



The NRL TCS-08 Satellite Products



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Sponsors:

Office of Naval Research (ONR)

TCS-08/TPARC Data Management Workshop

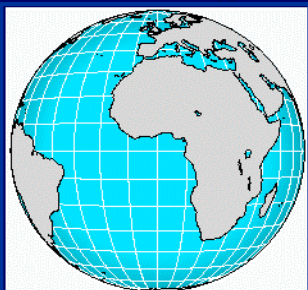
May 3, 2009



NRL Satellite Sensor Constellation

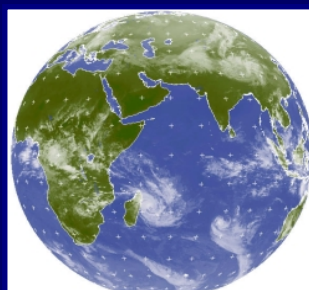
GEO Satellites (7)

105 E



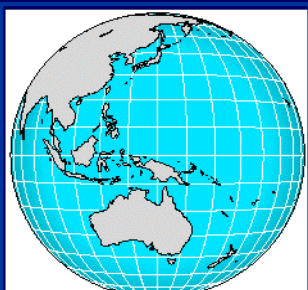
0 E Meteosat-9

European



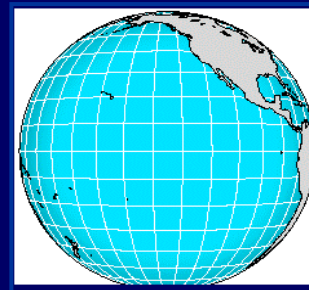
57 E Meteosat-7

European



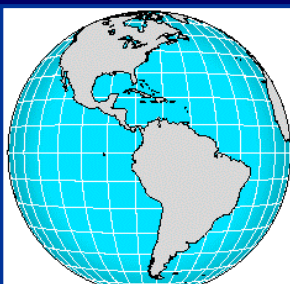
140 E MTSAT

Japan



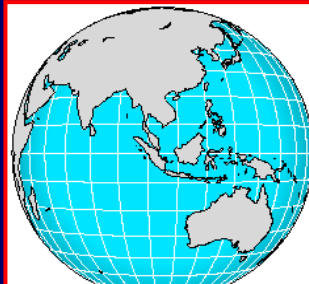
135 W GOES-10

United States



75 W GOES-12

United States



105 E FY-2D

China

Polar Orbiting Satellites (31)

Imagers (Vis/IR):

- NOAA - AVHRR (4)
- METOP - AVHRR (1)
- DMSP - OLS (5)
- NASA - MODIS (2)
- Comm - SeaWiFS

Microwave Imagers:

- DMSP - SSM/I (3), SSMIS (2)
- NASA - TMI, AMSR-E
- NRL - WindSat

Microwave Sounders:

- NOAA - AMSU-B (3), MHS (2)

Microwave Radar:

- NASA - QuikSCAT + ERS-2, PR, CloudSat, ASCAT

Collaborations: FNMOC, AFWA, NASA, NOAA, NAVO, CIRA

Data latency: GEO < 1 hour

LEO 1-3 hours

Data volume: 250 – 300 GB/day

Courtesy: Johnson & EUMETSAT

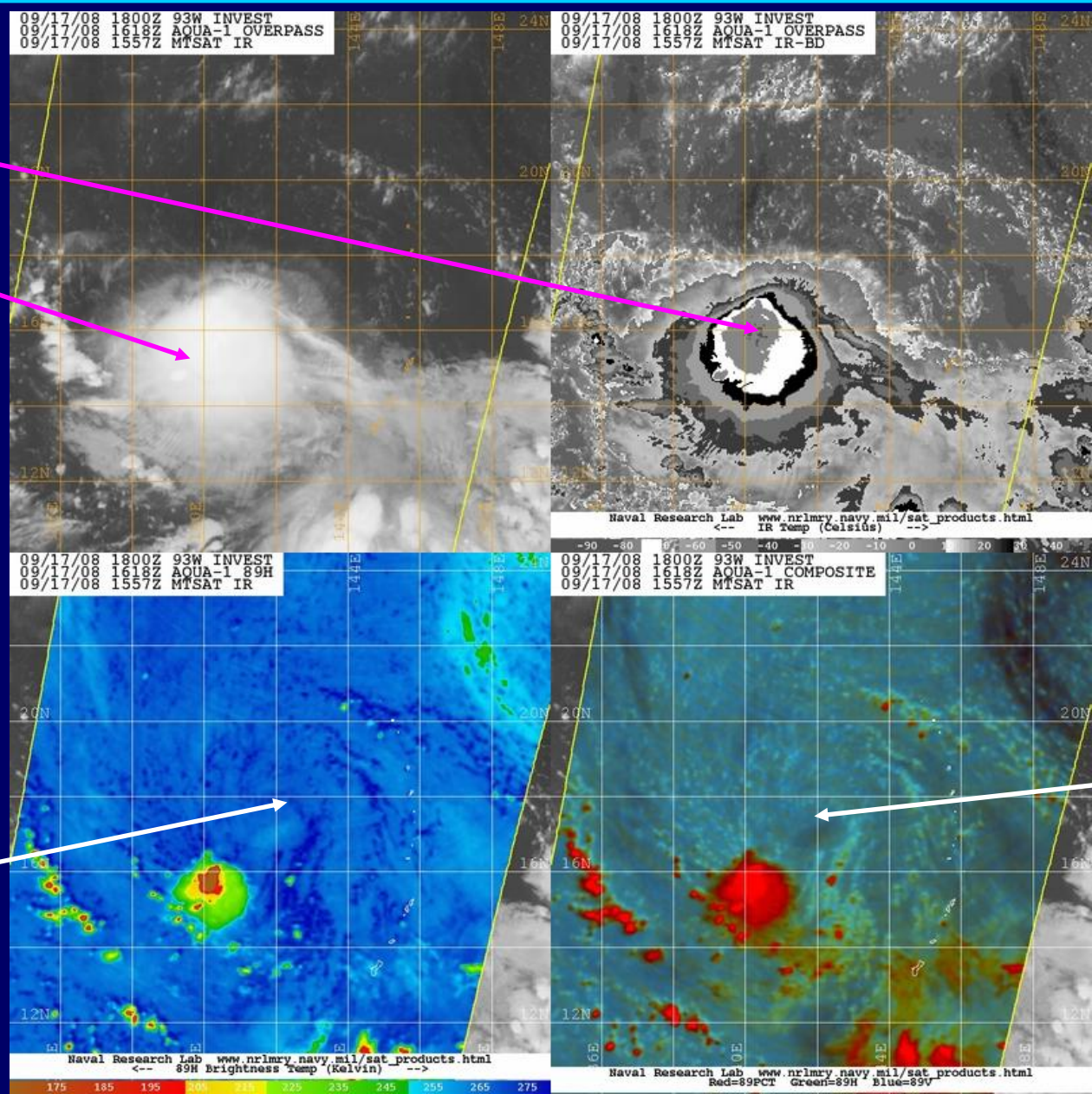


NRL TCS-08 Satellite Support



Good central mass

Low level circulation center exposed





NRL TC Web Resource

Storm Basins & Names

- 2008 Storms
 - All
 - Active
 - Year
- Atlantic
 - 11L.KYLE
- East Pacific
- Central Pacific
- West Pacific
 - 99W.INVEST
 - 98W.INVEST
 - 44W.NRLINVEST
 - 19W.JANGMI
 - 049.TCS049
 - 048.TCS048
 - 047.TCS047
- Indian Ocean
- Southern Hem.
- Season: 09

Latest Previous **Thumb** Full Pass_Mosaic Mosaic Loop ATCF Track&Image **Scat** **CloudSat**

Environment Total_Precip._Water_Vapor[TPW] TPW&NOGAPS_TPW TPW&NOGAPS_850_Winds Wind_Shear

Sensor	% Cov	VIS	IR	IR-BD	Multi Sens.	85GHz H	85GHz weak	85GHz PCT	Color	Rain	Wind	37GHz Color	37GHz V	37GHz H	SSM/I Vapor
SSM/I	60%														
SSMIS	76%														
TMI	60%														
AMSRE	89%														
WINDSAT	90%														
AMSUB	81%														

<= 6 hrs. old, <= 12 hrs. old, > 12 hrs. old

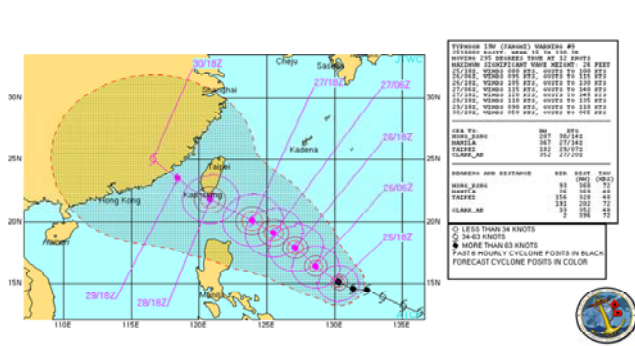
047.TCS047, GEO, 26 SEP 2008 0030Z

Tutorials: Overview **COMET**

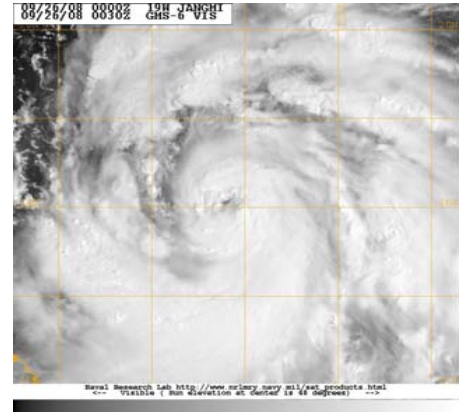
Scatterometer & CloudSat

Vis/IR imagery suite

Microwave imager/sounder product suite



Automated Tropical Cyclone Forecasting (ATCF) System warning graphic



Latest 1-km Visible/IR imagery (GEO/LEO)

30 minute MTSAT refresh with AVHRR/OLS as available



NRL TCS-08 Satellite Support



NPS operations team flexibility:

- Turn on/off interest for any “invest/suspect” area in WPAC.
- Full suite of NRL TC web products produced: near real-time.
- Focus on microwave sensors: see through non-rain/rain clouds.
 - Imagers: SSM/I, SSMIS, AMSR-E, TMI , and WindSat
 - Sounders: AMSU, MHS
 - Radars: TRMM PR, CloudSat

TCS invests to NOT show up on regular NRL TC public web site



NRL TCS-08 Satellite Support



NRL Satellite Data Product Locations

NRL TCS-08 web page suite:

- All jpeg products archived online
- All jpeg products archived at NPS/EOL
- All digital satellite products archived at NRL/NPS



NRL TCS-08 Satellite Web Page



<http://www.nrlmry.navy.mil/TCS.html>



ONR TCS-08



TCs Web Page

**Adaptive Observations&
Singular Vectors**

NOGAPS Genesis Index

COAMPSOS

COAMPS Adjoint

NRL Home Page

*Approved for public release by: Superintendent
Last updated: 7/31/2008
Sat Section Head
Webmaster*



NRL TCS-08 Satellite Web Page



> 54 TCS INVESTS

TCS 2008 Storms

West Pacific

- 060.TCS060
- 054.TCS054
- 053.TCS053
- 052.TCS052
- 051.TCS051
- 050.TCS050
- 049.TCS049
- 048.TCS048
- 047.TCS047
- 046.TCS046
- 045.TCS045
- 044.TCS044
- 043.TCS043
- 042.TCS042
- 041.TCS041
- 040.TCS040
- 039.TCS039
- 038.TCS038
- 037.TCS037
- 036.TCS036
- 035.TCS035
- 034.TCS034
- 033.TCS033
- 032.TCS032
- 031.TCS031
- 030.TCS030
- 029.TCS029
- 028.TCS028
- 027.TCS027
- 026.TCS026
- 025.TCS025
- 024.TCS024
- 023.TCS023
- 022.TCS022
- 021.TCS021
- 020.TCS020
- 019.TCS019
- 018.TCS018
- 017.TCS017
- 016.TCS016

Privacy Policy Disclaimer **NRL Monterey TCS 08 Page (Ver.4.33.01)** **Development Team**

NOTE: this page is short lived (10 m). DO NOT bookmark it or save it to Favorites. Instead, bookmark <http://www.nrlmty.navy.mil/TC.html>

LMAT

Track

Para. Model

Track

Track

ATCF

Track/Range

Scatt

CloudSat

Sensor	% Cov	VIS	IR	IR-BD	Multi Sens.	85GHz: H	85GHz: weak	85GHz: PCT	Color	Rain	Wind	37GHz: Color	37GHz: V	37GHz: H	SSM/I Vapor
SSM/I	36%														
SSM/IS	33%														
TMI	55%														
AMSRE	85%														
WINDSAT	42%														
AMSUB	81%														

■ ≤ 6 hrs. old, ■ 12 hrs. old, > 12 hrs. old

047.TCS047, TRACK_VIS, 01 OCT 2008 1730Z

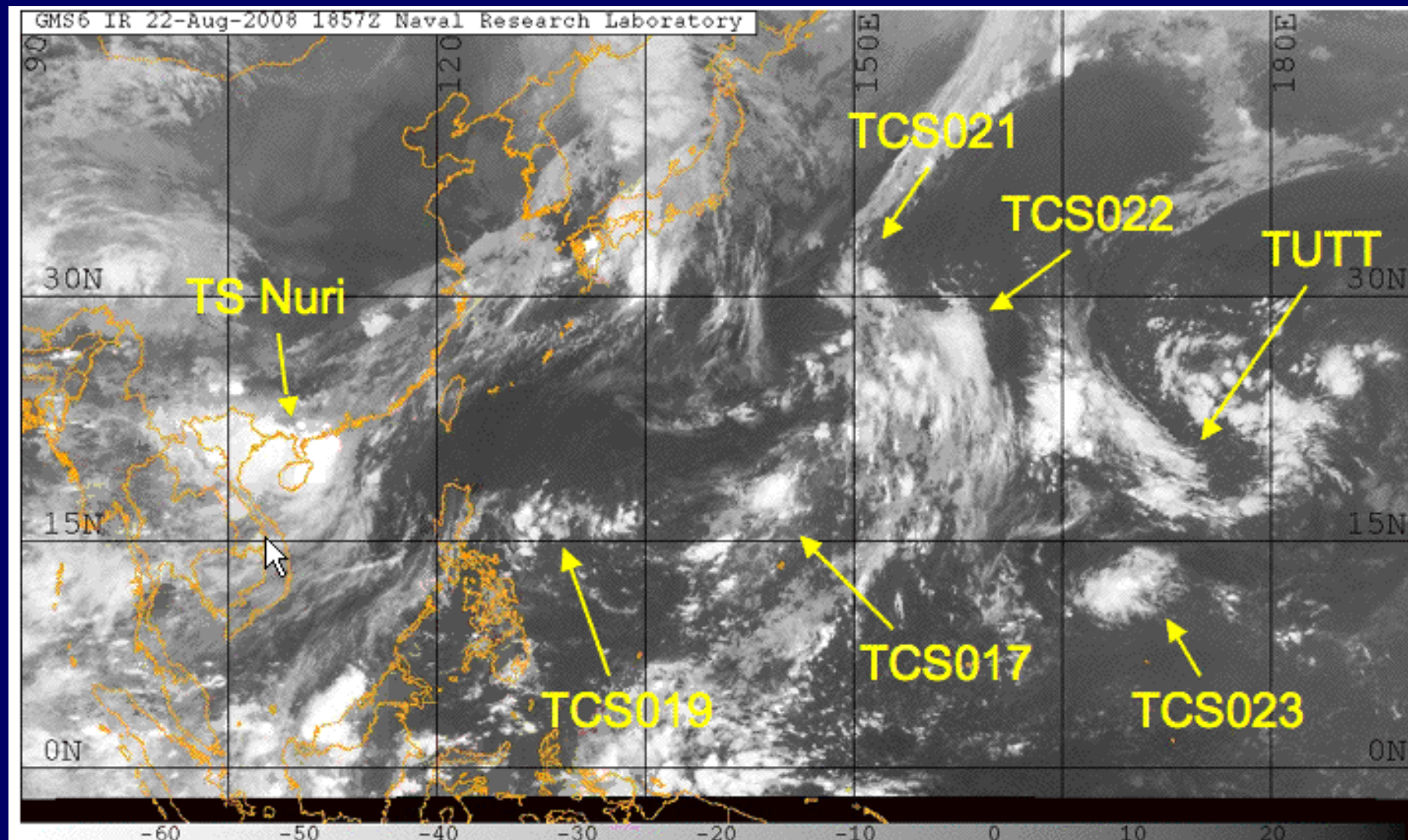
Tutorial: Overview COMET

Latestir/geo/1km bw/20081001.1730

Sensor	Latest	Next (View All)
SSM/I	10/02 0920 Z, F-15 0703	10/02 1035 Z, F-16 0975
TC_SSM/IS	10/02 0852 Z, F-16 1348	10/02 1035 Z, F-16 0975
TMI	10/02 1422 Z, TRMM 0060	/ Z Z, 0000
AMSRE	10/02 0327 Z, AQUA-1 0425	10/02 1534 Z, AQUA 1303
WINDSAT	10/01 2011 Z, CORIOLIS 0809	10/01 2153 Z, WIND 1495
AMSUB	10/02 1152 Z, METOPA 0117	10/02 1153 Z, METOP-A 0286
SCATT	09/24 0914 Z, QUIKSCAT 0000	09/30 2018 Z, QUIK 0030



TCS-08 Satellite Products





TCS-08 Satellite Products



Jangmi MODIS 250 m visible imagery (9-27-08 0447Z)



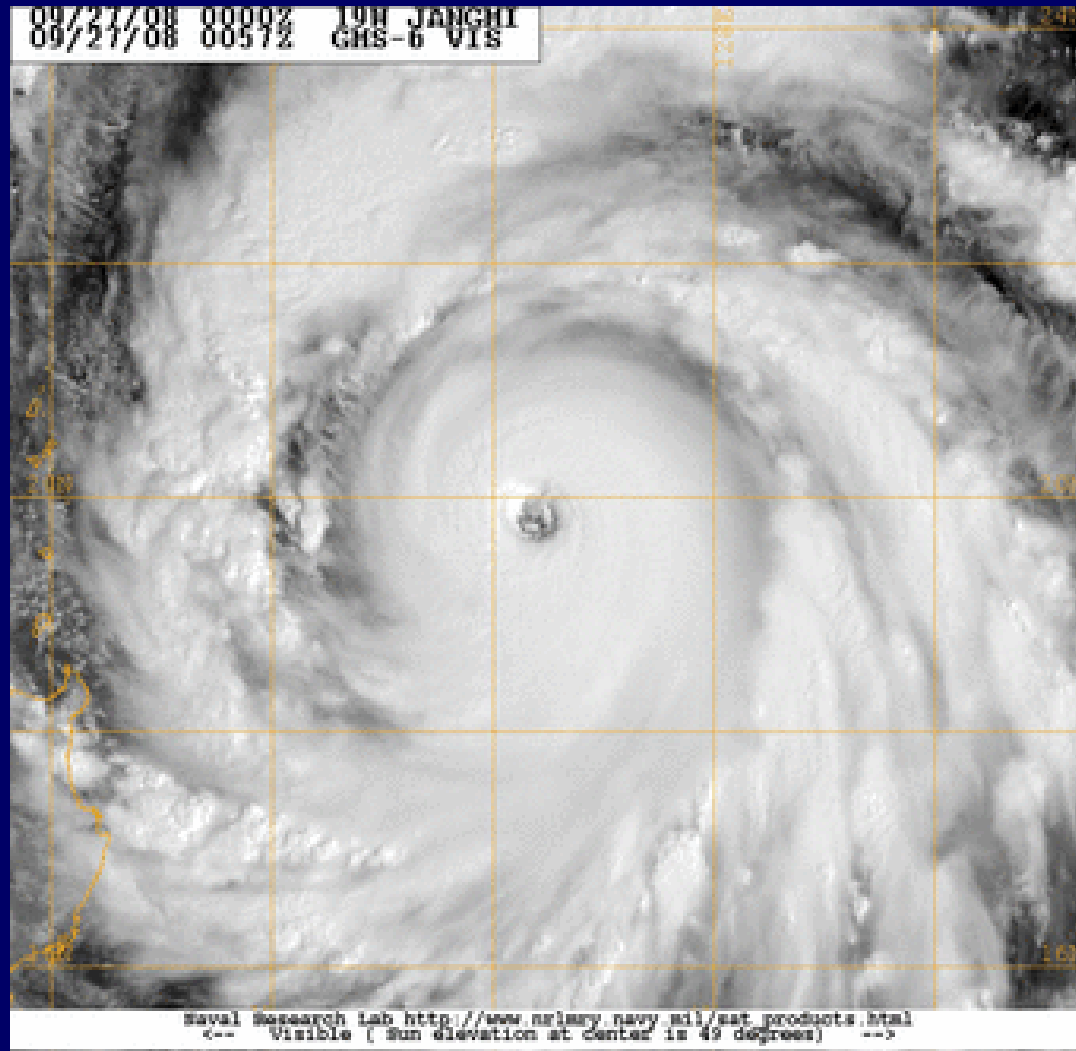
mb-207N-1256E.100pc.jpg



TCS-08 Satellite Cal-Val



Build your own GEO vis/IR animation

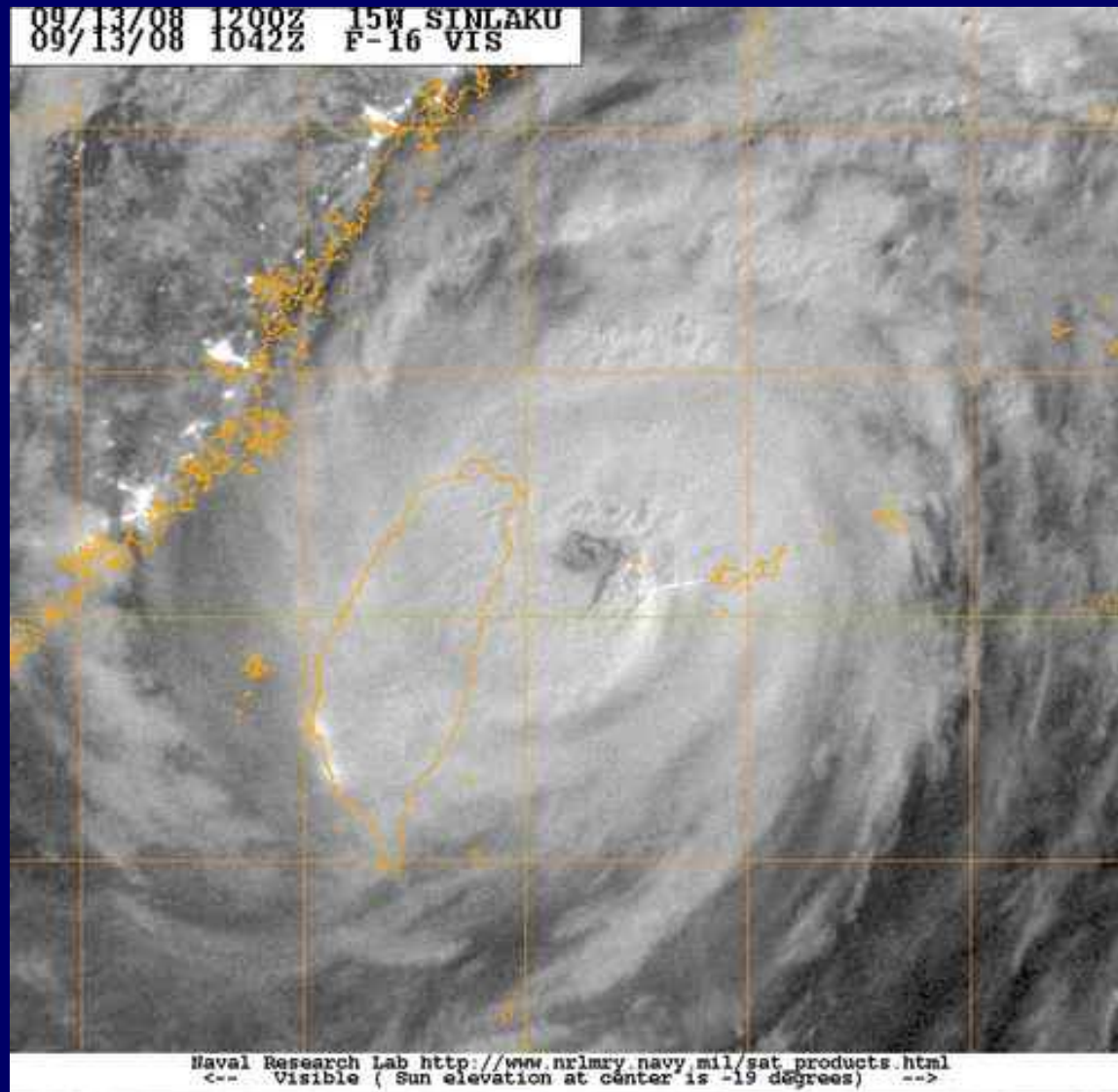




NRL TCS-08 Satellite Products



DMSP OLS Night Time Visible: Sinlaku

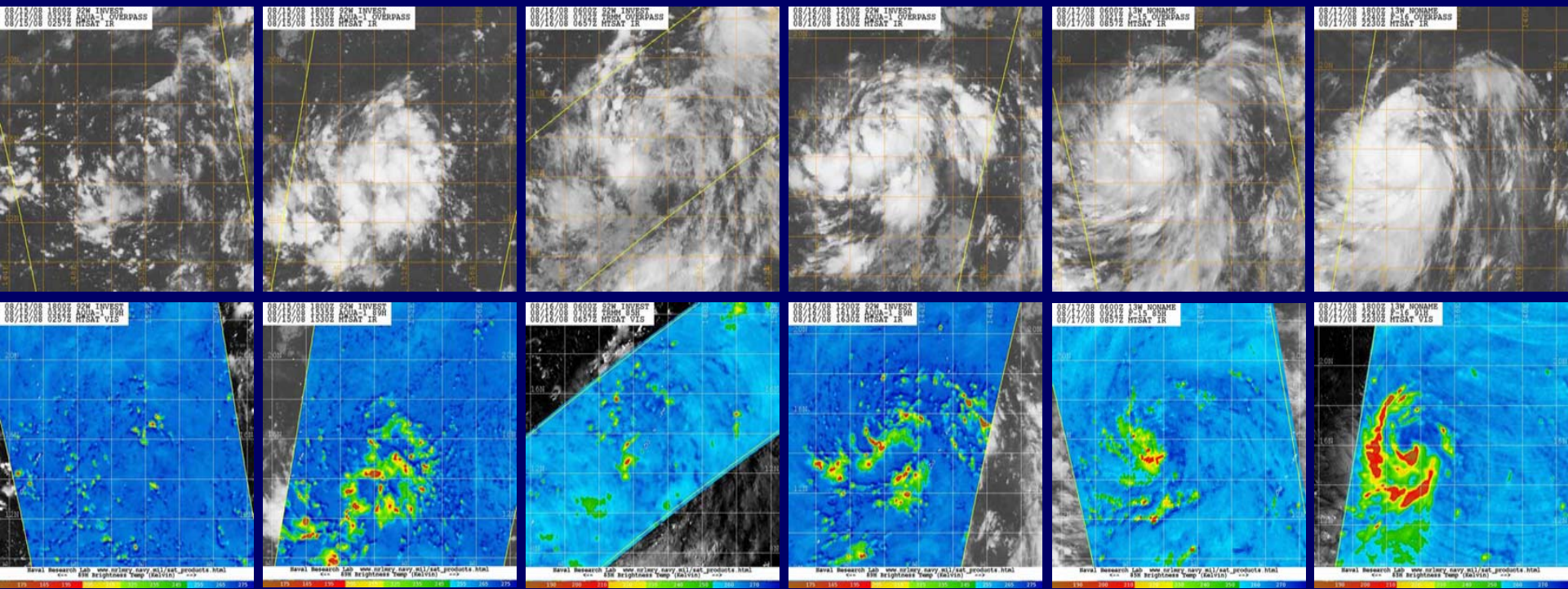




TCS-08 Microwave Capabilities



Monitoring convective activity in spite of upper-level clouds



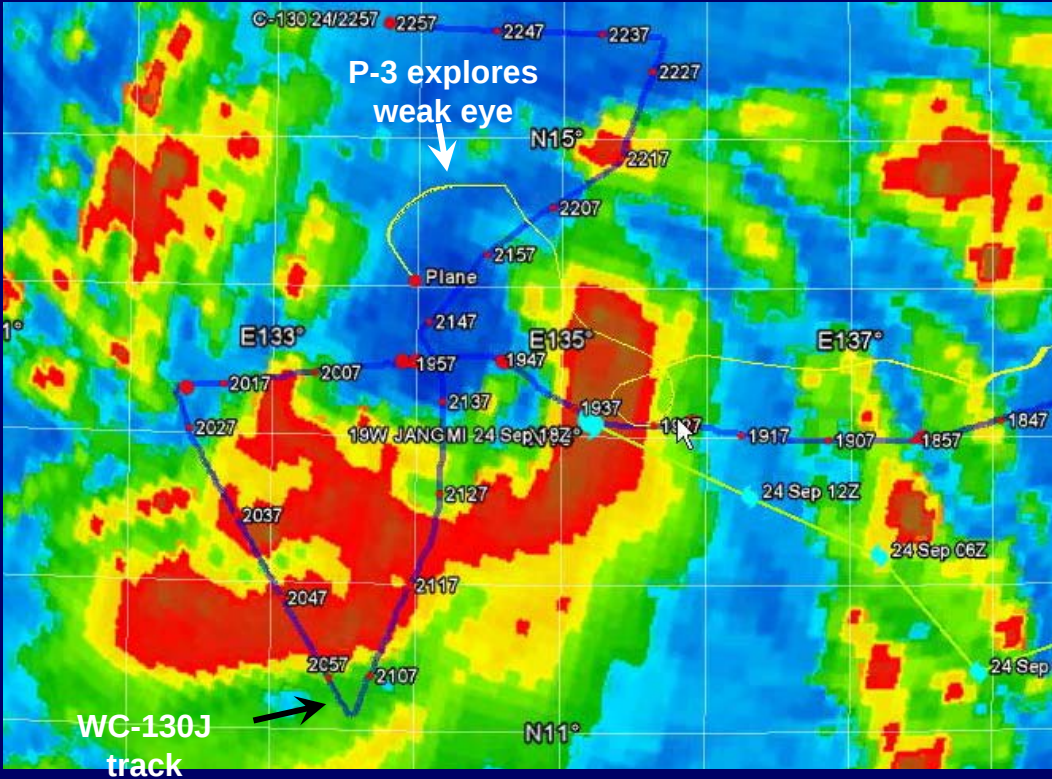
Microwave imagery(85-91 GHz T_b) helps capture dramatic diurnal convection cycles in near real-time on Aug 15-16, 2008, which is then sustained on the 17th and leads to typhoon Nuri development. Microwave enhances convective knowledge versus IR-only scenario.



TCS-08 Satellite Visualization



TCS-08 flight tracks overlain on 85 GHz image



NRL P-3
track

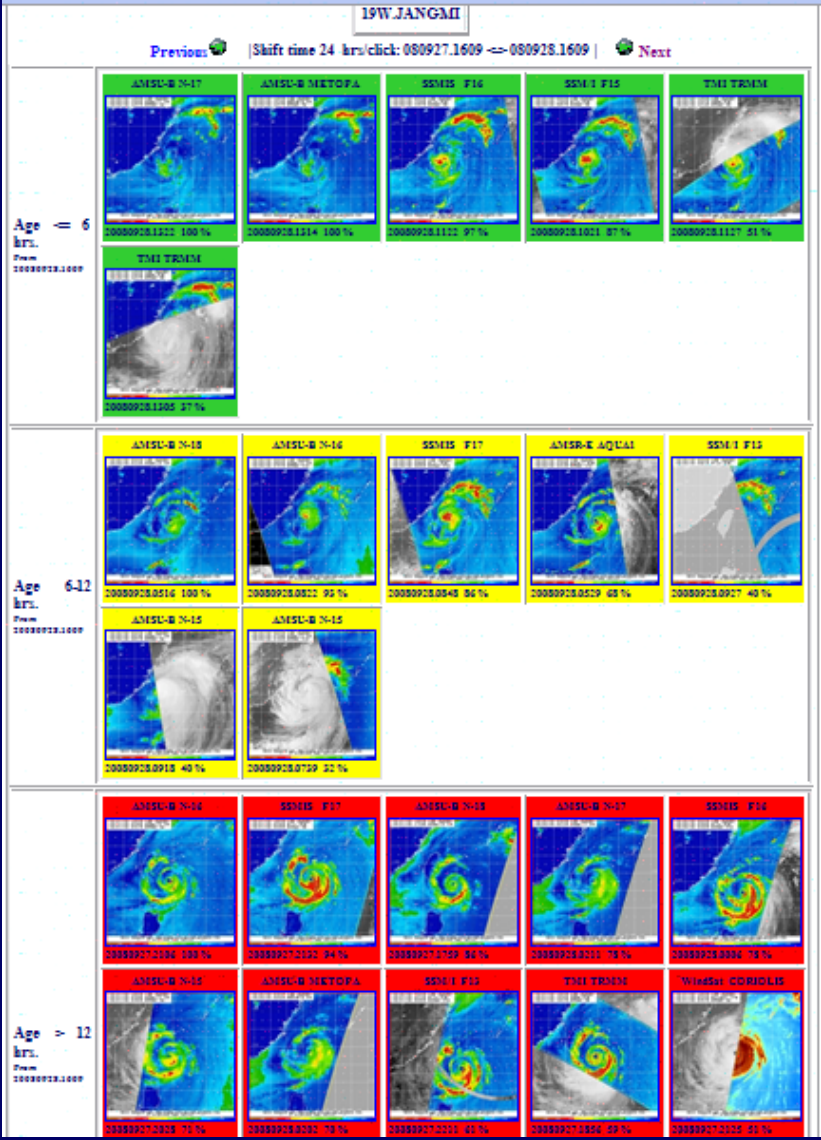
WC-130J
track

Storm
track

F-16 SSMIS 91 GHz imagery more clearly outlines the “open-weak” section of typhoon Jangmi’s eye, greatly assisting P-3 flight operations



NRL TC Web Resource



Each click displays the next 24-hours of 85 GHz H-pol products (from all sensors) available.

Color coded by time, most recent on the top.

Best % coverage gets higher priority (listed 1st)

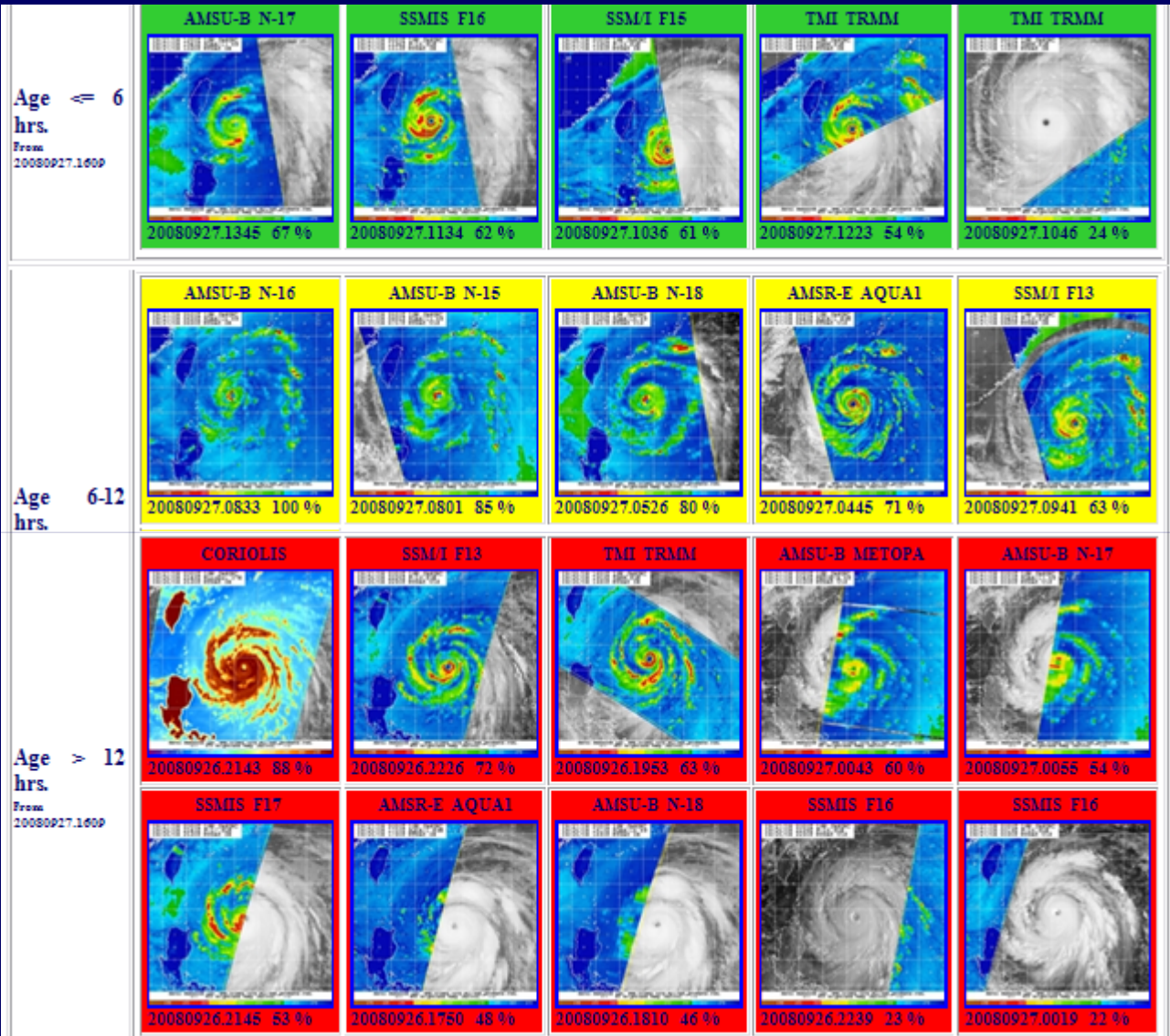
Pass Mosaic Function Addition



TCS-08 Microwave Capabilities

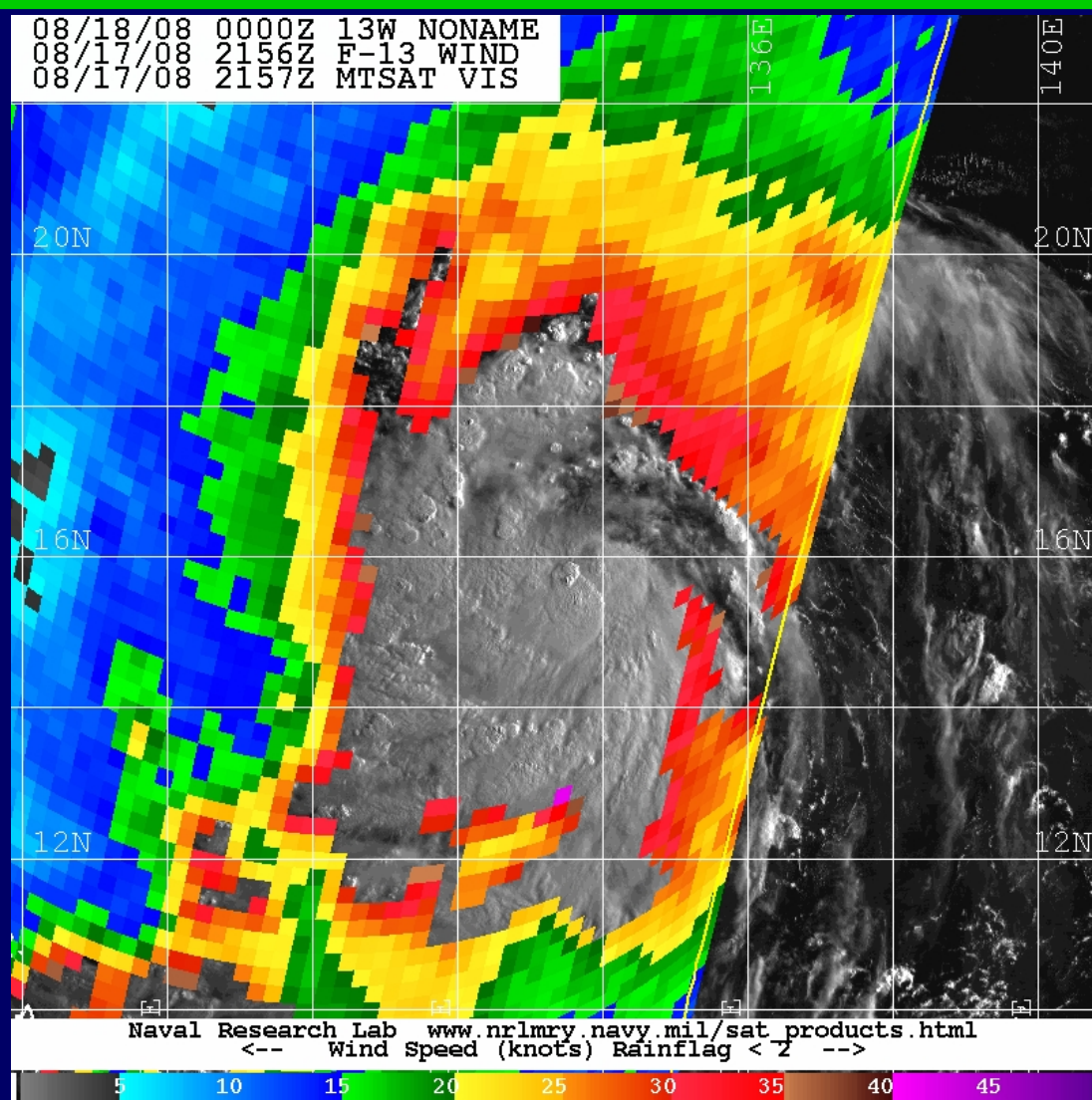


Jangmi Microwave Imagery Pass_Mosaic





TCS-08 Satellite Products



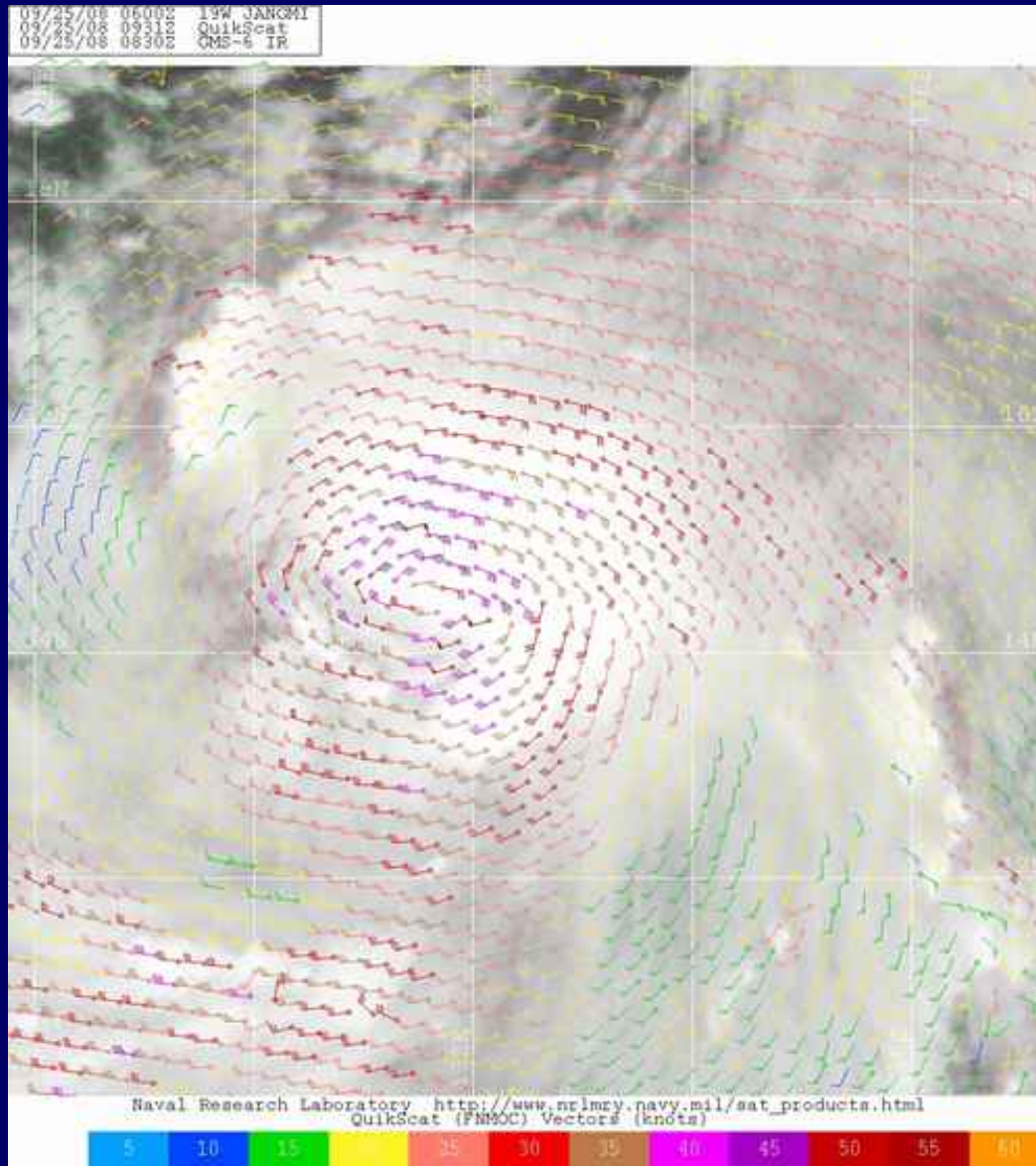
Wind Speeds: Passive Microwave Imager)



TCS-08 Microwave Capabilities



Jangmi Scatterometer Ocean Surface Winds

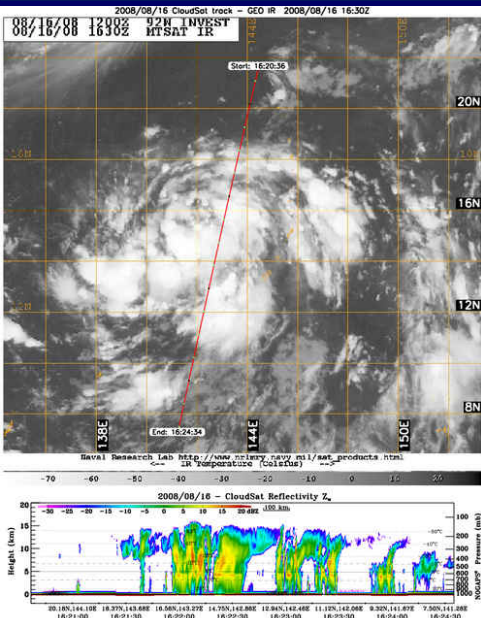




TCS-08 Satellite Products



CloudSat Vertical Cross Sections





TCS-08 Satellite Cal/Val

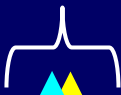


WC-130J Penetrations: TC Intensity (MSLP & Max Winds):

- Single
- Double
- Triple



13W Nuri



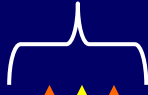
03
Center
Fixes

15 W Sinlaku

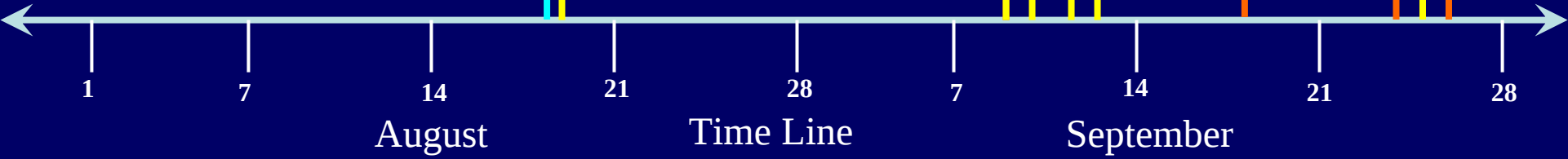


11
Center
Fixes

19 W Jangmi

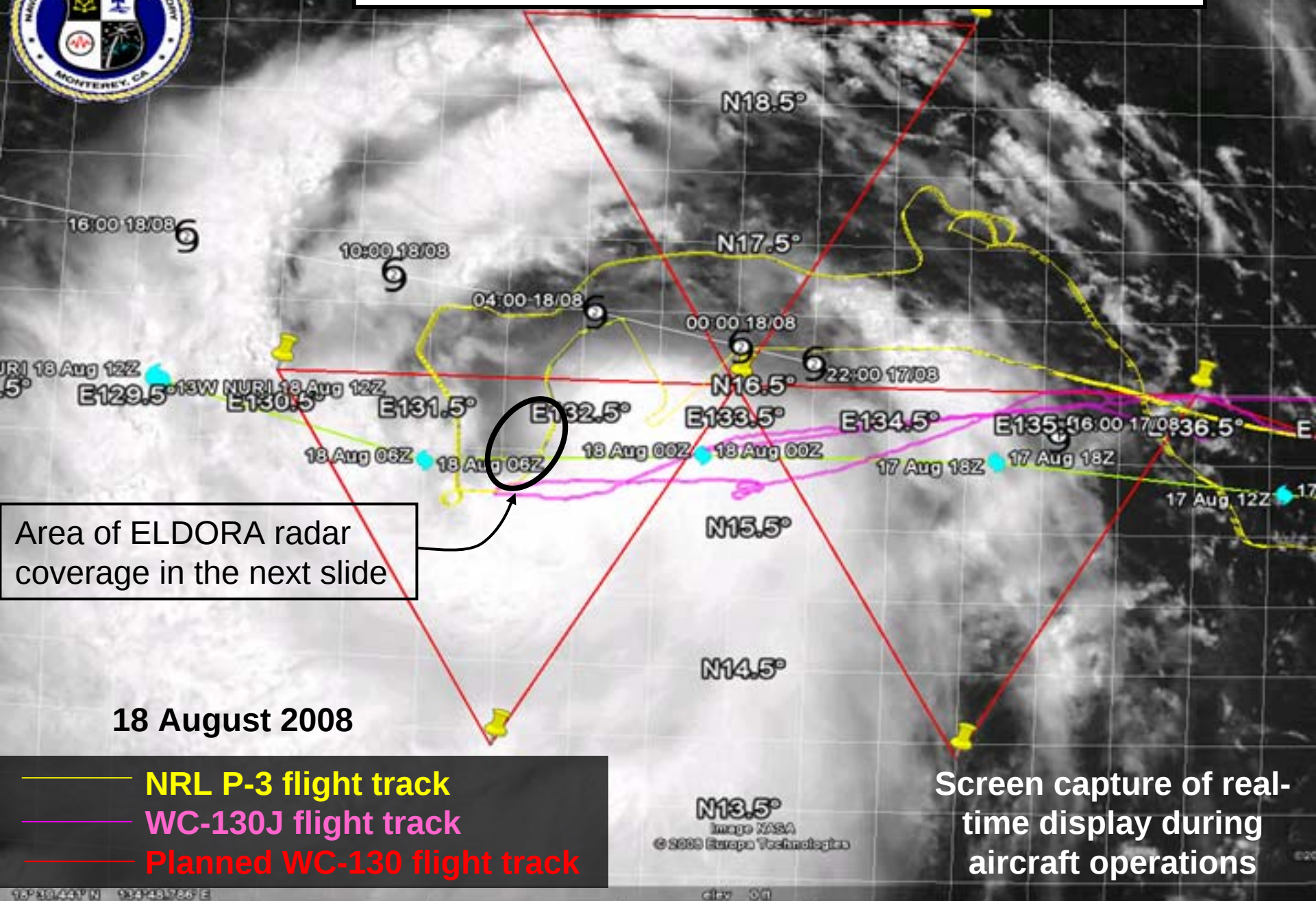


8
Center
Fixes





TCS-08 3rd flight into the Pre-TY Nuri (13W) [Harr]





TCS-08 Satellite Cal-Val



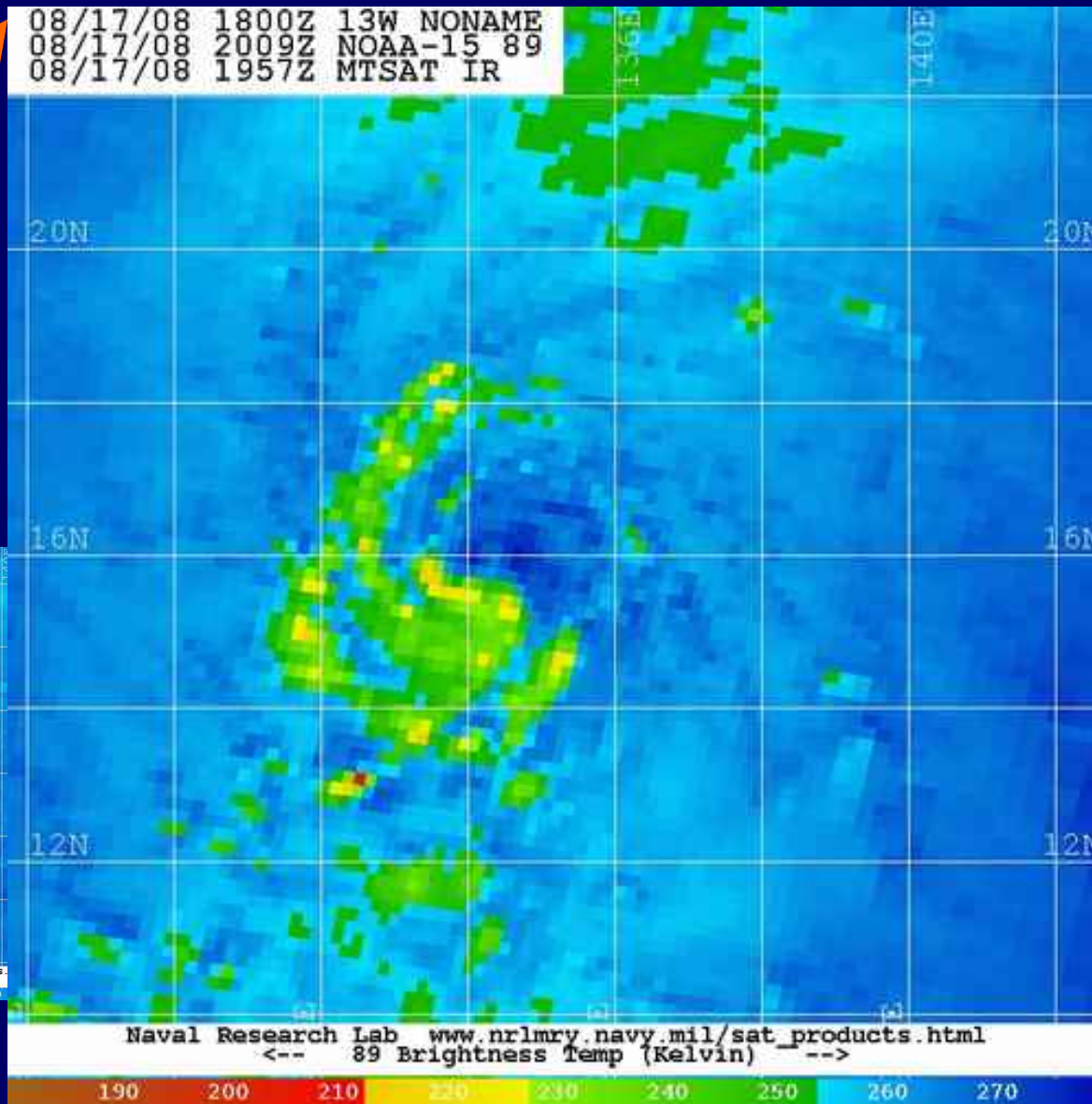
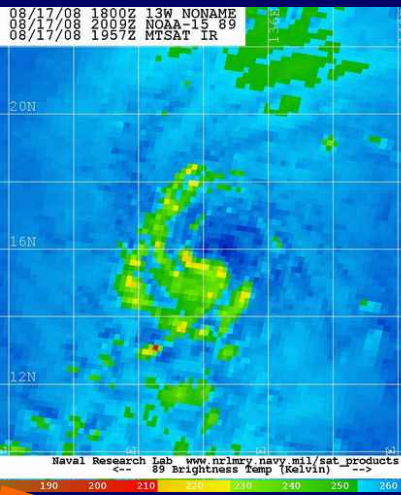
3 Engines: One WC-130J Nuri penetration – then home (Guam)



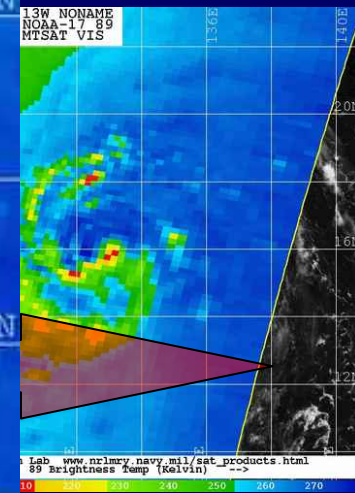
TCS-08 Satellite Cal-Val



NOAA-15
2009Z



NOAA-17
0123Z

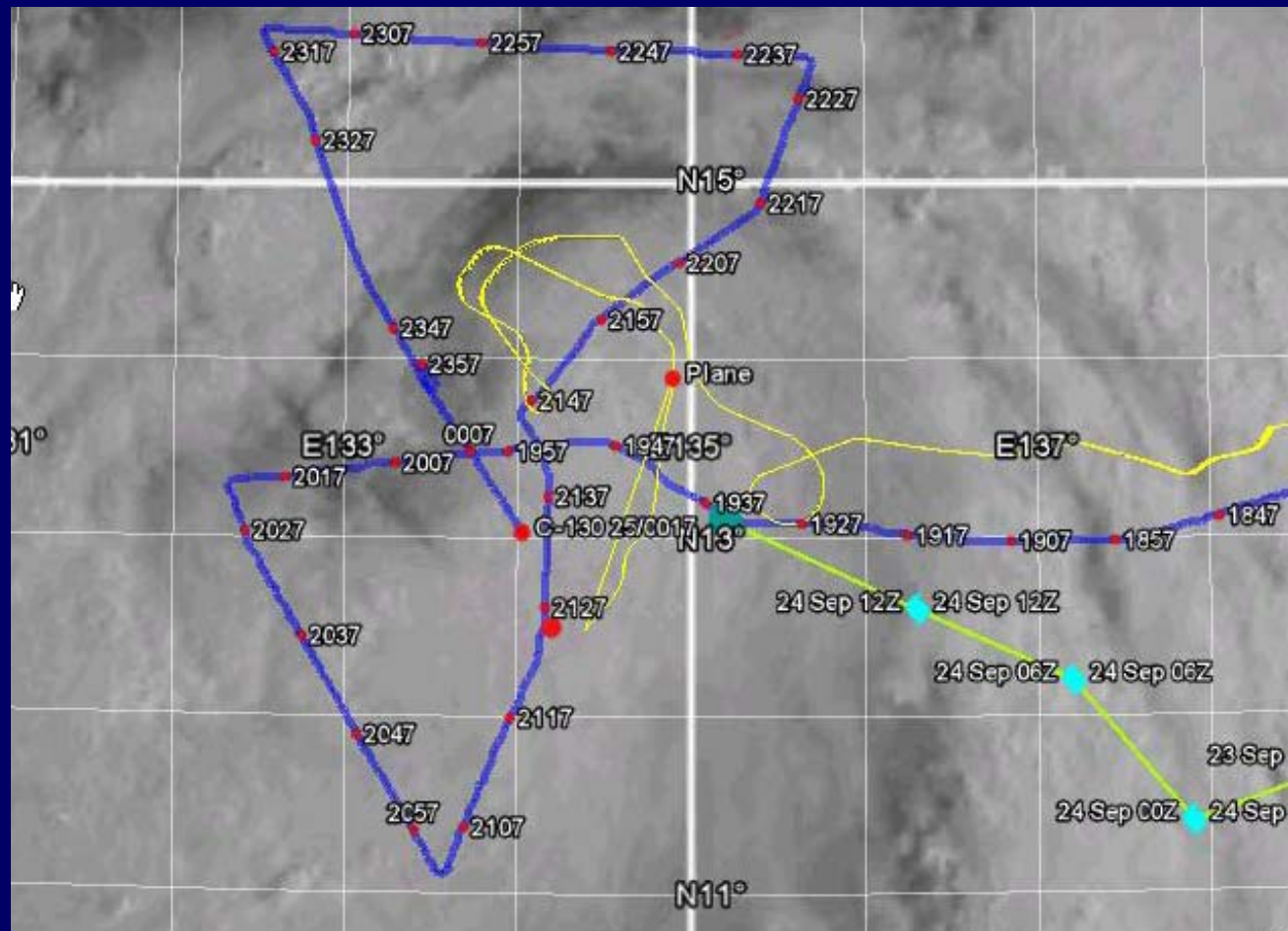




TCS-08 Satellite Visualization



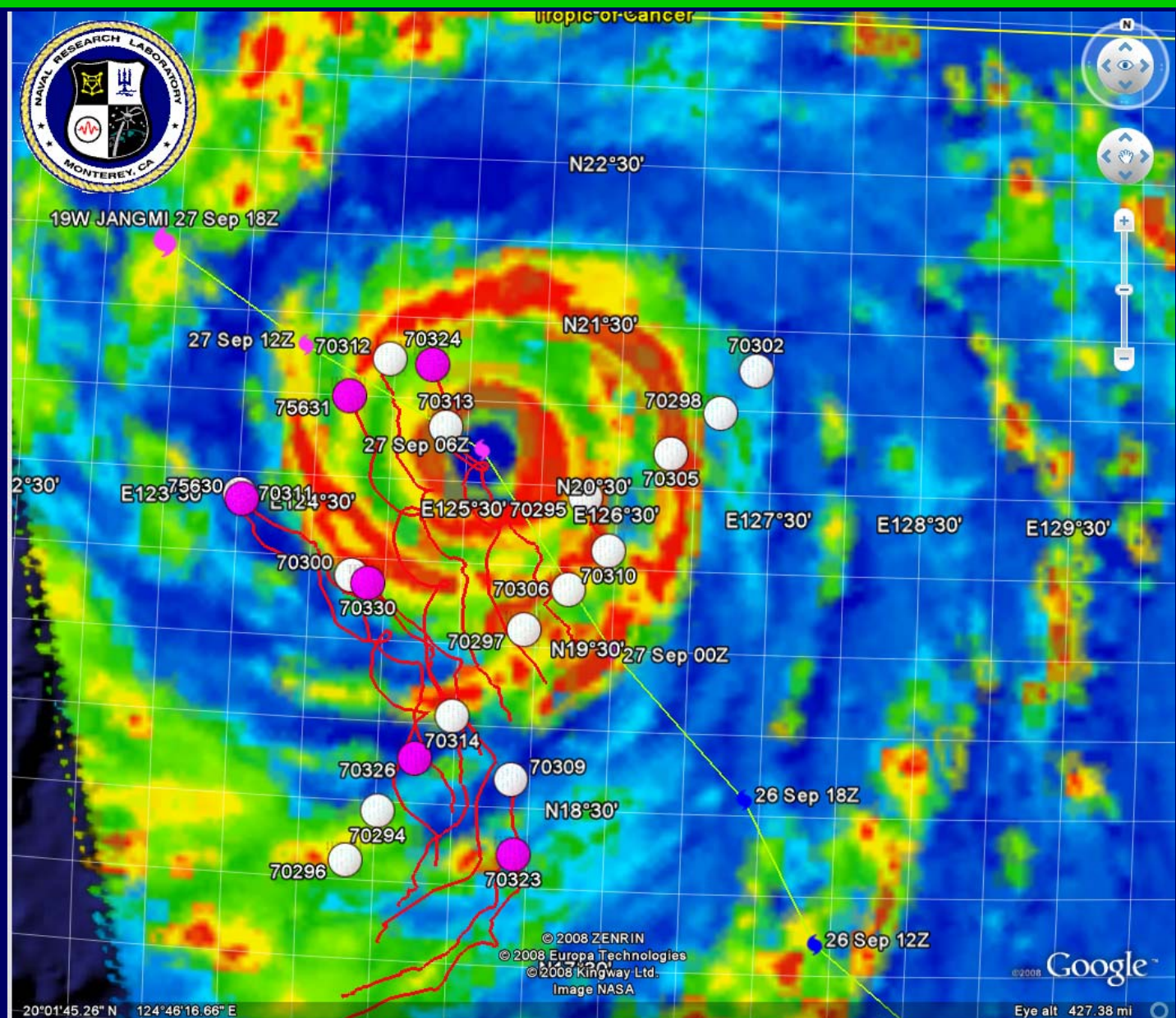
Google Earth Applications



TCS-08 flight tracks overlain on MTSAT image



WC-130J Drifting Buoy Deployment



Rapid Structure Change

STY Jangmi

Eyewall open west,
NW quad rainbands
disappear

27 Sept, 2132

Eyewall, bands
decay

27 Sept, 1134

Eyewall shrinks,
asymmetric band
structure forms

27 Sept, 0445

Concentric Eyewalls:
Peak Intensity

28 Sept, 0006

Time

Black

Cold,
Shallow

OHC Gradient

Warm, Deep





TCS-08 Guam Deployment

