T-PARC/TCS-08 Satellite Data and Product Availability and Archive

(UWisc-CIMSS Component)

Howard Berger, Chris Velden, Dave Stettner

Cooperative Institute for Meteorological Satellite Studies (CIMSS)

T-PARC/TCS-08 Data Management Workshop

May 2-3, 2009

Supported by the ONR Marine Meteorology and Atmospheric Effects Program

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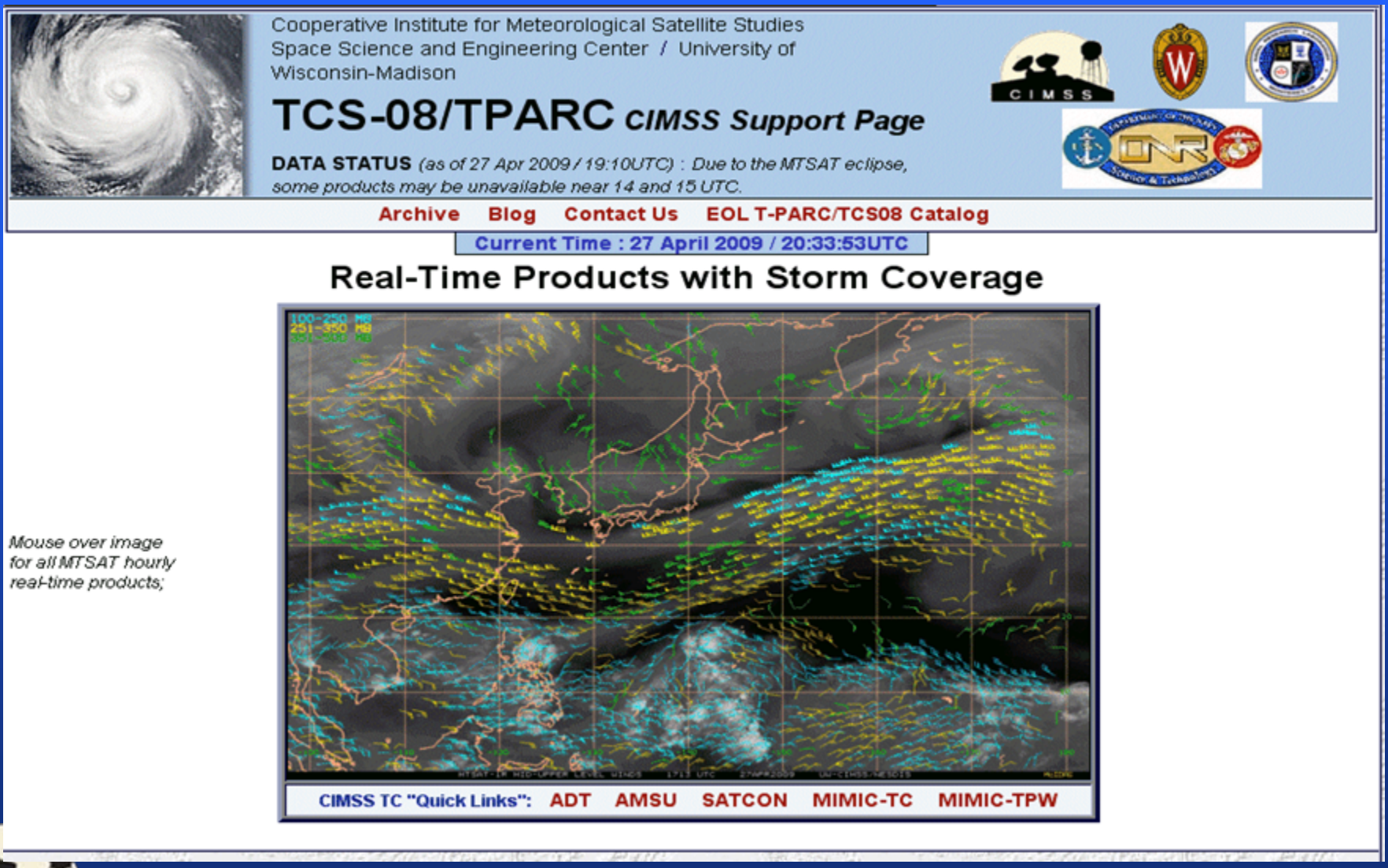
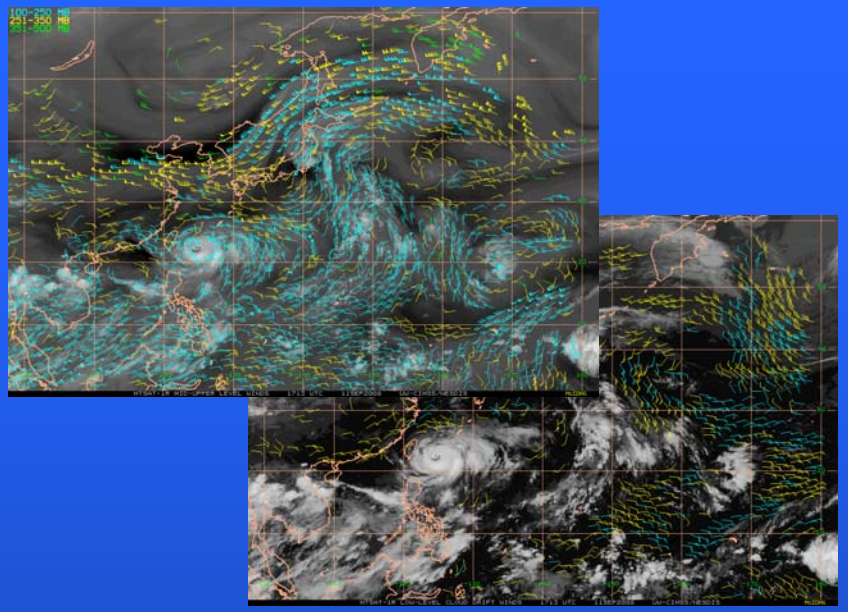
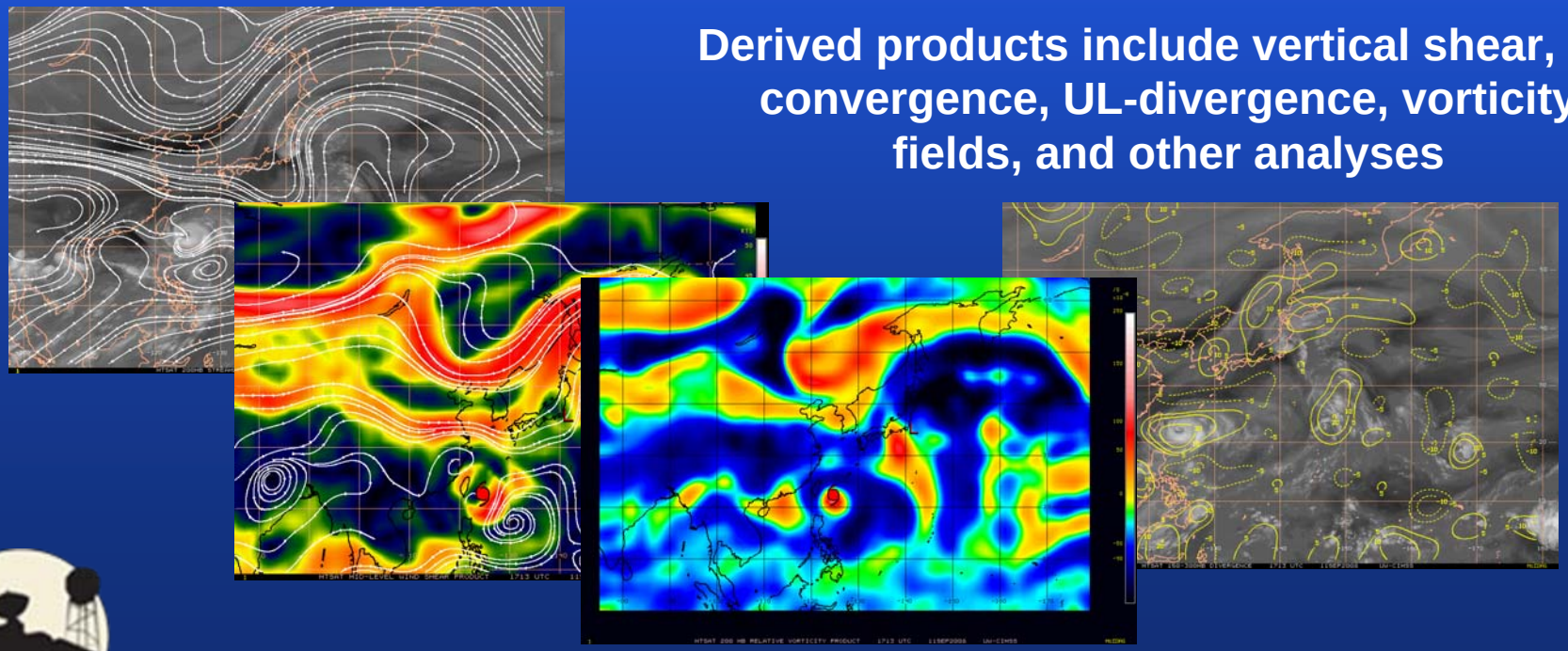
CIMSS T-PARC/TCS-08 Satellite Product Web Site
http://cimss.ssec.wisc.edu/tropic2/tparc/



All data, products and analyses available in real time during the field experiment are available for on-line browsing



On-line product archive includes MTSAT atmospheric motion vectors and derived products plots



Derived products include vertical shear, LL-convergence, UL-divergence, vorticity fields, and other analyses

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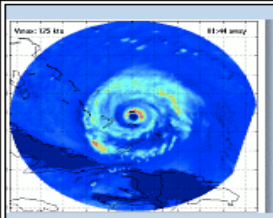
T-PARC/TCS-08 Satellite Data Blog

http://cimss.ssec.wisc.edu/tropic2/tparc/blog

Near-real time analysis of CIMSS satellite products with model output and other T-PARC Products



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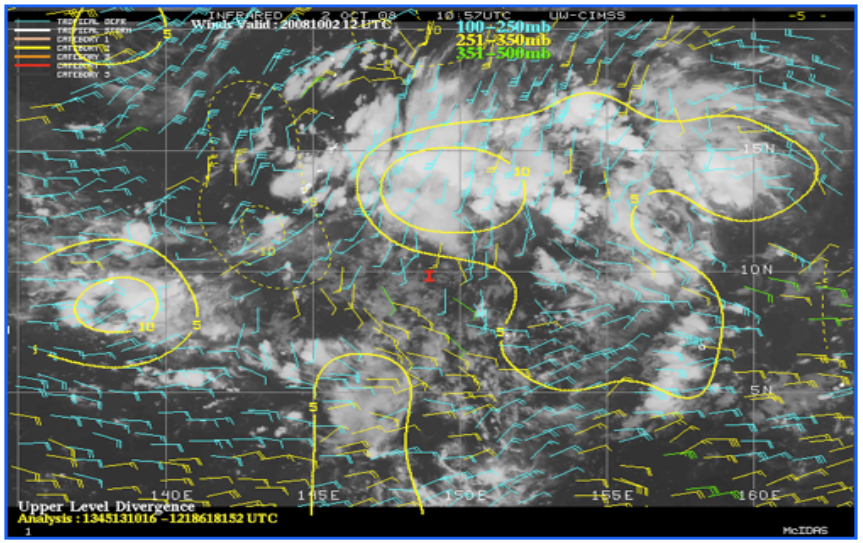
TCS049…the next TPARC target

October 2nd, 2008

TCS049 is a potential flight target for today. If they flew, the P3 would fly from 21Z on the 2nd - 05Z on the 3rd.

The animation shown below gives some sense of its structure:



It has some decent convection to the north and moderate upper level divergence. You can see signs of anticyclonic outflow to the northeast of the storm. You can also see a fairly strong TUTT low to the storm's

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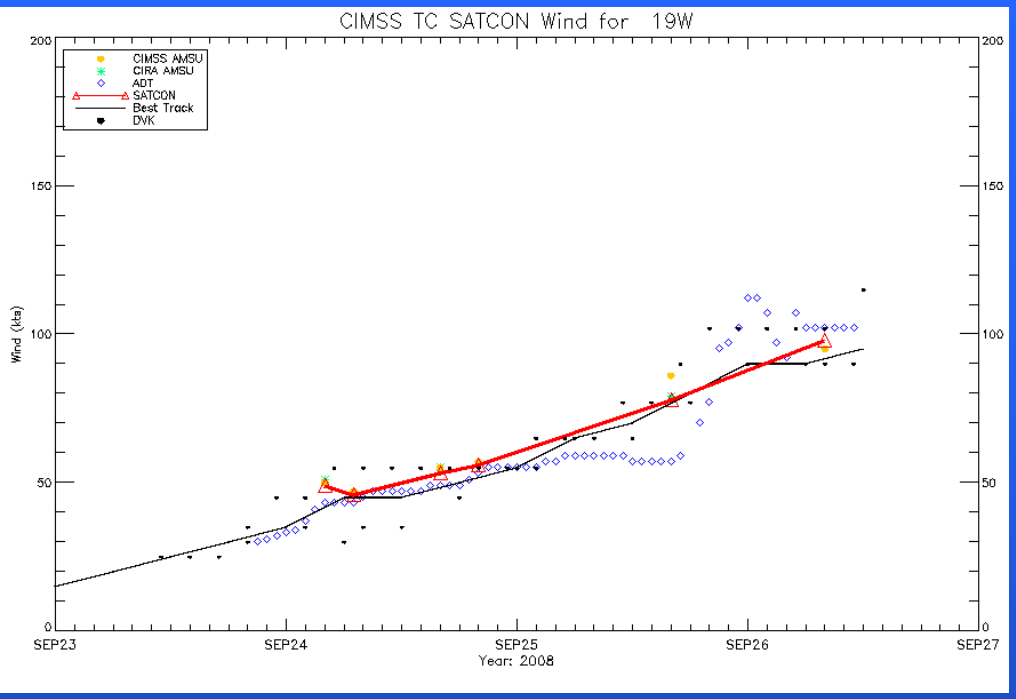
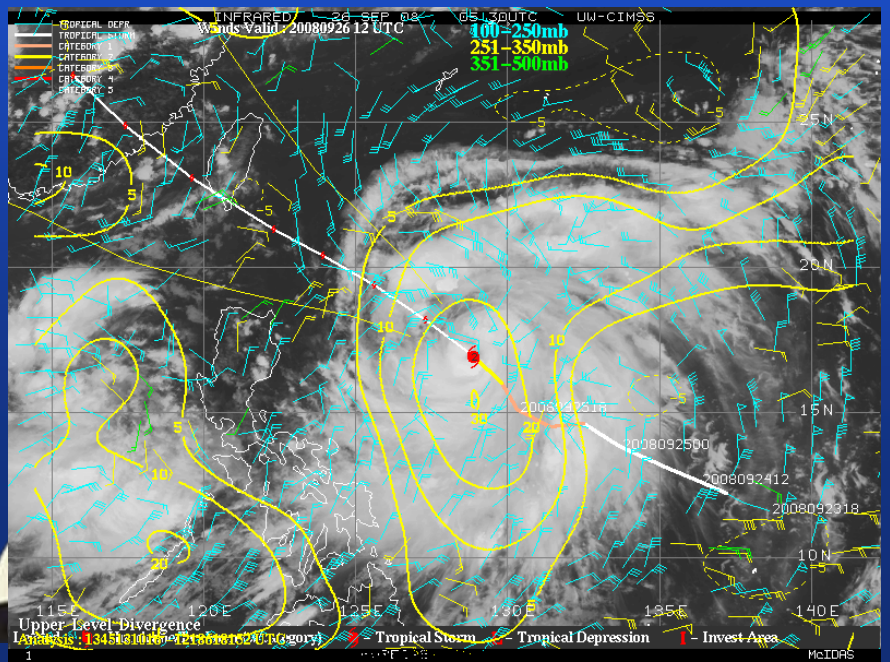
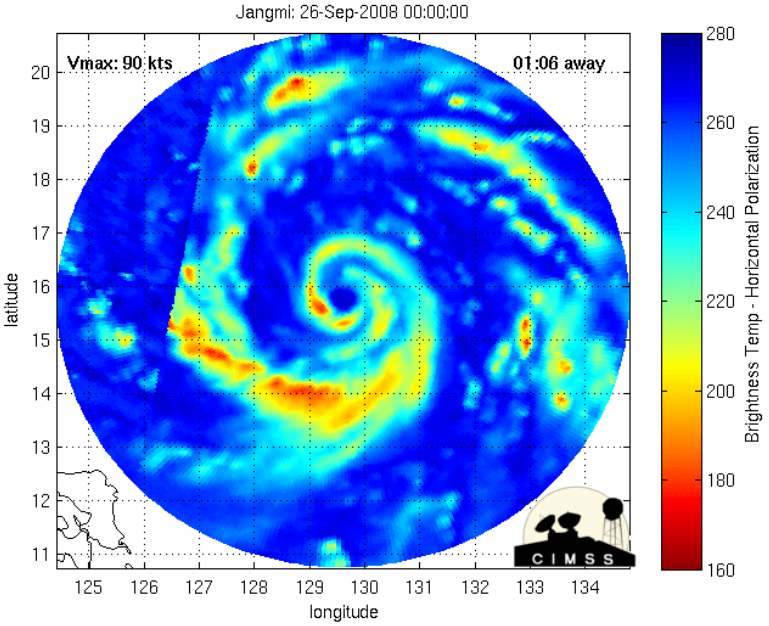
- Upper Levels (19)

Example blog post on 12Z September 26th 2008: Jangmi strengthens

Compilation of CIMSS intensity estimates, AMV products, and microwave MIMIC display

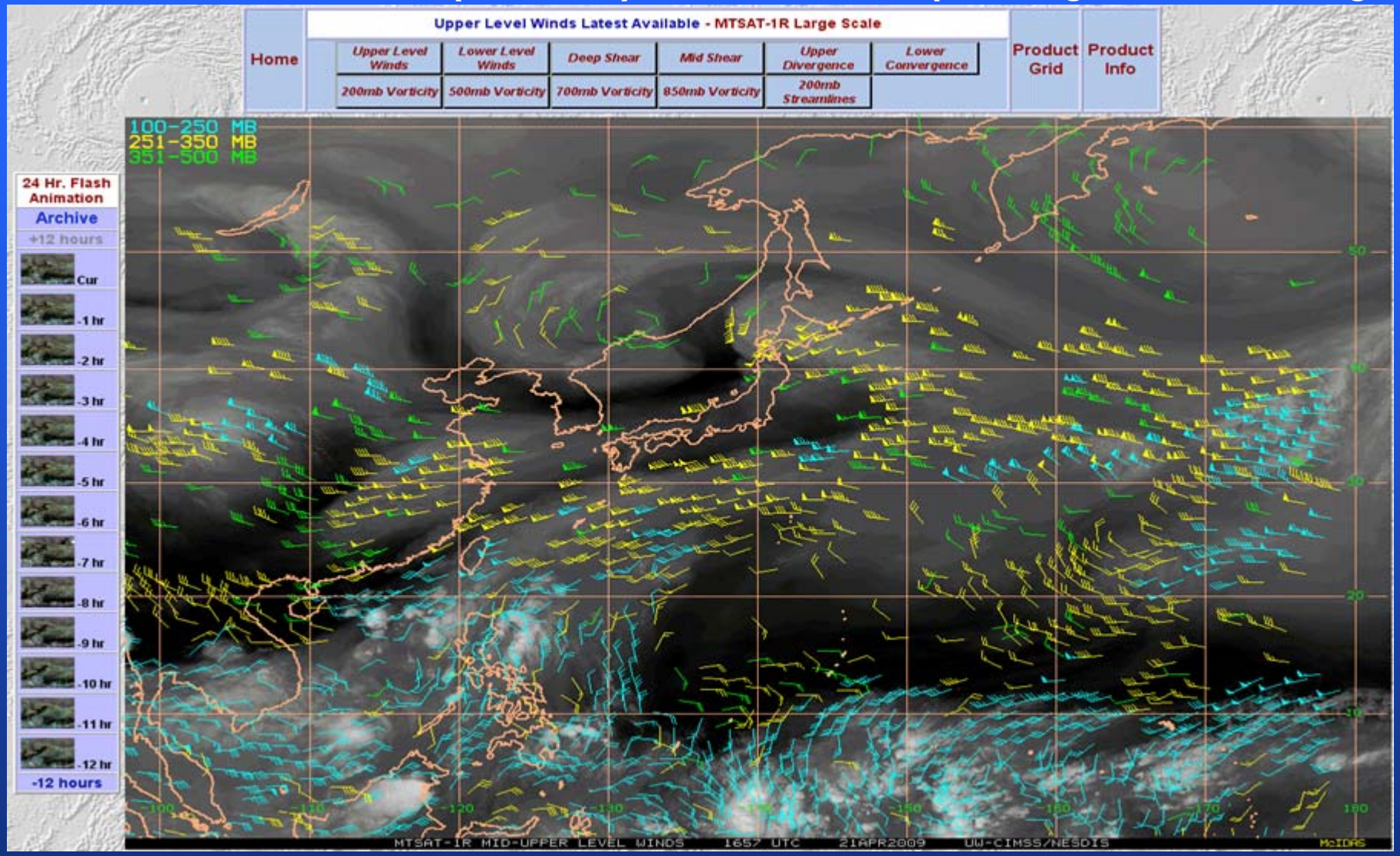






MTSAT-1R wind vector datasets were produced every hour during T-PARC/TCS-08

Winds and derived fields (i.e. shear) used in mission planning and forecasting



The hourly AMV datasets were also disseminated to NRL-MRY for NOGAPS model assimilation and forecast impact studies

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MTSAT-2 Rapid Scan Data Availability

MTSAT-2 was activated during selected times by JMA, and operated in rapid-scanning mode. Normal scanning mode is 30-min. imaging. R/S modes were 15-min. scans, with embedded 4-min. or 7-min. scans at 3-hourly intervals over limited (targeted) areas

Dates/Times (UTC)-- 15-Min. (white), 4-Min. (green) 7-min. not shown

2008/09/10: 16-23 (13, 16, 19, 22)

2008/09/11: 00-13,16-23 (01, 04, 07, 10, 22)

2008/09/12: 00-13,16-23 (01, 04, 07, 22)

2008/09/13: 00-06 (01, 04)

Typhoon Sinlaku

2008/09/17: 16-23 (22)

2008/09/18: 00-11 (01, 04, 07)

Typhoon Sinlaku ET

2008/09/27: 16-23 (22)

2008/09/28: 00-11 (01, 04)

Typhoon Jangmi

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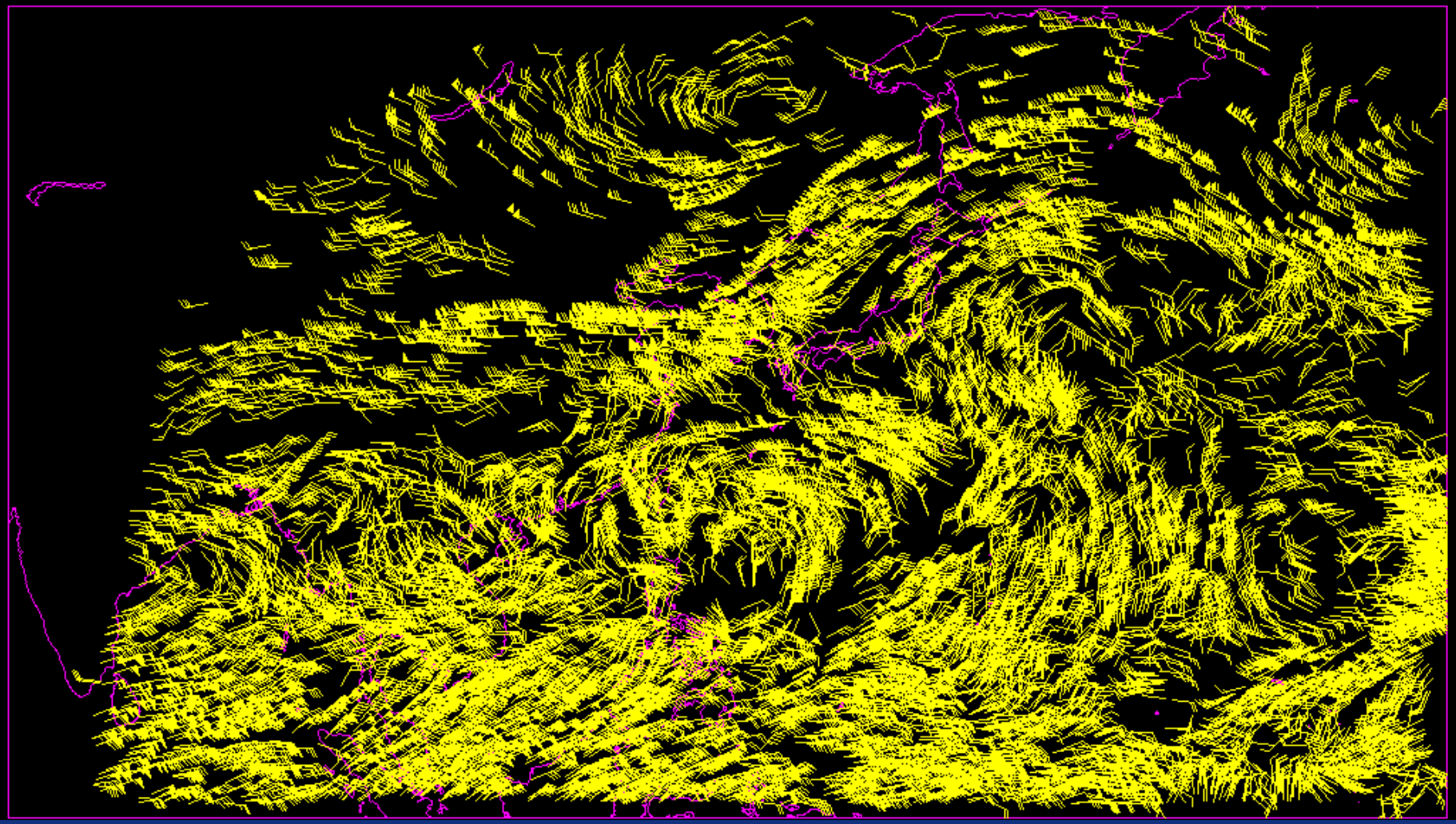
Rapid-Scan AMV Coverages
Valid 07z 11 September, 2008



30-min. AMVs 15-min. AMVs 4-min. AMVs

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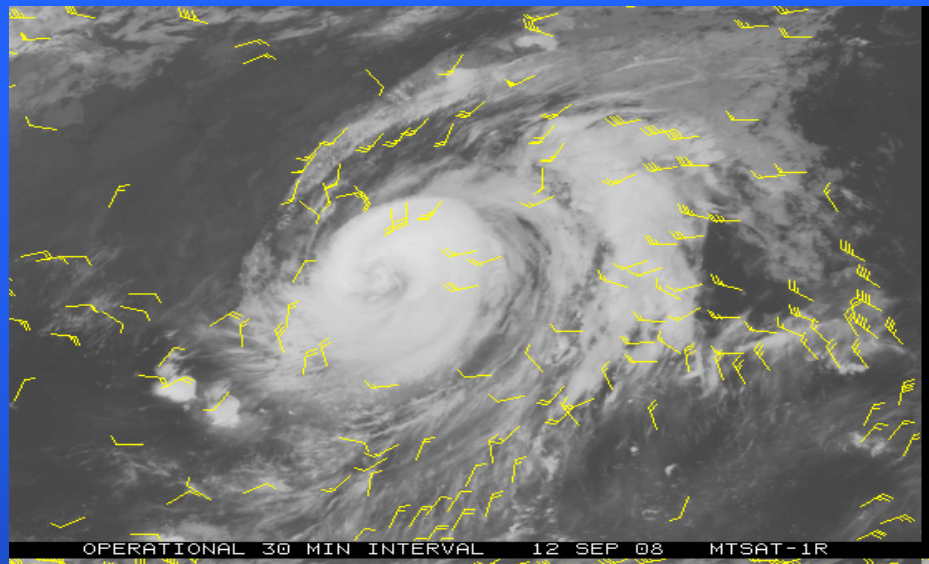
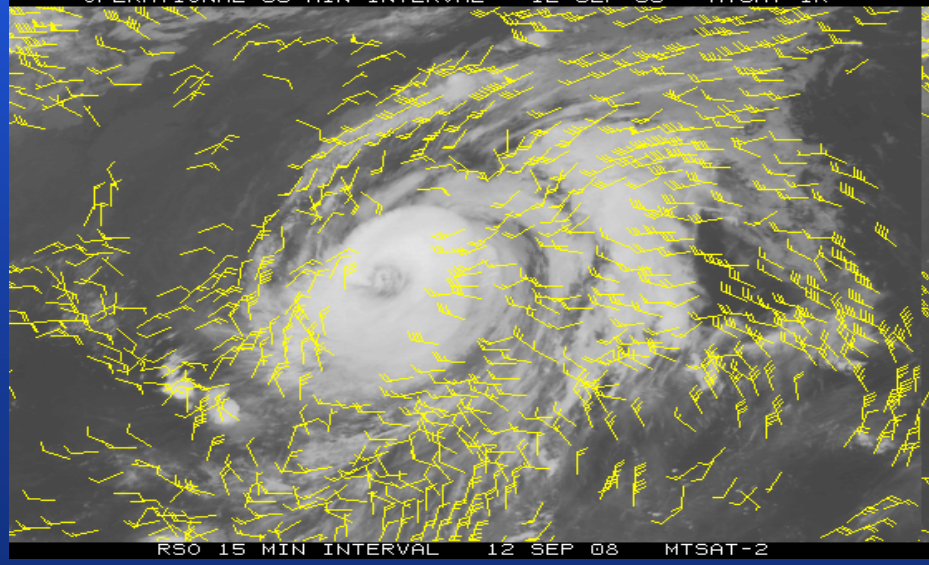
Wind Vectors from MTSAT Rapid-Scan Images

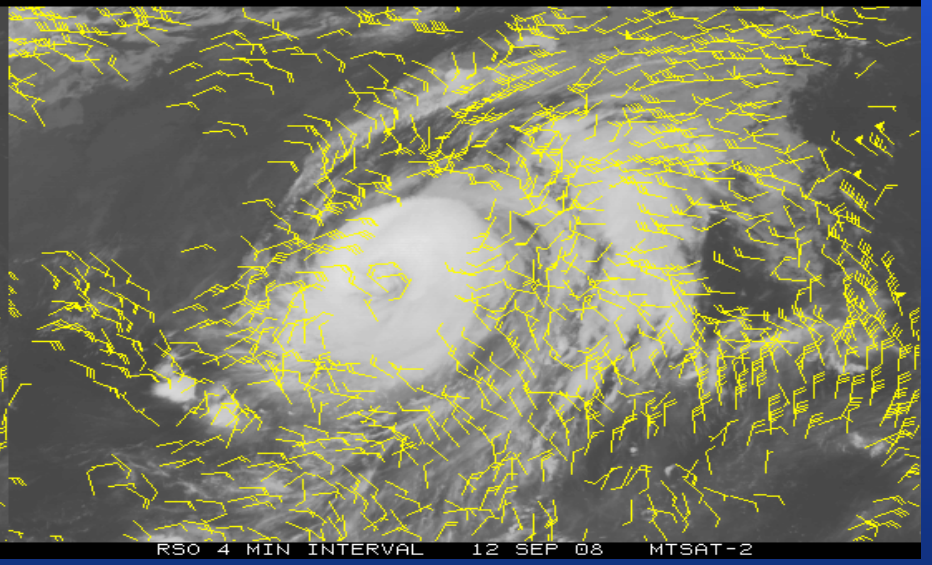


Left: Vector field produced from a routinely available 30-min sequence of images (15W - Sinlaku)

Bottom Left: Using a 15-min rapid scan sequence

Bottom Right: Using a 4-min rapid scan sequence (much improved detail of TC flow fields)





NOGAPS 4DVAR assimilation and model forecast impact studies underway

Future plans for COAMPS-TC assimilation experiments

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AMV Datasets – Current Status

- **Hourly MTSAT AMVs (from 30-minute images) produced by CIMSS for entire T-PARC/TCS-08 period are currently available**

- **Processing of periodic rapid-scan AMV datasets is underway at CIMSS.**

  1) Testing/optimizing targeting and height assignment settings, and exploring novel tracking schemes in collaboration with Dr. Kazuki Shimojo (JMA)

  2) Datasets should be available this summer

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T-PARC/TCS-08 Satellite Data Science Applications

- **Satellite-Based TC Intensity Estimates -- Cal/Val Study**

- **NRL Model Data (AMV) Assimilation and Forecast Impact Experiments**

Analysis of Satellite-Based TC Intensity Estimation in the WNP

Chris Velden and Derrick Herndon

University of Wisconsin – Madison
Cooperative Institute for Meteorological Satellite Studies (CIMSS)

***Just presented at the*:**
Meteorological Satellite (METSAT) Conference
Ford Island Conference Center
Pearl Harbor, HI
27-28 April 2009

Research supported by
the ONR Marine Meteorology and Atmospheric Effects Program

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Analysis of Sat-Based TC Intensity Estimation in the WNP

Objectives and Motivation

Satellite-based recon is the workhorse for TC monitoring in the WNP, yet the intensity estimation methods have not been carefully validated since a/c recon left the WNP 23 years ago

Newly-developed automated methods have become operationally available and show promise, but have only been validated in the Atlantic

The TCS-08/TPARC campaigns in 2008 offered a rare opportunity for in situ observations of WNP TC core intensities, and validation of satellite-based estimates

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Analysis of Sat-Based TC Intensity Estimation in the WNP

Assets brought to the WNP for the TCS-08/T-PARC field campaigns used in the validation study

USAF C-130 from the 53rd WRS, with Dropsondes and SFMR

NRL P-3, with Dropsondes and Eldora radar

Drifting buoys deployed by the C-130

Period of deployment: Early Aug. through early Oct. 2008

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Analysis of Sat-Based TC Intensity Estimation in the WNP

Satellite-based Methods to be Validated

Dvorak Technique **-- IR/VIS, Primary operational tool, Manual**

Advanced Dvorak Technique (ADT) **– Objective/Automated**

Advanced Microwave Sounding Unit (AMSU) **– Obj/Auto, Method based on polar-orbiter 54GHz microwave data**

SATellite CONsensus (SATCON) **– Obj/Auto, Weighted consensus of ADT and AMSU methods**

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Analysis of Sat-Based TC Intensity Estimation in the WNP

Validation Cases during TCS-08/TPARC

TC Nuri (13W)

TC Sinlaku (15W)

TC Jangmi (19W)

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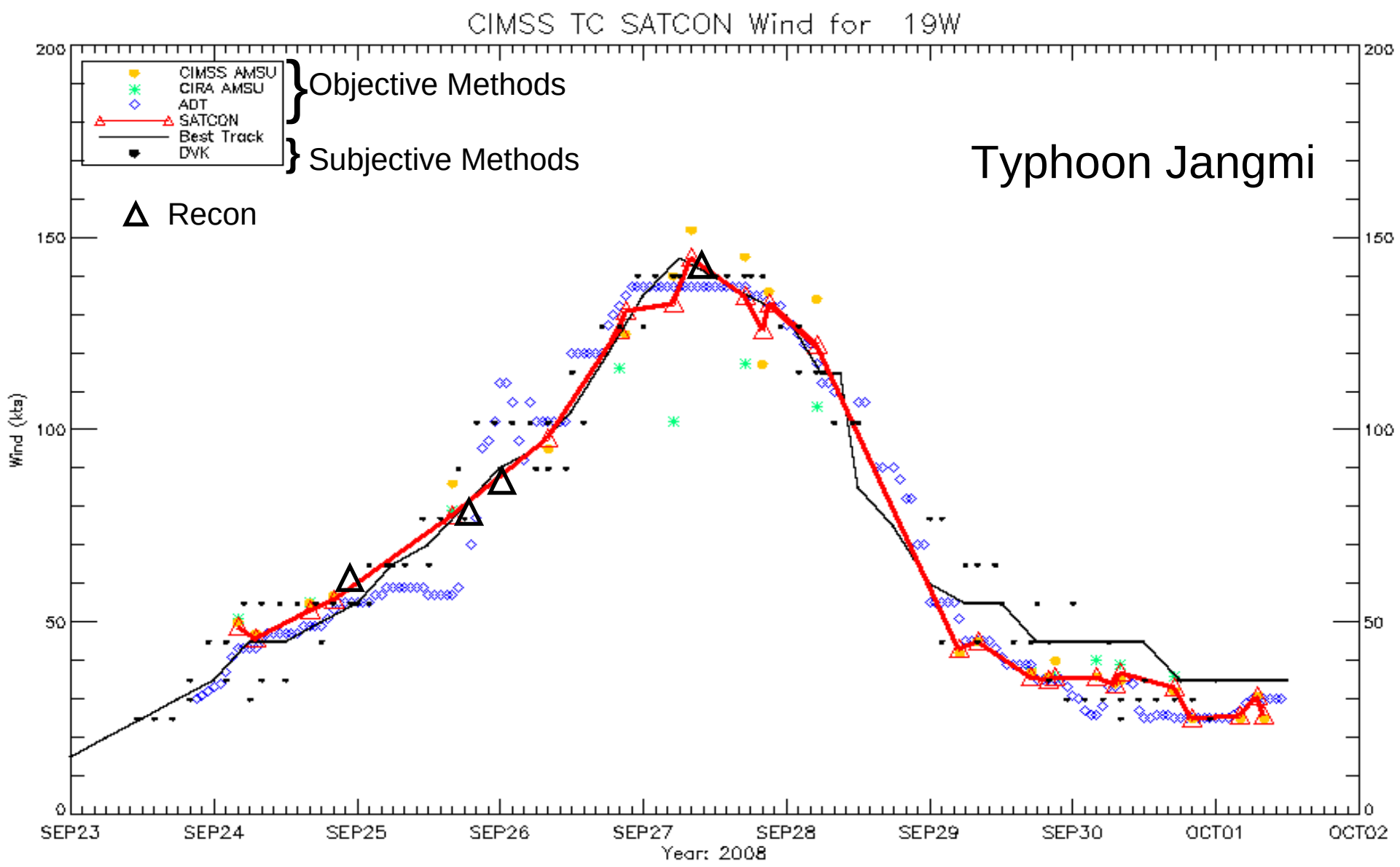
Analysis of Sat-Based TC Intensity Estimation in the WNP



Analysis of Sat-Based TC Intensity Estimation in the WNP

General Preliminary Conclusions

(Based on limited sample of 15 recon validation points)

- **Objective satellite- based methods are very competitive with Dvorak**
- **Significant spread in subjective Dvorak estimates**
- **Consensus means improve accuracies for all methods**
- **Need additional validation points for statistical confidence in results**

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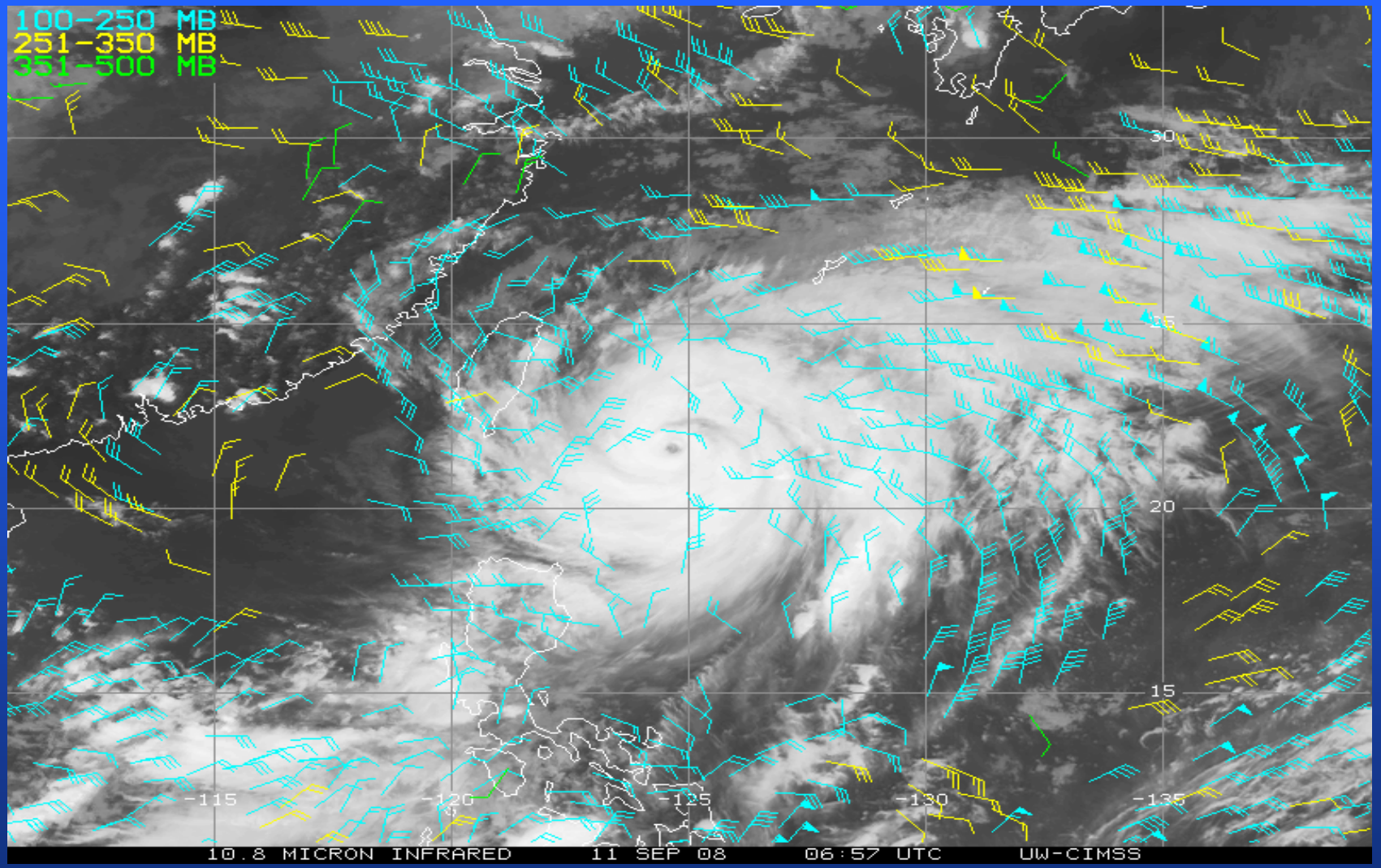
NRL Data Assimilation Experiments

Example: Hourly AMVs from Typhoon Sinlaku (11 Sept 2008)



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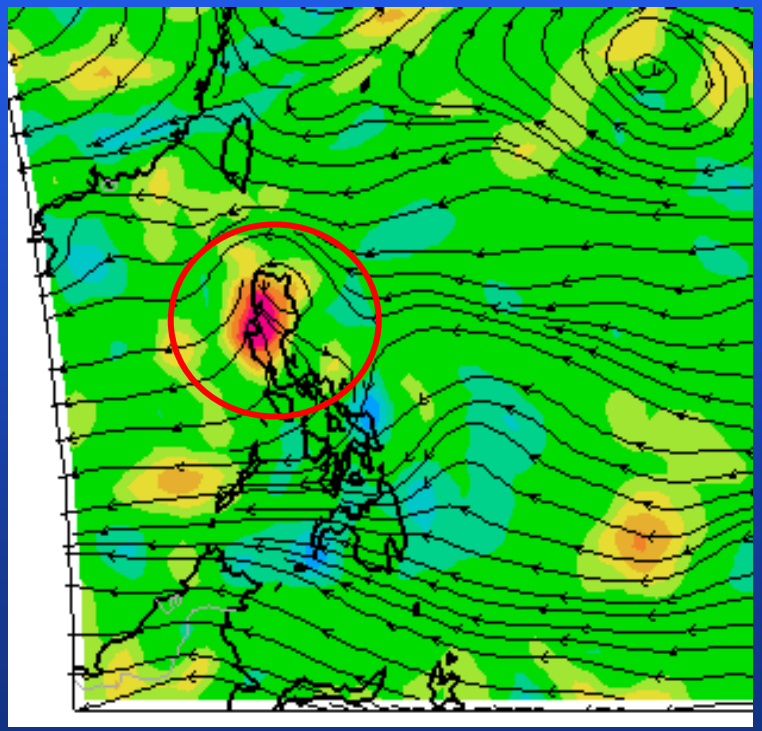
TCS-08 Data Impact Experiment

Testing impact of assimilated hourly MTSAT Atmospheric Motion Vectors (AMVs) on NOGAPS forecasts of TC track and intensity

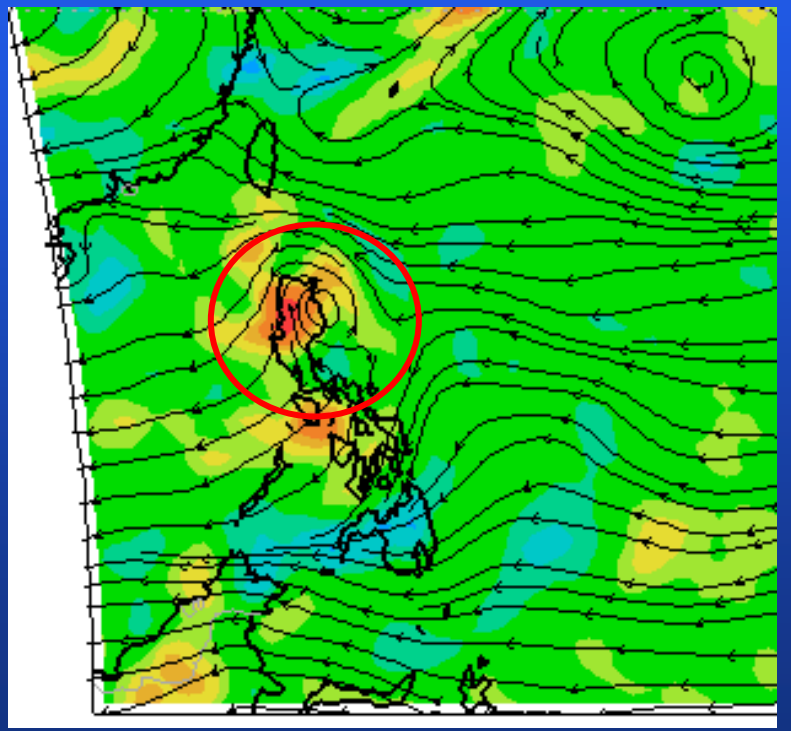
NAVDAS 4DVAR 250 hPa Analysis: Streamlines and Divergence
Valid 00UTC 20 August, 2008 **Nuri's Vmax is 100 kts (JTWC)**

Divergence is stronger and more concentrated over TC Nuri in analysis with hourly AMVs

Forecast experiments are in progress



Hourly AMVs Included



Hourly AMVs Denied

Divergence ($1x10^{-5}$ s^{-1})

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Velden/Berger/Langland

Other T-PARC/TCS-08 Satellite Data Issues

- All CIMSS real-time satellite data and products are archived in the EOL depository. All data requests should go there, although participating CIMSS scientists will be glad to offer advice or additional info on the data/products
- The reprocessed rapid-scan AMV datasets will be delivered to the EOL archive this summer
- MTSAT digital imagery is available at CIMSS, however the primary archive will reside at JMA and/or EOL