


# Results from the ATREC-03 and Winter Storm Reconnaissance (WSR) 2004 programs



**Lacey Holland**

SAIC at EMC/NCEP

**Zoltan Toth**

EMC/NCEP/NWS

**Jon Moskaitis**

MIT

**Sharan Majumdar**

Univ. of Miami

**Craig H. Bishop**

NRL

**Roy Smith**


NCO/NCEP/NWS




# Acknowledgments



- NWS field offices, HPC/NCEP and SDMs
- NOAA G-IV and the USAFR C-130 flight crews
- CARCAH (John Pavone)
- Jack Woollen - EMC
- Russ Treadon - EMC
- Mark Iredell - EMC
- Istvan Szunyogh – Univ. of Maryland
- *+ others who have contributed!*



# About the Winter Storm Reconnaissance (WSR) Program



- Took place 21 Jan – 17 March 2004
- Dropwinsonde observations taken over the NE Pacific by aircraft operated by NOAA's Aircraft Operations Center (G-IV) and the US Air Force Reserve (C-130s).
- Observations are adaptive –
  - collected only prior to significant winter weather events of interest
  - in areas that influence the forecast the most.
- Previous forecasts improved in 60-80% of targeted cases (in past studies)
- Operational since January 2001
- 36 flights, around 720 dropsondes this winter

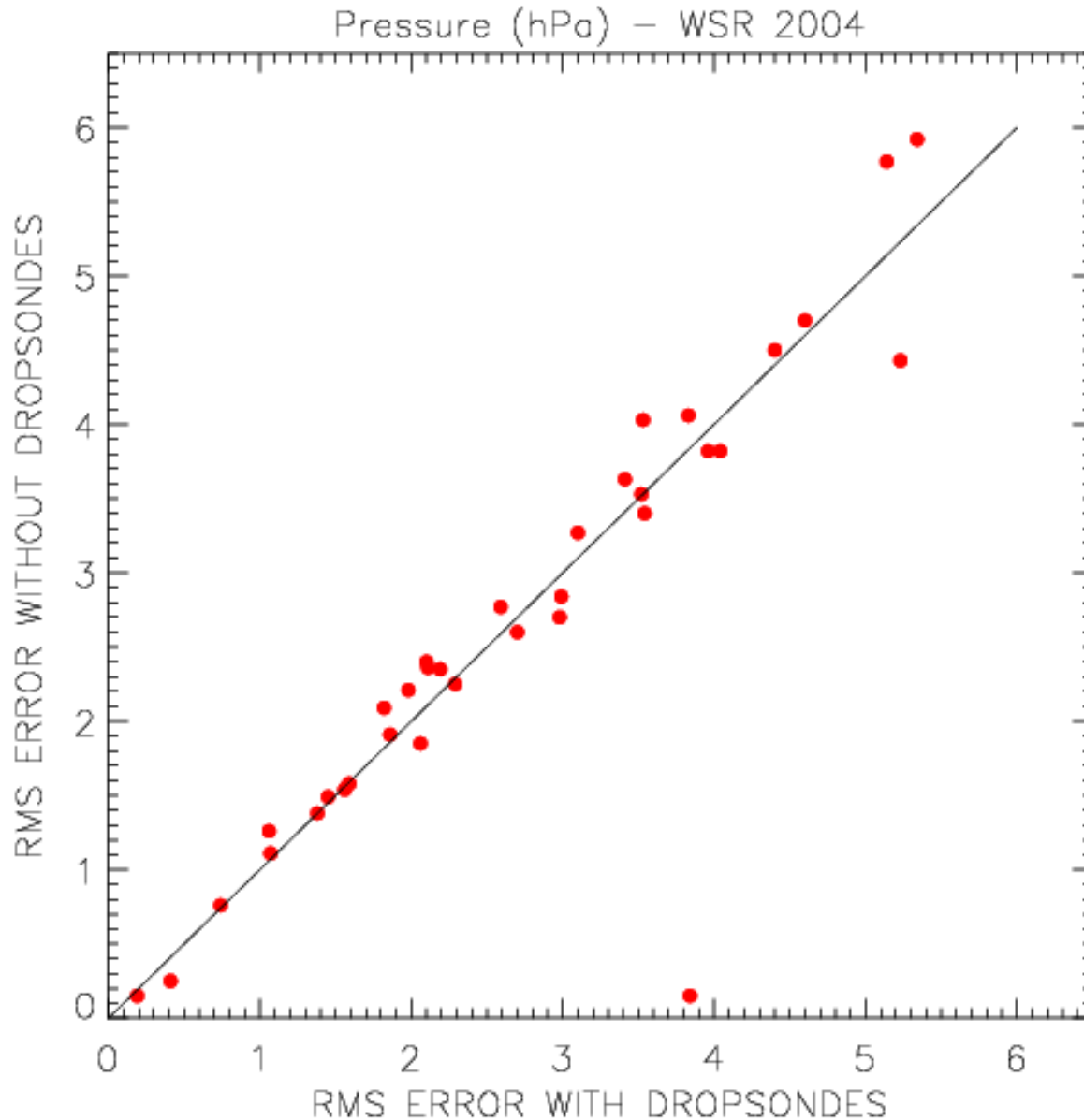


# Evaluation methodology



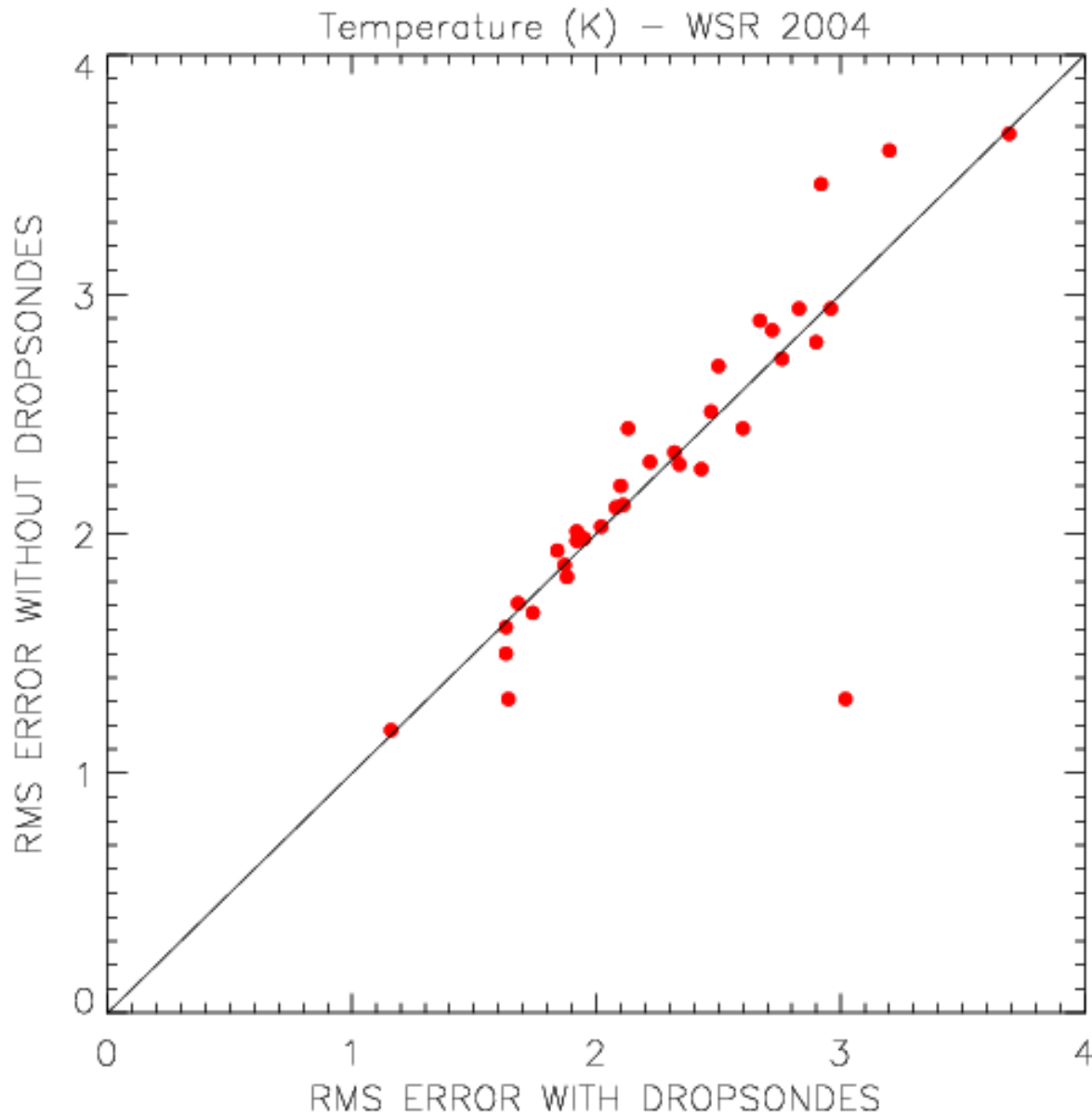
- Compare analysis and forecast cycles from the GFS at T126L28 resolution including all operationally available data (includes dropsondes); the other excludes only dropsonde data - to evaluate the data impact
- Verify against observations over the pre-selected area of interest (verification region)
  - Rawinsonde observations for surface pressure, 1000-250 hPa temperature, and other fields
  - Rain gauge data for precipitation

# Results for Surface Pressure



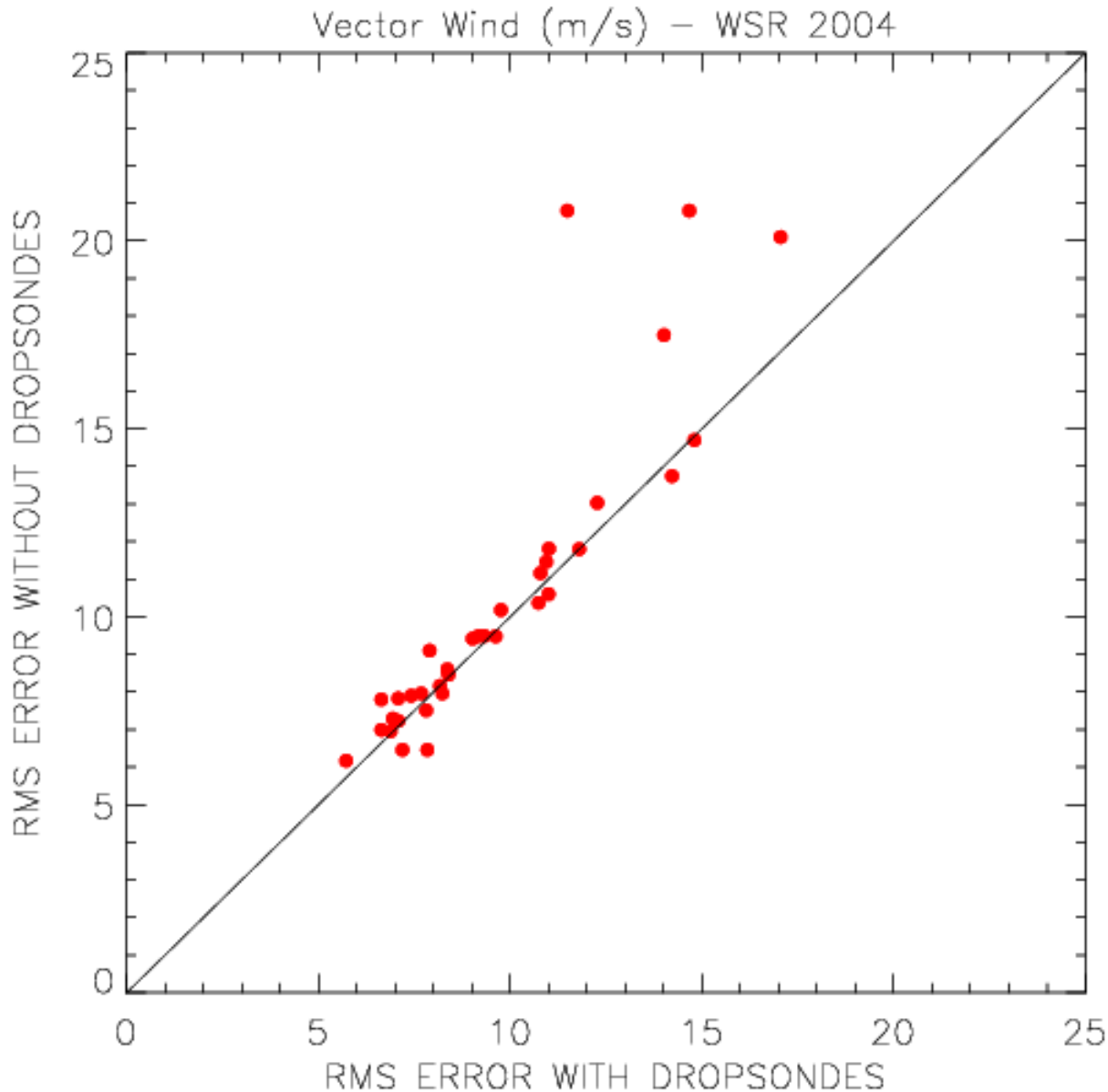
Of the cases:  
21 improved  
1 neutral  
13 degraded

# Results for Temperature



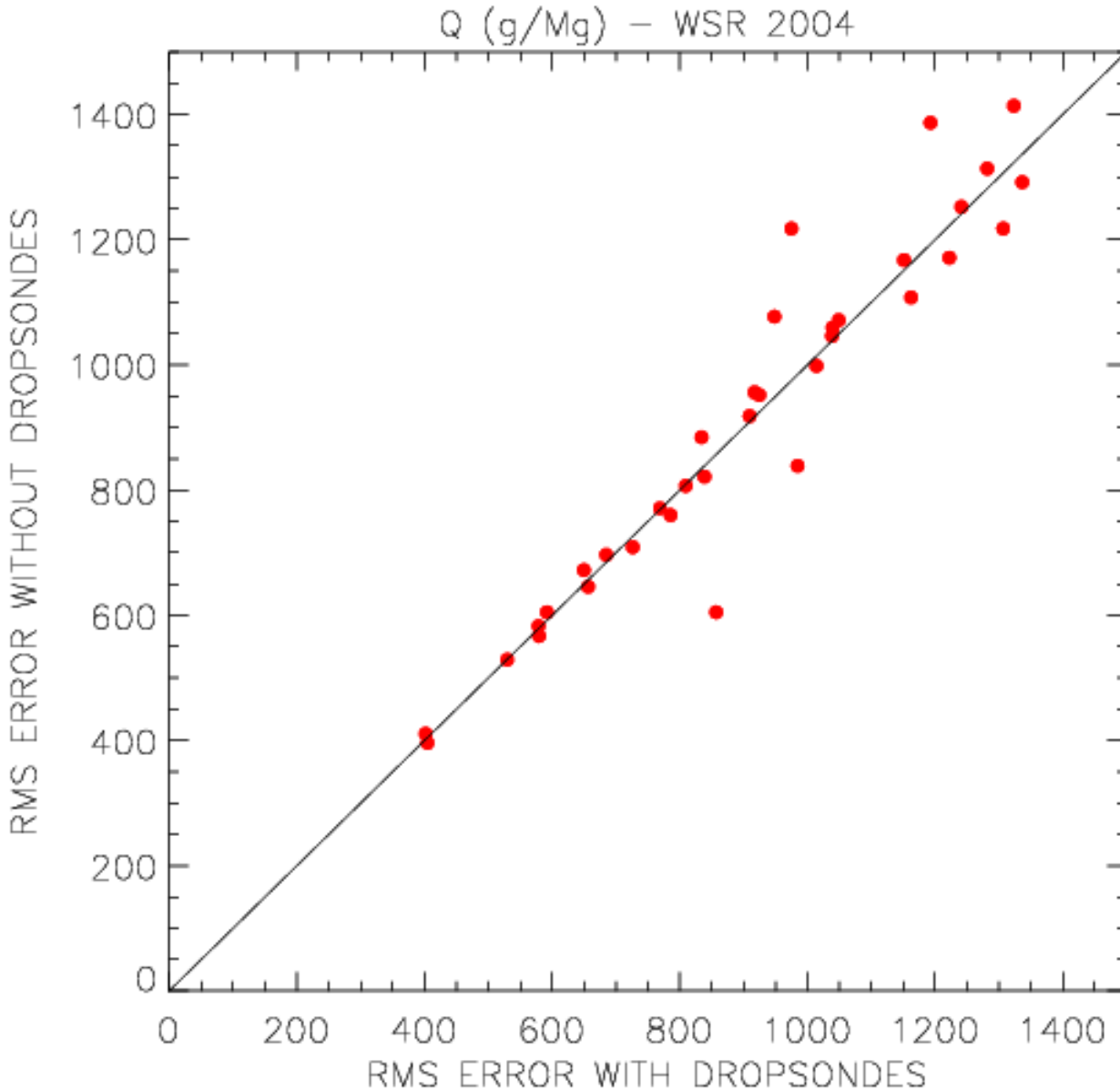
Of the cases:  
21 improved  
1 neutral  
13 degraded

# Results for Vector Wind



Of all cases:  
24 improved  
1 neutral  
10 degraded

# Results for Specific Humidity



Of all cases:  
21 improved  
0 neutral  
14 degraded





# Breakdown for cases



<b>Variable</b>	<b># cases improved</b>	<b># cases neutral</b>	<b>#cases degraded</b>
<i>Surface pressure</i>	21	1	13
<i>Temperature</i>	21	1	13
<i>Vector Wind</i>	24	1	10
<i>Humidity</i>	21	0	14

# Individual Case Comparison

OBS. DATE P, T, V, OVERALL

2004012900 1 1 1 1  
2004020100 -1 1 1 1  
2004020200 1 1 1 1  
2004020500 1 -1 1 1  
2004020500 0 1 1 1  
2004020800 -1 1 1 1  
2004020900 1 1 1 1  
2004021000 -1 1 1 1  
2004021300 1 1 -1 1  
2004021500 1 1 1 1  
2004021600 1 1 0 1  
2004021700 1 1 1 1  
2004021800 1 -1 1 1  
2004022100 -1 0 -1 -1  
2004022200 1 1 1 1  
2004022300 1 -1 -1 -1  
2004022400 1 1 1 1  
2004022500 1 -1 1 1  
2004022600 1 1 1 1  
2004022600 -1 -1 1 -1  
2004022600 1 1 -1 1  
2004022700 1 1 1 1  
2004022800 -1 -1 1 -1  
2004030200 1 1 1 1  
2004030600 -1 -1 -1 -1  
2004030600 -1 -1 -1 -1  
2004030600 -1 -1 -1 -1

2004030700 -1 -1 1 -1  
2004030700 -1 -1 -1 -1  
2004031200 1 1 1 1  
2004031200 1 1 1 1  
2004031300 1 1 1 1  
2004031300 -1 -1 -1 -1  
2004031500 -1 -1 -1 -1  
2004031700 1 1 1 1

**1** denotes positive effect

**0** denotes neutral effect

**-1** denotes negative effect

## OVERALL EFFECT:

**24** OVERALL POSITIVE CASES.

**0** OVERALL NEUTRAL CASES.

**11** OVERALL NEGATIVE CASES.

*69% improved*

*31% degraded*



# Future Work

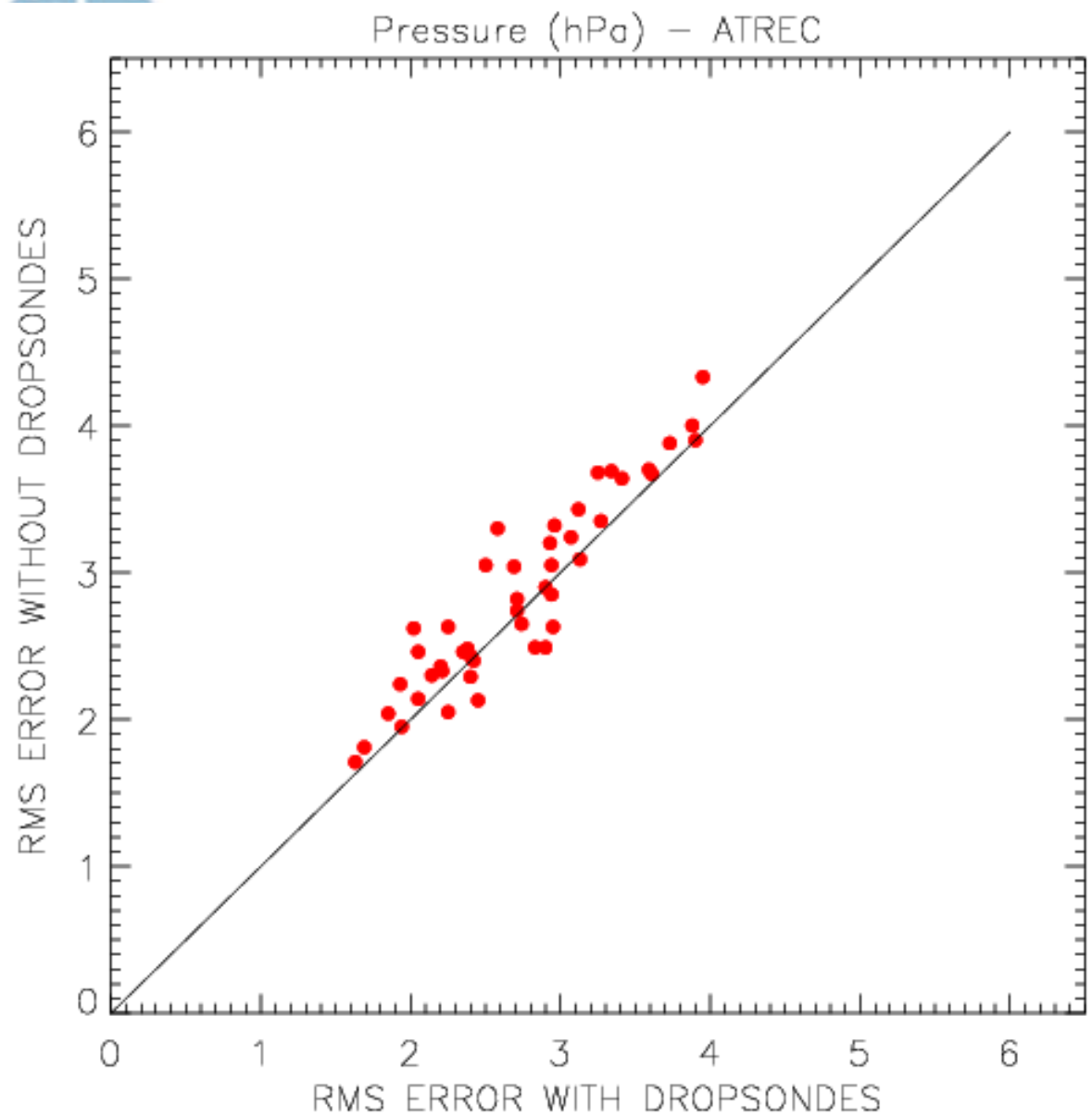


- Examine the effect of dropsondes on precipitation
- Compute average improvement / degradation over WSR domain (NE Pacific, U.S.)
- Improve targeting method by reducing spurious or misleading guidance due to statistical sampling problems
- Evaluate NCEP Atlantic Winter Storm results
- Evaluate WSR using ensembles for WSR05
- Increase resolution and ensemble membership to 40 members for WSR05
- Increased duration of program for WSR05-06?



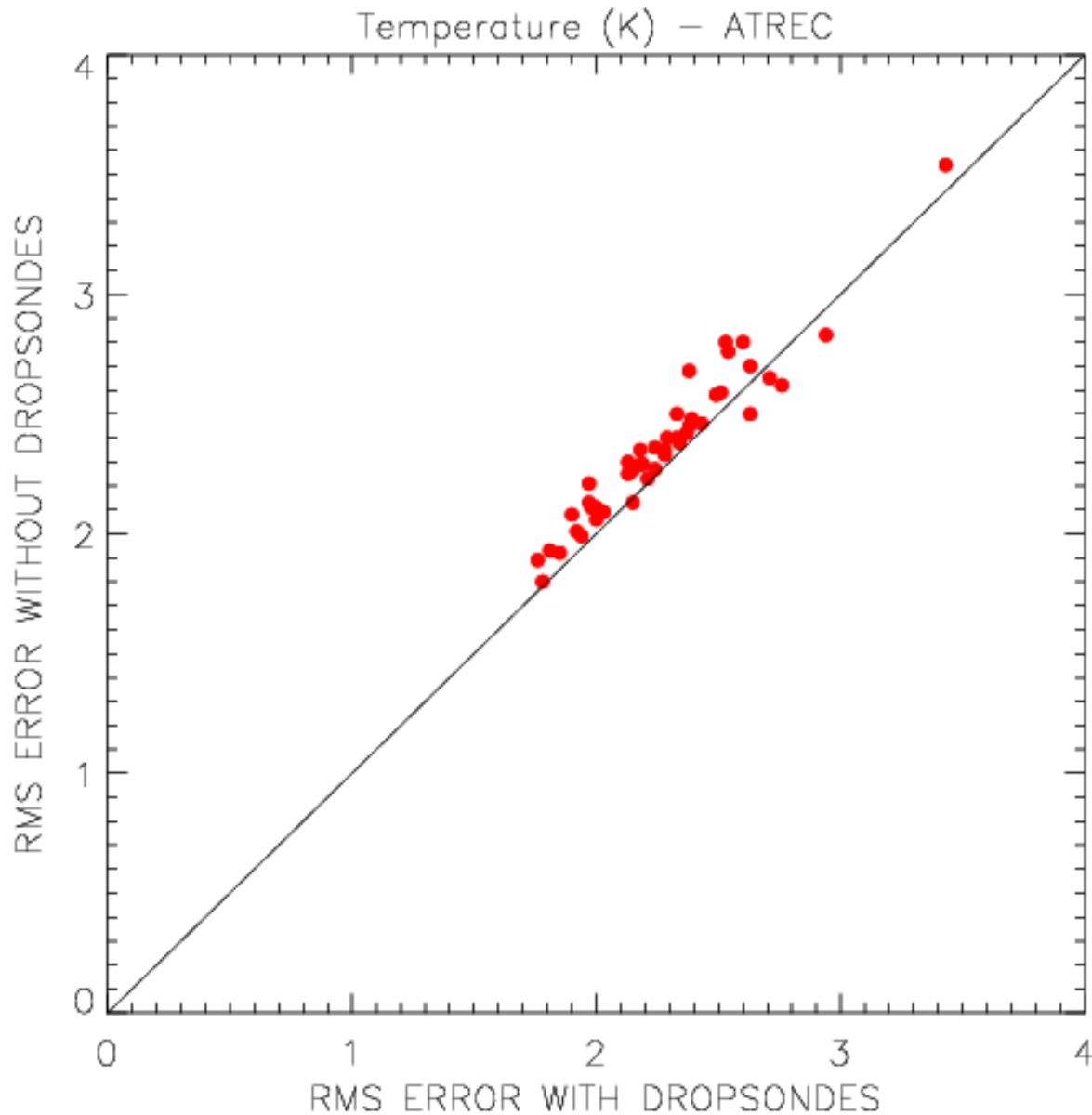
# ATReC Prelim. Results

# Results for Surface Pressure



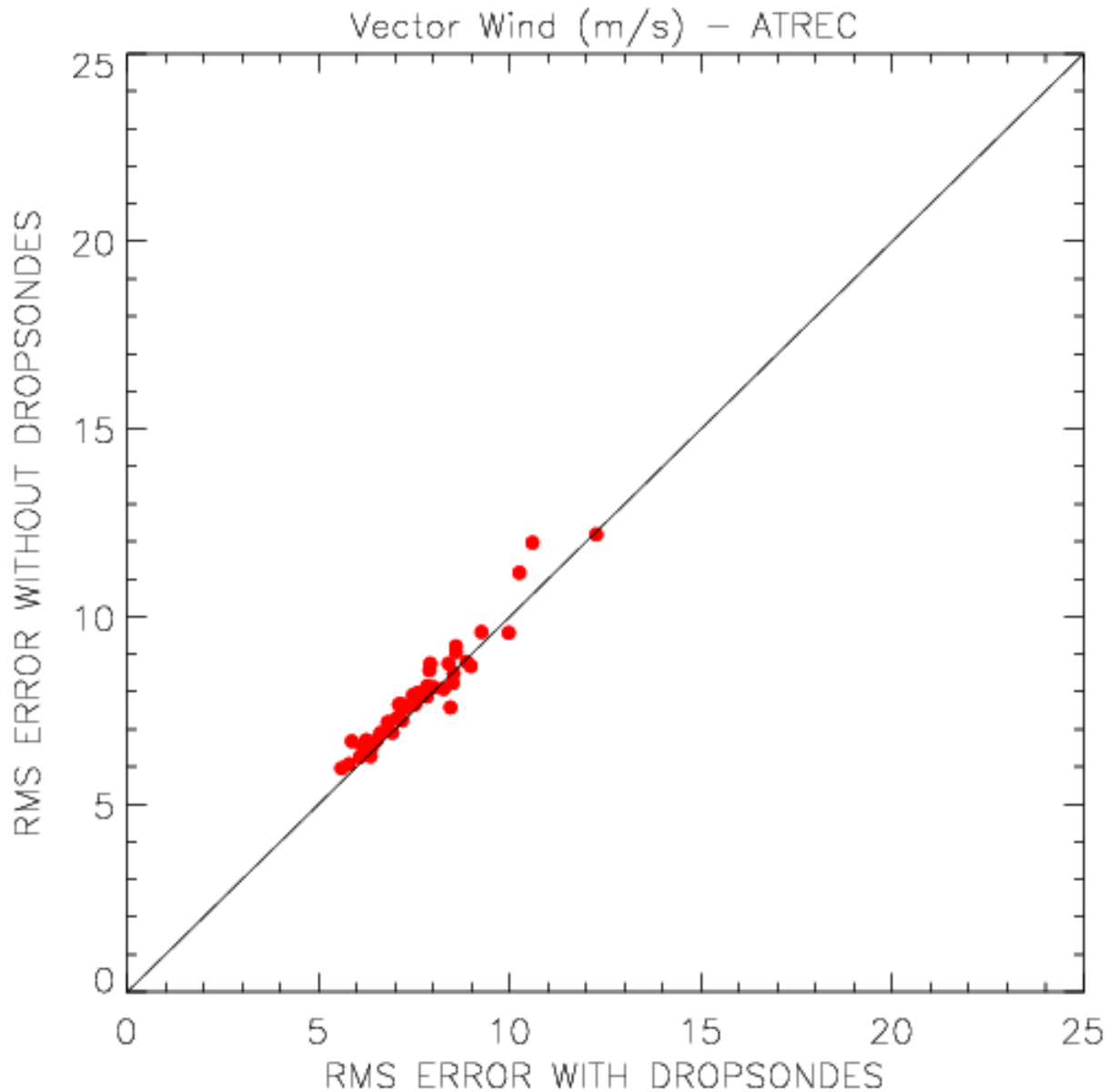
Of all cases:  
35 improved  
2 neutral  
10 degraded

# Results for Temperature



Of all cases:  
42 improved  
0 neutral  
5 degraded

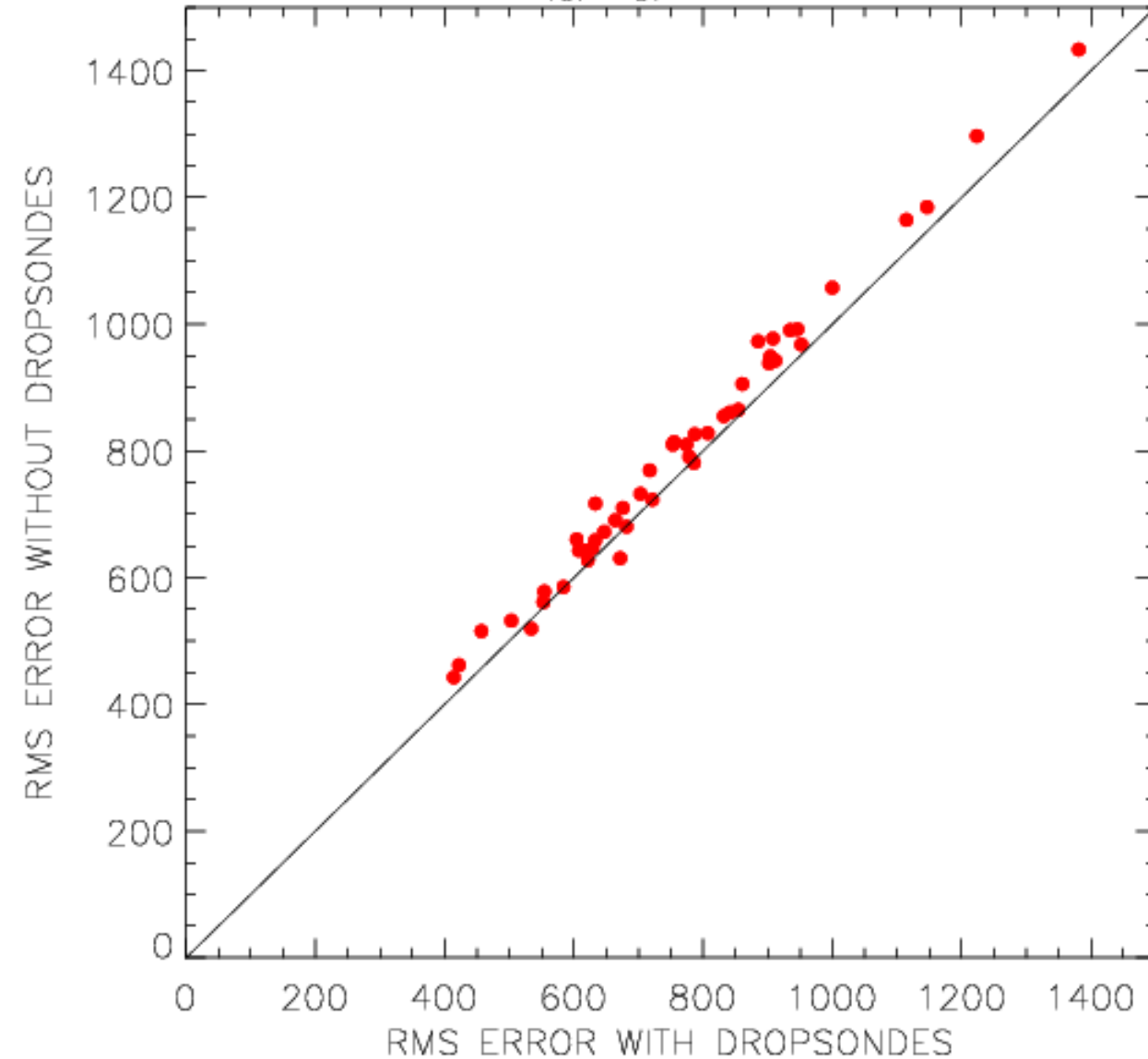
# Results for Vector Wind



Of all cases:  
37 improved  
0 neutral  
10 degraded

# Results for Humidity

Q (g/Mg) – ATREC



Of all cases:  
43 improved  
0 neutral  
4 degraded





# Breakdown for cases



<b>Variable</b>	<b># cases improved</b>	<b># cases neutral</b>	<b>#cases degraded</b>
<i>Surface pressure</i>	35	2	10
<i>Temperature</i>	42	0	5
<i>Vector Wind</i>	37	0	10
<i>Humidity</i>	43	0	4

# Individual Case Comparison

CASE P, T, V, Q, OVERALL

1	1	1	1	1	1	25	1	1	1	1	1
2	-1	1	-1	-1	-1	26	-1	1	1	1	1
3	1	1	1	1	1	27	1	1	1	1	1
4	1	1	-1	1	1	28	1	1	1	1	1
5	1	1	1	1	1	29	1	1	1	1	1
6	-1	1	1	1	1	30	1	1	1	1	1
7	1	1	1	1	1	31	1	-1	1	1	1
8	-1	1	1	1	1	32	1	-1	1	-1	0
9	1	1	1	1	1	33	1	1	1	1	1
10	1	1	1	1	1	34	1	1	1	1	1
11	1	1	1	1	1	35	-1	1	-1	1	0
12	1	1	1	1	1	36	-1	1	1	1	1
13	1	1	1	1	1	37	-1	1	-1	1	0
14	1	1	1	1	1	38	1	1	1	1	1
15	1	1	-1	1	1	39	0	1	-1	1	1
16	1	1	1	1	1	40	1	1	-1	1	1
17	1	-1	1	1	1	41	-1	1	1	-1	0
18	-1	-1	-1	1	-1	42	1	1	1	1	1
19	1	1	1	1	1	43	1	1	1	1	1
20	1	1	1	1	1	44	-1	1	-1	1	0
21	1	-1	-1	1	0	45	1	1	1	1	1
22	1	1	1	1	1	46	1	1	1	1	1
23	1	1	1	1	1	47	1	1	1	1	1
24	0	1	1	-1	1						

## OVERALL EFFECT:

**39** OVERALL POSITIVE CASES.

**6** OVERALL NEUTRAL CASES.

**2** OVERALL NEGATIVE CASES.

*83% improved*

*13% neutral*

*4% degraded*

**1** denotes positive effect

**0** denotes neutral effect

**-1** denotes negative effect