt gate-to-gate near tip of hook, base scan
FC	(2144:27) [To: COORDINATORS] DOW6 and DOW7 are scanning. DOW7 is 0.5 mi north of FC. Use the veggieburger tool to see the lobes.
DOW6	(2141:28) [To: coordinators sct1] sct2 dow6 dow7 up and dd scanning hook
FC2	(2141:19) [To: COORDINATORS] Pslb blob echo (DRC) formation near tip of current hook
FC2	(2139:25) [To: ALL_TEAMS] 80 kt differential base scan, two gates apart
P3	(2138:53) [To: P3 FC ALLTEAMS] at the split it goes unpaired and is a ranch road
FC2	(2136:52) [To: COORDINATORS] More extreme deviance than 290 is not out of the question, we will alert you if we see it happening.
P3	(2136:32) [To: FC ALLTEAMS] road 242 or bear creek road is a fairly good road to drive on... terrain issues though exist in some spots for both radar and eyeball visibility
FC2	(2135:26) [To: COORDINATORS] Storm has made its turn to 290... expect it to persist unless it weakens. This takes it down the center of my cone, tending toward the south half.

Developed by Erik Rasmussen of Rasmussen Systems under NSSL contract



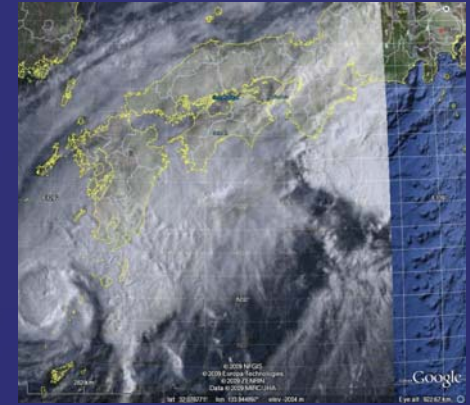
# Explosion in the use of Google Earth



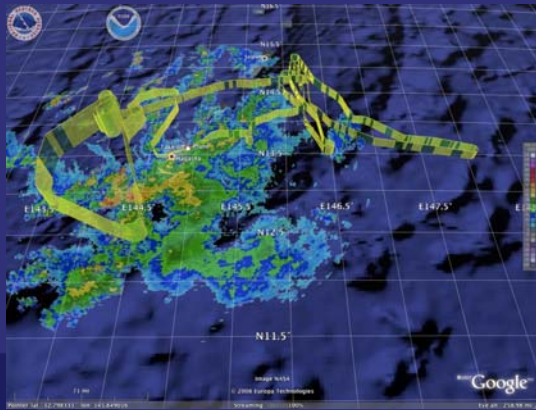
T-PARC DLR Lidar



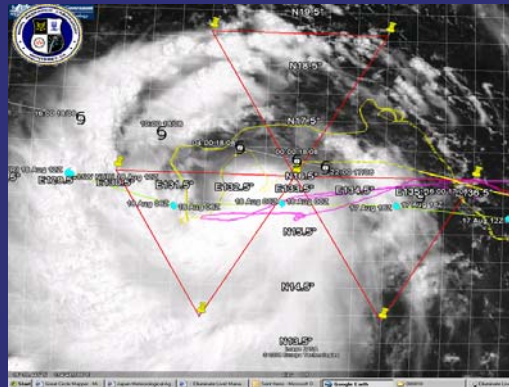
START08 G-V



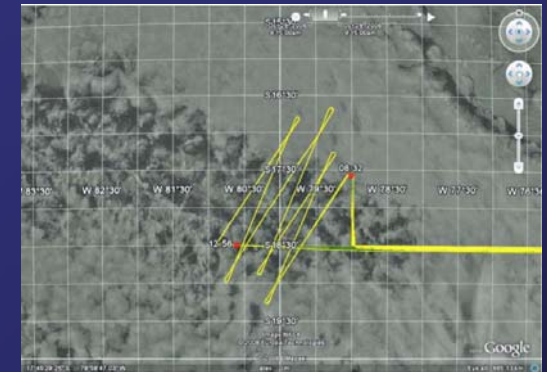
T-PARC P-3



T-PARC P-3



T-PARC Overlay

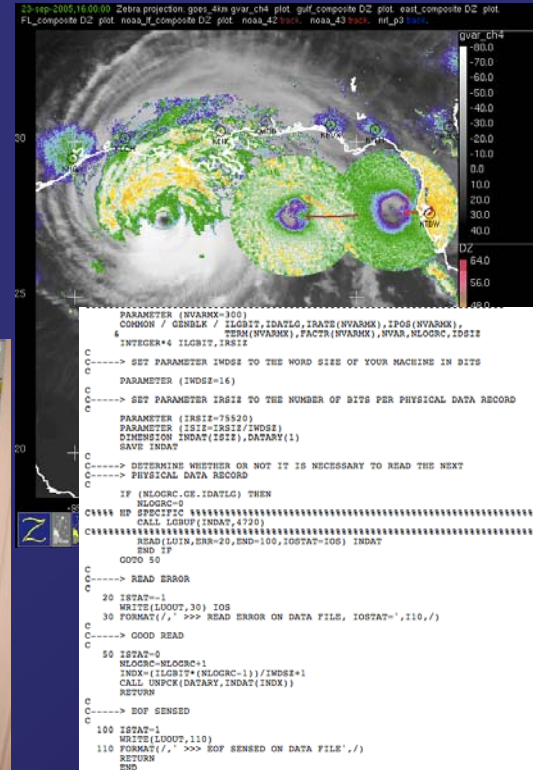


VOCALS C-130





# Pretty Faces...



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# The Virtual Operations Center (VOC): An NSF Mid-Sized Infrastructure (MSI) proposal



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# Some relevant UCAR 2009 Community Survey comments

- **In what ways could EOL improve the utility or access of its systems or of data from its systems for research or educational activities?**
  - “Continue to develop the web interfaces to allow data streams to be observed remotely in more or less real time.”
  - “Make sure everything from field campaigns is available online for immediate download“
  - “Having quick-look type imagery online is very useful, so expanding those efforts as possible would be helpful“
- **Where should increased emphasis be placed?**
  - “Development of EOL-instrument data analysis methods for nowcasting purposes that NCAR/RAL may not already be doing.“
  - “Insuring that aircraft data collection systems and plotting software for mission scientists on aircraft are fully functional.”
  - “I would emphasize integrated observations - combining satellite, radar, and ground based network data into near real time analyses and subsequent research.”
  - ”Central repository for field data”
- **What new activities should be undertaken if resources were to be made available?**
  - “Collaboration technology”
  - “Better support of on board instrumentation. The one chemist is overwhelm.“



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# Summary of VOC components

- Visualization Tools
- Field Data Assimilation System
- Communication & Collaboration Tools
- In-Field and Real-time Data Access and Management Infrastructure
- Remote Instrument Control Infrastructure
- Field Project Training Laboratory (FPTL)

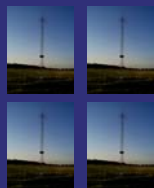




# VOC Team

- Mike Daniels (EOL)
- Chandra (CSU)
- Don Middleton (CISL)
- Don Murray (UNIDATA)
- Jenny Sun (ESSL MMM/RAL)
- Chris Burghart (EOL)
- Luca Cinquini (CISL)
- Mike Dixon (RAL)
- Jeff McWhirter (UNIDATA)
- Vidal Salazar (EOL)
- Kathy Sharpe (EOL)

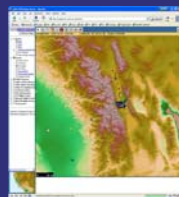




Mesonet



NEXRAD



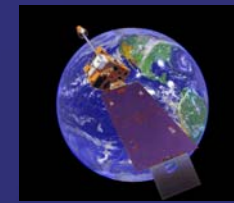
GIS  
Mapservers



G-V



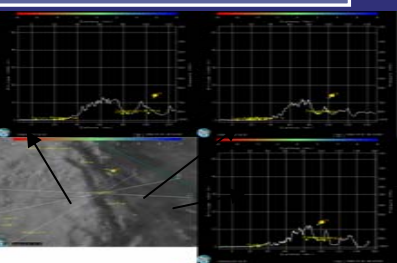
Present & Future  
NSF LAOFs



Satellite  
Data



Regional forecast  
model input &  
output



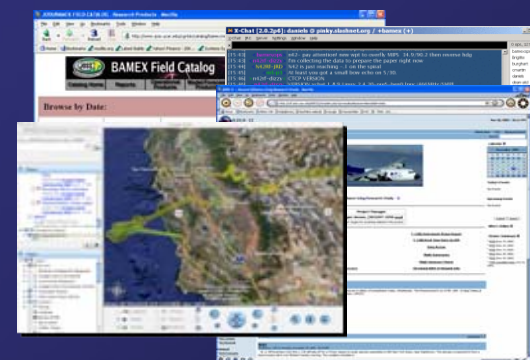
Visualization Tools



Virtual CHILL (VCHILL) &  
remote instrument control



"there's an app for that"

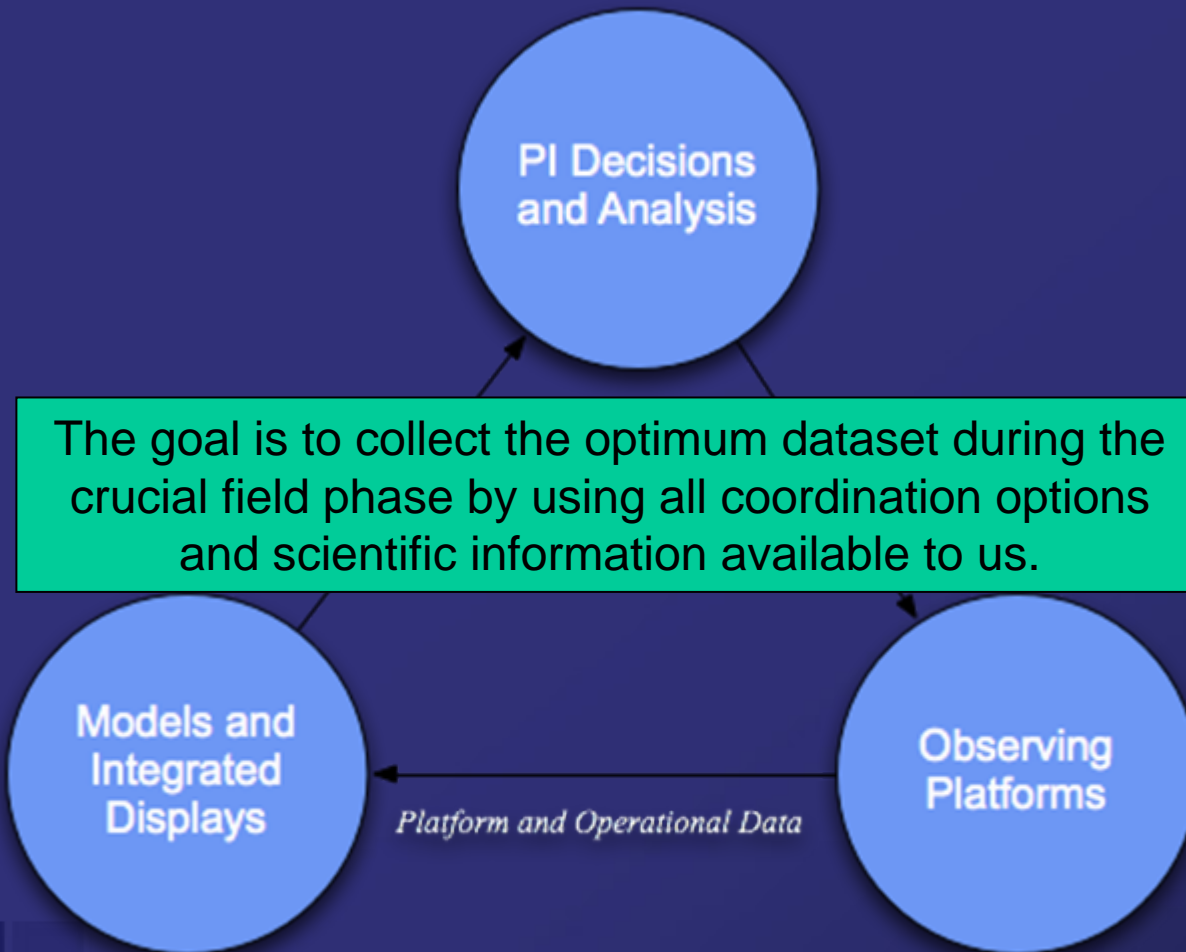


"lightweight" displays  
and collaboration tools

*The VOC: An  
Engineered  
Cyberinfrastructure  
Facility for the  
Community*



# The VOC-enabled “Feedback Loop”:



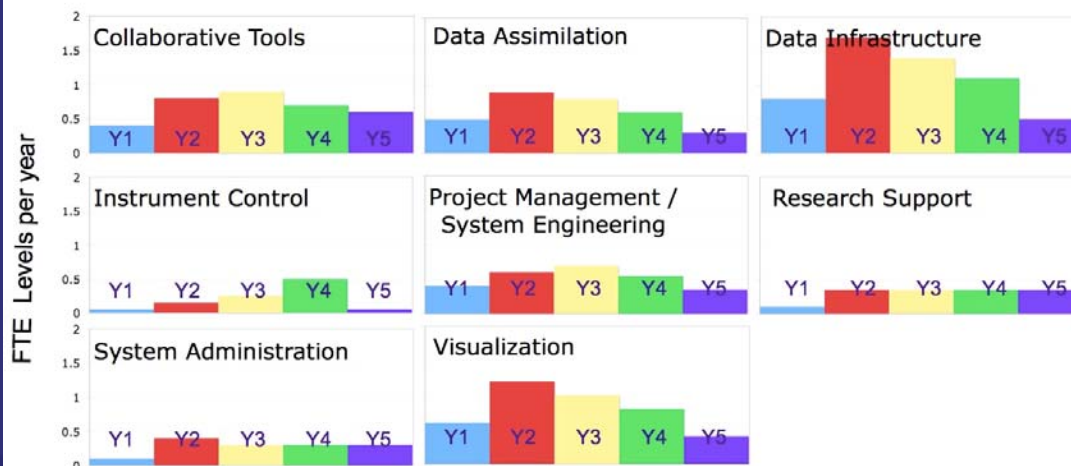
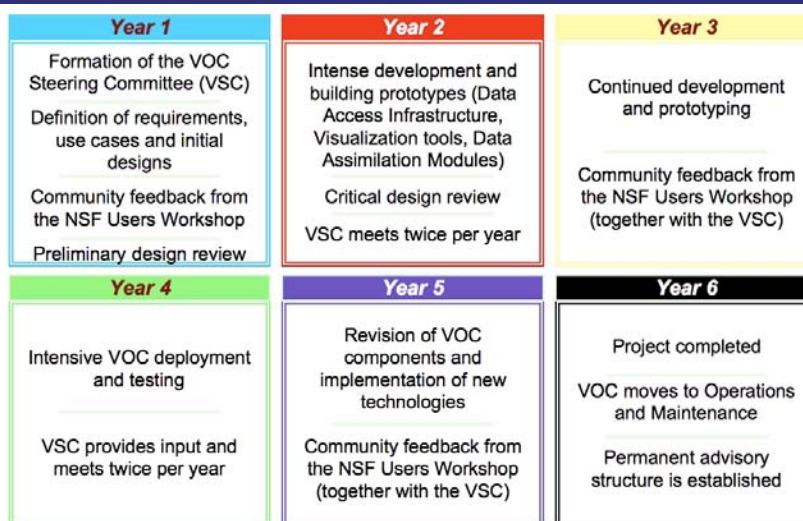
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# VOC Timeline



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# Questions & Discussion

<http://www.eol.ucar.edu/about/our-organization/cds>

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# END



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