



Fleet Numerical Meteorology & Oceanography Center

Overview of Operations

27 April 2010

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Chief Science Officer
N34 – AOPS, Models & Data





FNMOOC 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

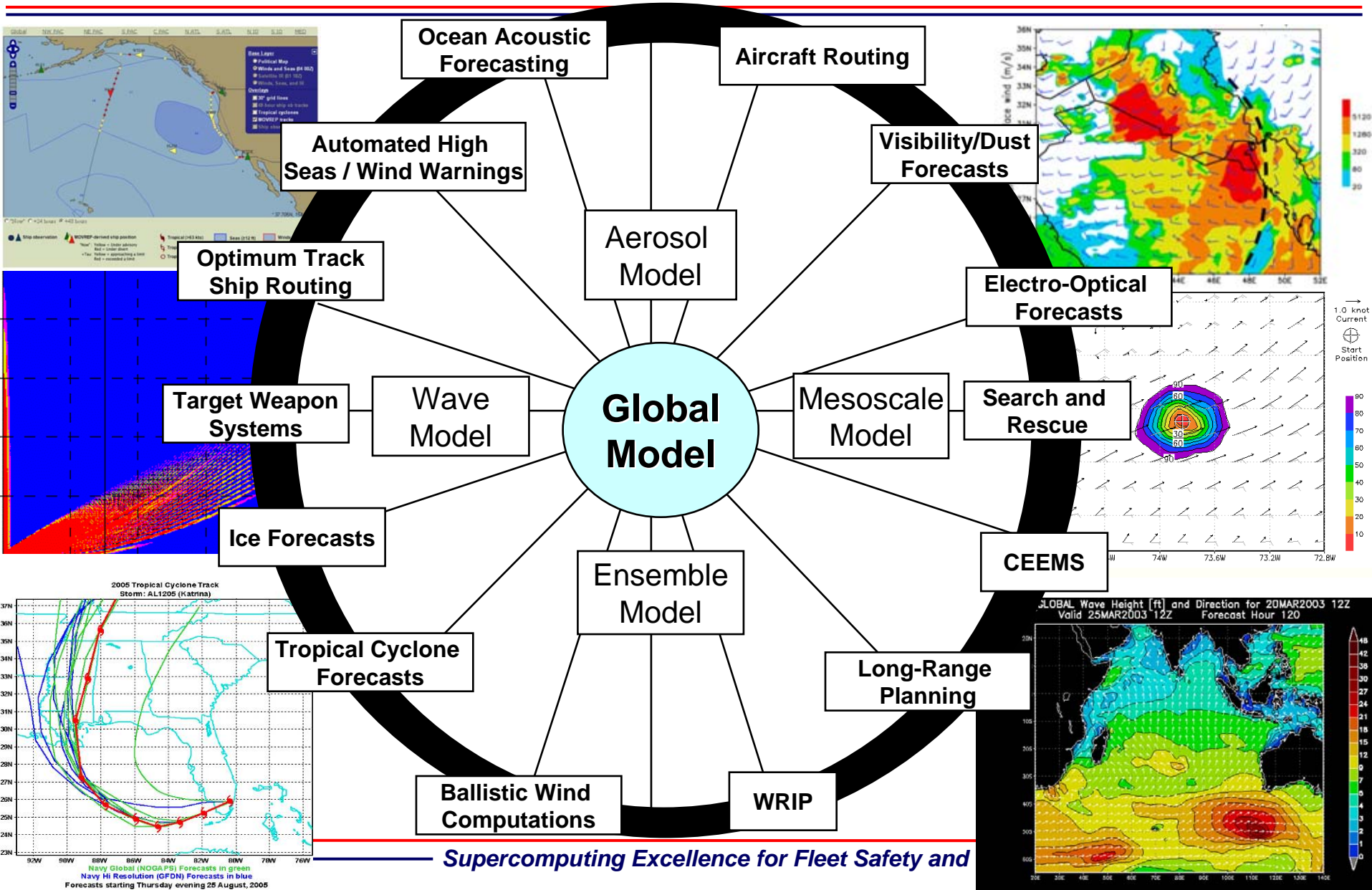


Models and Applications Points

- 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



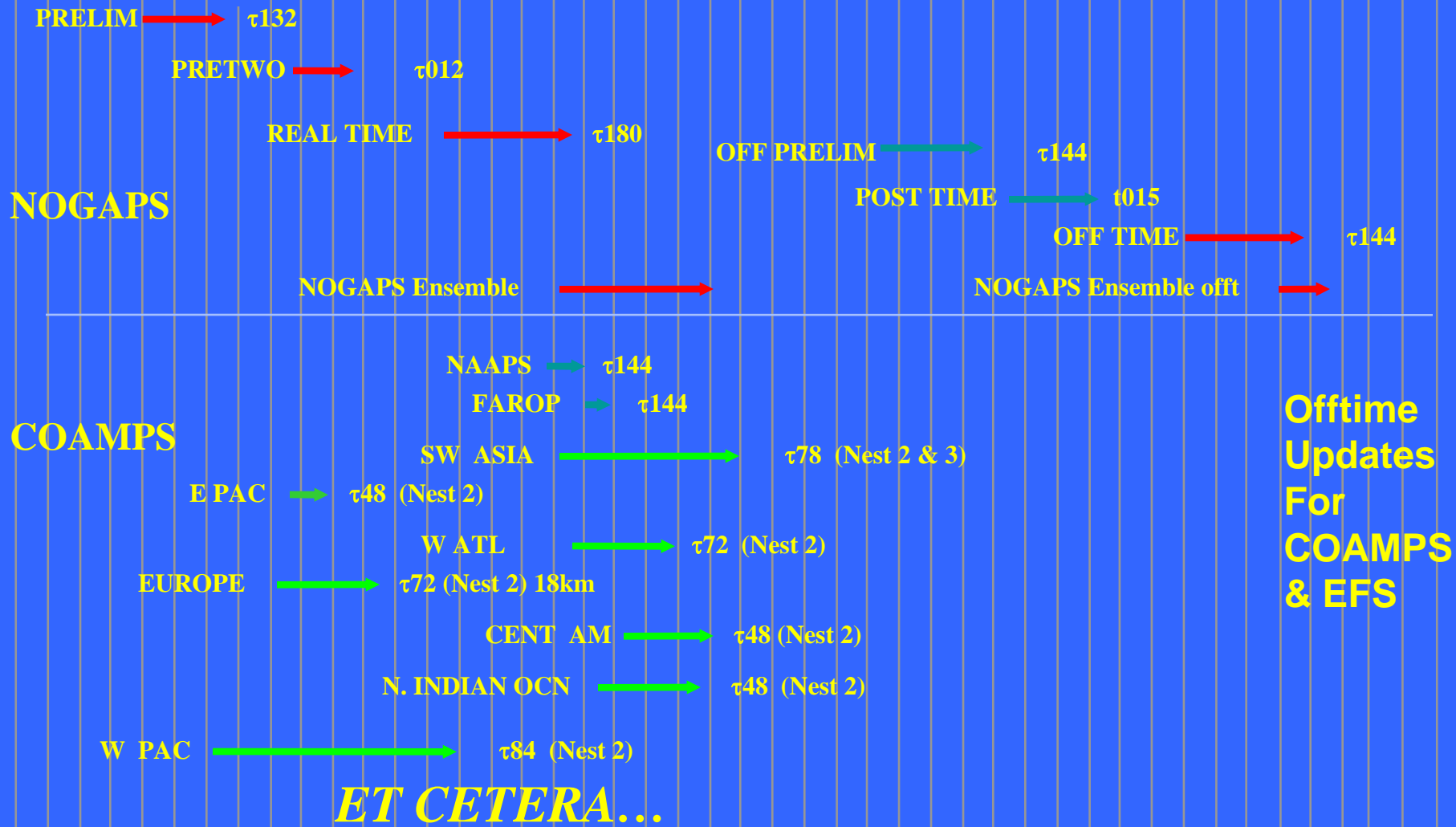


NOGAPS in the OPSRUN

- 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



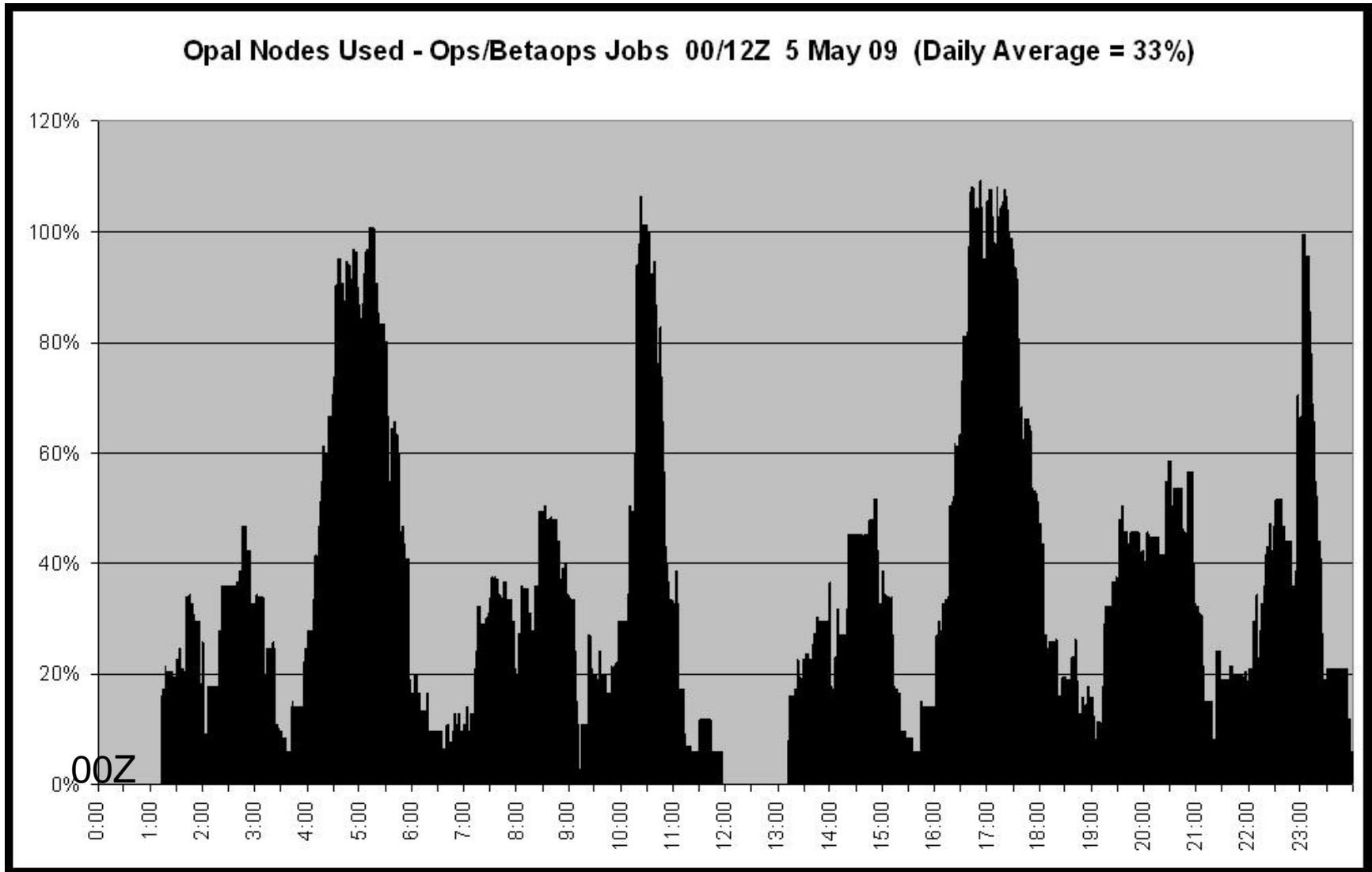


OPSRUN Points

- 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



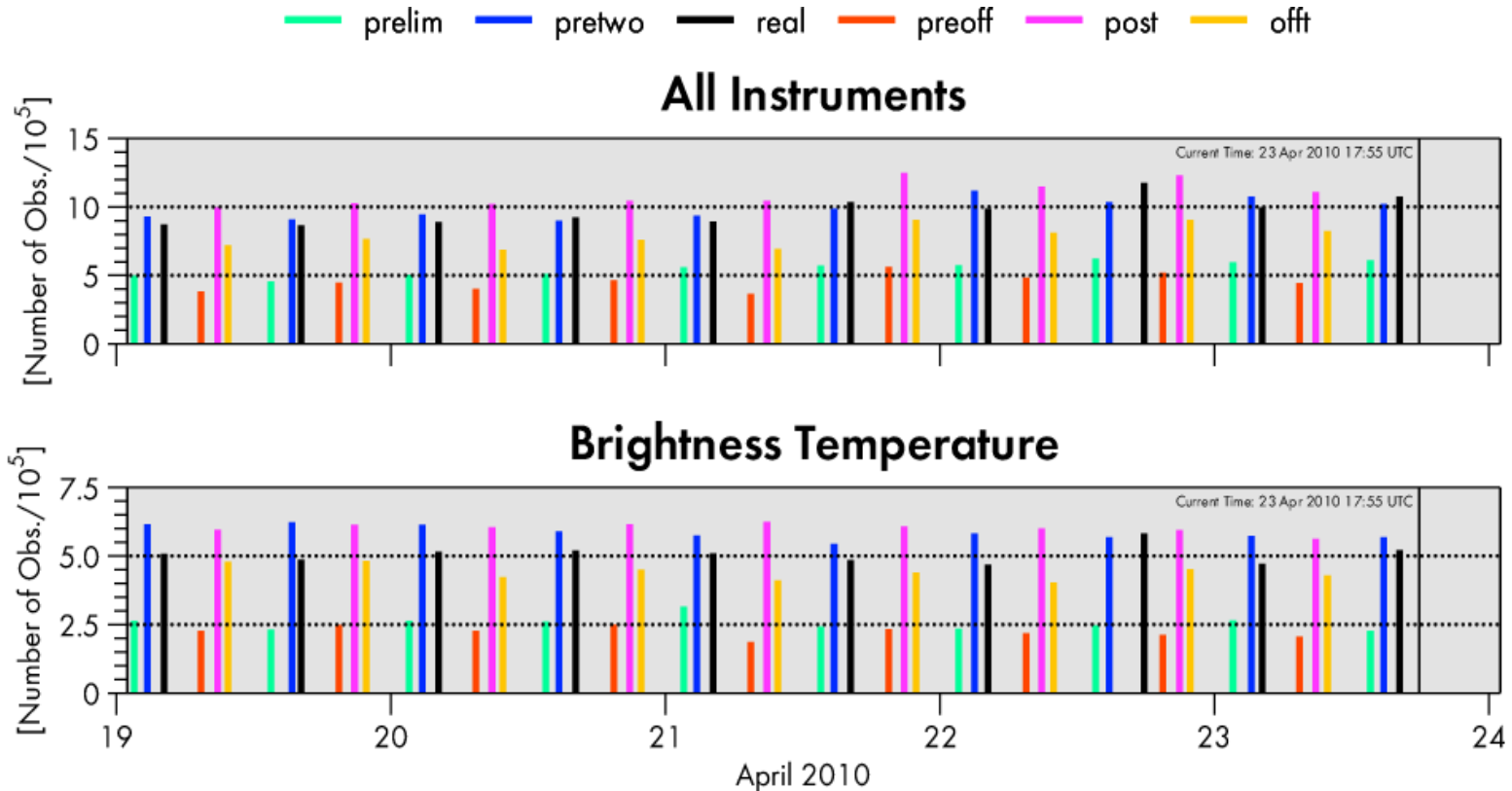


Observation Counts Points

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



Observation Counts from Innovation Files



L. Lyjak : /home/lyjak/ops/src/app/innov_statistics/src/main/plot_innov_stats.cpp : jobNumber=3042 : 23 Apr 2010 17:54:42 UTC : Page 1 of 1

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

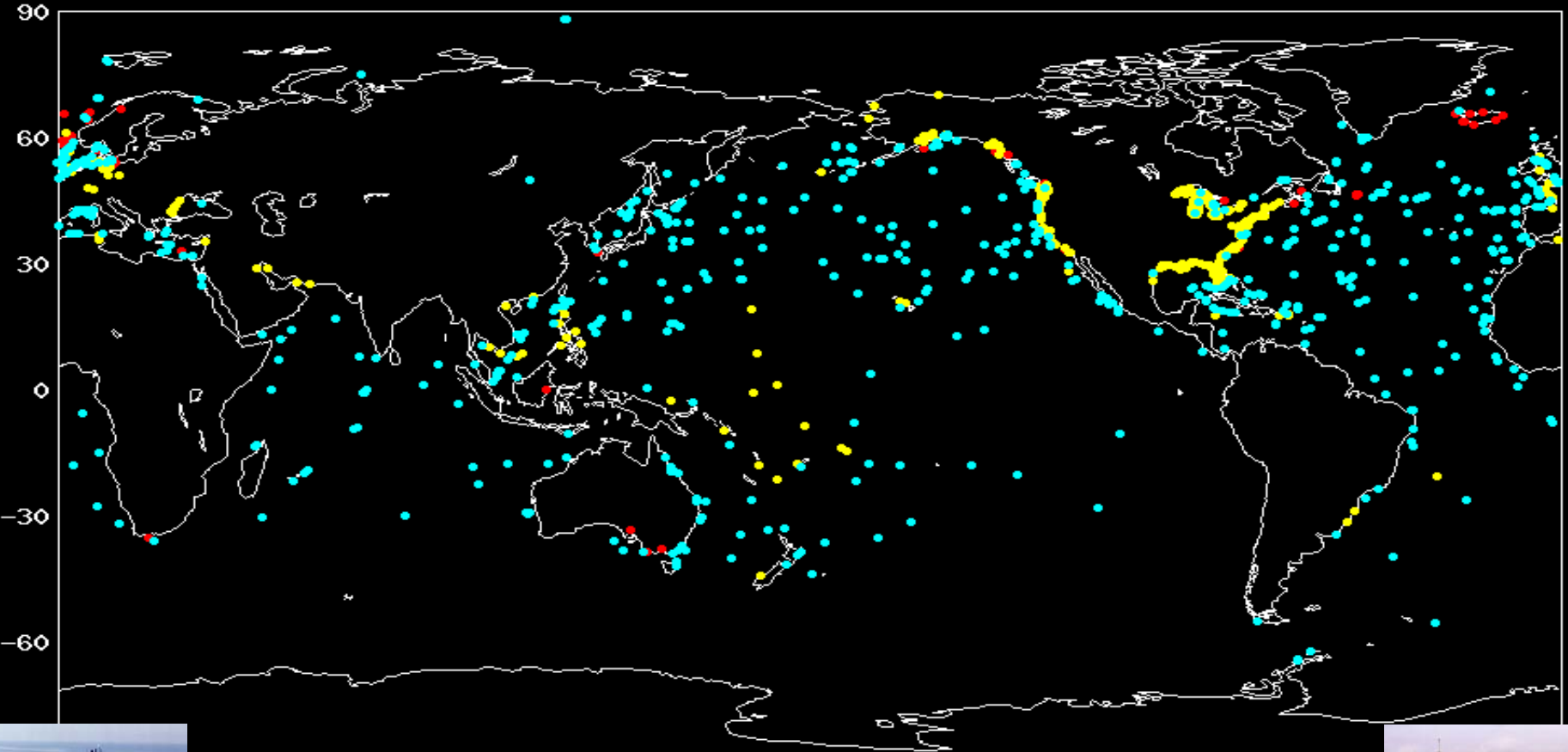


Ship Weather Reports



Ship/Coastal Coverage
2007050100 late

Fixed Ship		Coastal Surface/Marine		Mobile Ship	
count -----	215	count -----	9776	count -----	700
locations ---	75	locations ---	340	locations ---	647



60 120 180 -120 -60

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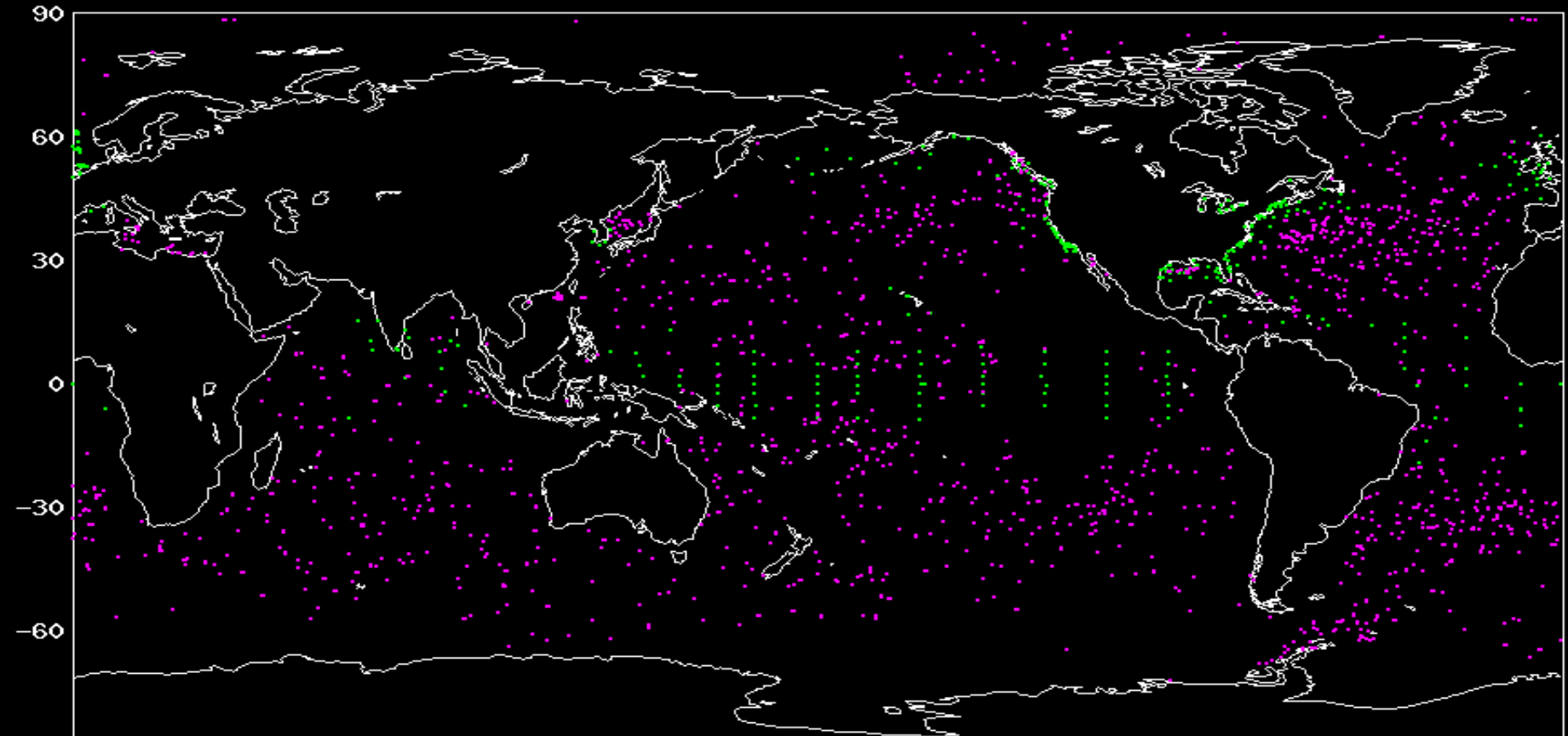
Buoy Observations



Buoy Coverage
2007050100 late

Fixed
count ----- 2178
locations --- 433

Drifting
count ----- 8114
locations --- 4366



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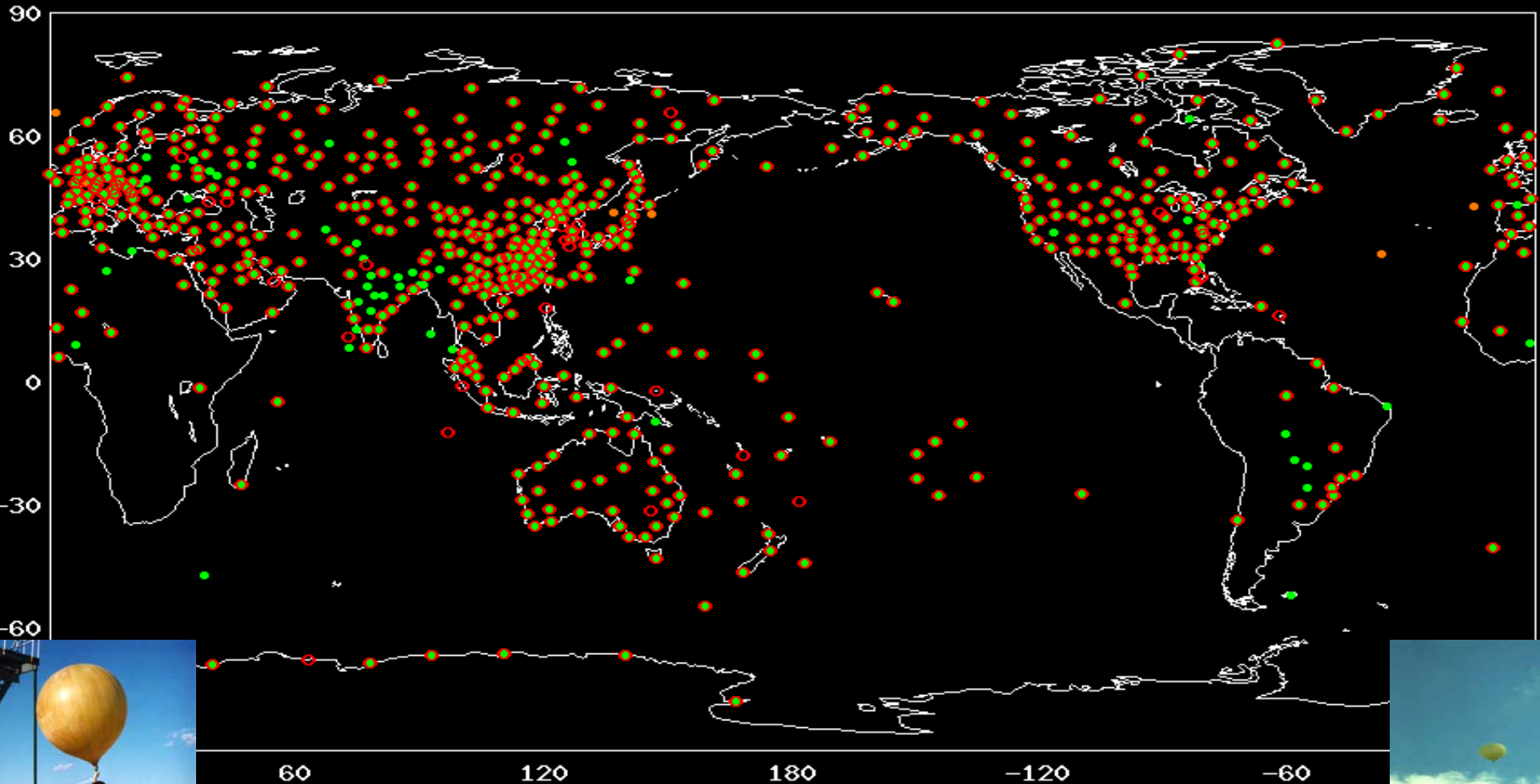


RADIOSONDE Observations



Raob Coverage
2007050100 late

Dropsonde	Ship	Land	75% Land, past 30 days
count ----- 0	count ----- 6	count ----- 618	count ----- 588
locations --- 0	locations --- 6	locations --- 613	locations --- 588



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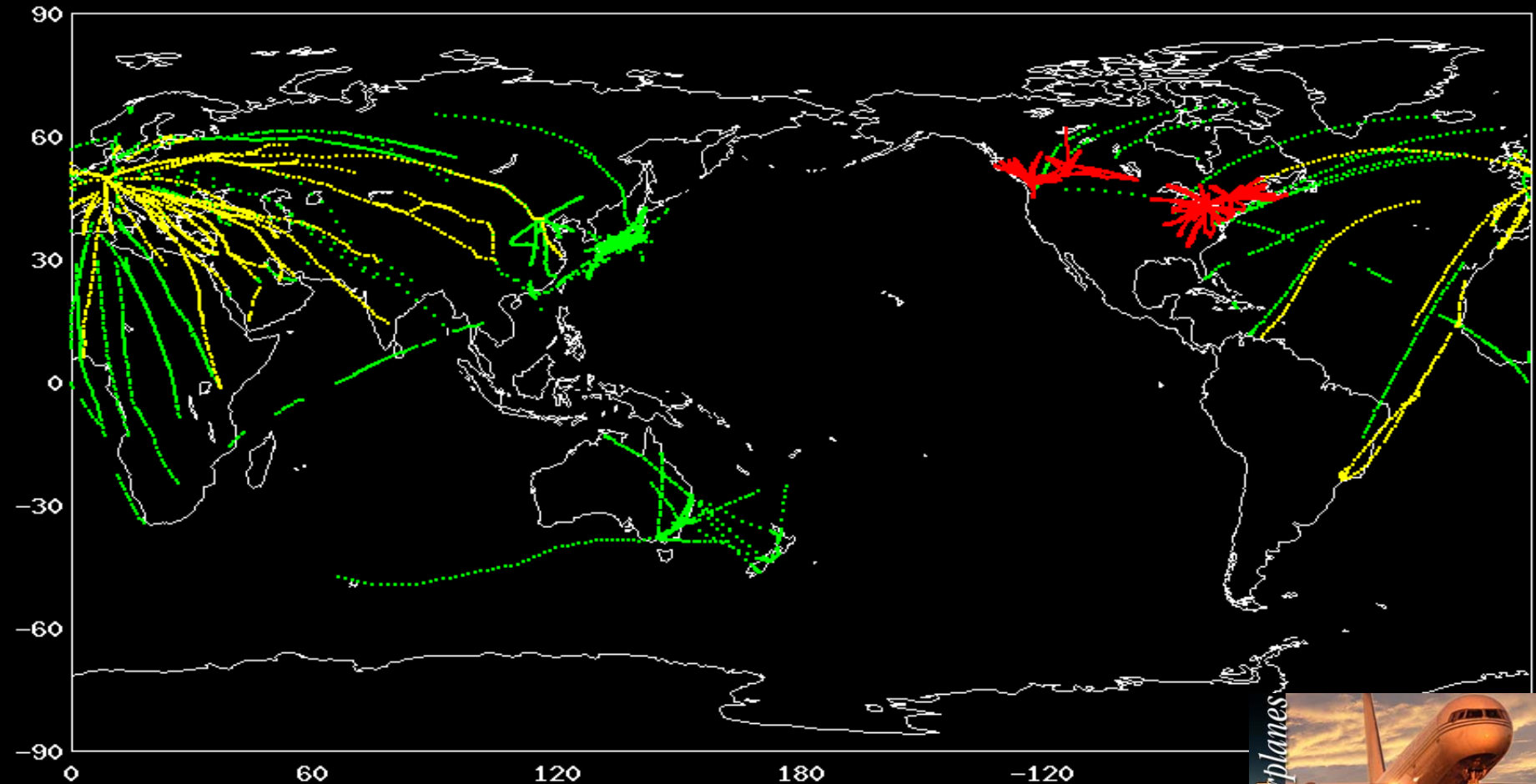


AIRCRAFT Reports



AMDAR Coverage
2007050100 late

AMDAR		German AMDAR		Canadian AMDAR	
count -----	9234	count -----	2923	count -----	11459
locations ---	8107	locations ---	2733	locations ---	9925



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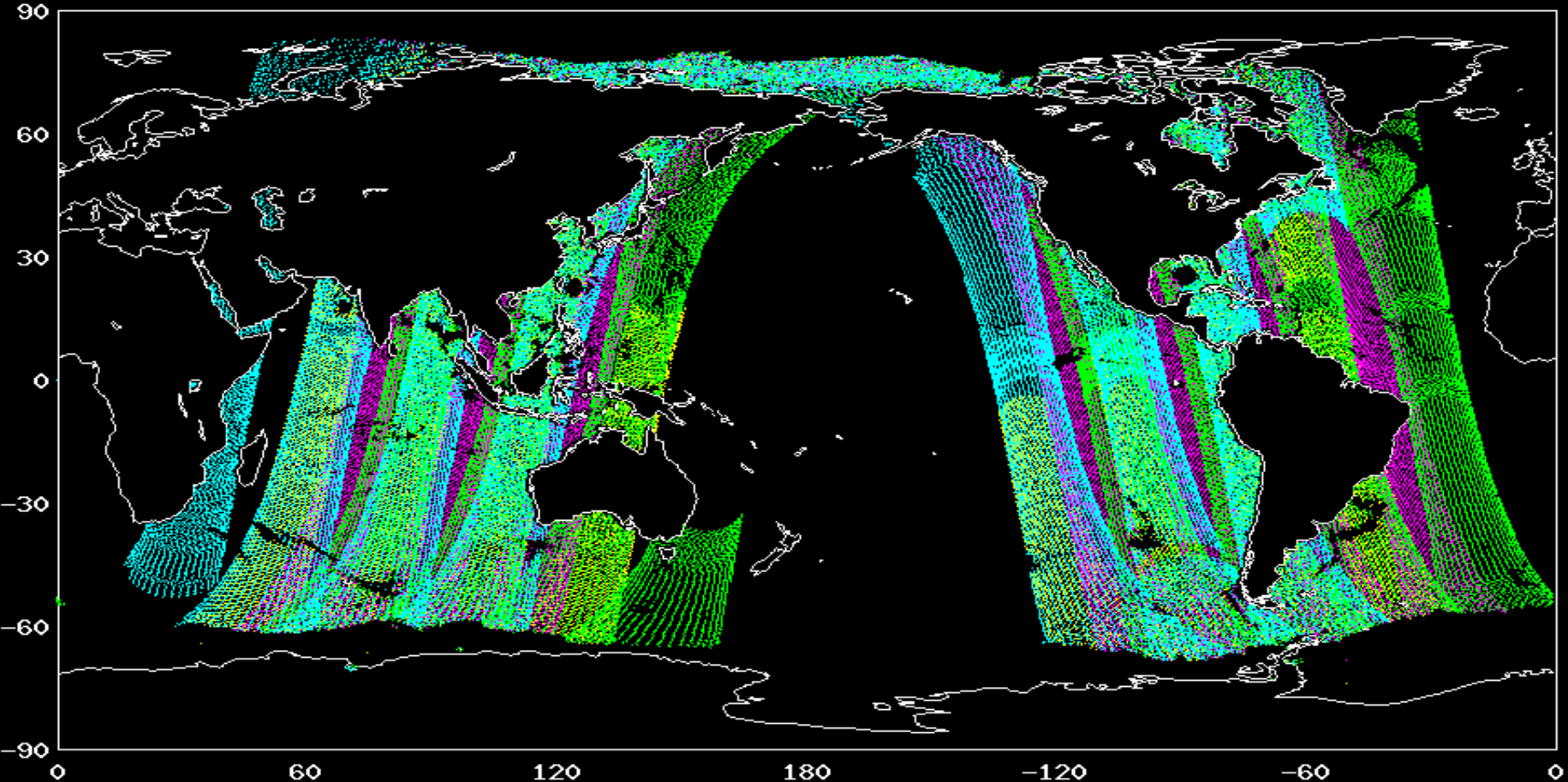


DMSP Polar SSM/I/S (Water Vapor, Rain Rate, Wind Speed)



SSM/I Coverage
2008091200 late

F13	F14	F15	F16	F17
count ----- 36593	count ----- 0	count ----- 39560	count ----- 57362	count ----- 55384
locations --- 31116	locations --- 0	locations --- 33554	locations --- 51233	locations --- 48483



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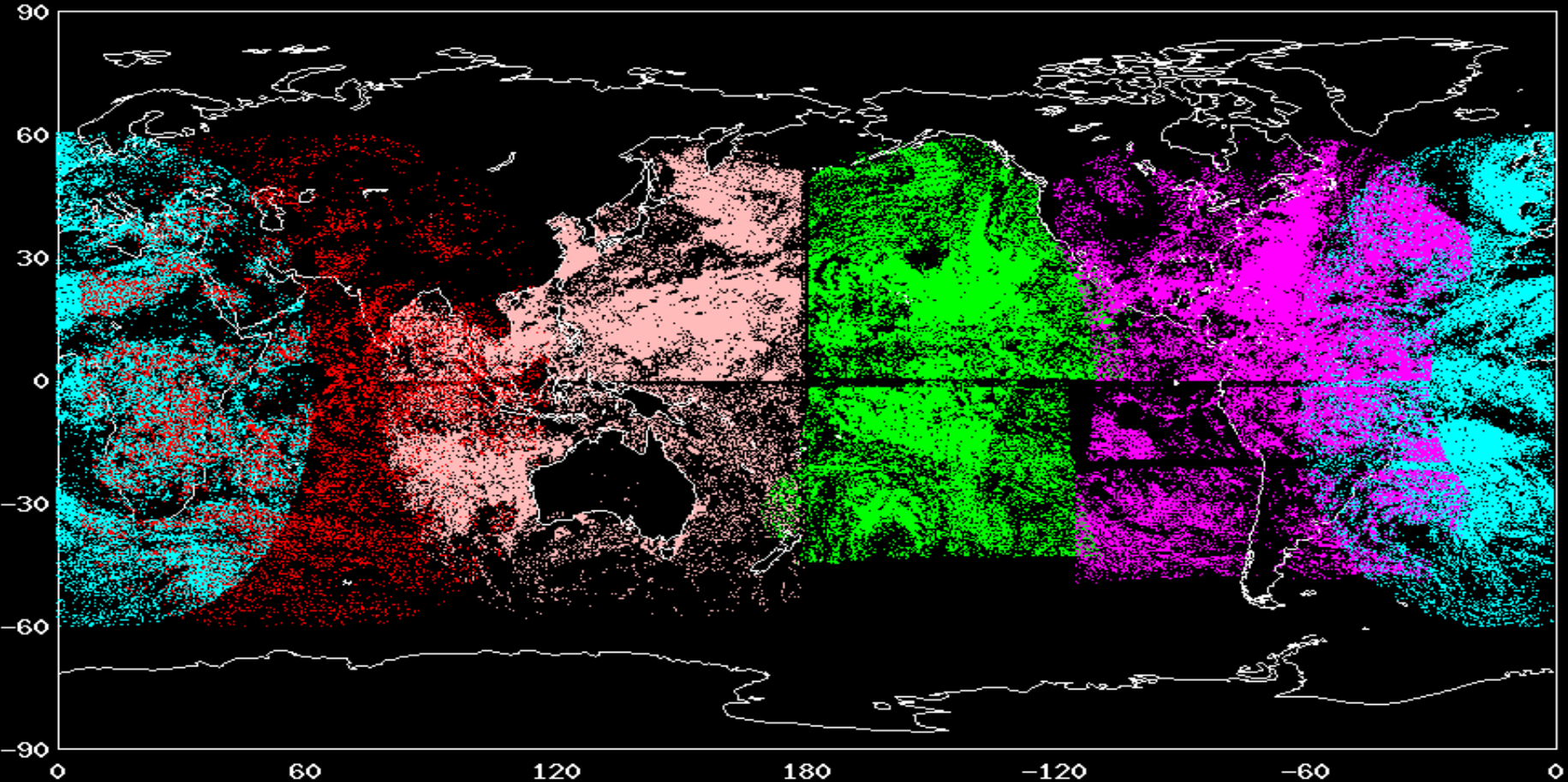


Geostationary Satellite Winds

CIMSS/Univ. of Wis., Satellite Feature Tracked Winds Coverage
2008112418 main



METEOSAT 9		METEOSAT 7		MTSAT-1R		GOES-11		GOES-12	
count -----	69068	count -----	17916	count -----	43335	count -----	61032	count -----	63300
locations ---	66205	locations ---	17425	locations ---	41773	locations ---	53742	locations ---	50504



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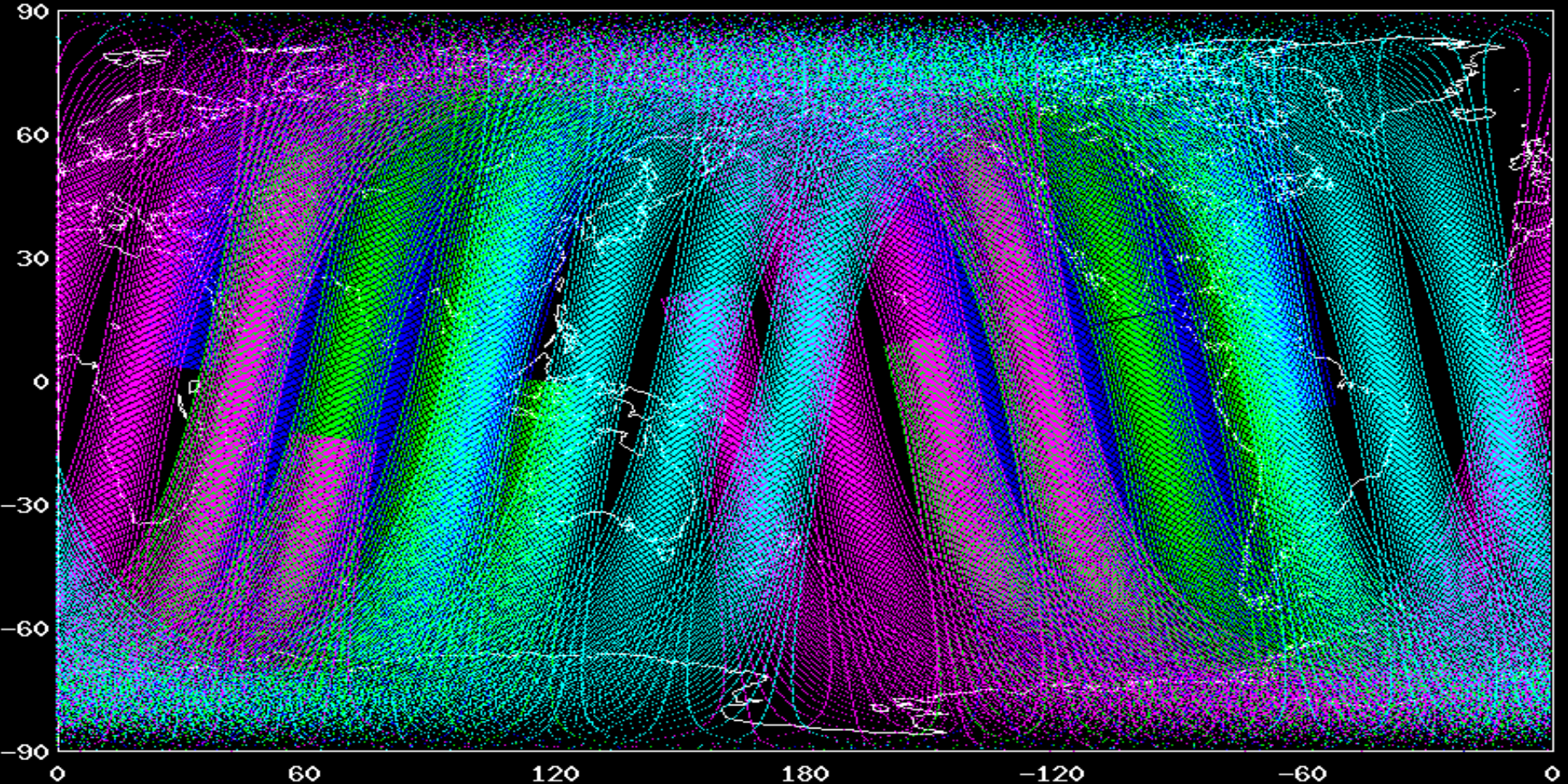


AMSU-A Coverage



AMSUA Radiance Scan Locations Coverage
2008091200 late

NOAA 15		NOAA 16		NOAA 18		METOP-A	
count -----	82920	count -----	83820	count -----	84420	count -----	79380
locations ---	79976	locations ---	81055	locations ---	81032	locations ---	79117



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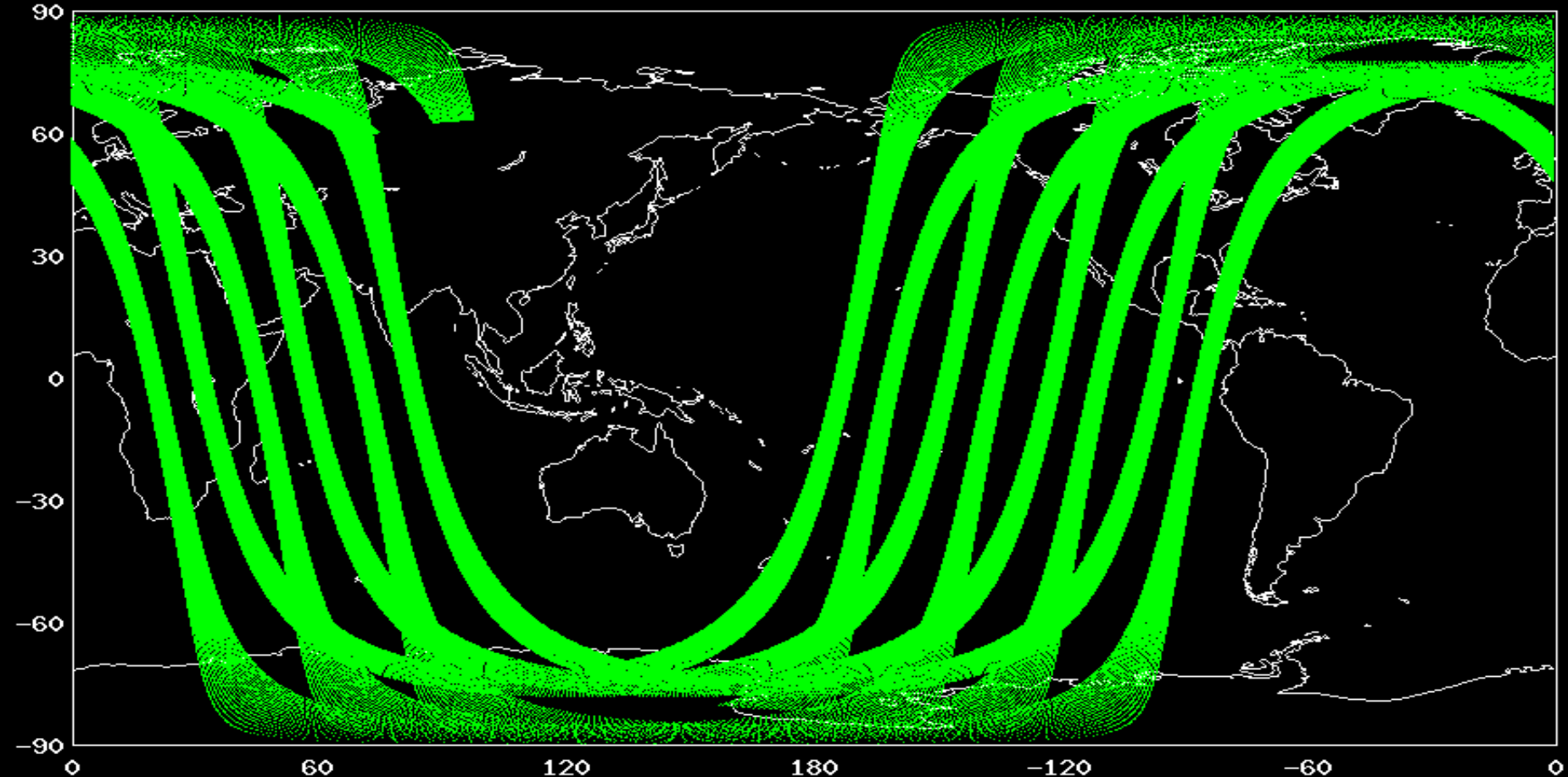


ASCAT METOP Coverage

Advanced Scatterometer (MetOp) Coverage
2008090918 late



count ----- 241542
locations --- 241511



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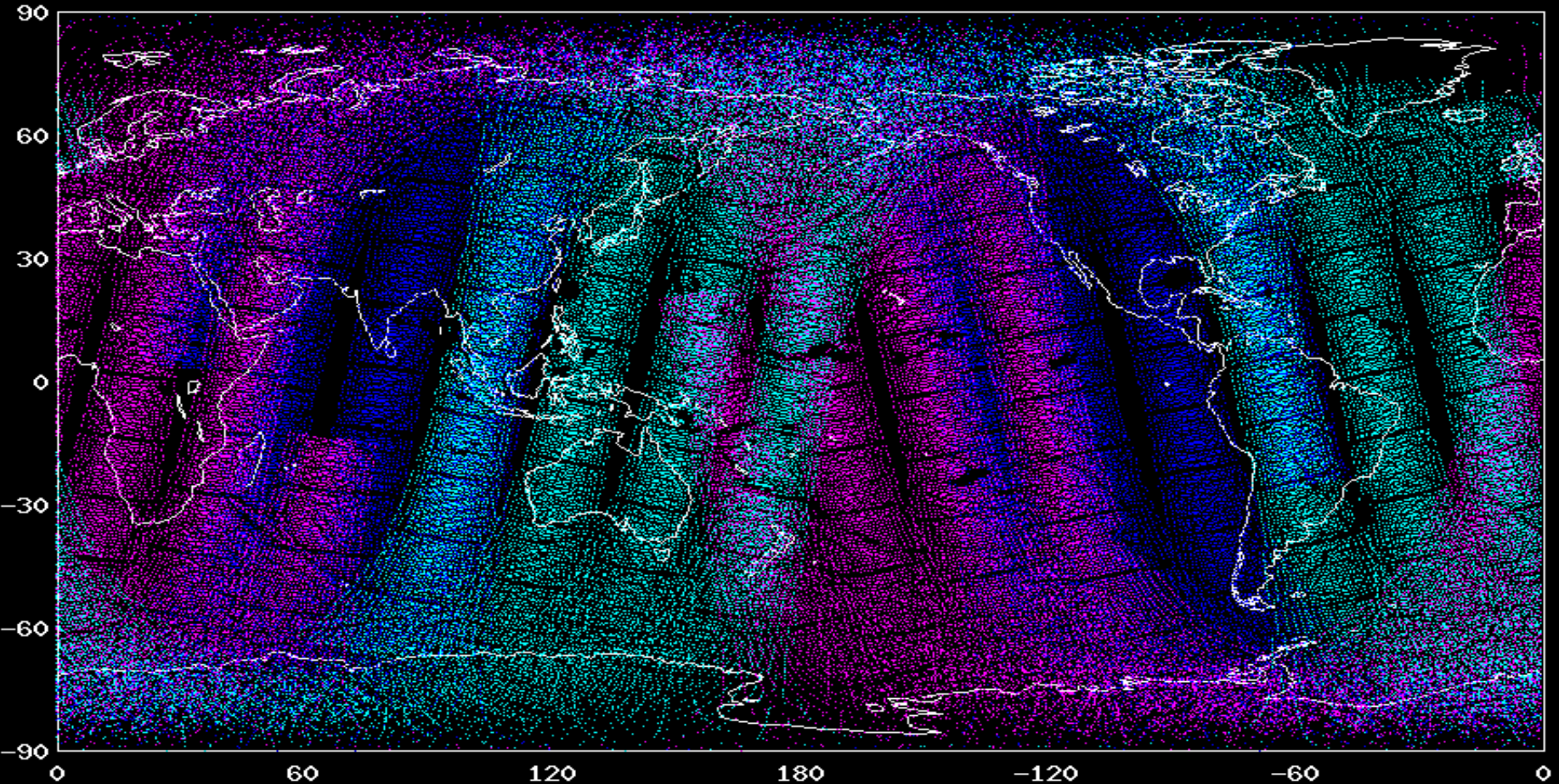


ATOVS Coverage



ATOVS Soundings Coverage
2008091200 late

ATOVS 15		ATOVS 16		ATOVS 18		METOP-A	
count -----	44297	count -----	0	count -----	44224	count -----	41971
locations ---	44297	locations ---	0	locations ---	44224	locations ---	41971



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MODIS Polar Feature Track Winds

MODIS, Satellite Feature Tracked Winds Coverage
2008091200 late



AQUA IR

count ----- 0

locations --- 0

TERRA IR

count ----- 1656

locations --- 1653

AQUA WV

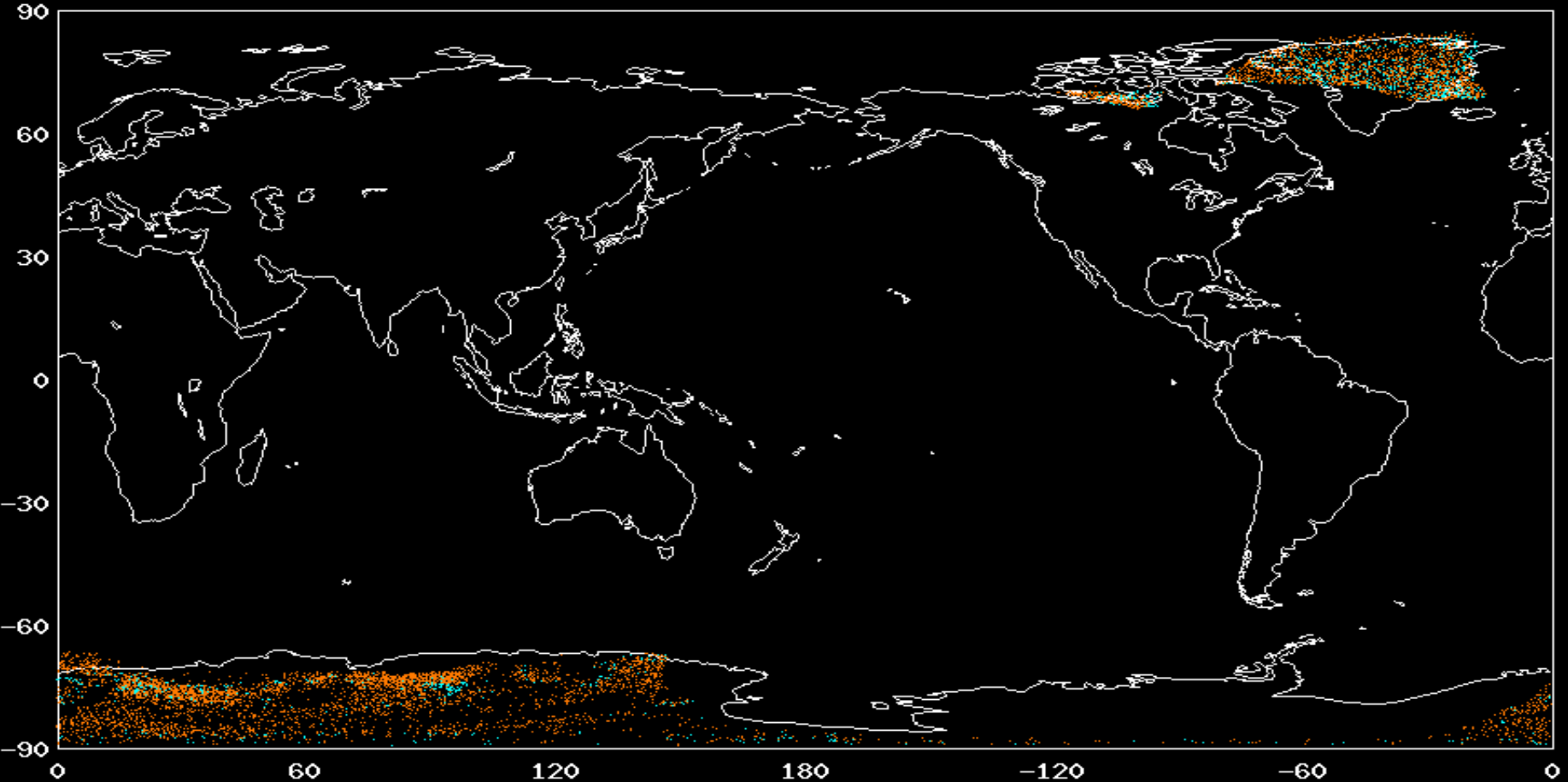
count ----- 0

locations --- 0

TERRA WV

count ----- 5105

locations --- 5102



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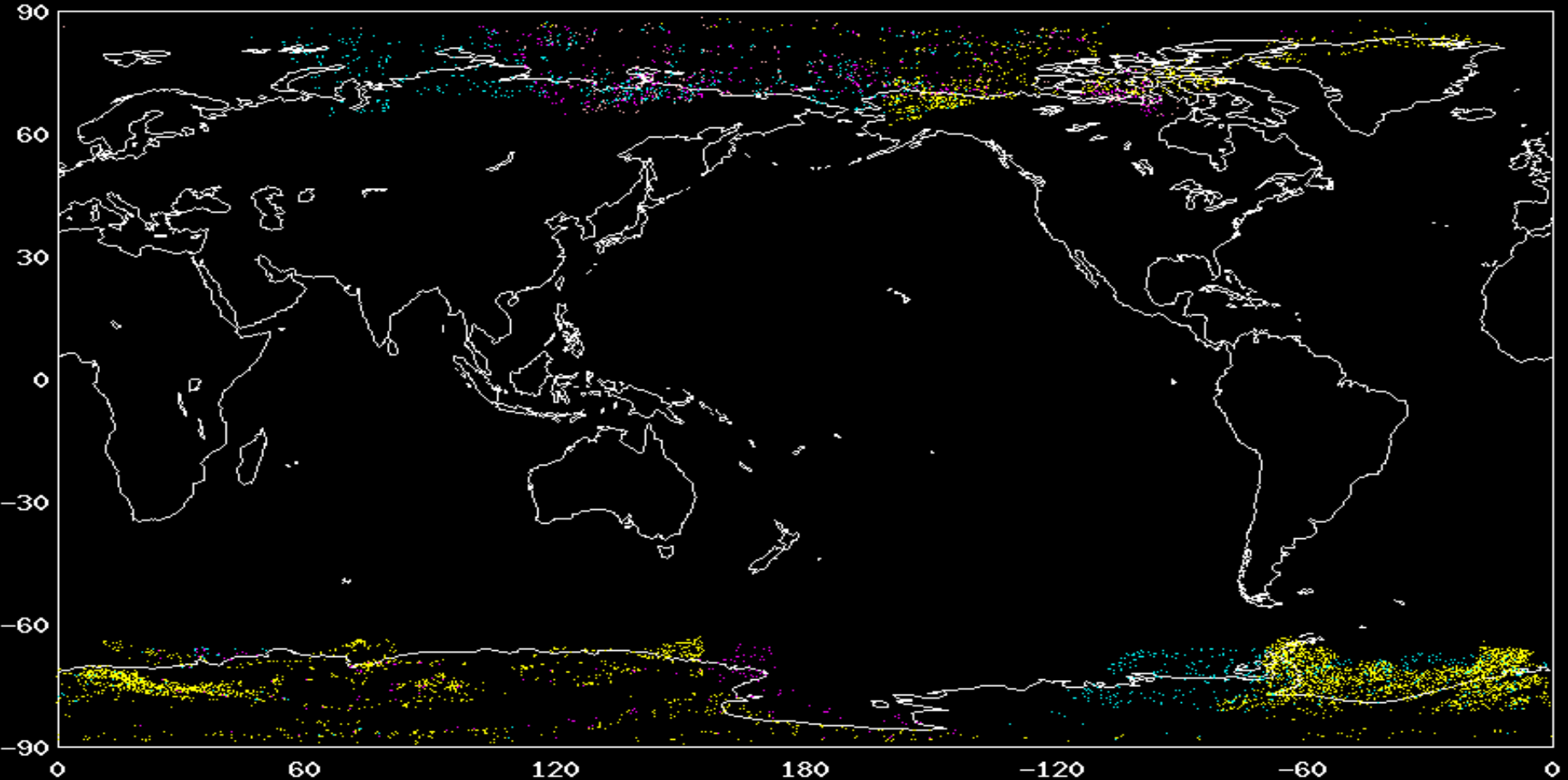


AVHRR Polar Feature Track Winds

AVHRR, Satellite Feature Tracked Winds Coverage
2008091200 late



NOAA 15 IR		NOAA 16 IR		NOAA 17 IR		NOAA 18 IR		METOP IR	
count -----	391	count -----	0	count -----	616	count -----	1127	count -----	4221
locations ---	391	locations ---	0	locations ---	616	locations ---	1127	locations ---	4214



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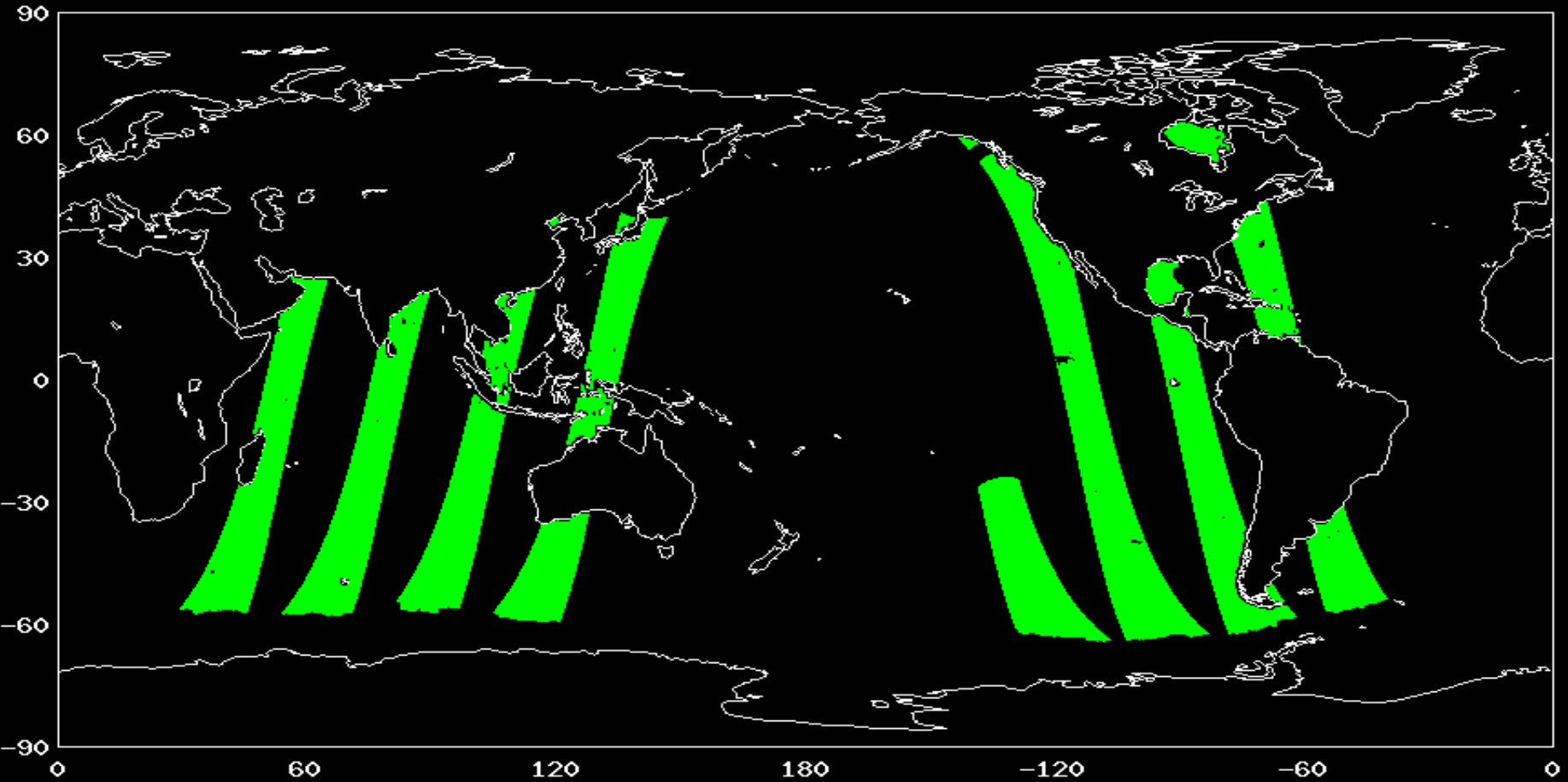


WINDSAT Total Precipitable Water & Winds

WindSat (Coriolis) Coverage
2008091200 late



count ----- 371385
locations --- 370304



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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 ?