



# Deriving Atmospheric Motion Vectors From AIRS Moisture Retrieval Data

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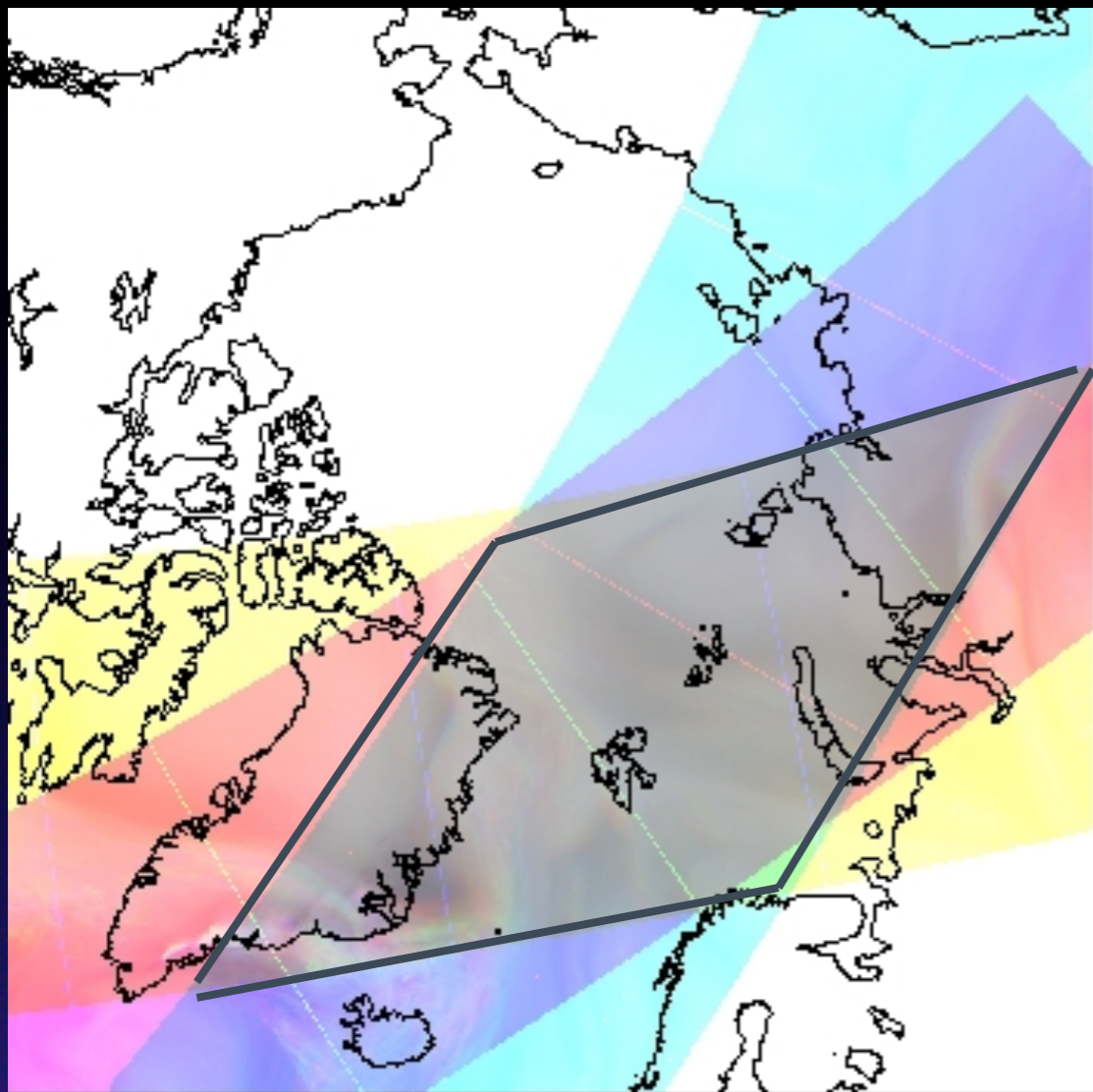


# Tracking humidity features from AIRS retrievals

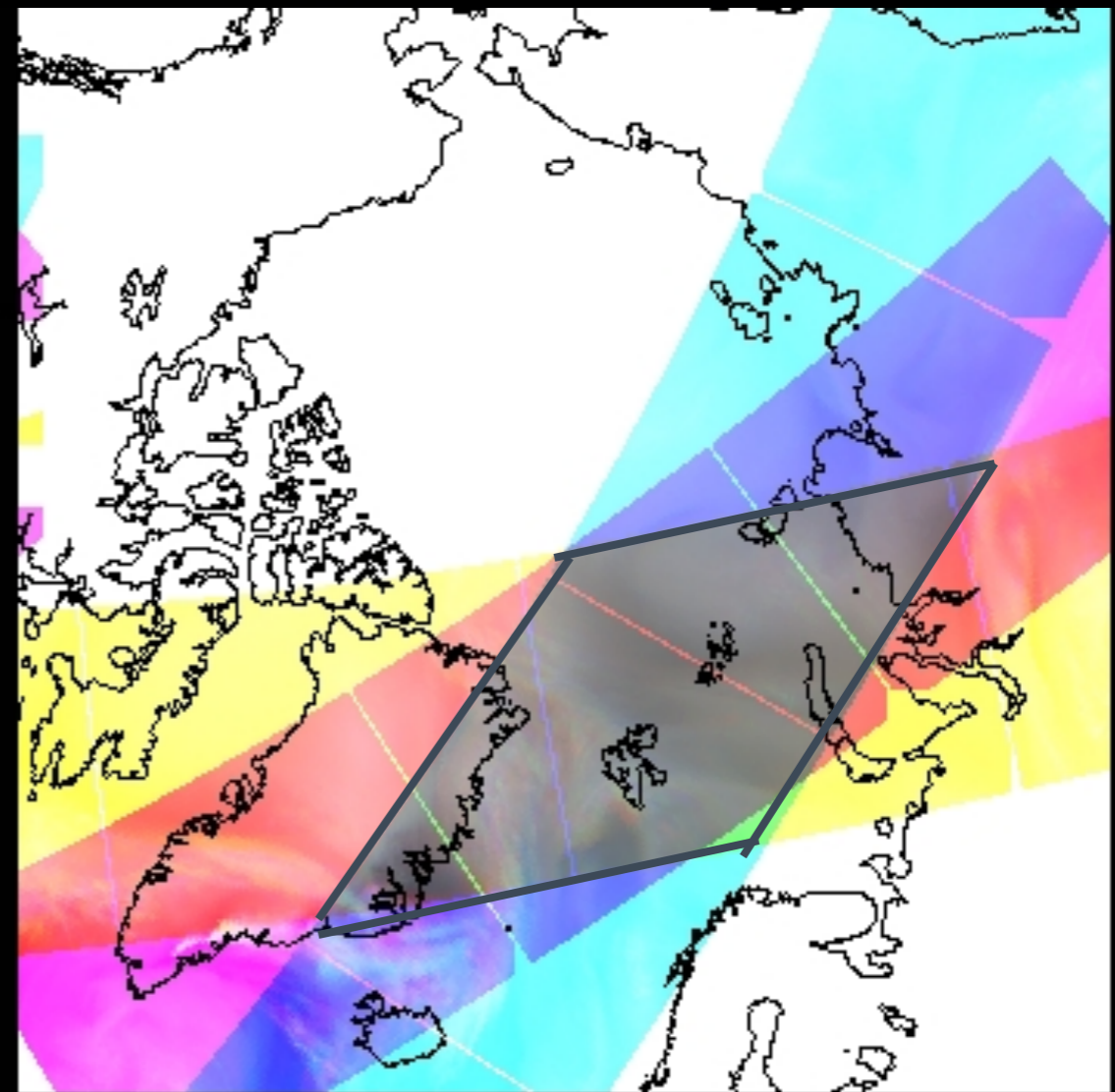
## Project Overview

- 1) Determine to what extent AIRS-derived AMVs can provide useful wind information. Advantages:
  - a) Provide a 3-dimensional winds dataset
  - b) Removes issues with AMV height determination
  - c) Clear sky (and above cloud) wind information
  - d) No water vapor imager channel after MODIS (polar orbiter)
- 2) Blend the AIRS moisture retrieval AMVs with MODIS AMVs to create 3-D polar wind fields.
- 3) Perform NWP experiments with the blended product to determine the overall impact on numerical forecasts, and the relative contributions of each data type (MODIS vs. AIRS).

# Polar Winds Coverage MODIS vs. AIRS

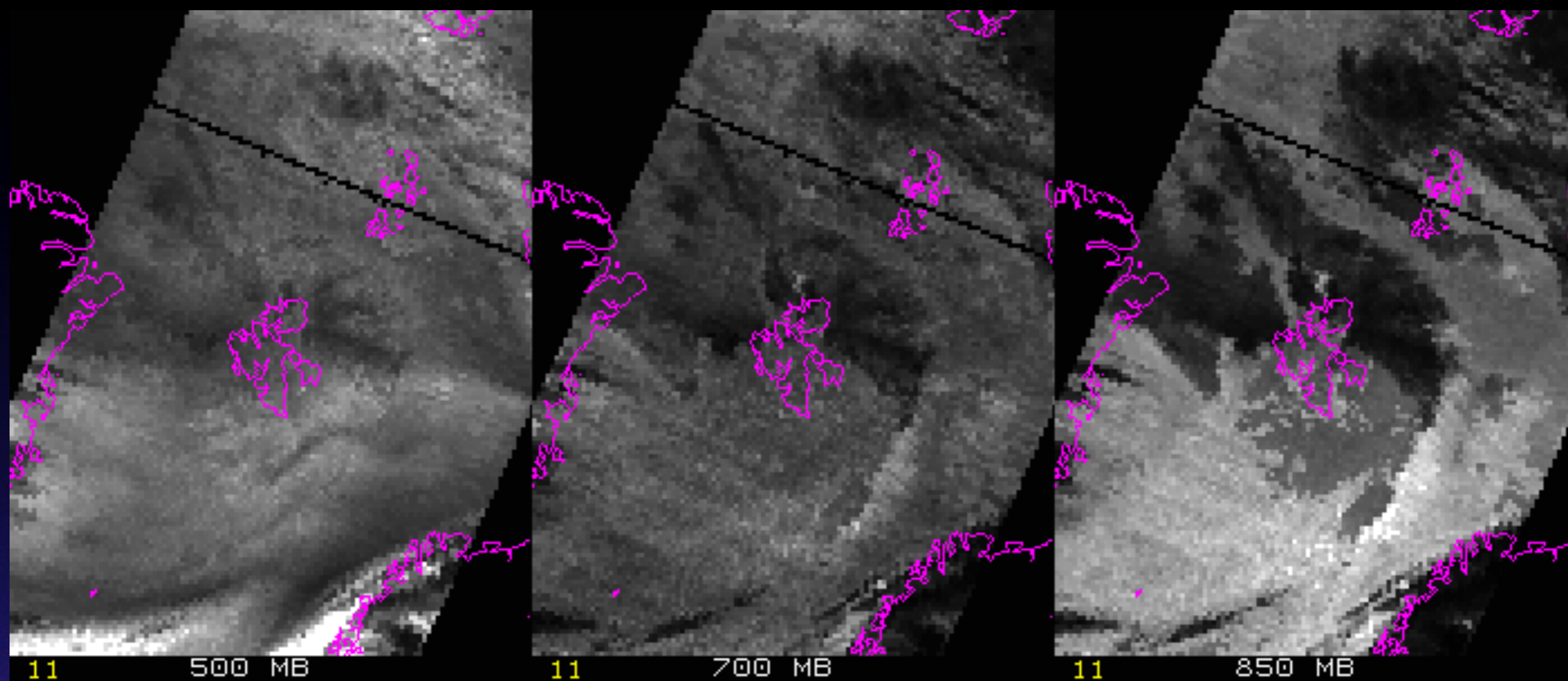


AQUA MODIS COVERAGE



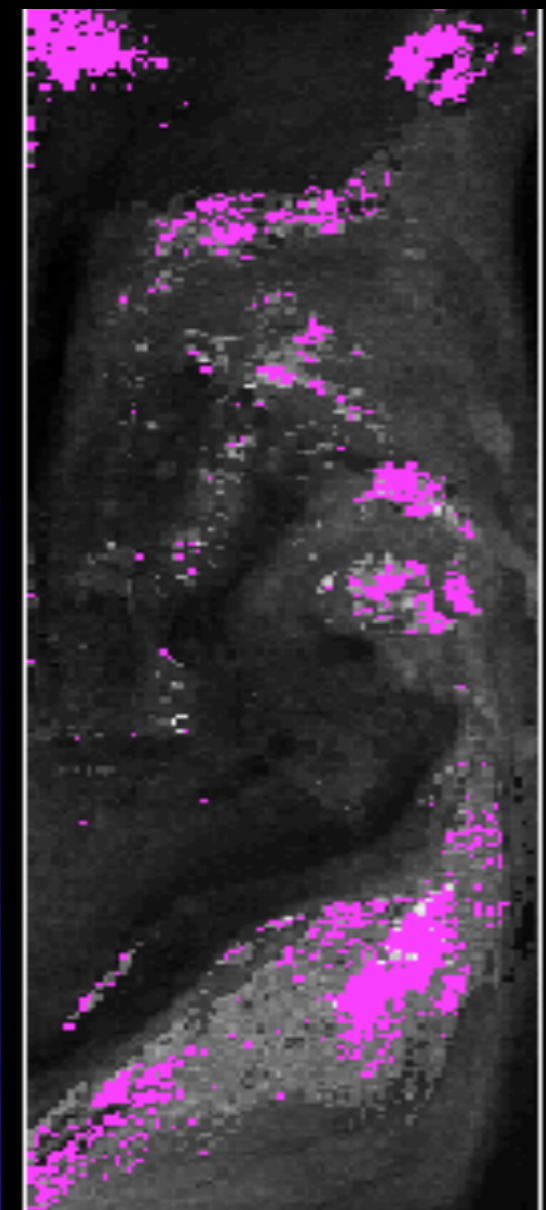
AQUA AIRS COVERAGE

# AIRS Retrieval Images at 500, 700, 850 hPa

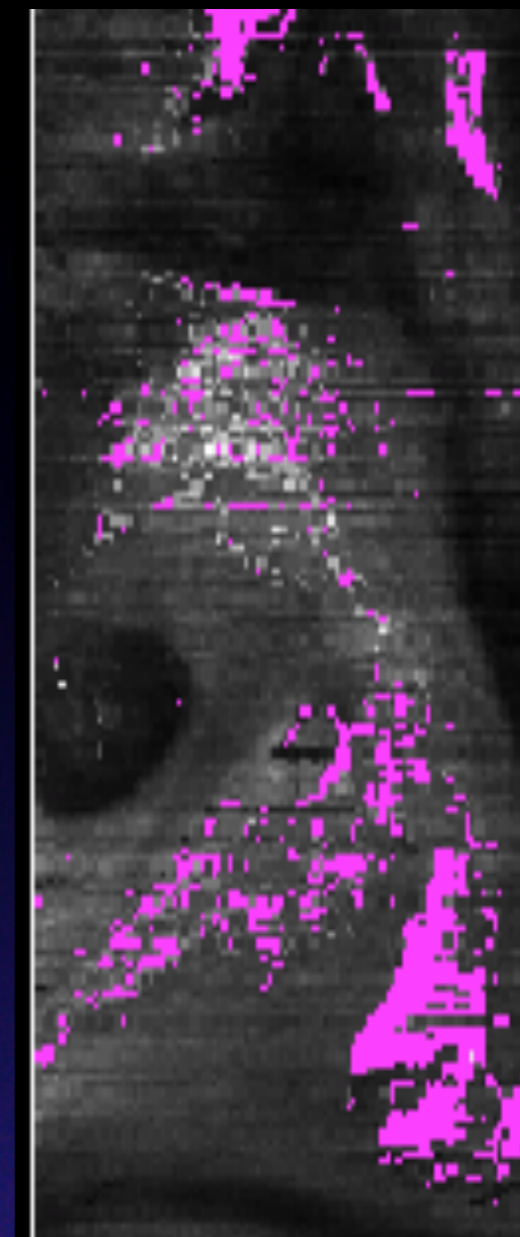


Specific humidity SFOV AIRS retrievals  
Remapped composites at 16 km resolution

# Sensors Degrading?



01 Jan 2005

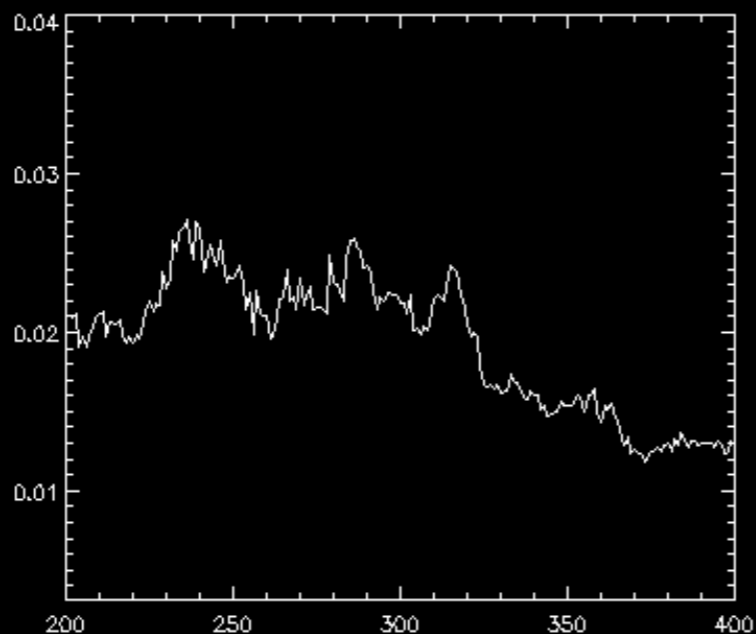
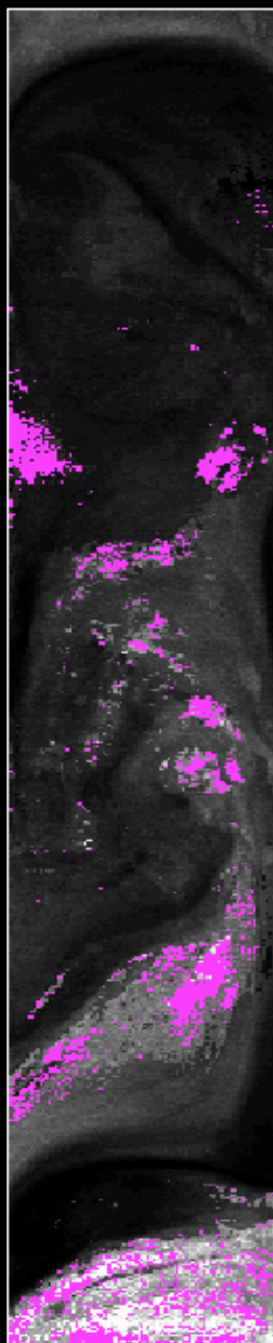


08 Jan 2011

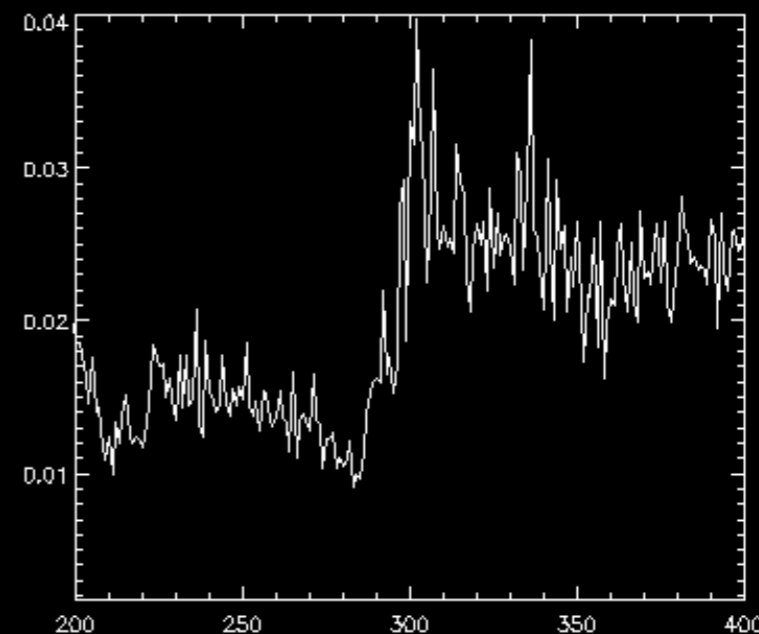
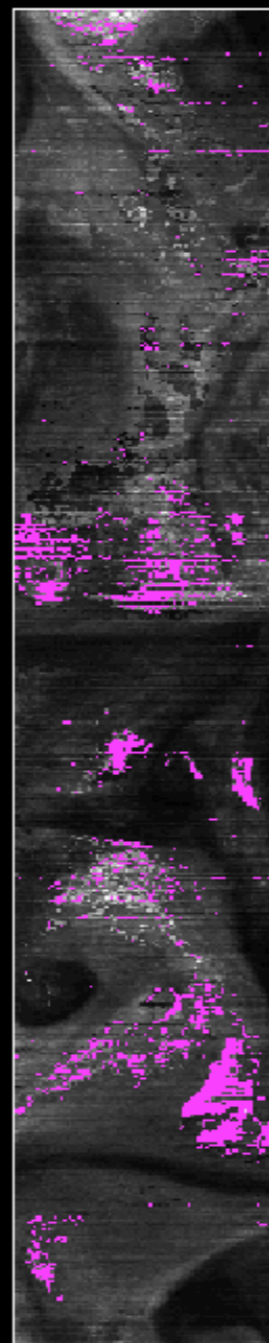
AIRS moisture 300 hPa over polar region; clouds in cyan

# Sensors Degrading? Line average

01 Jan 2005



08 Jan 2011

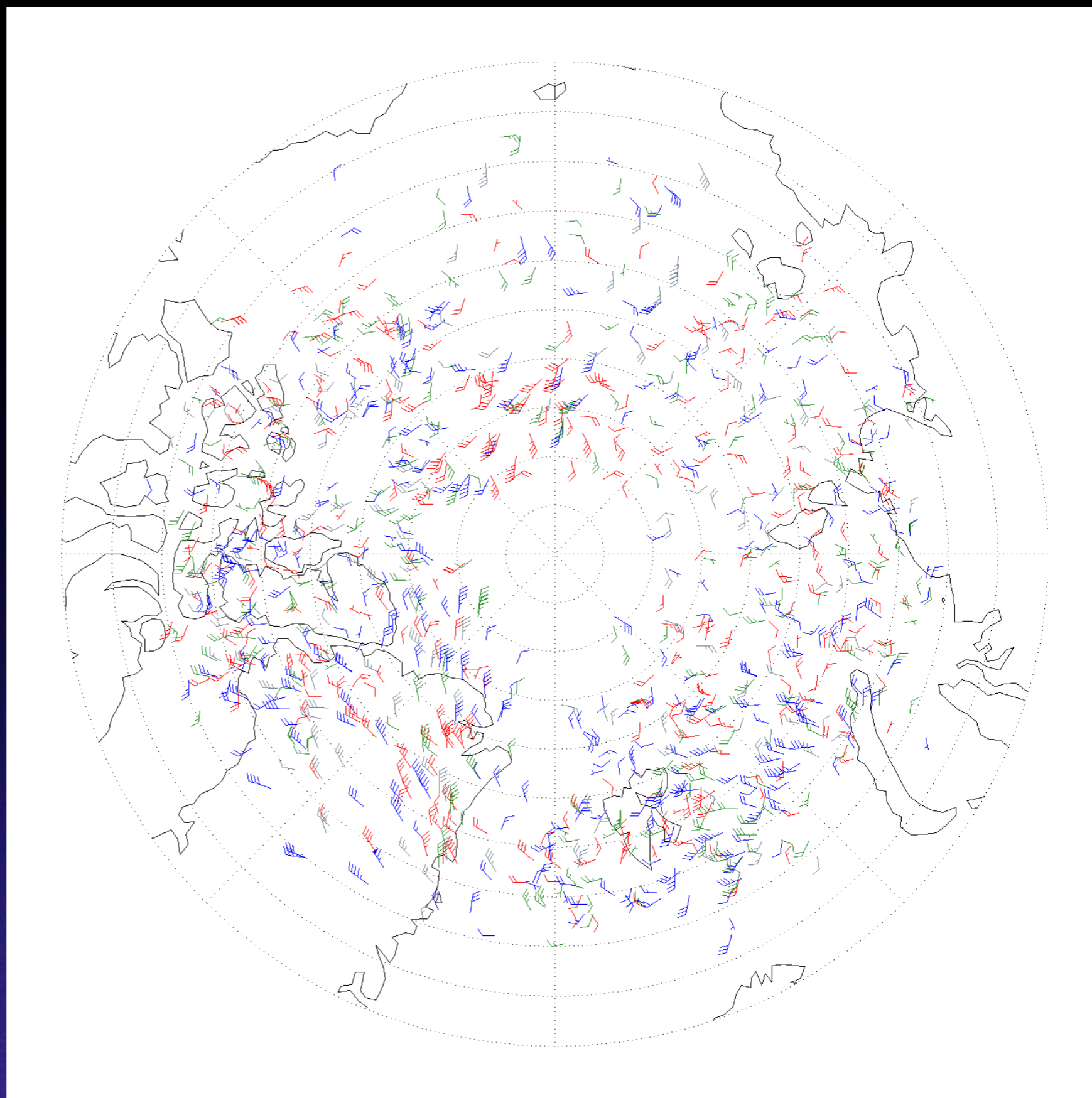


AIRS moisture 300 hPa over polar region; clouds in cyan

# Spatial distribution of AIRS retrieval winds for one day. North Pole region.

All derived winds from 5 January 2011. Color coded by level:

- 700 - 600 hPa (red)
- 550 - 450 hPa (green)
- 400 - 300 hPa (blue)
- 150 hPa ozone (gray)

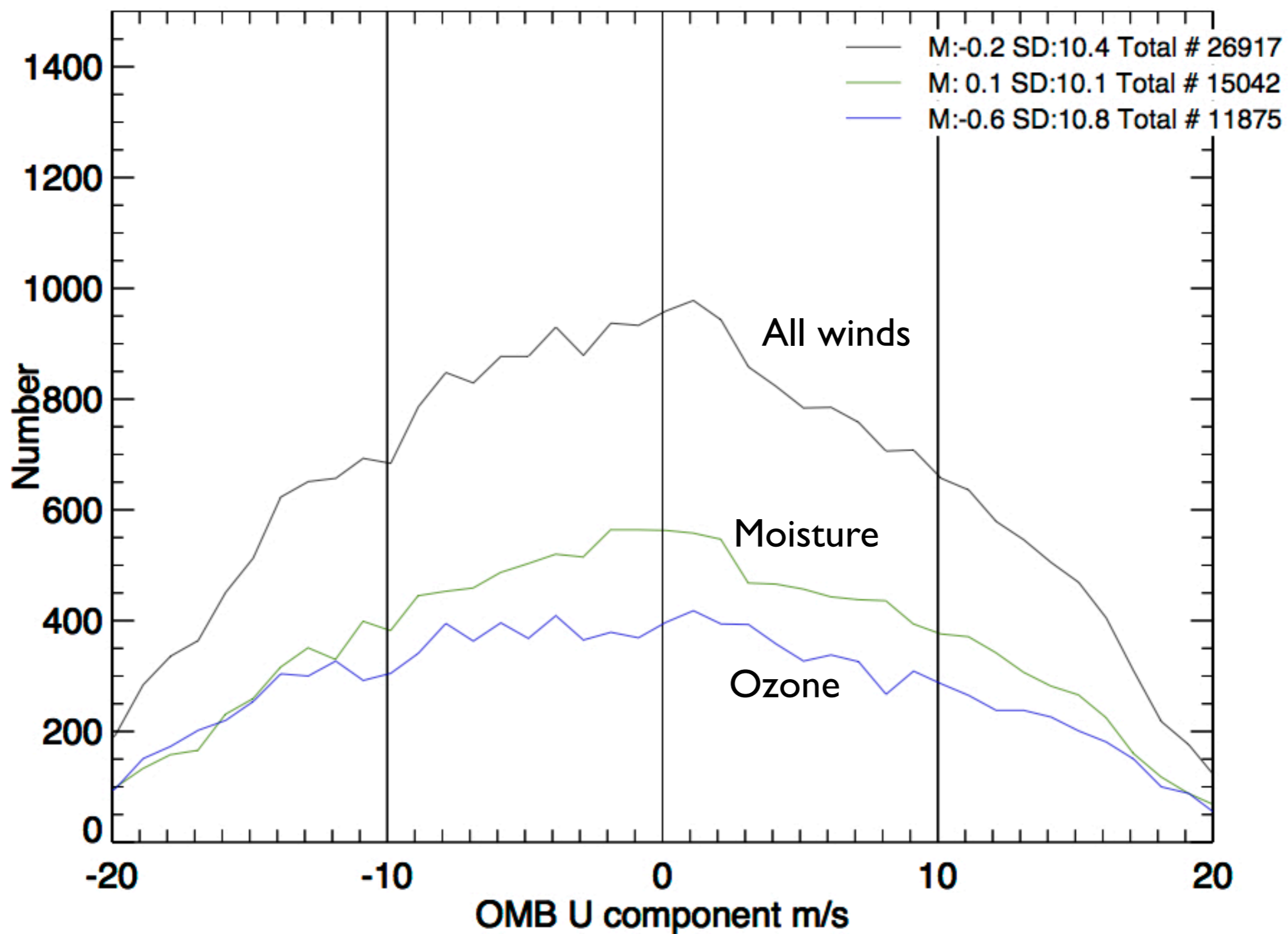


# Assimilation

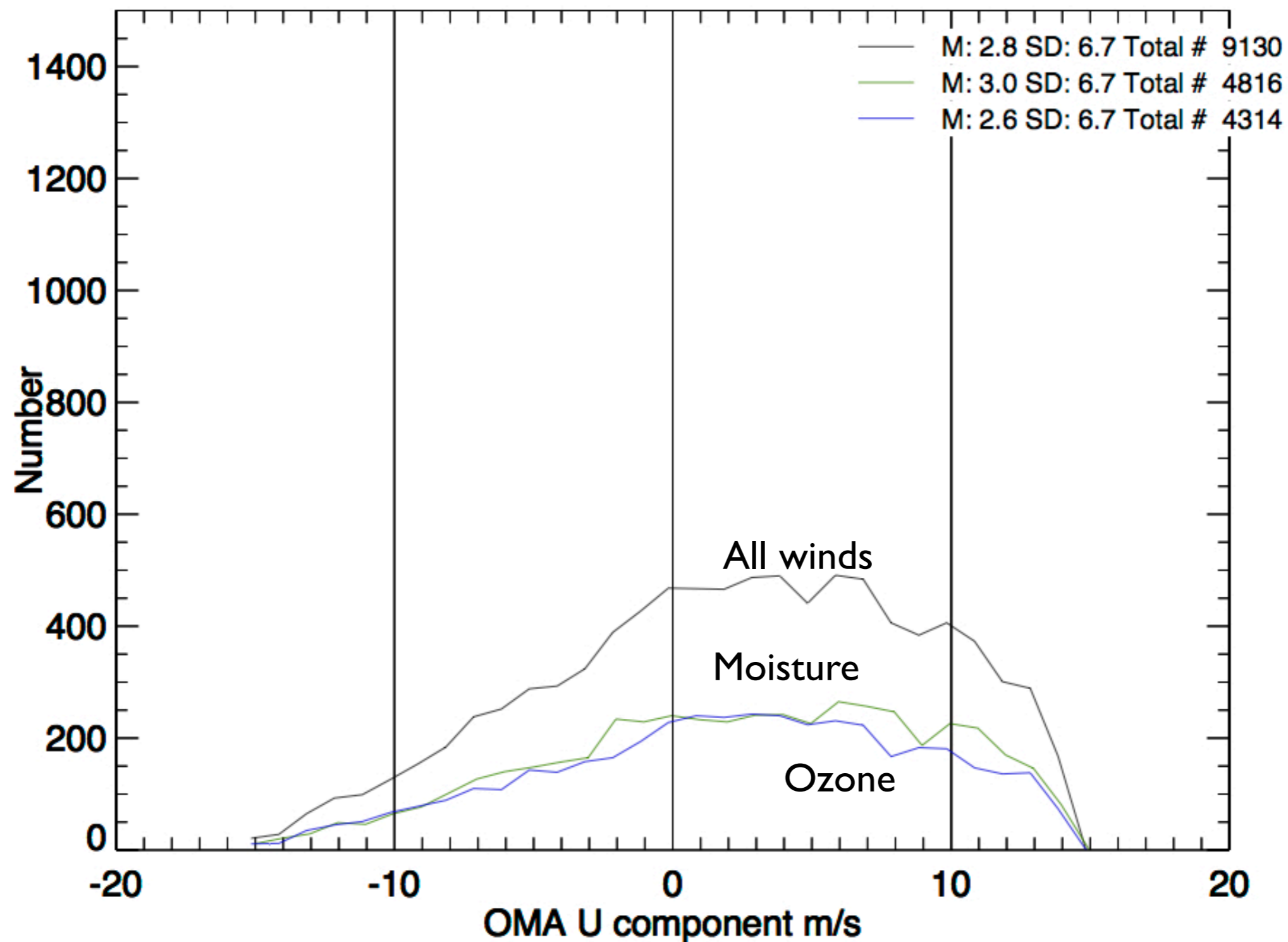
- 1) Two weeks: 01 – 14 January 2011
- 2) Northern Hemisphere
- 3) 29 levels: 12 ozone and 17 moisture levels (away from tropopause)
  - Ozone: 103 - 201 hPa
  - Moisture: 359 – 661 hPa
- 4) 2010 version of GSI
- 5) All winds; no quality control



# Assimilation



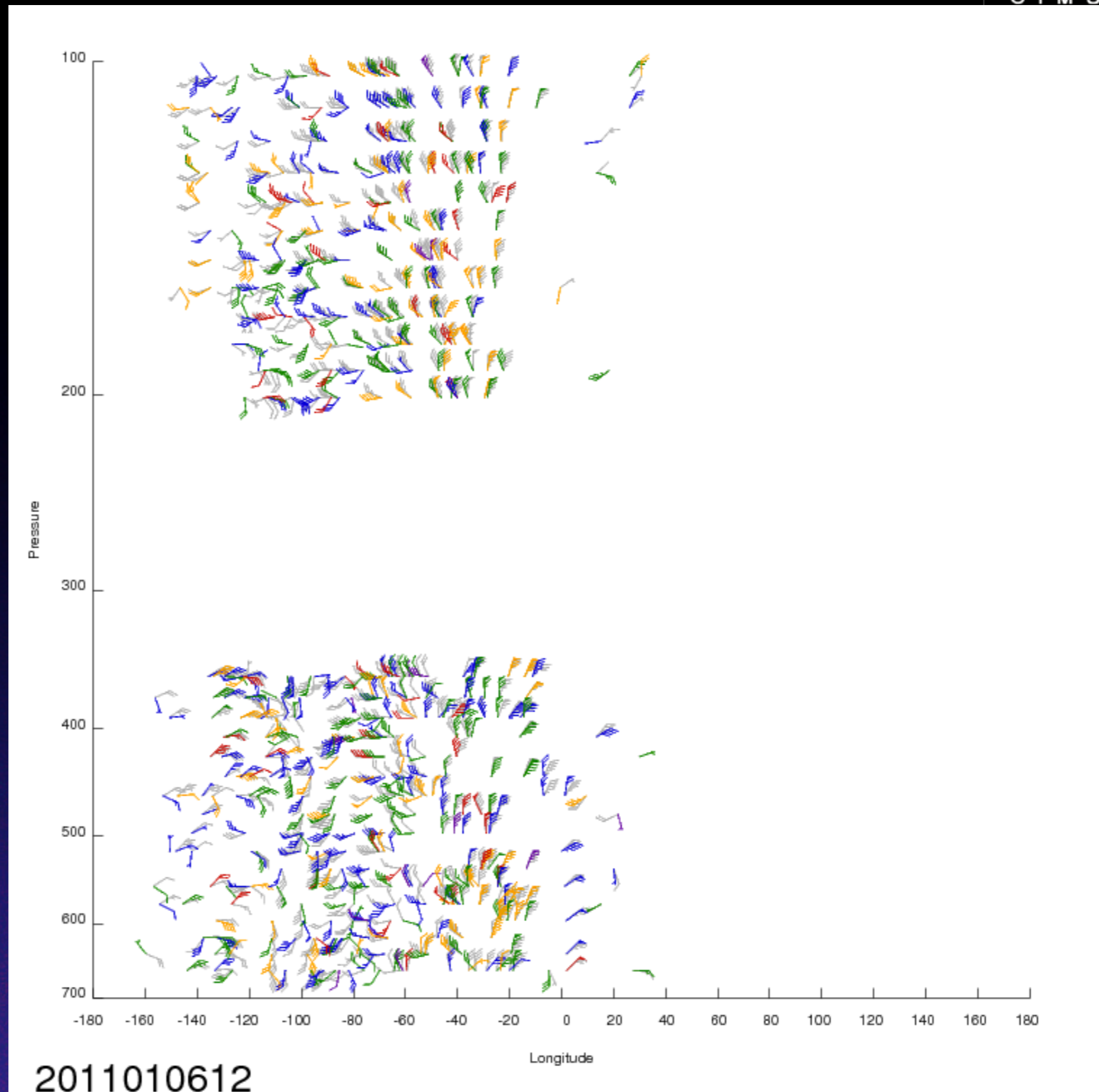
# Assimilation



# Vertical distribution of AIRS retrieval winds used. North Pole region.

All derived winds from 6 January 2011 at 1200 UTC.

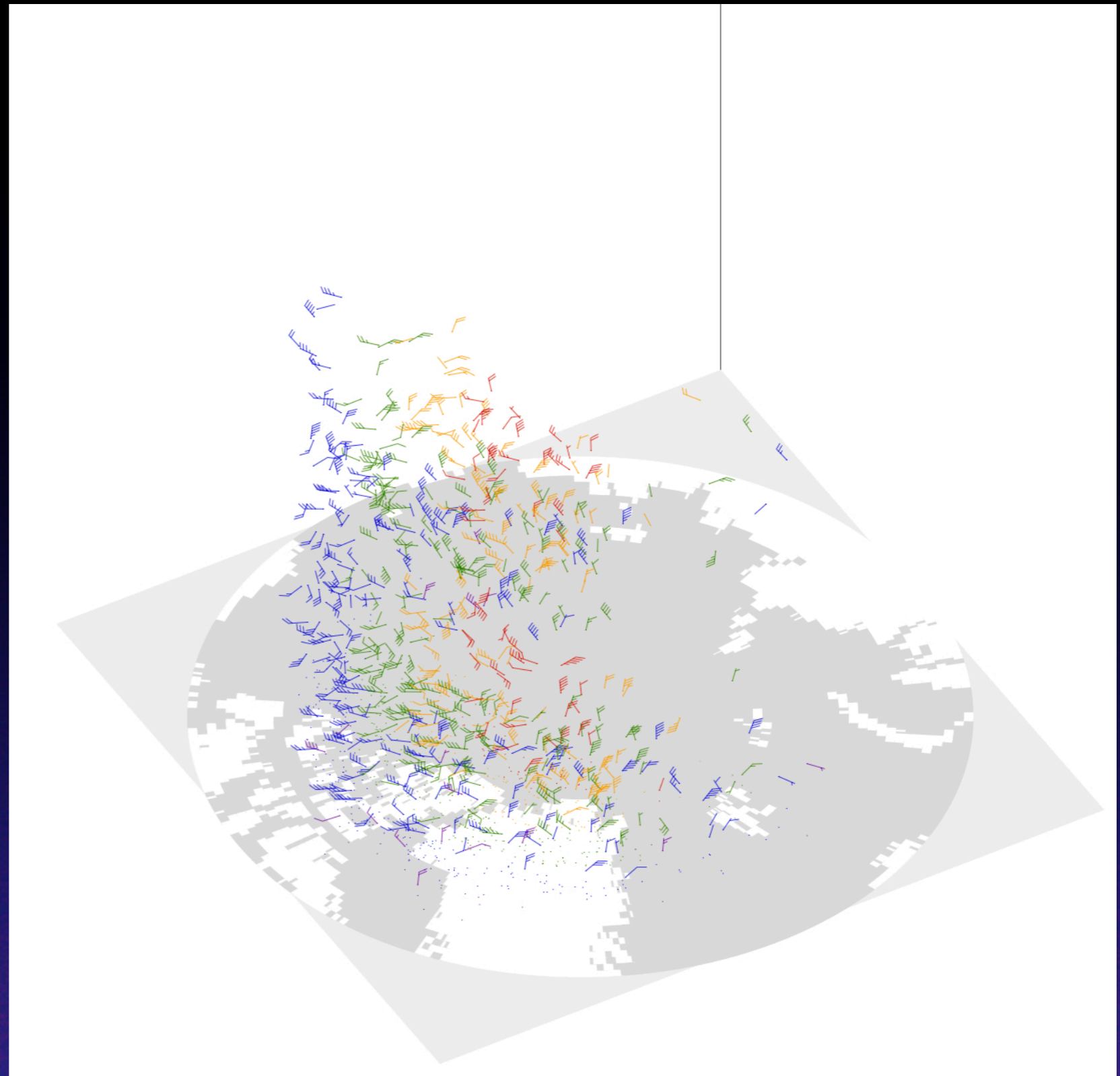
Colors denote distance from pole: blue (far) to red (close). Gray is the analysis.



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2011 at 1200 UTC.

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the analysis.





# Status

- New challenges:
  - Lower resolution (16 km) vs. 4 km for AVHRR
  - Noise in SFOV retrievals (low pass and median filters)
- Use this AIRS retrieval tracking method for IASI (Metop) and CrIS (Suomi NPP, JPSS)

NASA ROSES: NNX11AE97G