

**A Comparison
of
Sea Level Pressure Analyses
Derived from
QuikSCAT Winds**

**to
Manual Surface Analyses
Produced in
the NOAA Ocean Prediction Center**

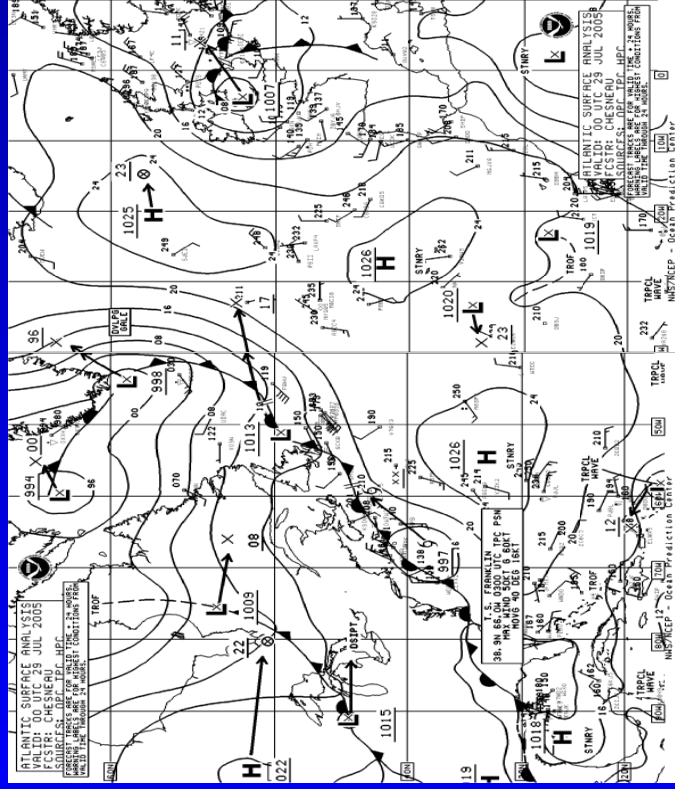
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OPC produces manual surface analyses for North Atlantic and North Pacific 4 times daily

• Distributed to ships at sea

- Surface pressure analyzed in 4 hPa intervals
- Contain wind warnings, fronts, high and low pressure centers



- Forecasters use the 6 hr forecast of sea level pressure (slp) from the most recent run of the Global Forecast System (GFS) Model as a first guess.
- Satellite imagery and surface observations are used to fine tune the analysis.



Until recently, the primary sources of surface observations over the oceans were:

- ship reports through the VOS Program
- data buoys

A substantial data void remained over the oceans.





- QuikSCAT wind retrievals eliminated much of the data void in *surface wind observations* over the open oceans.
- Since QuikSCAT the assessment of *wind conditions* over the open oceans is more accurate than ever before.

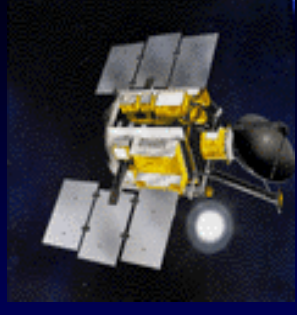
Same cannot be said for *surface pressure analyses*.

Why is this a problem?

- Even though satellite imagery and QuikSCAT winds may indicate a deeper cyclone forecasters are hesitant to stray too far from numerical slp guidance.

How do we solve this problem?

- *More surface pressure observations*
- *A reliable and accurate slp analysis*





University of Washington Planetary
Boundary layer model (UWPBL4.0)
produces a slp analysis using Level 2b
QuikSCAT winds.

- Derives slp gradient from the QuikSCAT winds
- Seeds the gradient with slp observations within the swath to produce the slp field.

OPC ran UWPBL4.0 model on numerous extratropical cyclones using Level 2b QuikSCAT winds from PODAAC to produce the slp fields.



- Able to derive dynamically consistent slp fields
- For many cases UWPBL produced lower central pressures than OPC manual analyses and GFS model guidance.
- The slp fields from this model would make an excellent analysis tool for OPC.
- However.....Level 2B data is not available in near real time!



OPC and the UWPBL group adapted PBL model to use near real time MGDR lite QuikSCAT winds from NOAA/NESDIS

- Model can be run operationally
- Output can be made available to forecasters right in their N-AWIPS workstations



To evaluate the use of the UWPBL
Model as an operational tool for OPC
forecasters we:

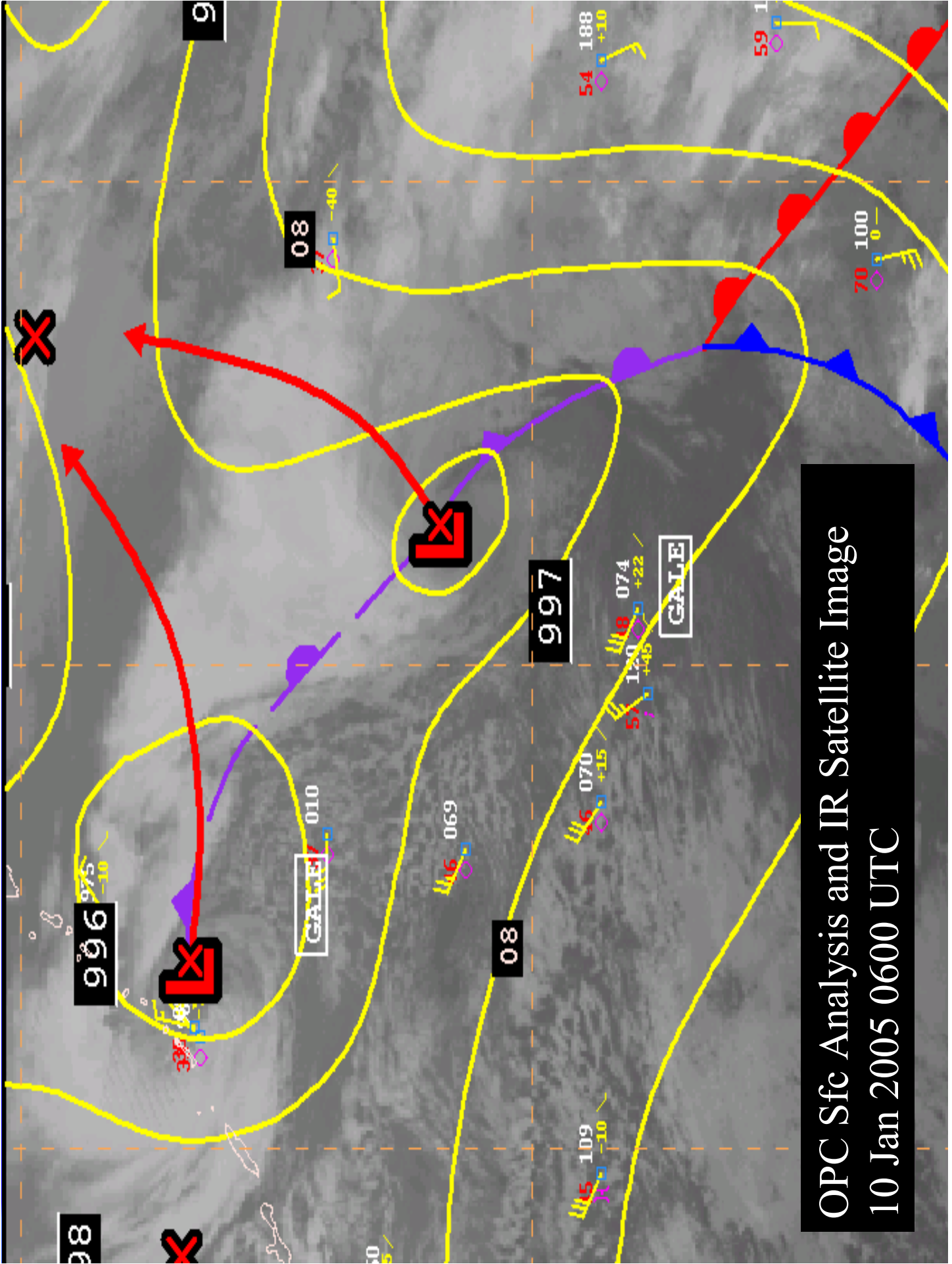
Examined 40 extratropical cyclones

- 20 Atlantic
- 20 Pacific

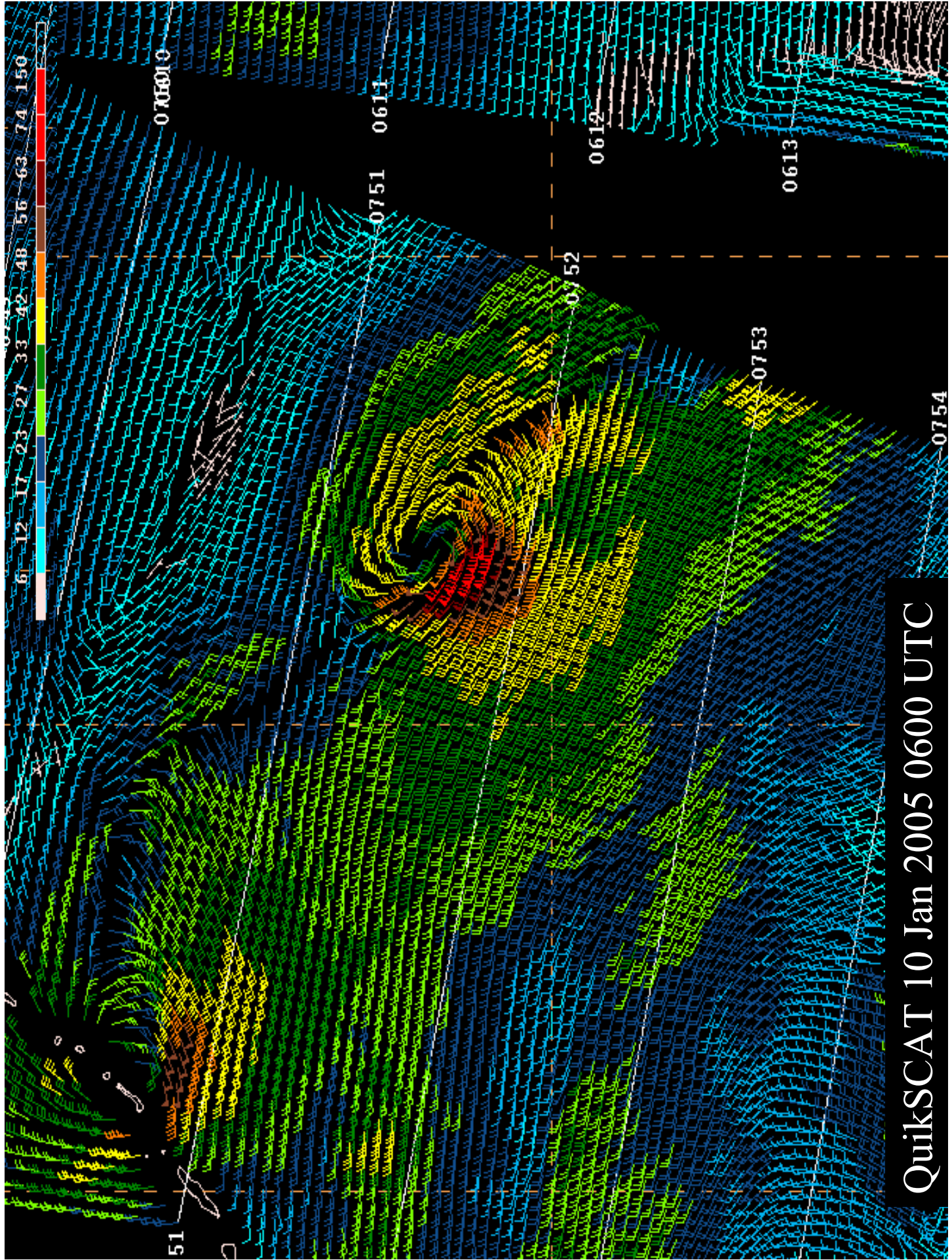


For each cyclone

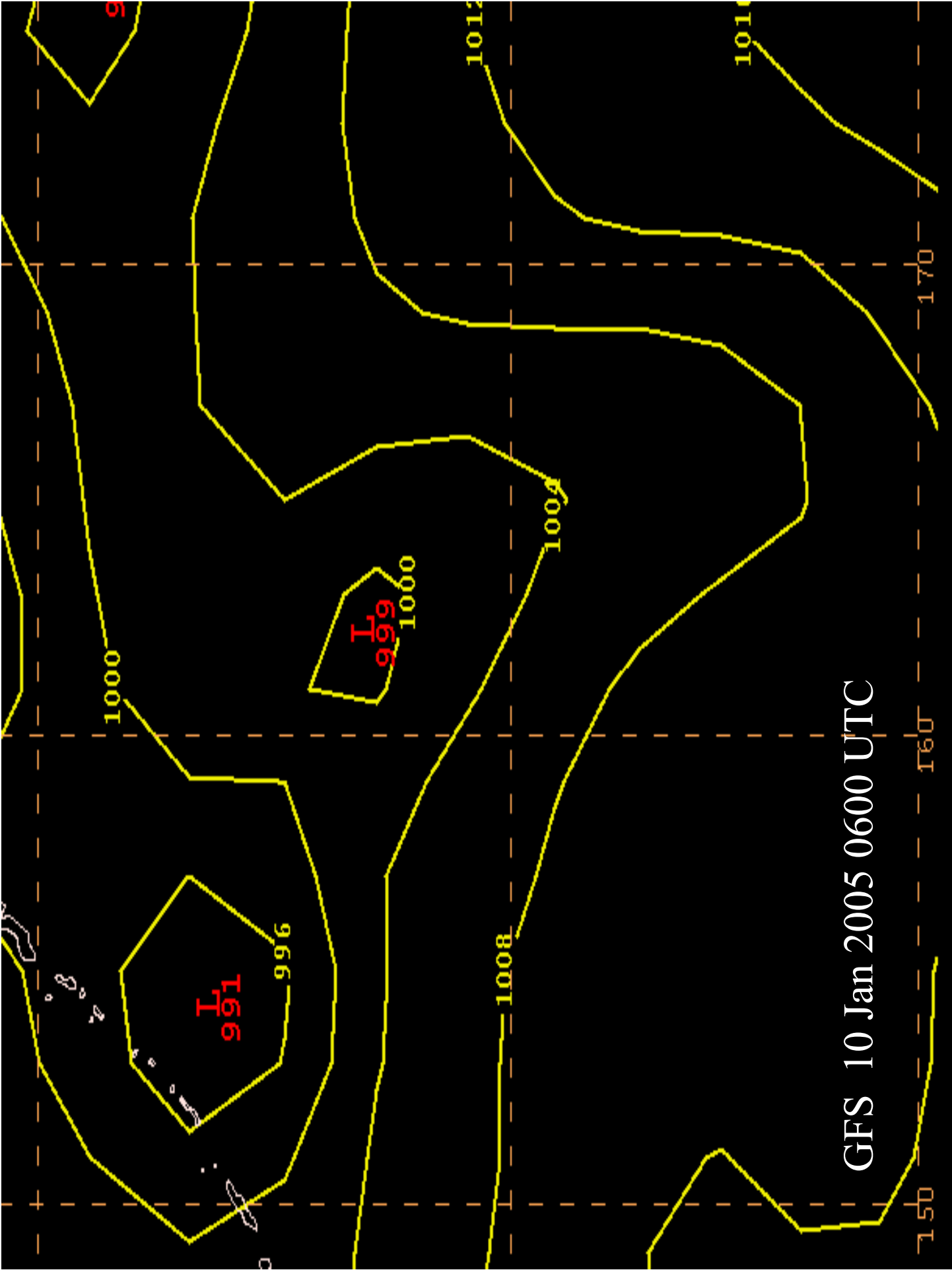
- Compared the UWPBL slp analysis to the corresponding OPC manual surface analysis and the slp analysis or forecast from the GFS model..



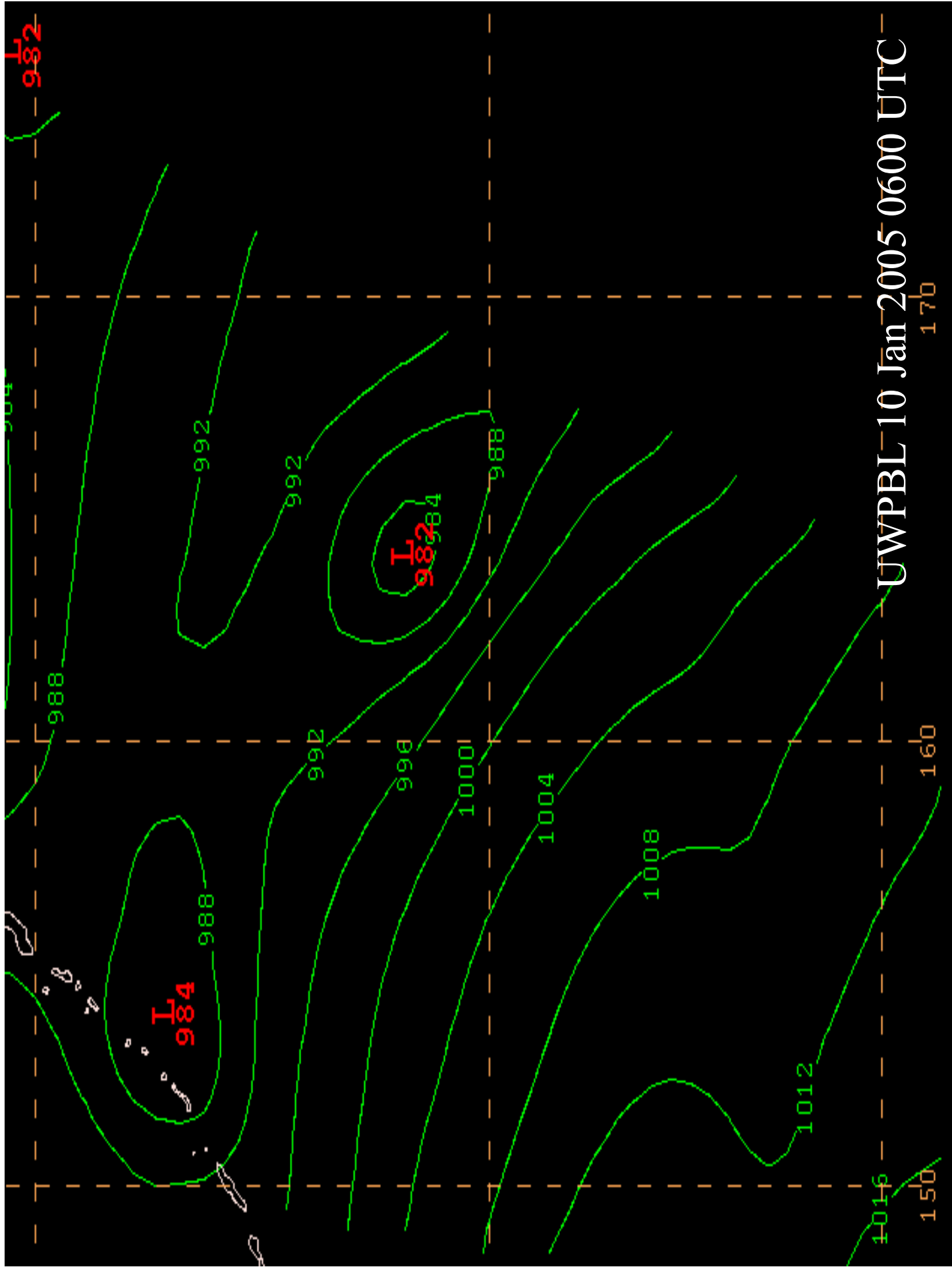
OPC Sfc Analysis and IR Satellite Image
 10 Jan 2005 0600 UTC



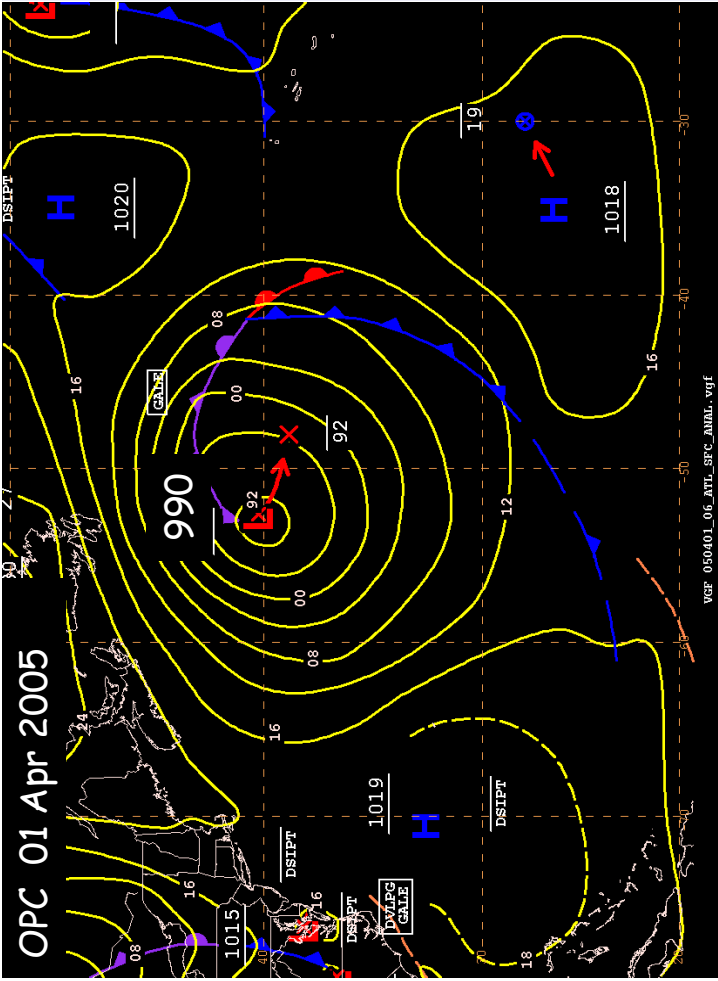
QuikSCAT 10 Jan 2005 0600 UTC



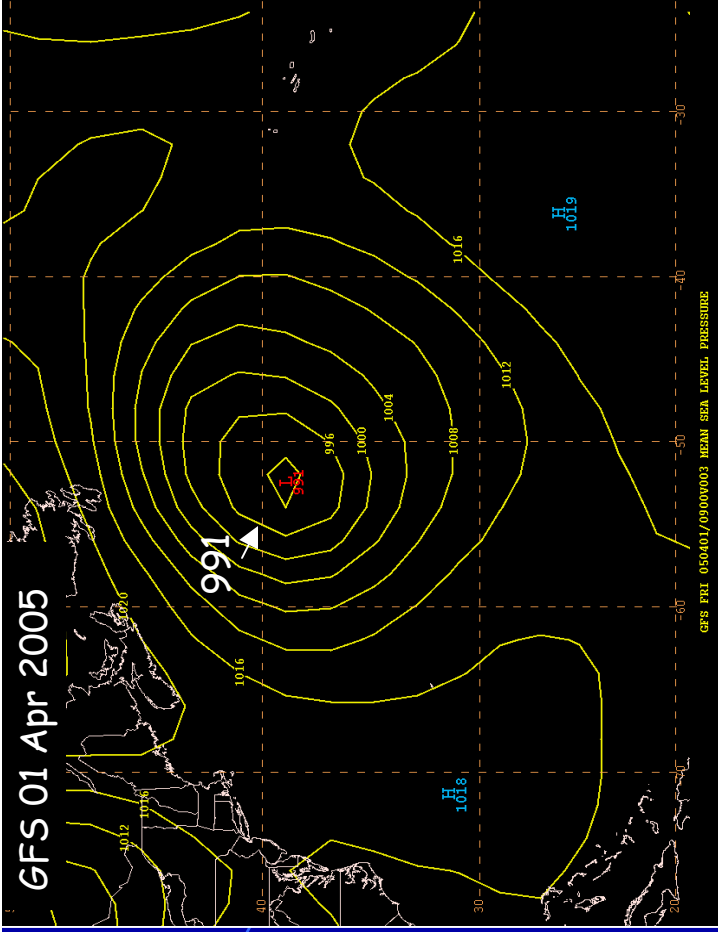
GFS 10 Jan 2005 0600 UTC



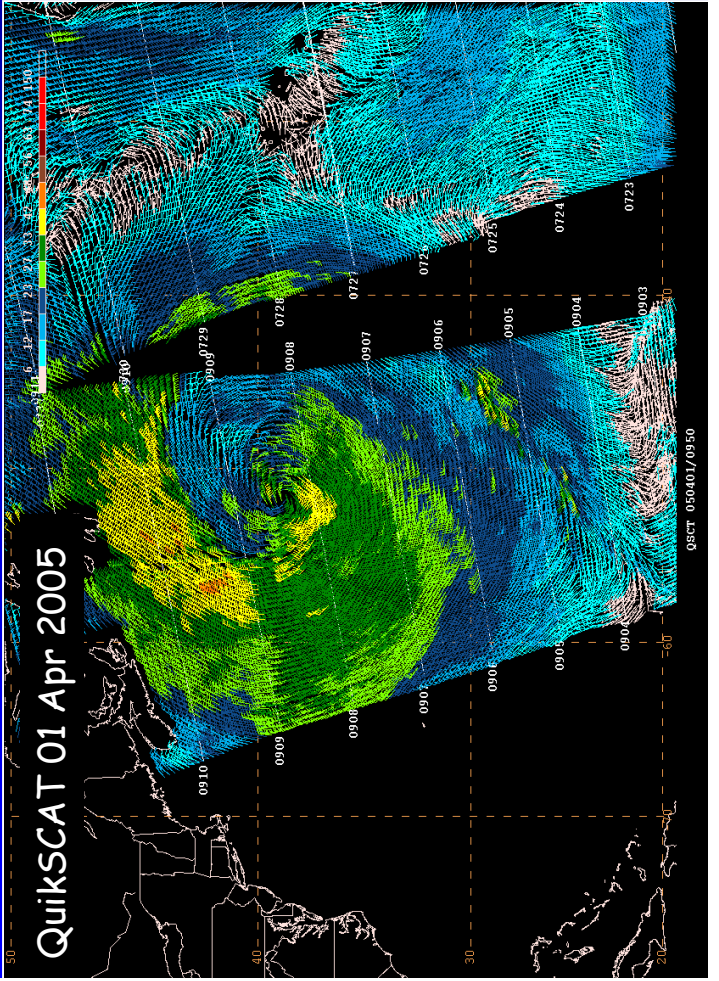
UWVPL 10 Jan 2005 0600 UTC



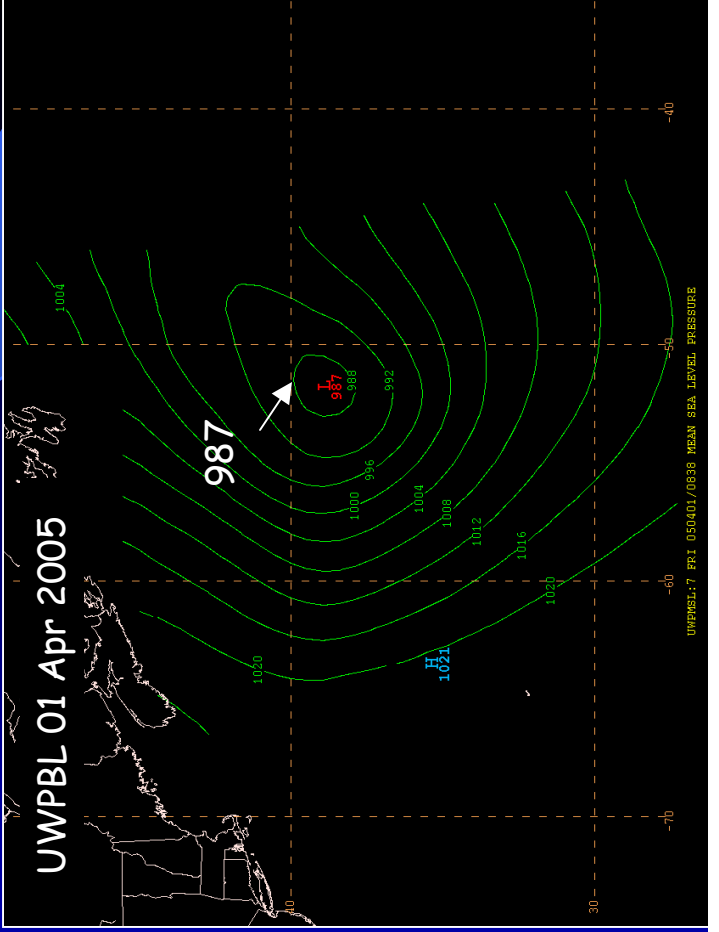
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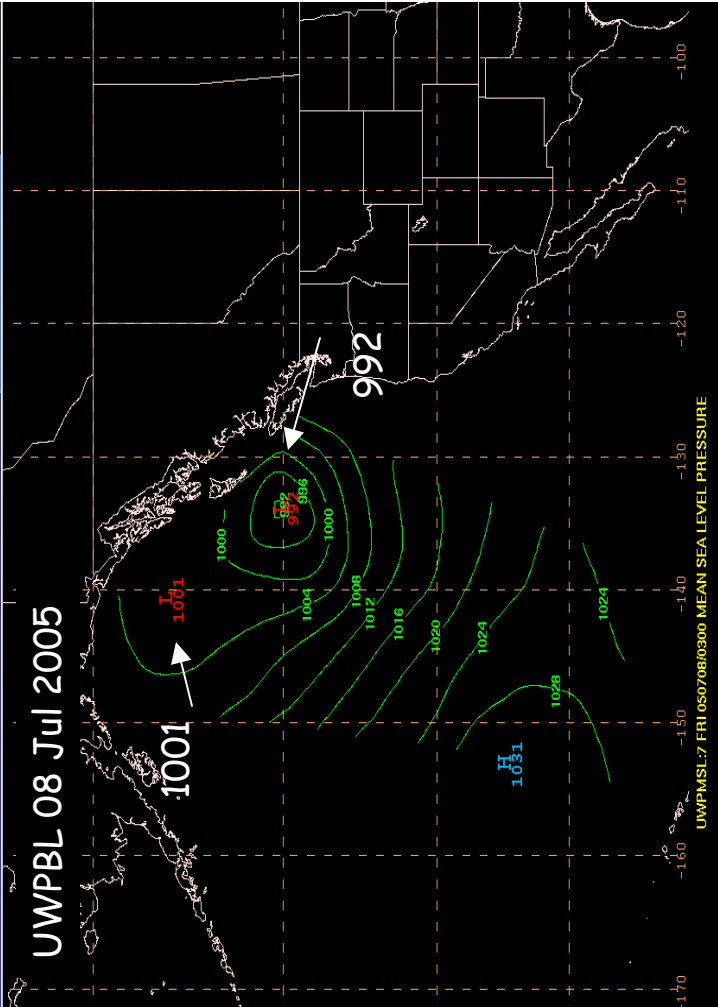
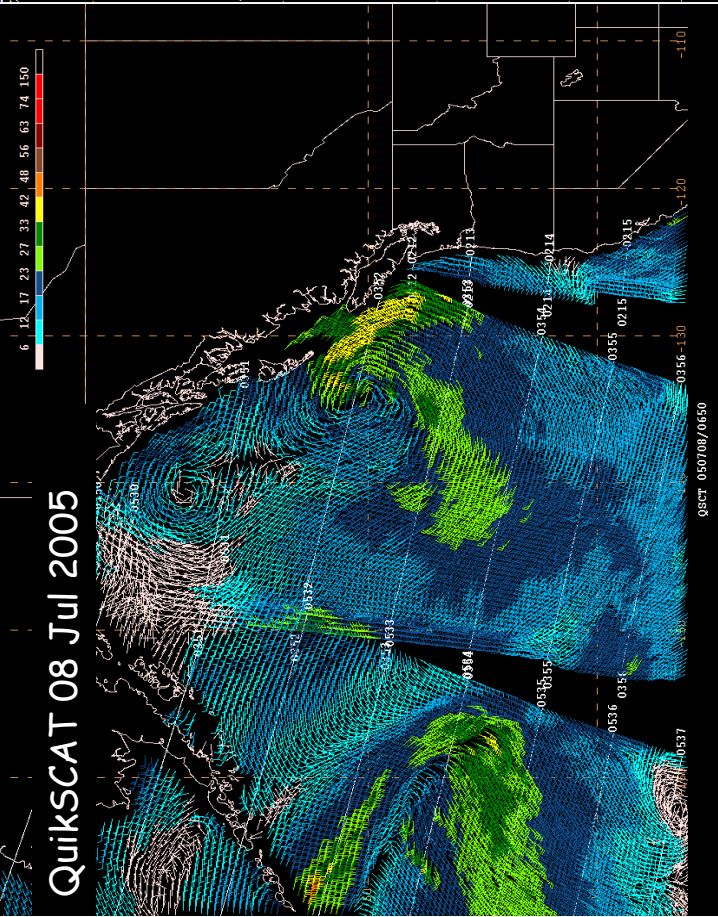
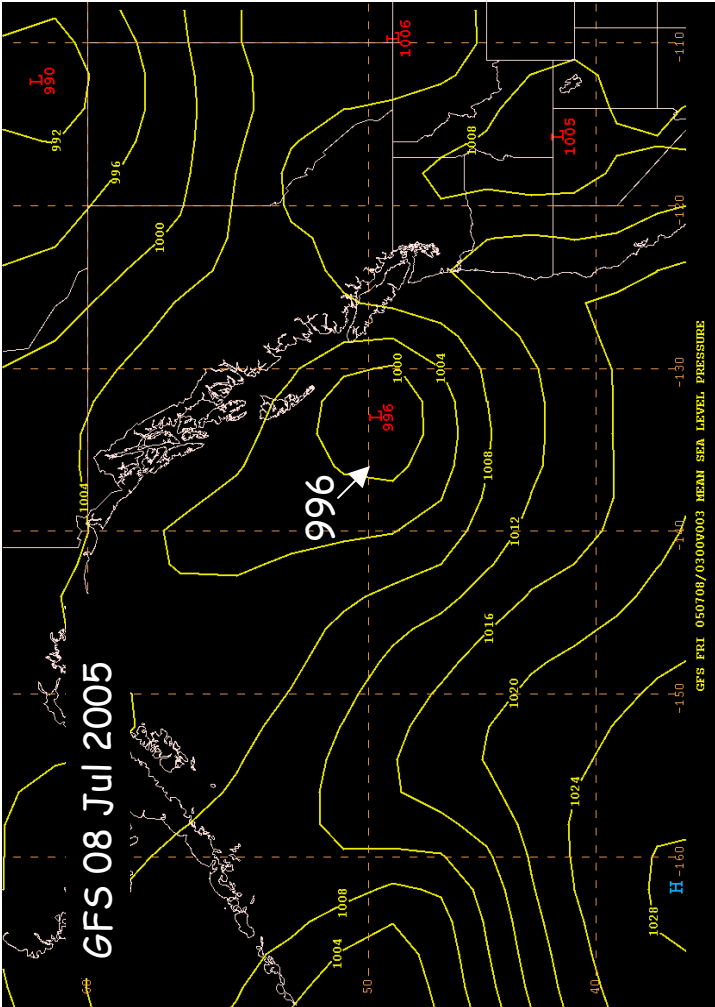
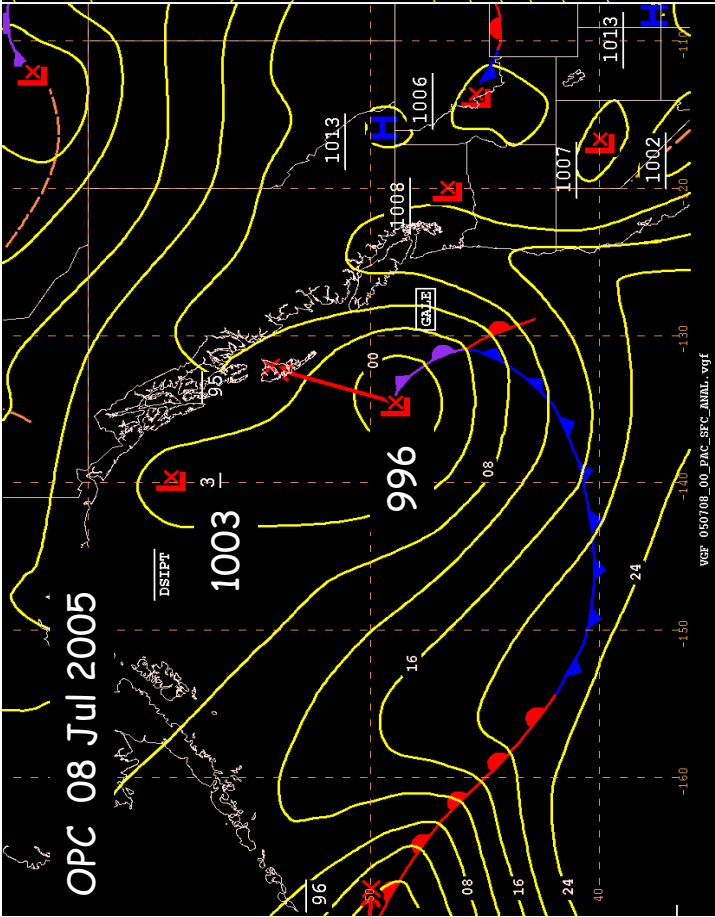
GFS FFI 050401/09000003 MEAN SEA LEVEL PRESSURE

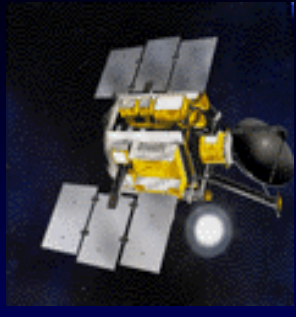


QSCT 050401/0950



UWPBL:7 FFI 050401/0839 MEAN SEA LEVEL PRESSURE



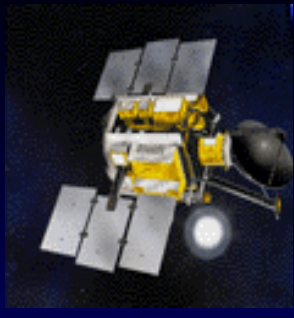


Compared Central Pressure differences:

	OPC - GFS	UWPBL-OPC	UWPBL-GFS
ATLANTIC	-0.8	-2.7	-3.3
PACIFIC	-0.7	-1.3	-2.0

CONCLUSIONS AND SUMMARY

- The UWPL model:
 - ✓ reliably produced dynamically consistent slp fields using QuikSCAT winds in near real time
 - ✓ would be useful as an observational tool within the OPC



To be incorporated into the operations at OPC an observational tool must meet certain requirements.

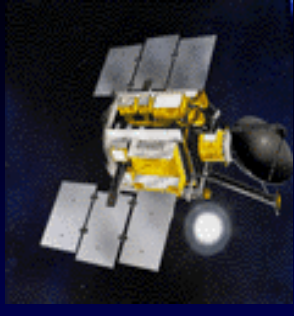
- Must be available in a timely manner right at the forecasters workstations.
- Optimally the data should be able to be overlaid over other observation fields.
- Must be dynamically consistent

Overall, the UWPL model has met these criteria.



There are a few “bugs” that need to be worked out

- UWPBL occasionally produces central pressures that are considered to be too deep.
- The reason for this appears to be related to the assimilation of the surface pressure observations into the model.
- This must be evaluated and corrected before the model can become fully operational



What is the next step?

- Implement the UWPBL model operationally within the OPC
- Vorticity and divergence fields can also be derived from QuikSCAT winds using the model.
 - evaluate these fields for use as tools to locate frontal boundaries.

