

Using McIDAS-X to Support the NASA SEAC₄RS Field Experiment

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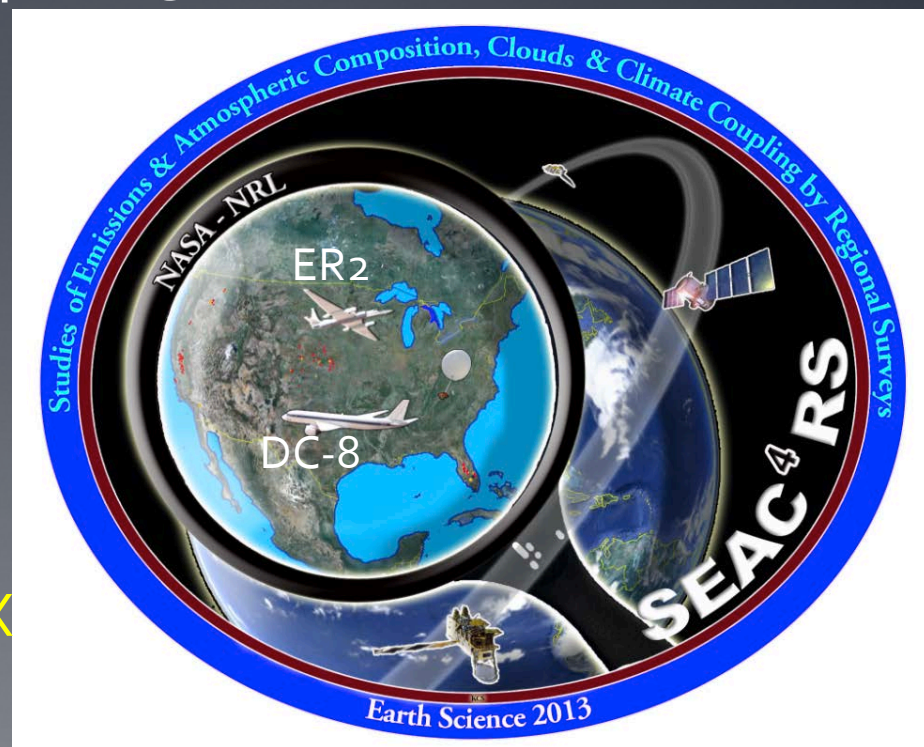
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Introduction

SEAC₄RS: Studies of Emissions and Atmospheric Composition, Clouds, and Climate Coupling by Regional Surveys (Aug-Sep 2013)

- *Interest in pollution, smoke, atmospheric chemistry, North American monsoon, convective cloud microphysics.
- *NASA LaRC personnel on site at Ellington Field in Houston, TX running McIDAS-X on 2 Mac OS X computers.



McIDAS-X Tasks

- GUI configured for 156-166 frames with specific frame sequences for each satellite channel and domain.
- Scheduler run to ingest GOES data and display imagery in loop sequences; runs BATCH files.
- Make and display virtual graphics of plane positions, tracks, and altitudes (ZA, PATH, AIRPLANE, VIRT=, SHOWVG).
- Make polar orbiting satellite track maps (NAVDISP) and data (NAVCALC).
- Overlay lightning, radar (SATOVERLAY2), overshooting tops on imagery.
- Use DIST command to find distance to points of interest.
- Obtain LAT/LON of points of interest to have the planes fly toward.
- Provide cloud-top height (IMGDISPCP, BARCP).

GUI with GOES-13 Enhanced Channel 4 Image with Plane Tracks

The screenshot displays the McIDAS-X 2013.1 interface. The main window shows a weather radar map of the United States with a color scale at the bottom ranging from 300 to 320. A red arrow points to a specific location on the map. A configuration window is open in the foreground, listing various buttons and their commands. The 'Configure' menu item in the main window is circled in orange. The 'FLT IR LOOP' button in the bottom toolbar is also circled in orange. The text '*PATH, AIRPLANE 17:02 GMT Aug 23, 2013' is overlaid on the map. The text '*BAR', '*PCT, ZA', and '*SHOWVG' are also overlaid on the map.

McIDAS-X 2013.1: field@jcsrpr000011srs.jsc.nasa.gov

File Display Copy List Color **Configure** View

ER-2 17.237 7.01155 178.600 m DC-8 17.249 Z alt=2526.000 m 10-9 18.894 Z alt=104.000 m

***PATH, AIRPLANE 17:02 GMT Aug 23, 2013**
***BAR**
***PCT, ZA**
***SHOWVG**

Configure View

Shortcut Buttons

Name	Type	Command
UPDATE TRK	BUTTON	BATCH 0 CON=YES "PLOT-VGRAPHI
FLT VIS LOOP	BUTTON	LS 115-124; DR 9*2 20; DR AUT
FLT IR LOOP	BUTTON	LS 125-134; DR 9*2 20; DR AUT
CLD TOP Z	BUTTON	SF 135
CLD TOP P	BUTTON	SF 136
Lightning	BUTTON	SF 137; BATCH UPDATE.LIGHT.BA
OST	BUTTON	SF 138; BATCH DISP.SEAC4RS.OS
WILD FIRE	BUTTON	SF 139; BATCH 0 DISP.SEAC4RS.
RADAR	BUTTON	LS 140-147; DR 7*2 20; DR AUT
GOES RSO	BUTTON	LS 148-156; DR 8*2 20; DR AUT

Number of buttons to show: 10

New Button Edit Delete Down Up

OK Dismiss

Prev **FLT IR LOOP** CLD TOP Z CLD TOP P Lightning OST WILD FIRE RADAR GOES RSO Next

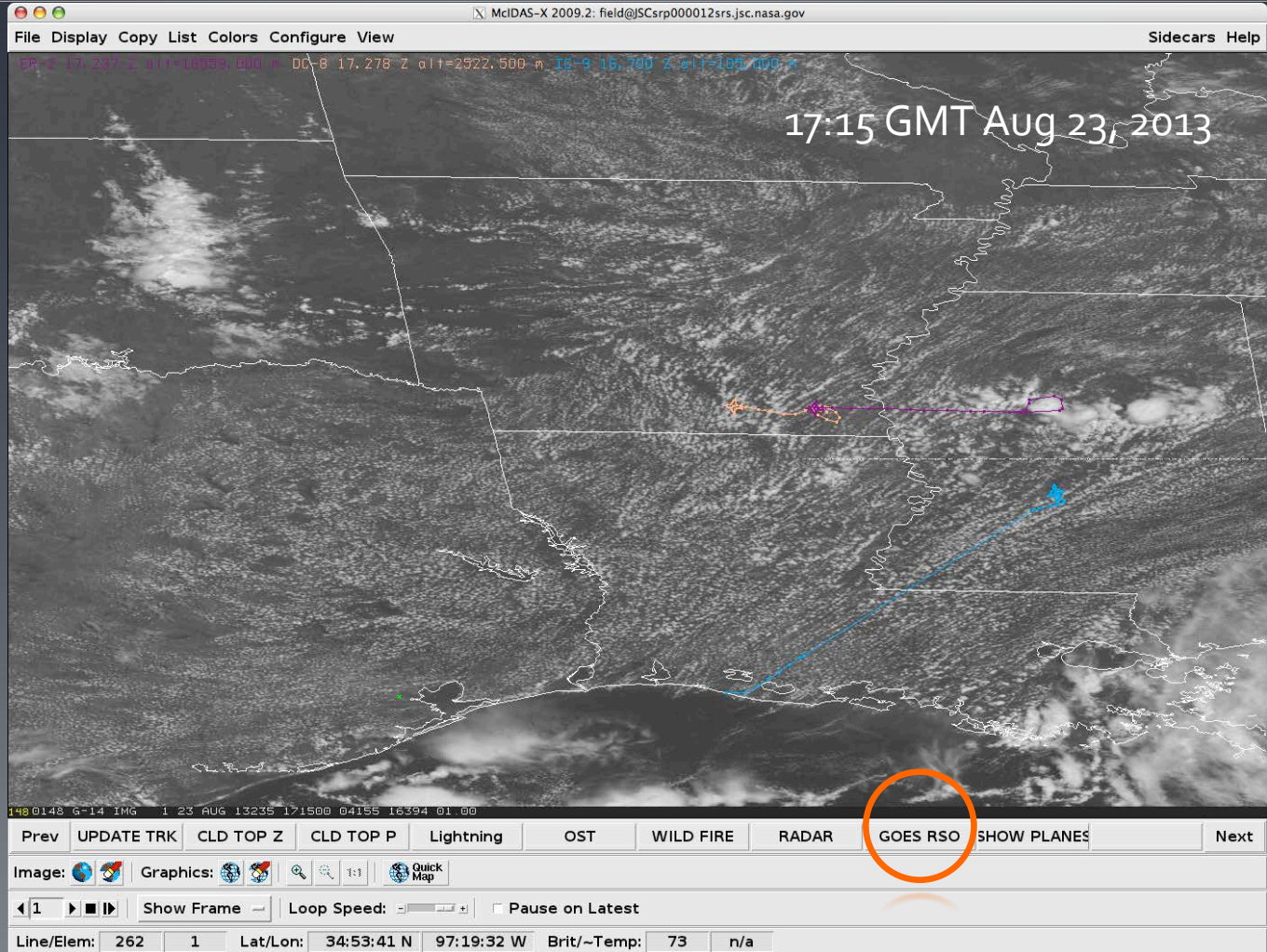
Image: 1:1

Show Frame Loop Speed: Pause on Latest

Line/Elem: 7 737 Lat/Lon: 47:27:47 N 93:02:29 W BrT~Temp: 83 289

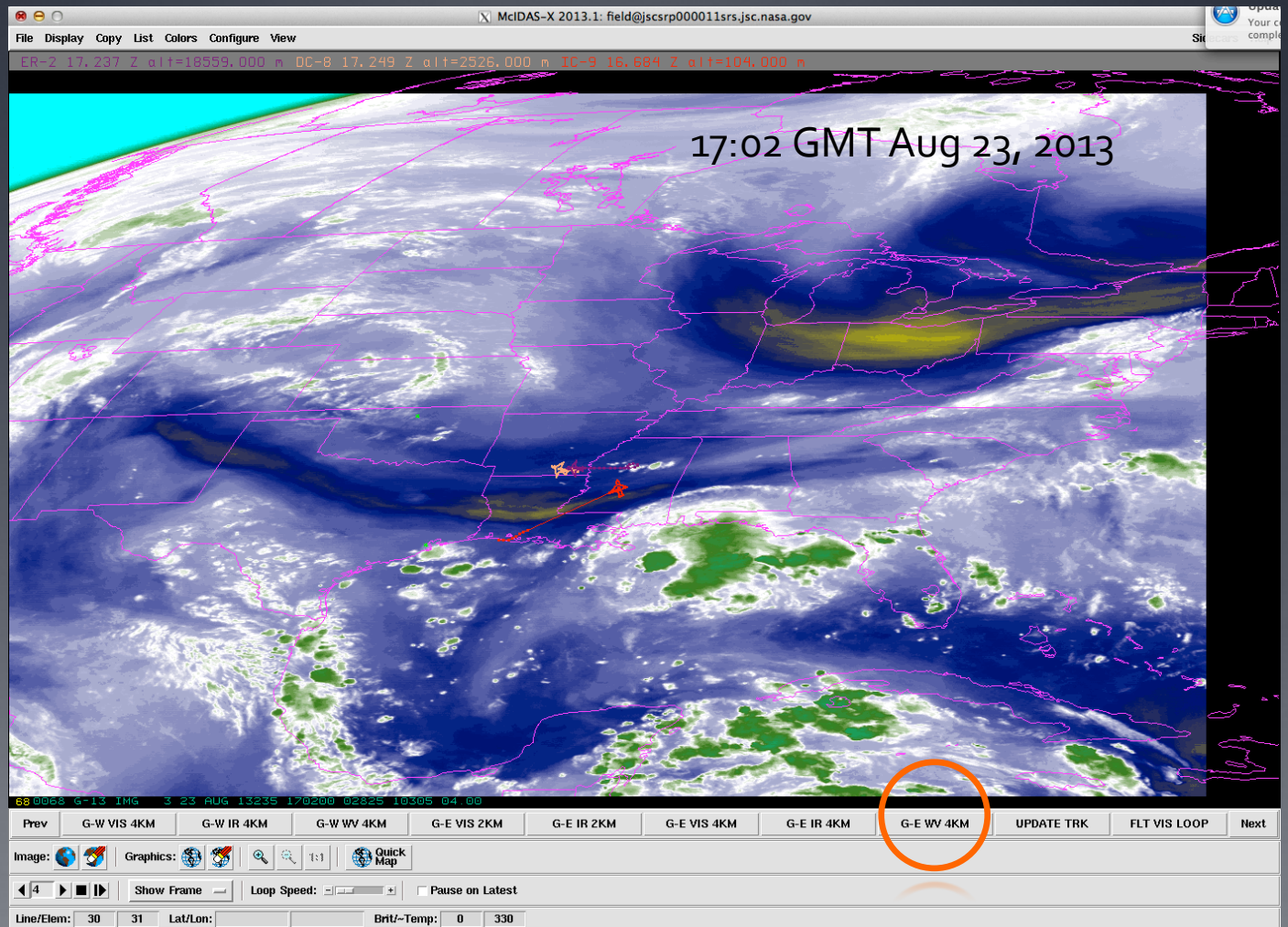
GUI Showing 1-km VIS from GOES-14 SRSO with Plane Tracks

*PATH, AIRPLANE
*SHOWVG
*ZA



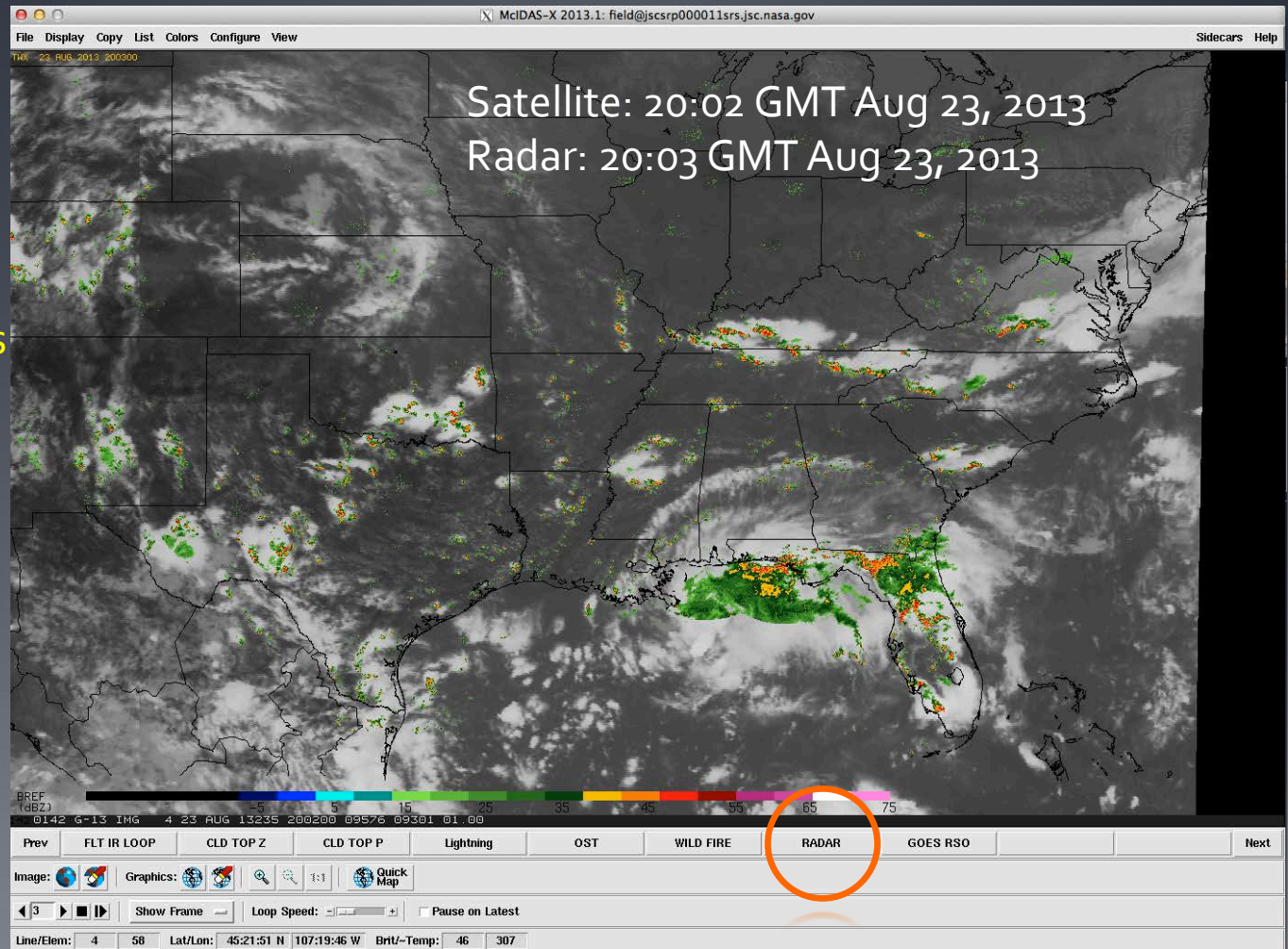
GUI Showing 4km WV from GOES-13 with Plane Tracks

*PATH, AIRPLANE
*SHOWVG
*ZA



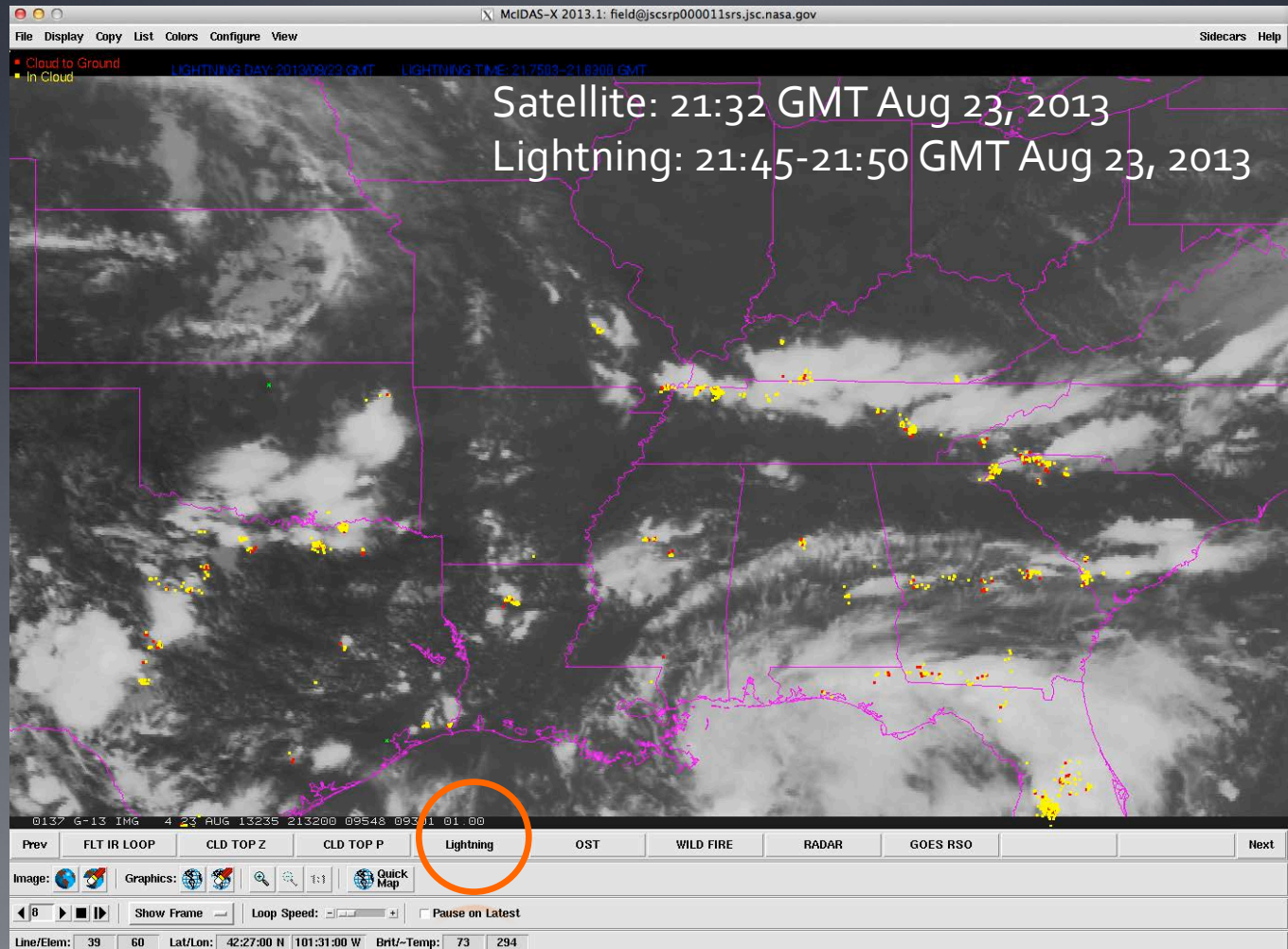
GUI Showing 4-km IR from GOES-13, 15 with NEXRAD Overlay

- *IMGREMAP
- *SATOVERLAY₂
(plot function)
- *BAR
- *PCT, ZA – BAR labels
- *MERGE_GEO



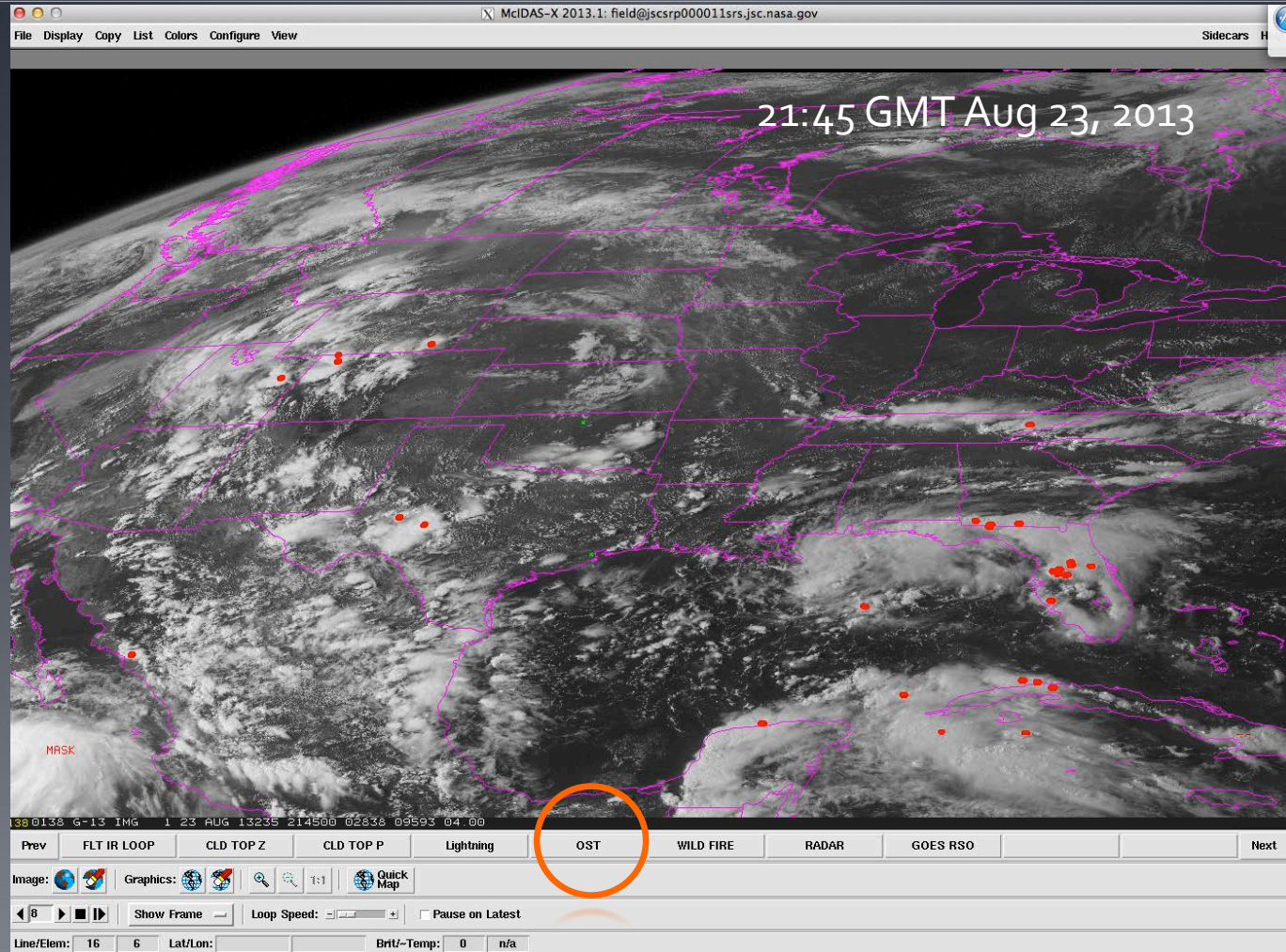
GUI Showing 4-km IR from GOES-13 with Lightning Overlay

- *IMGREMAP
- *PCE
- *ZLM FILL
- *SHOWVG



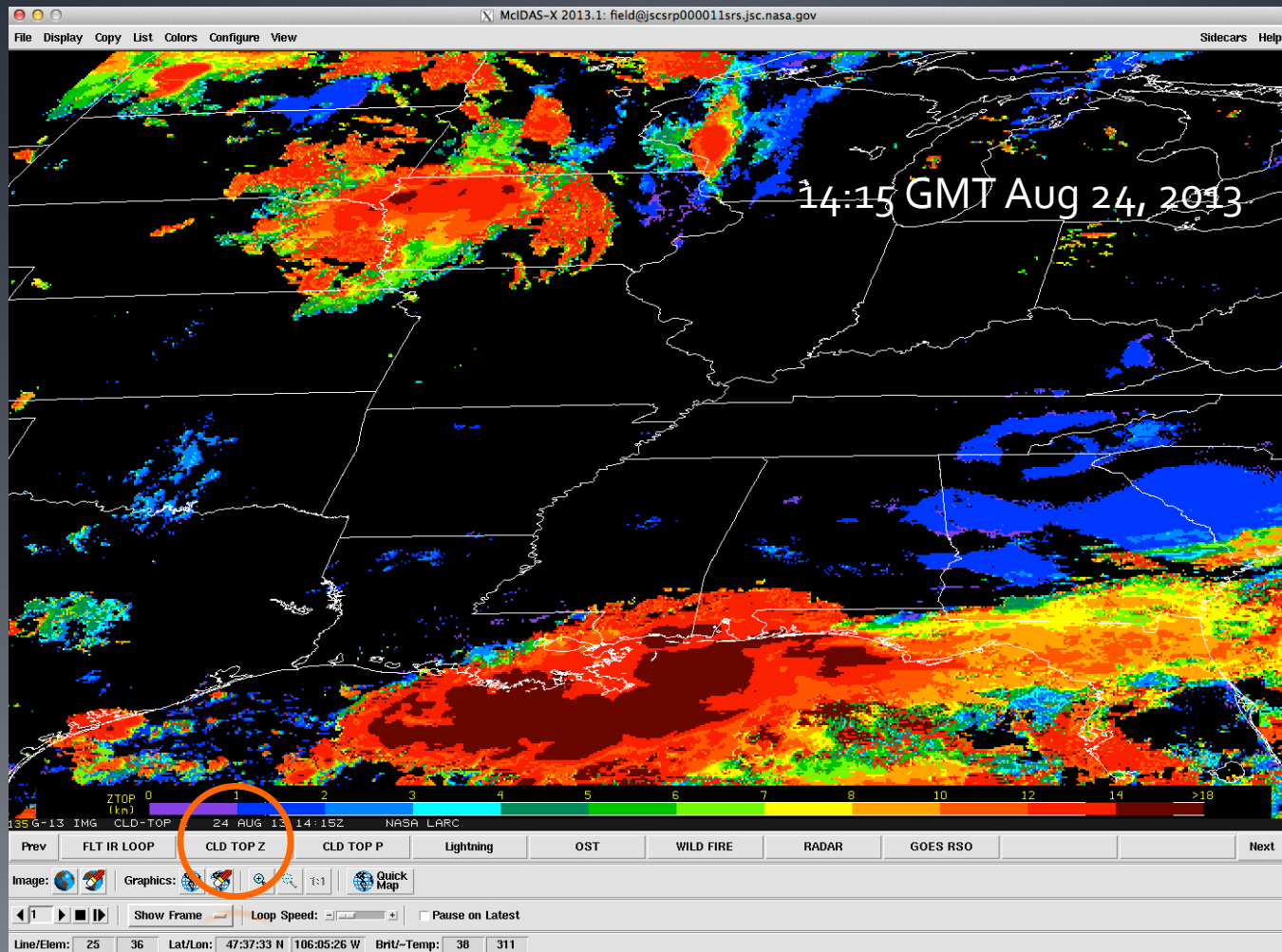
GUI Showing 4-km VIS from GOES-13 with Overshooting Tops

- *FRMLIST
- *PTLIST
- *PTDISP

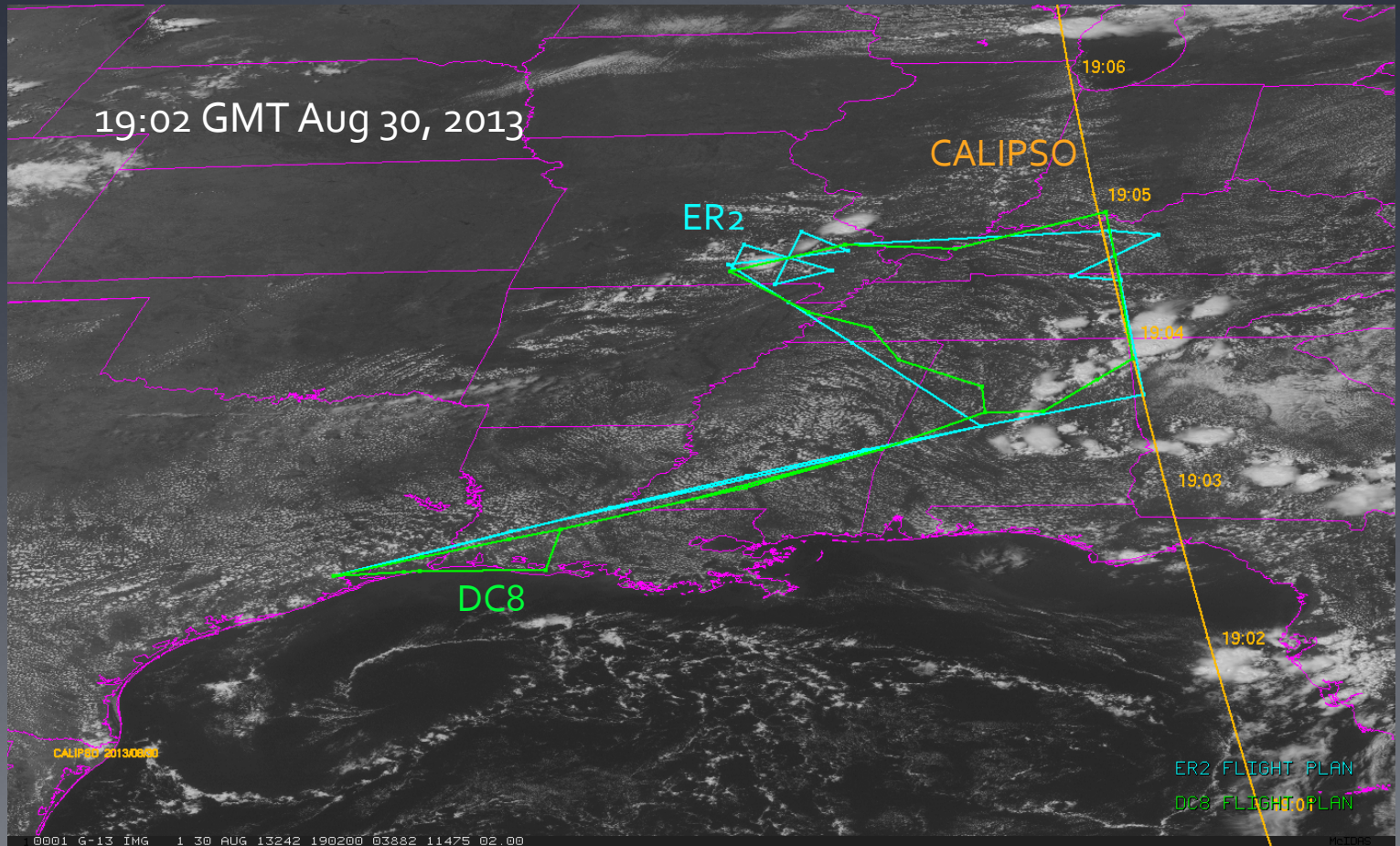


GUI Showing 4-km Cloud Top from GOES-13

*IMGDISPCP
*BARCP



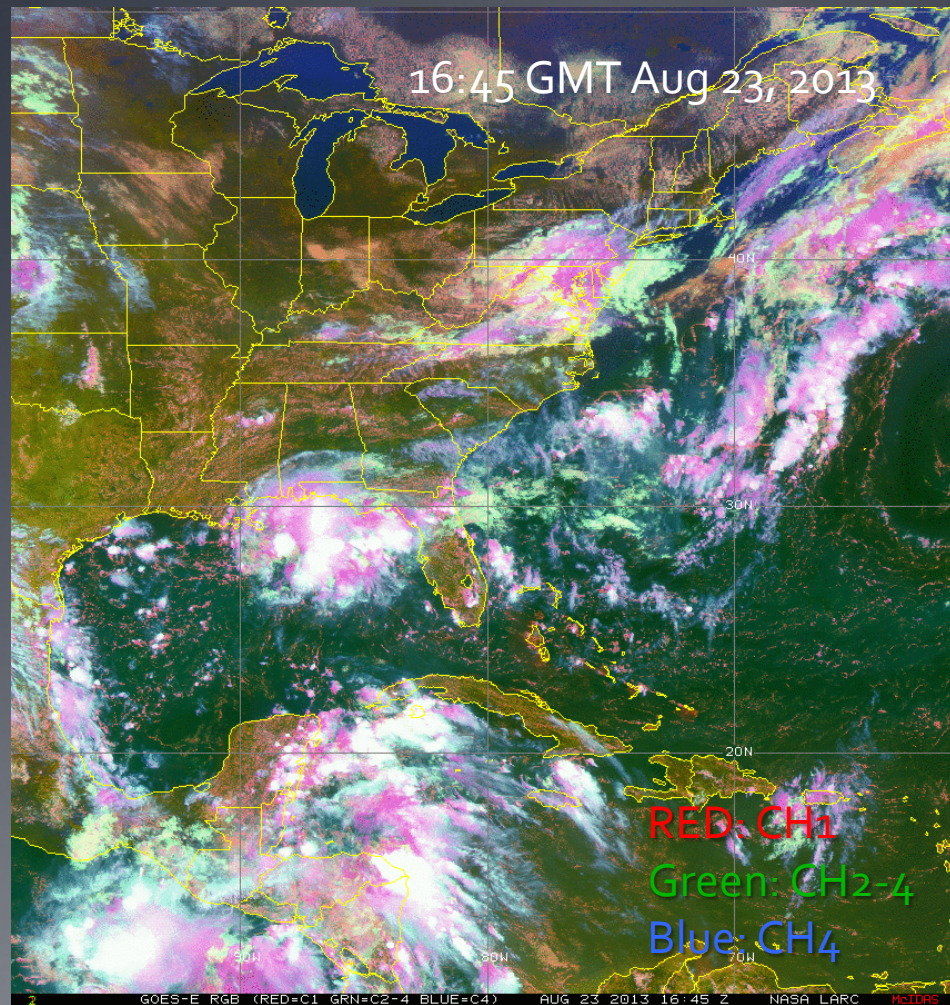
GOES-13 Image with Flight Plan for Aug 30, 2013



*PATH
*NAVDISP
with TLE files

GOES-13 5km Remapped RGB Image

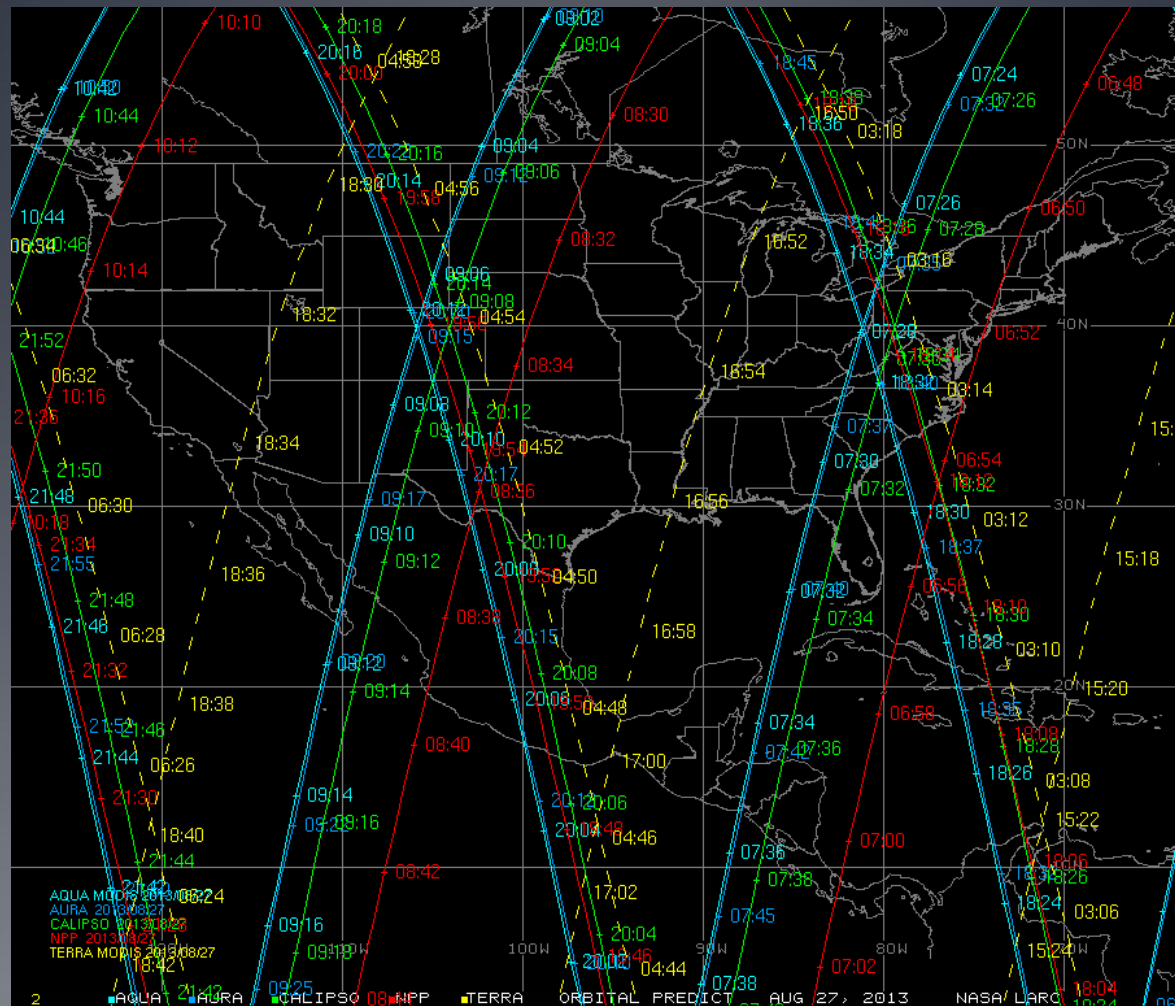
*IMGREMAP
*COMBINE



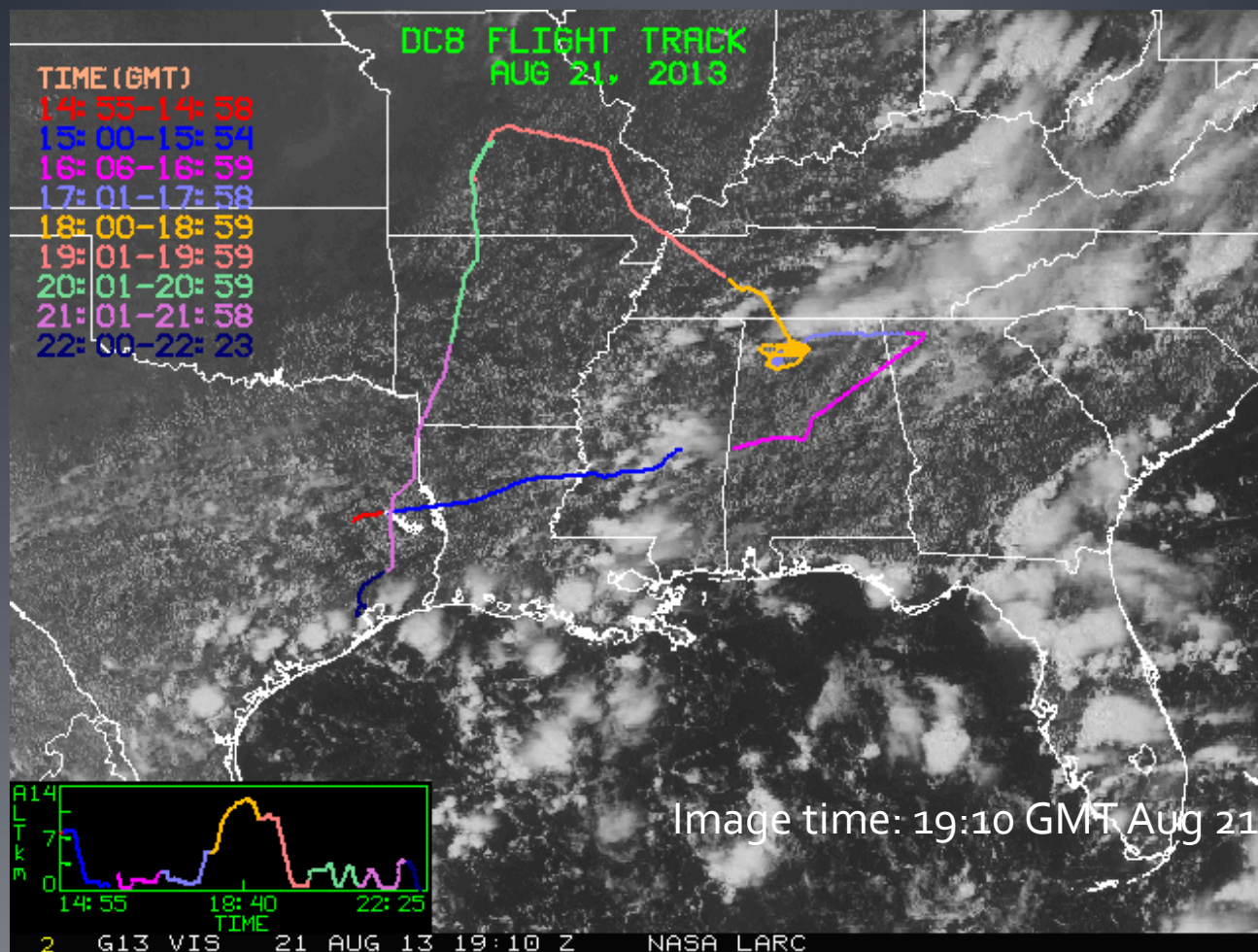
Orbital Predict for Aug 27, 2013

*NAVDISP with
TLE files
*PCT, ZLM – Squares in
frame's label

AQUA
AURA
CALIPSO
NPP
TERRA

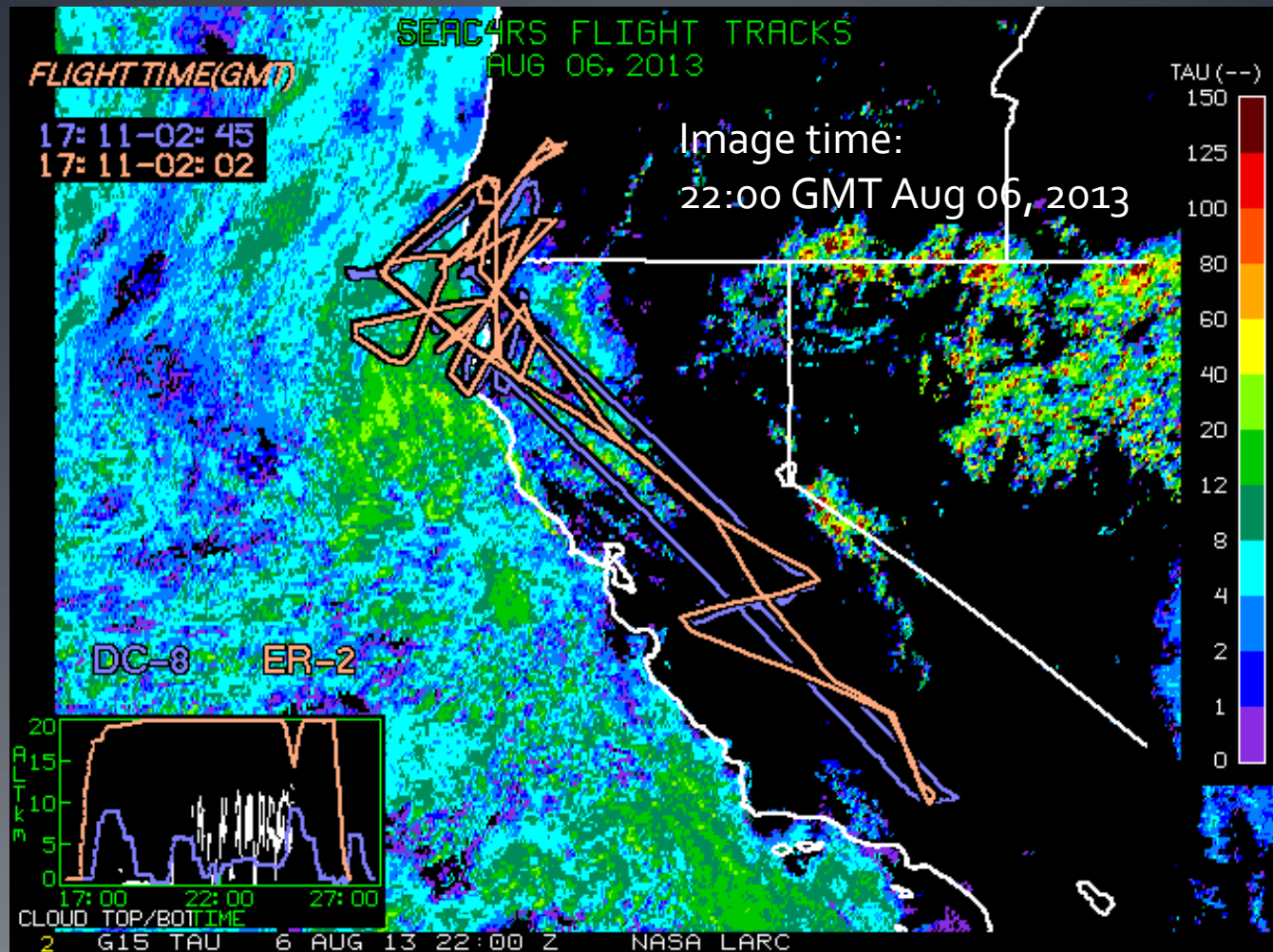


DC-8 Flight Track on GOES-13 VIS Image



*IMGREMAP
*plot routine
*ZA

Flight Tracks on GOES-15 Optical Depth Image



- *IMGREMAP
- *plot routine
- *ZA
- *IMGDISPCP
- *BARCP

Summary

- NASA LaRC cloud group in Houston, TX using McIDAS-X on 2 Mac OS X laptop computers to support SEAC₄RS field experiment (Aug-Sep 2013) .
- Real-time flight positions and past 20-60 min of aircraft tracks shown on GOES VIS, IR, WV image loops.
- Image loops with current and projected airplane positions used to make course adjustments for studying convective clouds, smoke.
- Polar orbiting satellite tracks shown to mission planning for aircraft coordination with overpass.
- For takeoff and landing at Ellington Field, McIDAS IR image with NEXRAD and lightning overlay used.
- McIDAS-X helped NASA-Langley support previous field missions: ATTREX, MACPEX, TC₄, CCVEX, AIRS-2, CRYSTAL-FACE.
- Need similar capabilities in McIDAS-V to support future field missions.