# Overview of Operations

*27 April 2010*

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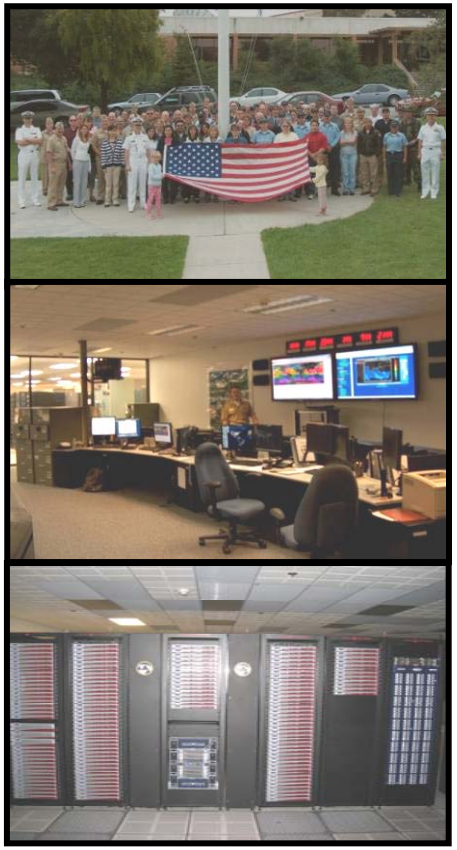
N34 – AOPS, Models & Data

# FNMOC Mission

- Mission – We produce and deliver weather, ocean, and climate information for Fleet Safety, Warfighting Effectiveness, and National Defense
- Numerical Weather Prediction is the core of our business
  - Global and Regional Operational Models
  - Scheduled and On-Demand Products

# Organizational Profile

- Highly technical, educated, and warfare experienced workforce consisting of military, civilians, and contractors
  - 23 Officers
    - 48% with MS Degree
    - ~22% will attend NPS next tour
    - wardroom includes: 1 x UK PEP, 1 x USAF PEP (deployed to Afghanistan), 1 x OIC, FNMOD Asheville
  - 24 Enlisted
    - 63% with Advanced Navy Specialty Training
    - includes 2 x IA, 1 x TAD to BHR
  - 140 FTE and ~10 Contractors:
    - Predominantly Physical Science and IT specialties (Meteorology, Oceanography, Computer Sciences)
    - PhD – 5, MS Degree - 23%, BS Degree - 34%
- $26.4M annual TOA



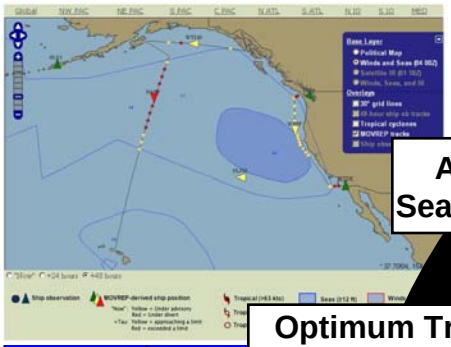
# *Operations? What's That?*

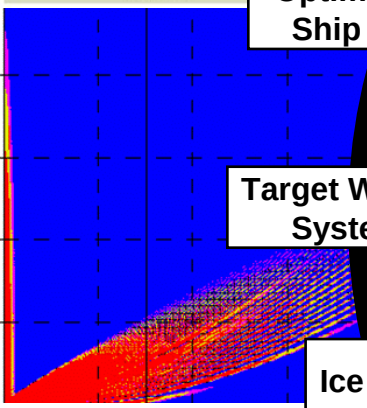
- What does operational mean?
  - Directly supports Naval operations (deployed forces)
    - Information assured
    - High levels of reliability and availability
    - 24 hours a day, every day
  - Paid for by operations & maintenance funding
    - No research and development funding
  - Automation is essential
  - Latency is key

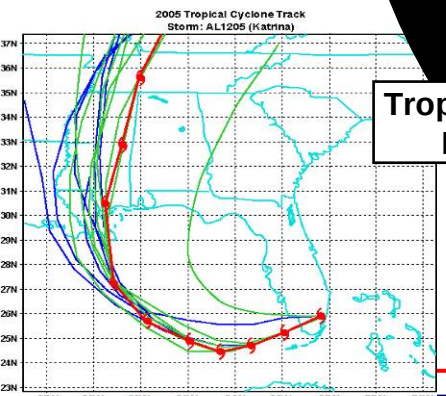
# *Models and Applications Points*

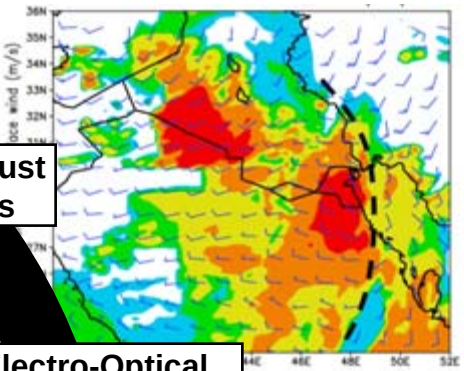
- NOGAPS/NAVDAS-AR foundation of production cycle
- Models and applications are interconnected
  - Medium-term plan is to directly incorporate aerosol predictions into NOGAPS framework
- Wide range of capabilities are supported by the modeling cycle

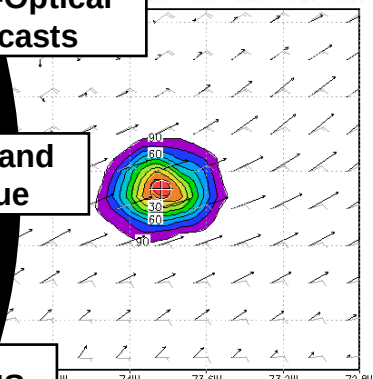
# Models and Applications

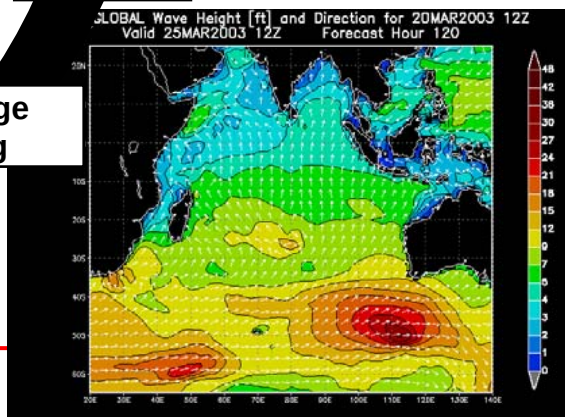











Ocean Acoustic Forecasting

Aircraft Routing

Automated High Seas / Wind Warnings

Visibility/Dust Forecasts

Optimum Track Ship Routing

Aerosol Model

Electro-Optical Forecasts

Target Weapon Systems

Wave Model

**Global Model**

Mesoscale Model

Search and Rescue

Ice Forecasts

Ensemble Model

CEEMS

Tropical Cyclone Forecasts

Long-Range Planning

Ballistic Wind Computations

WRIP

*Supercomputing Excellence for Fleet Safety and*

# NOGAPS in the OPSRUN

- NOGAPS is run three times for each of four valid times per day.
  - Prelim provides BCs for tropical cyclone model and early mesoscale runs
    - Obs latency 0-4 hrs
  - Realtime obs latency 0.5-6.5 hrs
  - Posttime obs latency 5-11hrs
- Data from late in the obs window has more impact than data from early in the obs window
- Job initiation is event-driven so that each job starts only when prerequisite jobs have completed

# Current A2 Operational Run

## *ATMOSPHERIC MODELS*


**NOGAPS**

- PRELIM → τ132
- PRETWO → τ012
- REAL TIME → τ180
- OFF PRELIM → τ144
- POST TIME → t015
- OFF TIME → τ144
- NOGAPS Ensemble
- NOGAPS Ensemble offt

**COAMPS**

- NAAPS → τ144
- FAROP → τ144
- SW ASIA → τ78 (Nest 2 & 3)
- E PAC → τ48 (Nest 2)
- W ATL → τ72 (Nest 2)
- EUROPE → τ72 (Nest 2) 18km
- CENT AM → τ48 (Nest 2)
- N. INDIAN OCN → τ48 (Nest 2)
- W PAC → τ84 (Nest 2)

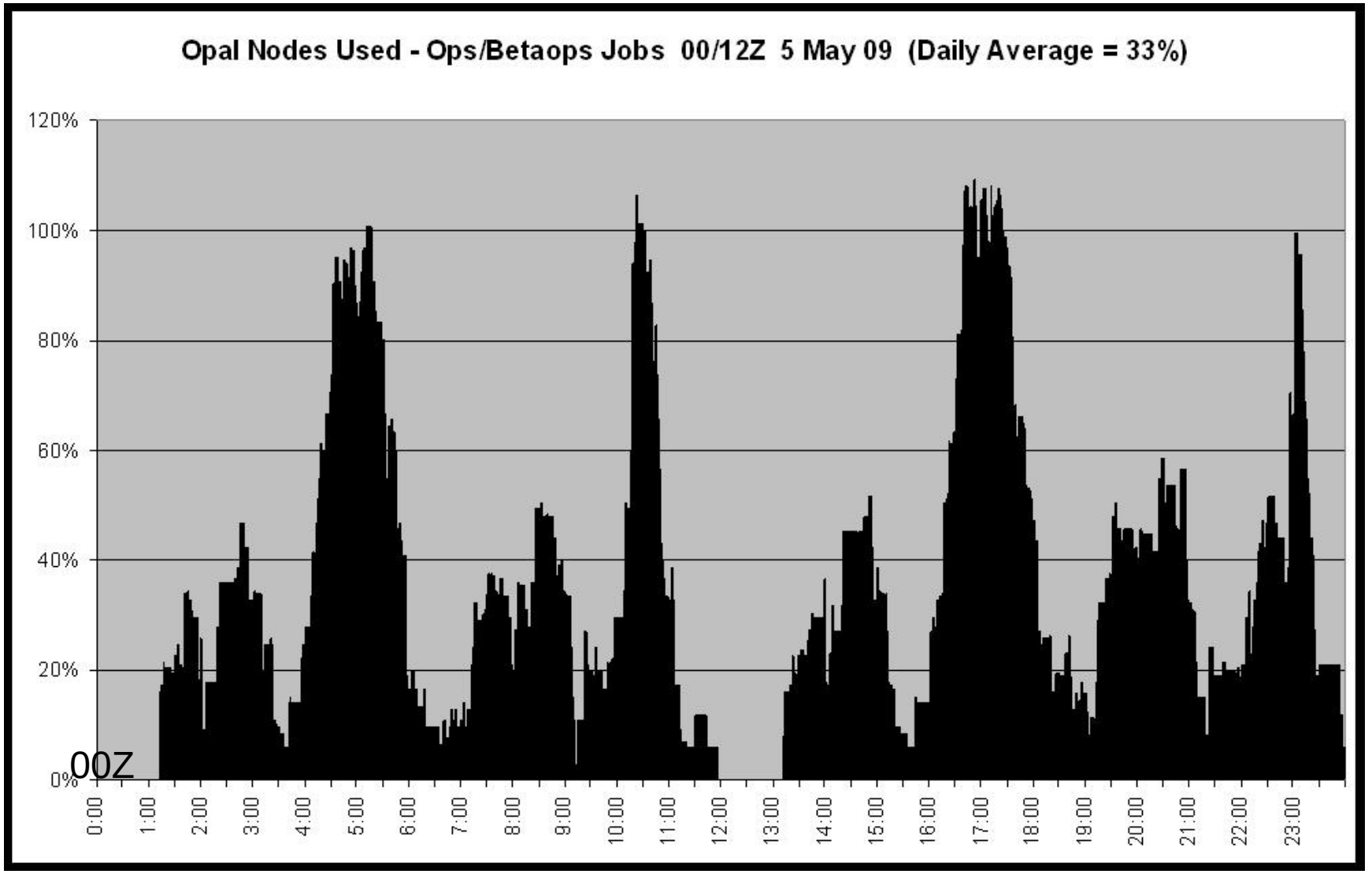
***ET CETERA…***

**Offtime Updates For COAMPS & EFS**

# OPSRUN Points

- Major peak in activity +4 - 6 hrs each watch
- Peak pushes the limits
  - Changes that require additional resources must be managed very carefully
  - 10% increase in run time can be too much

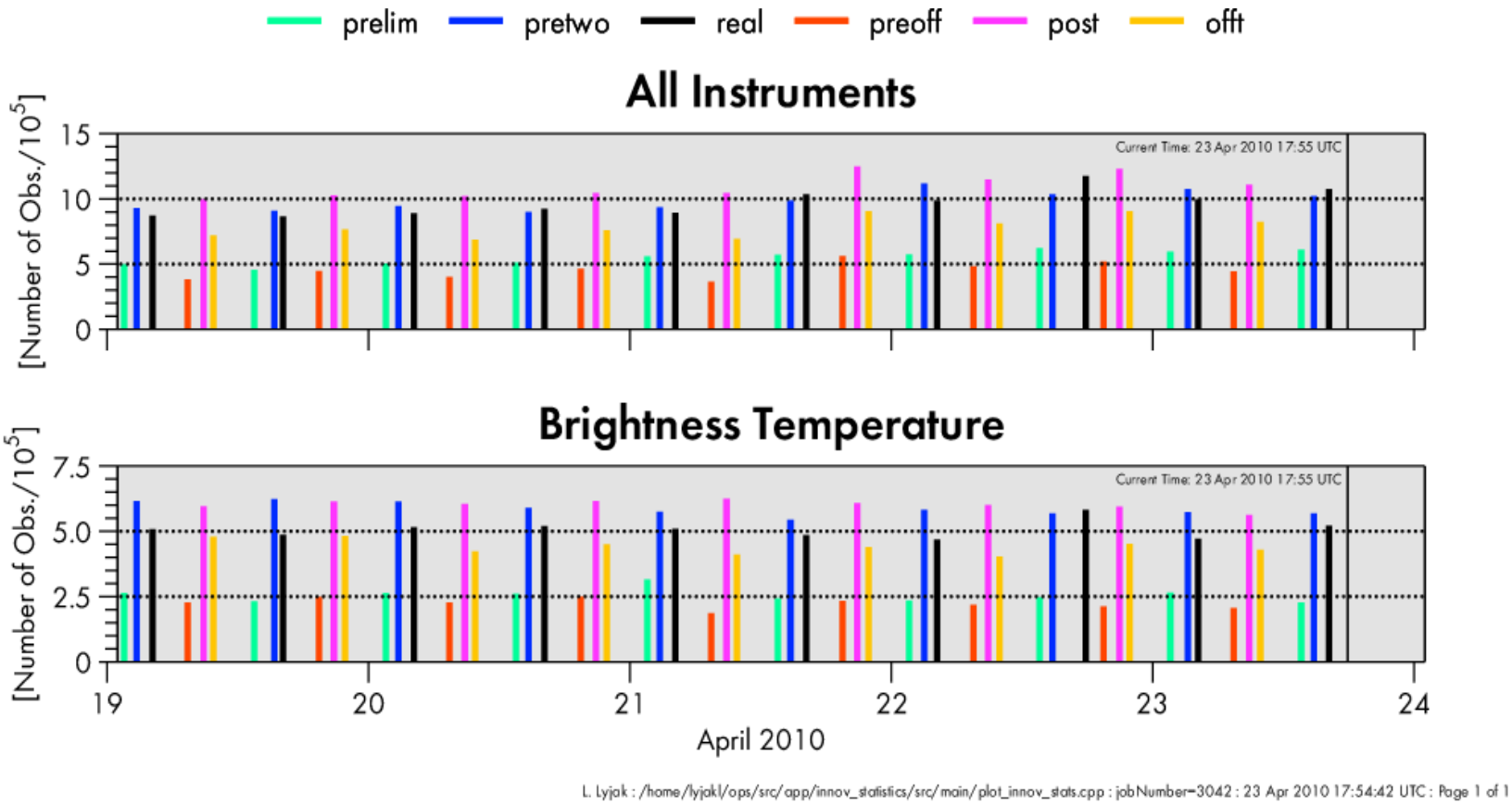
# Normal OPAL OPS Run



# *Observation Counts Points*

- About 1 million observations are exploited in the data assimilation each cycle.

# Observation Counts from Innovation Files

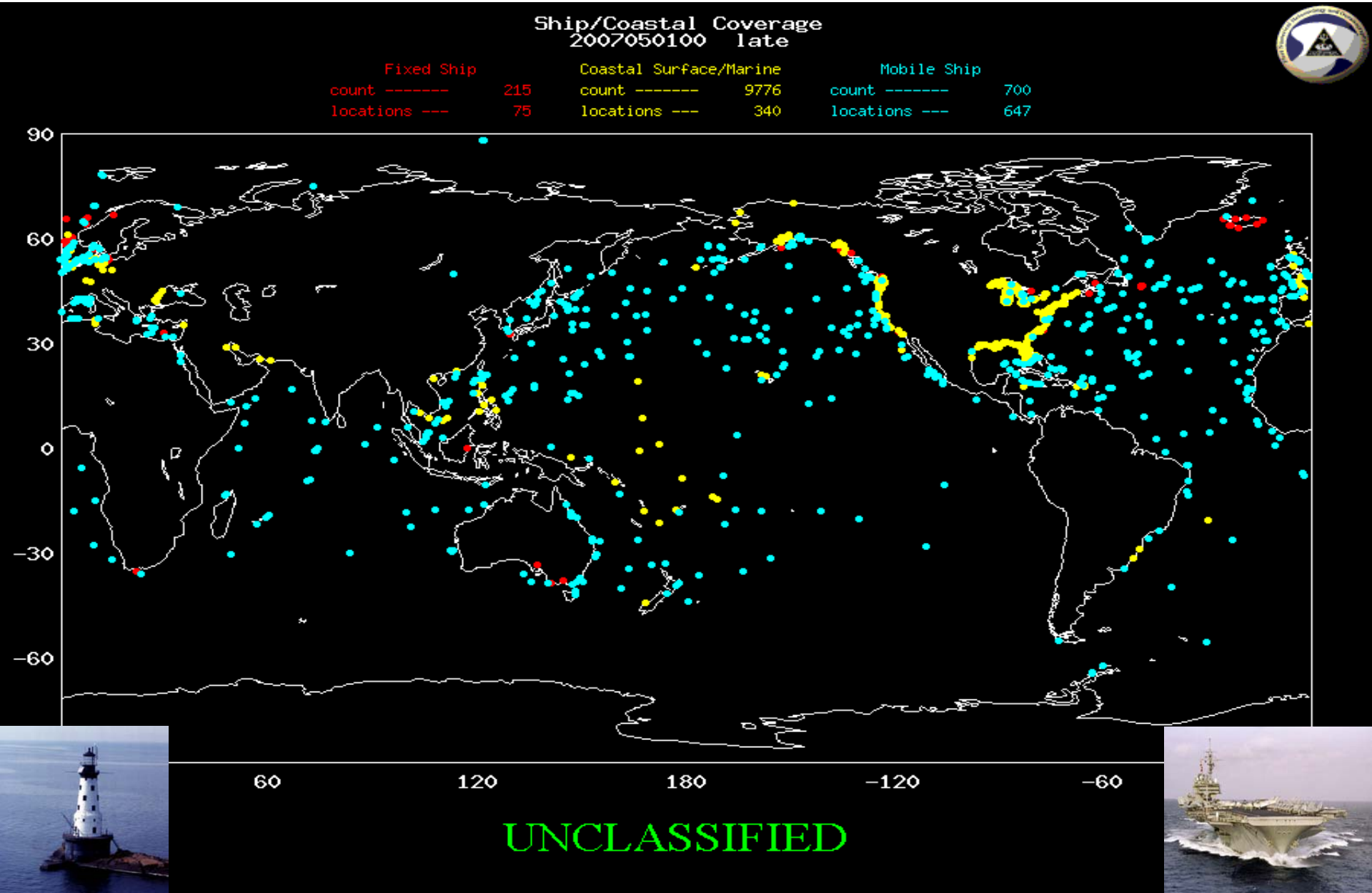



**NOGAPS assimilates ~ 1 million observations per run**

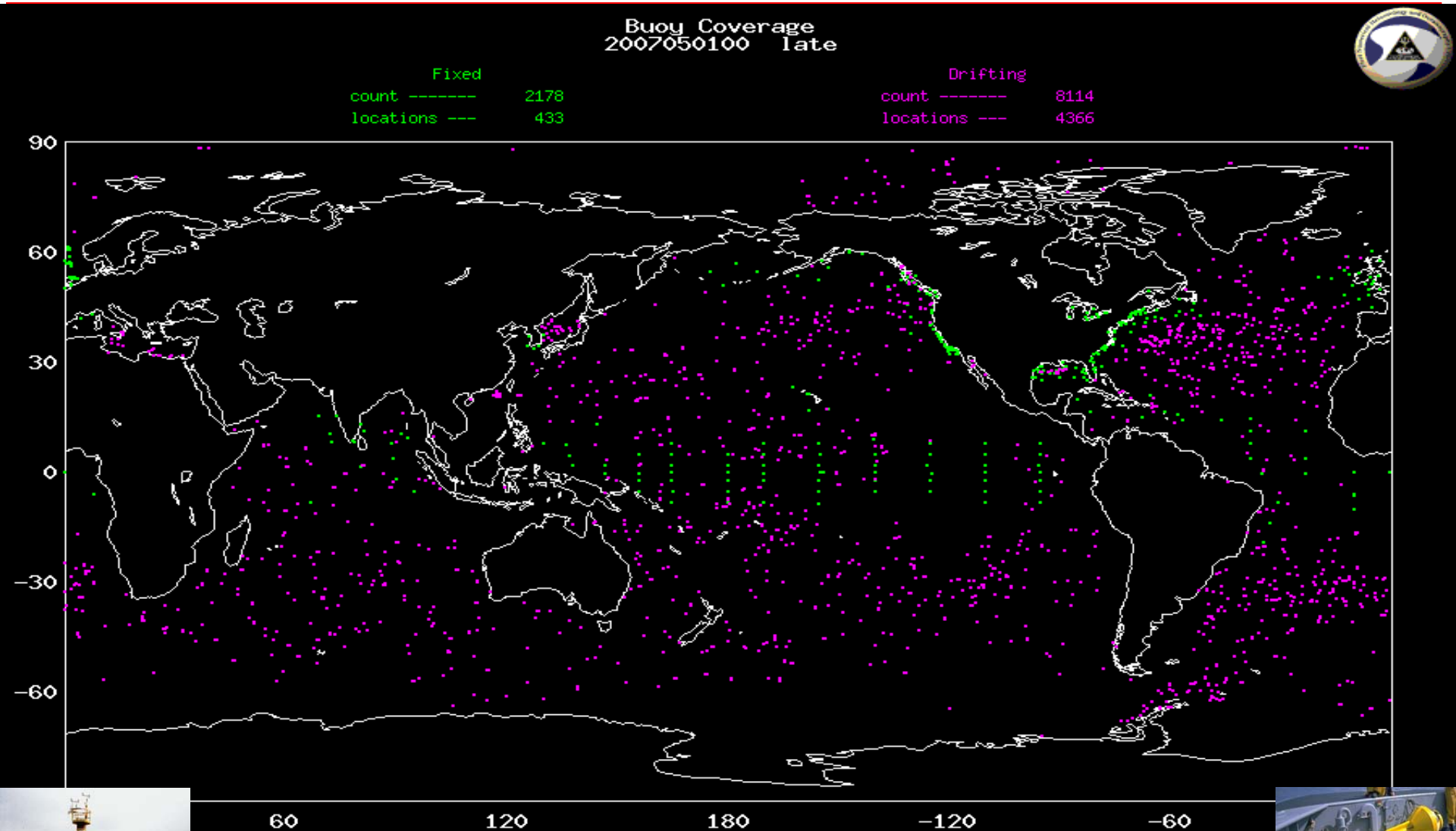
# *Data Sources Points*

- We get every type of data that we are in a position to exploit
- All data processing must be automated and robust

# Ship Weather Reports



# Buoy Observations

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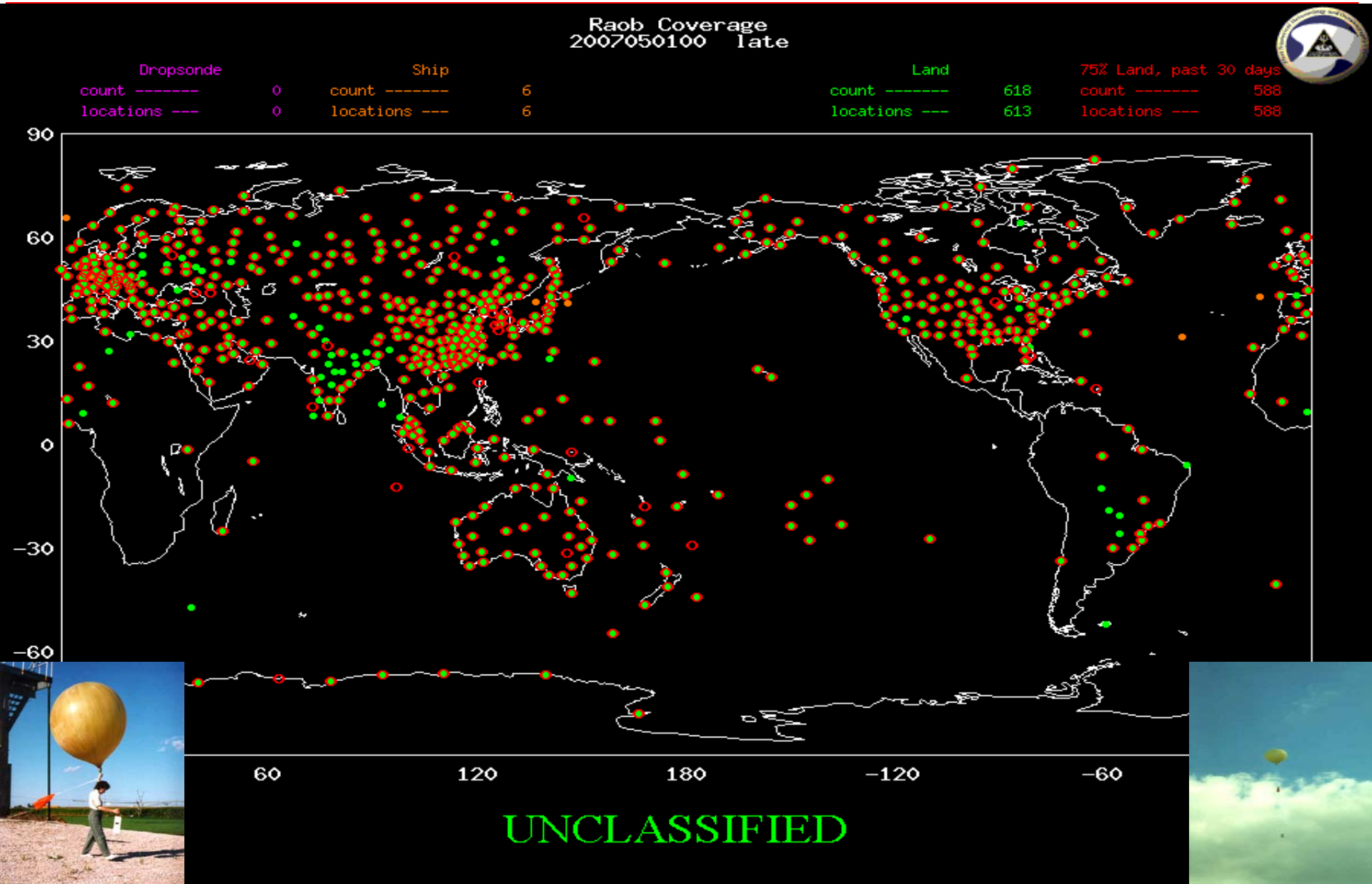
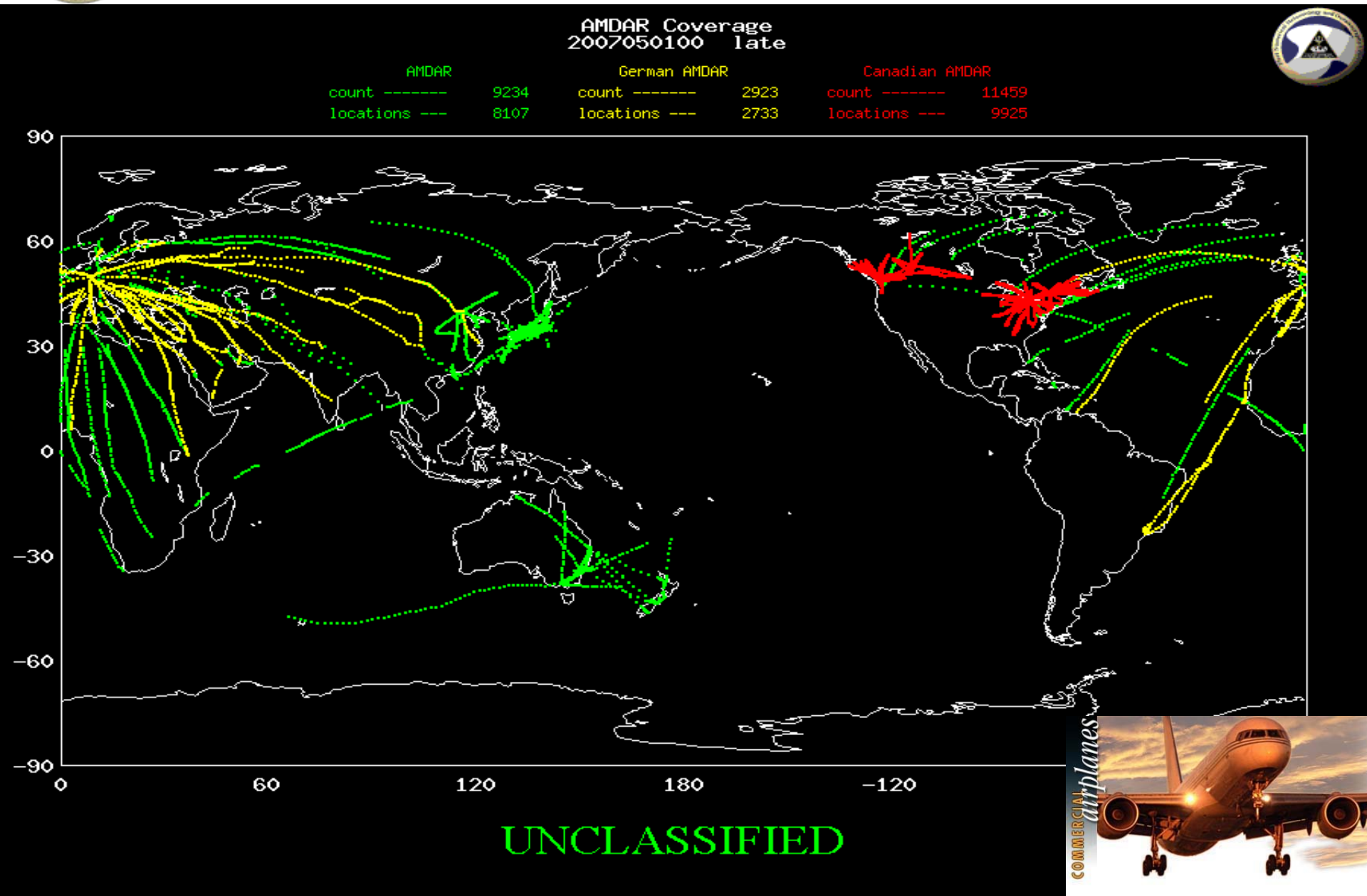
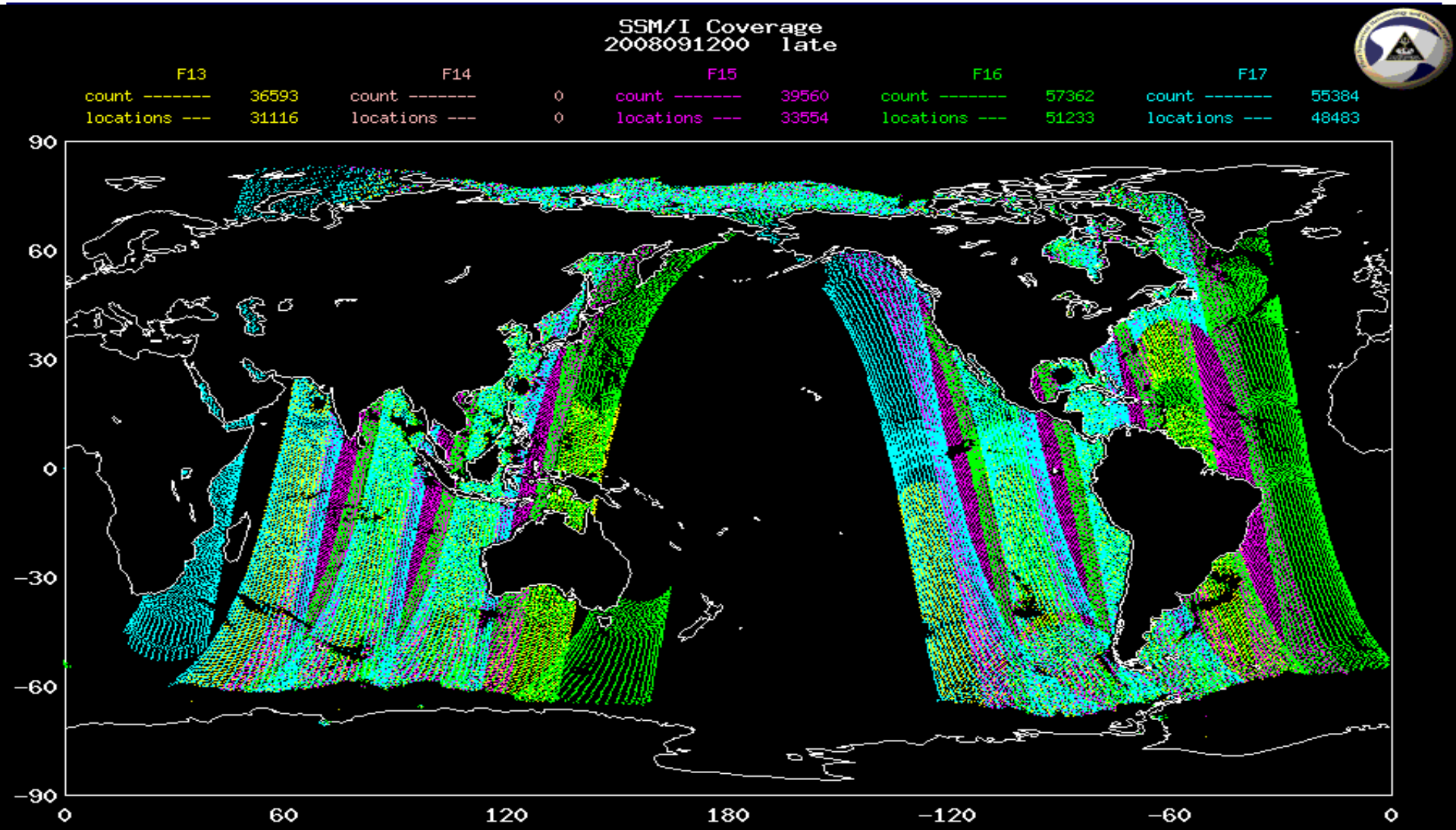
# RADIOSONDE Observations



# AIRCRAFT Reports



# DMSP Polar SSMI/S (Water Vapor, Rain Rate, Wind Speed)

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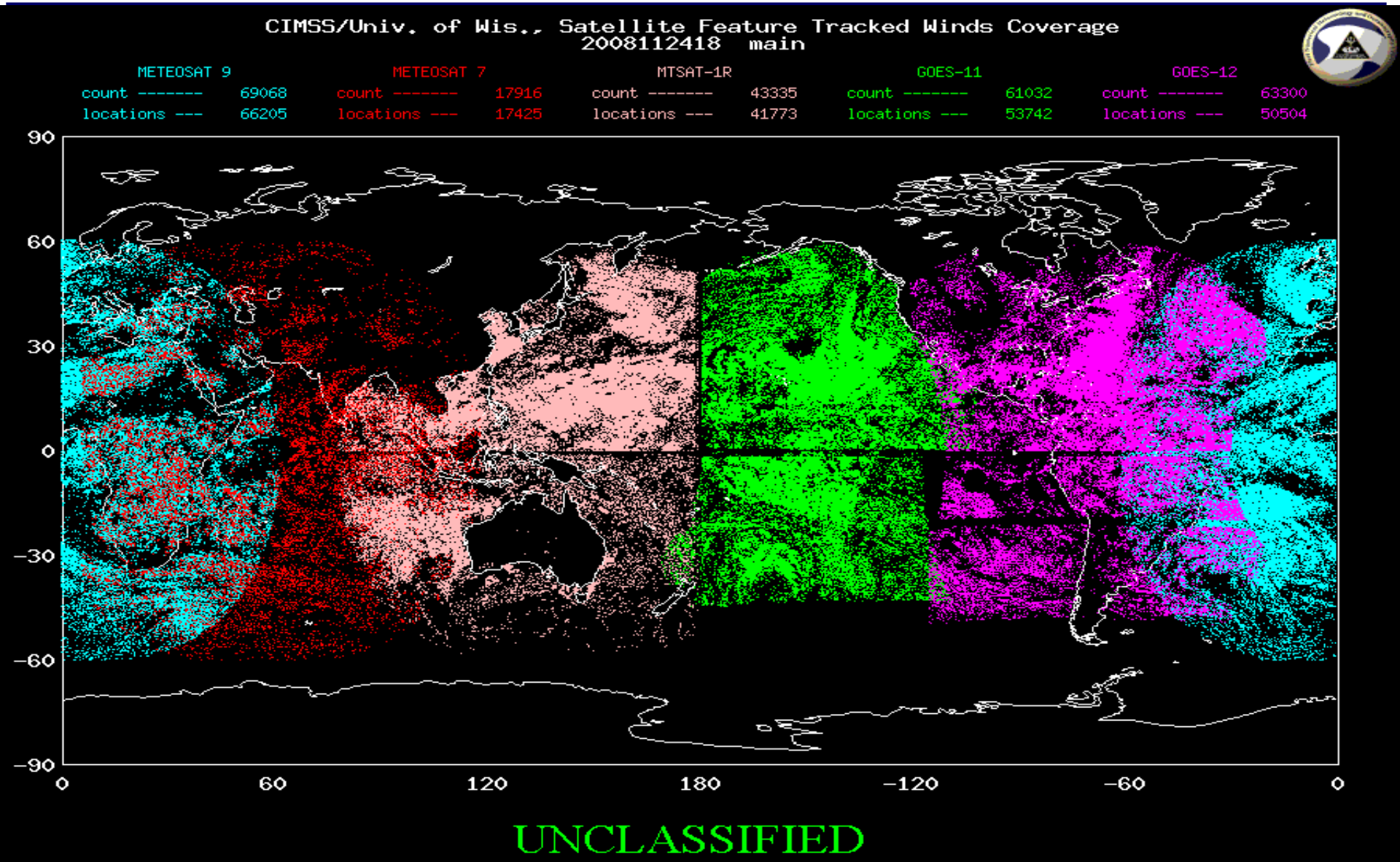
# Geostationary Satellite Winds

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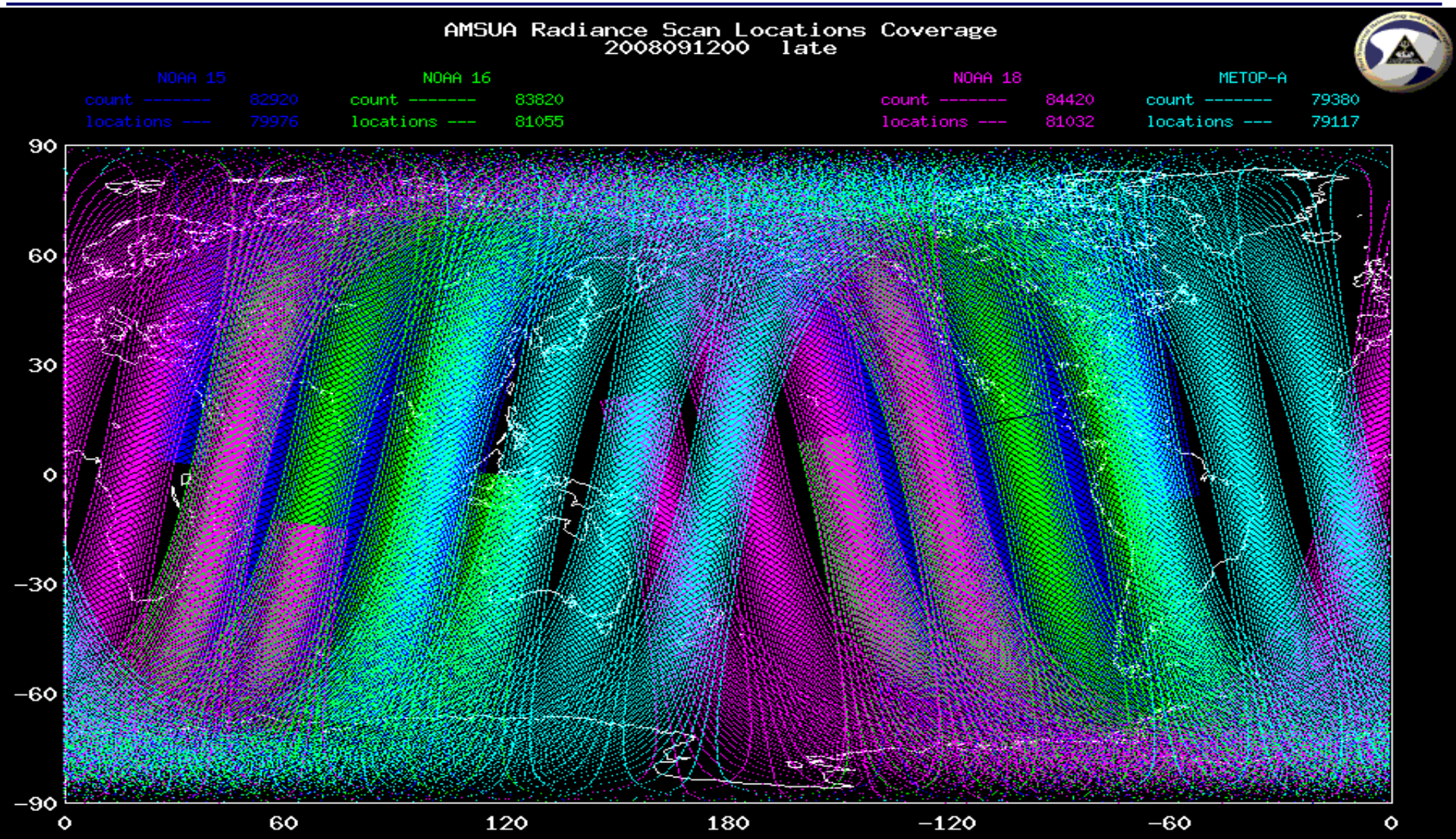
# AMSU-A Coverage

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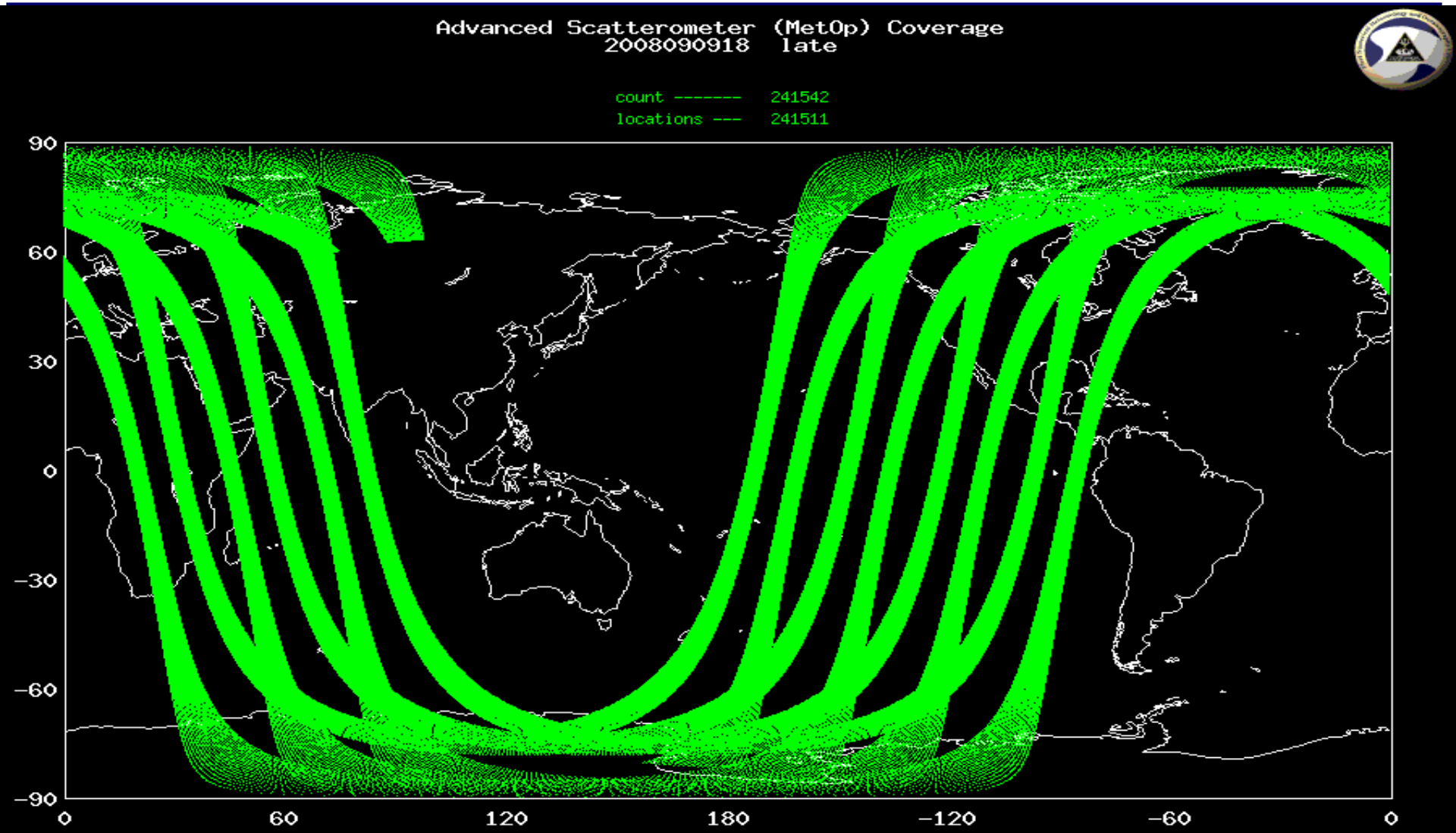
# ASCAT METOP Coverage

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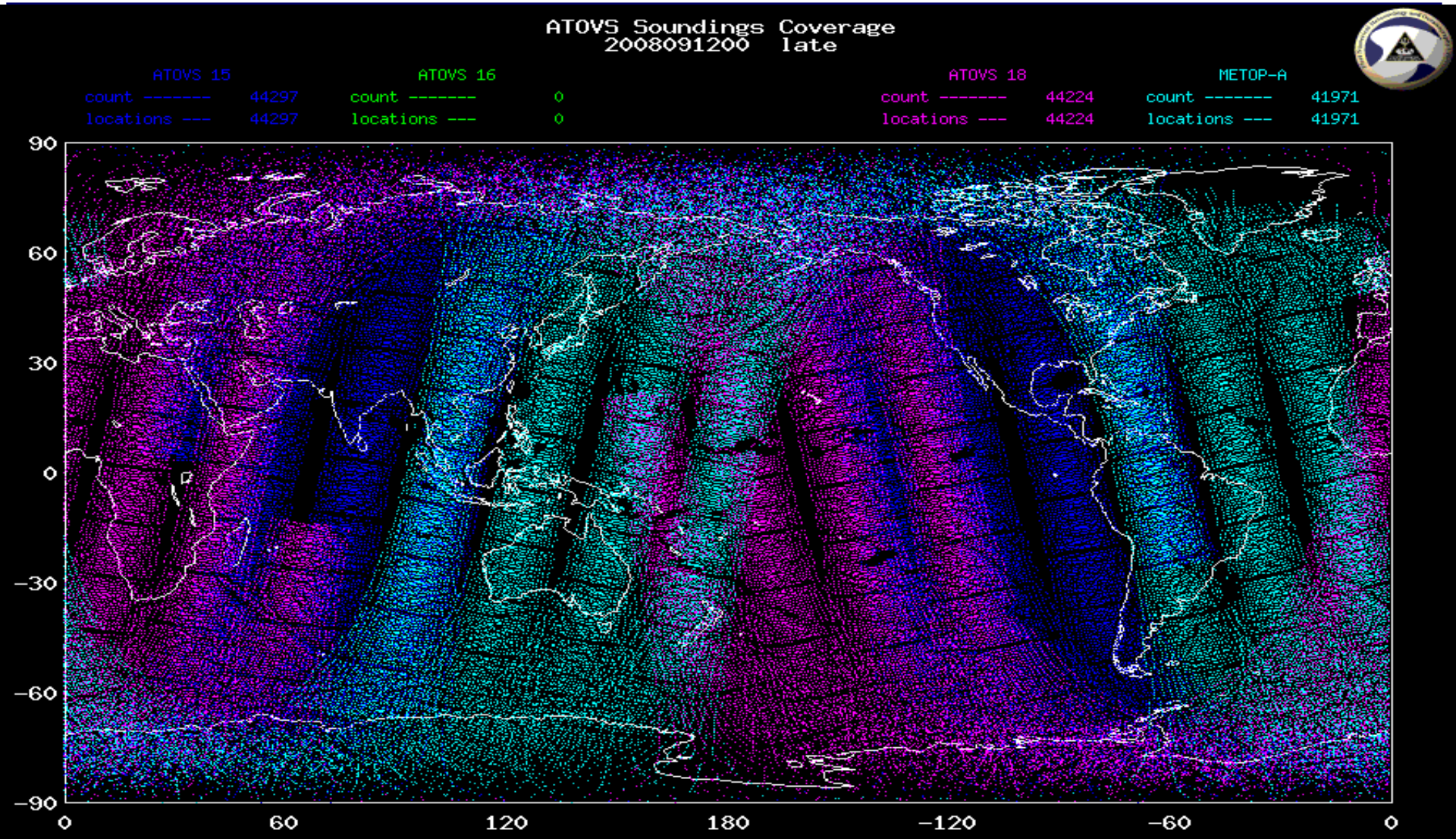
# ATOVS Coverage

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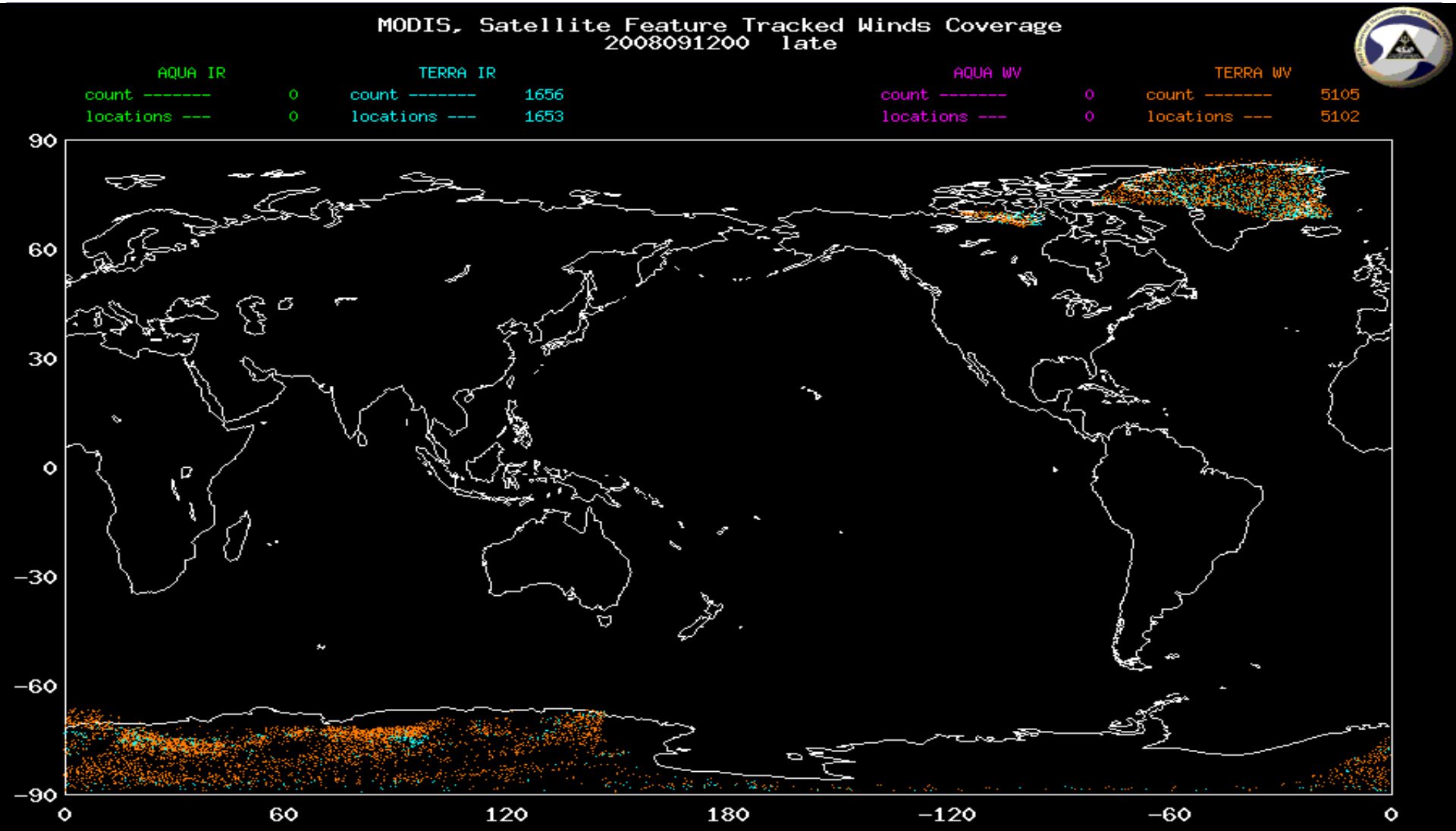
# MODIS Polar Feature Track Winds

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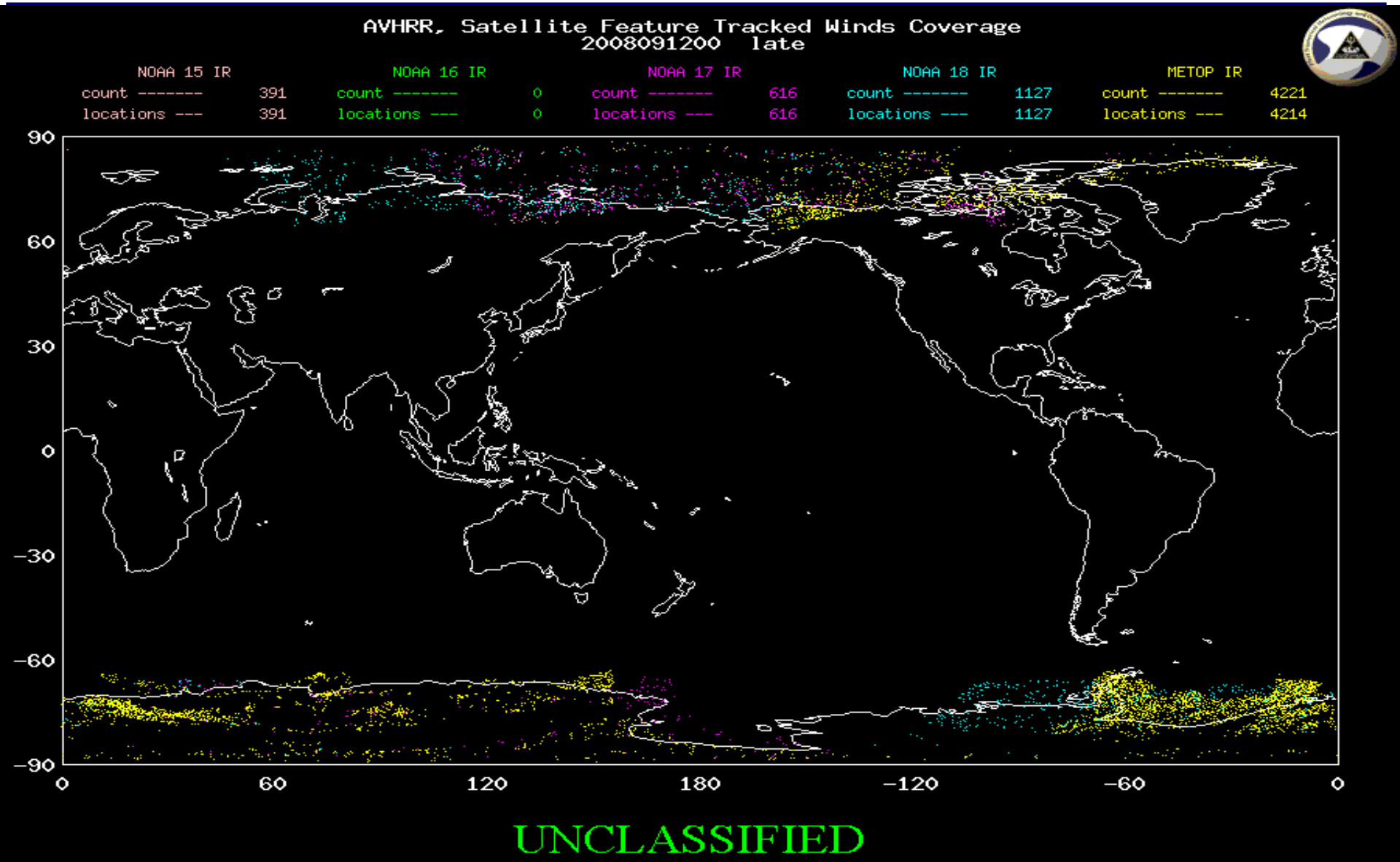
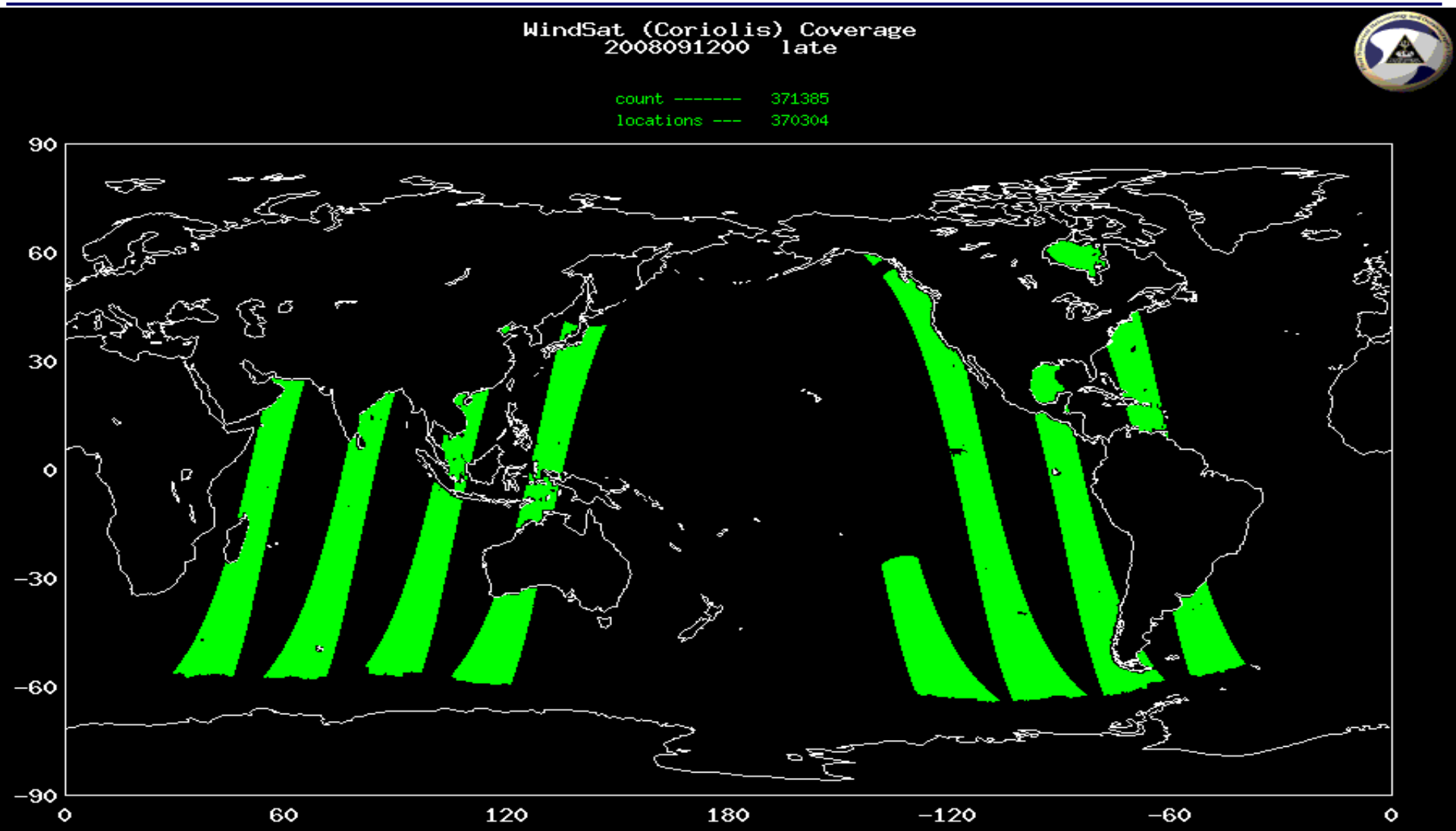
# AVHRR Polar Feature Track Winds



# *WINDSAT Total Precipitable Water & Winds*

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# Summary

- Automation and low latency are important for operations
- Desired latency is 0.5 – 6.5 hours, depending on when the observation occurs
- Maximum latency is 5 – 11 hours
- New capabilities that require additional computer resources must be managed very carefully

# Questions ?