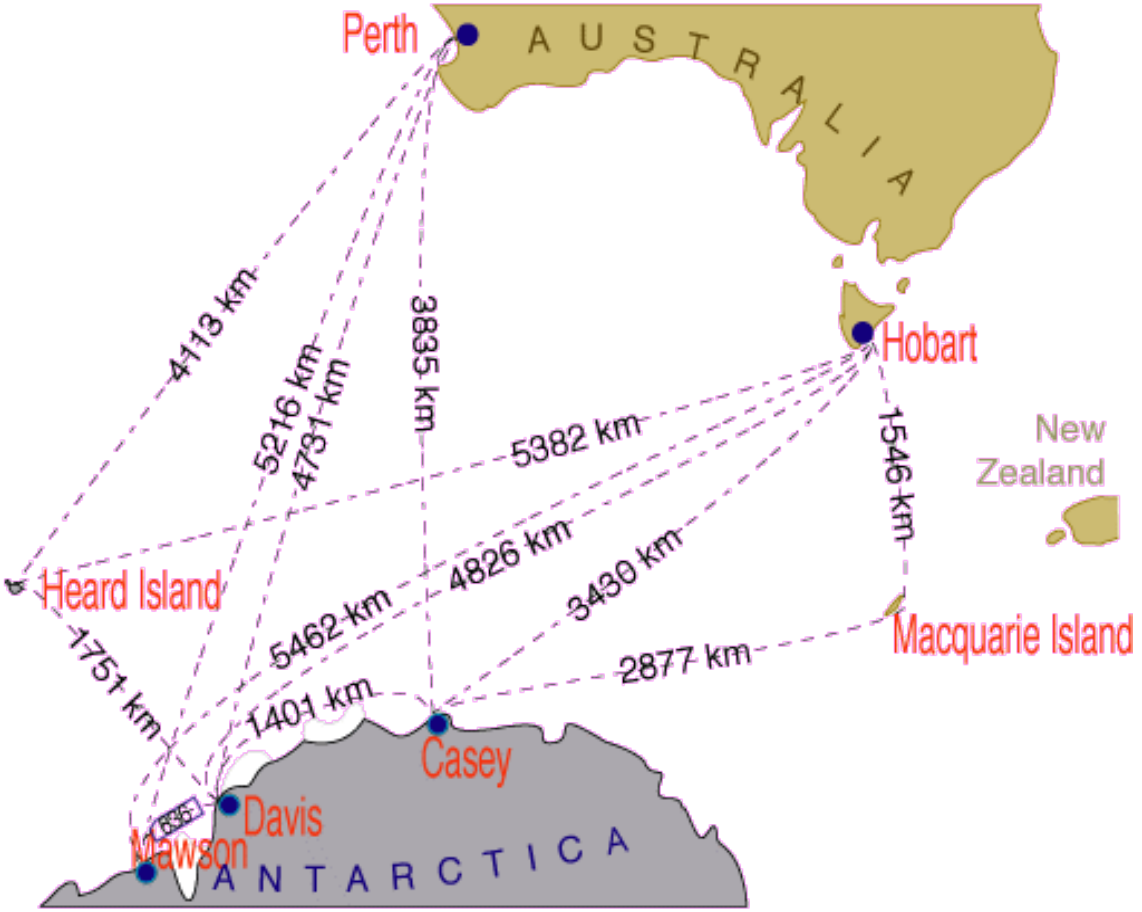
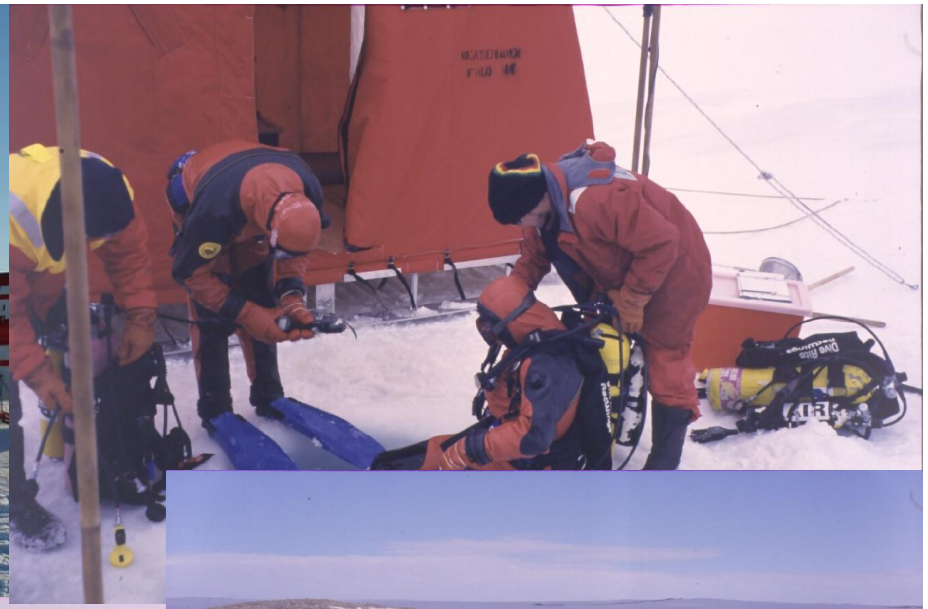
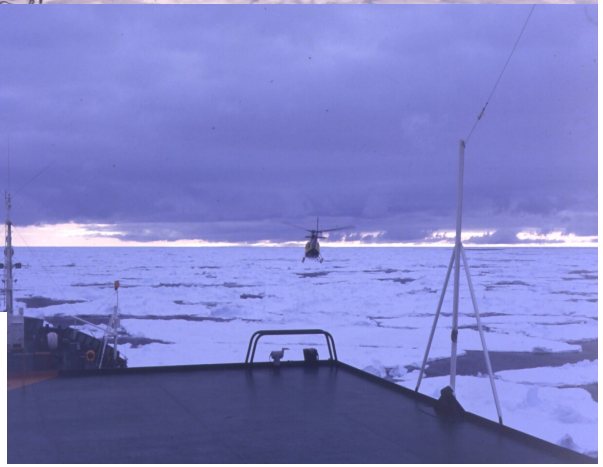
Continued Developments in Numerical Weather prediction and Weather Forecasting in Support of the Australian Antarctic Program.



Dr Neil Adams, Australian Bureau of Meteorology and
Antarctic Climate and Ecosystems Cooperative Research Centre (ACE-CRC).

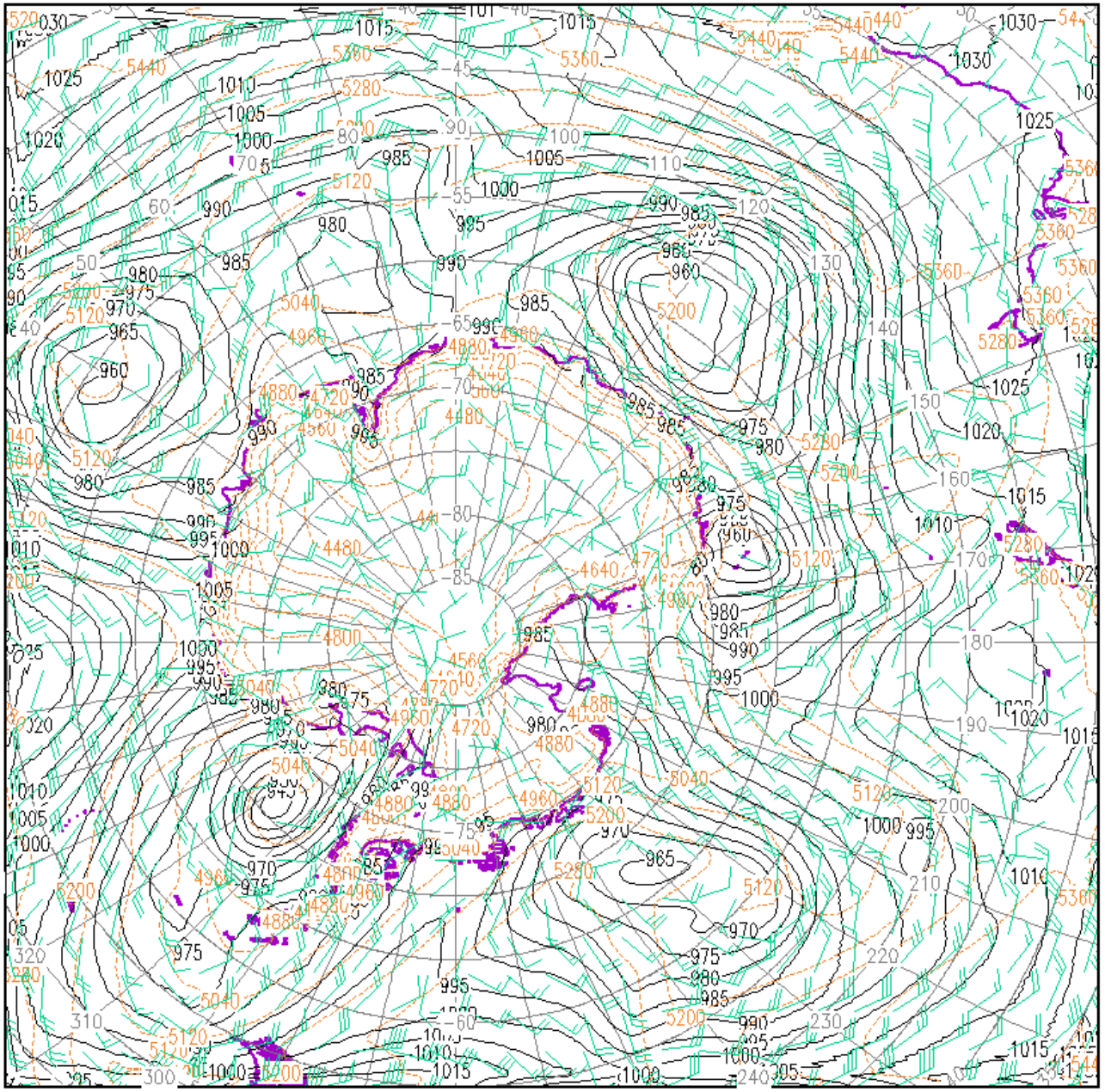
Boulder June 2006





PolarLAPS

Mean Sea Level Pressure and 1000–500hPa thickness



polarLAPS +120HR Prognosis valid at 1200UTC 10 JUN 2006 (base 12Z05JUN2006).

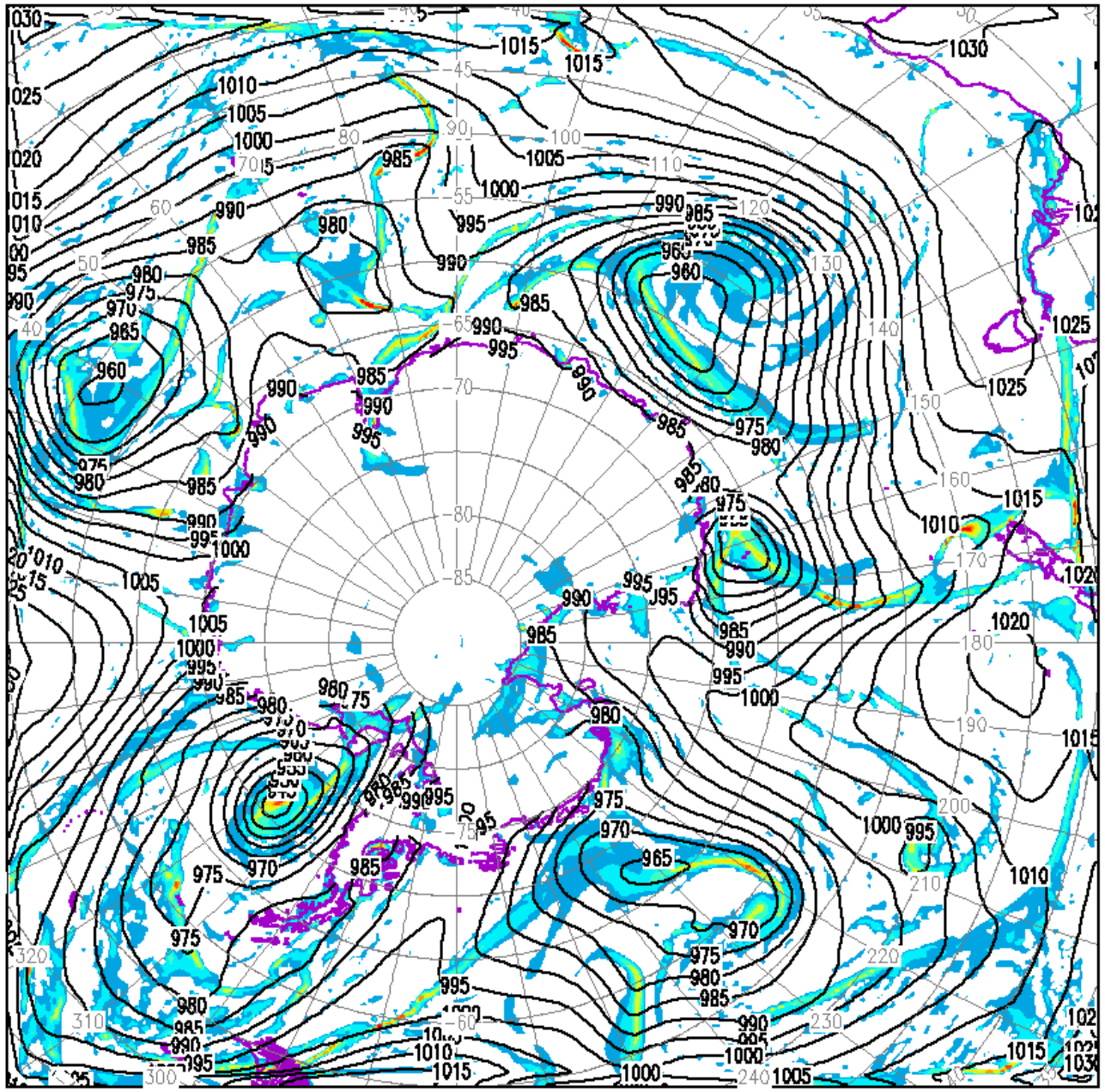
Polar-stereographic version of the Australian Limited Area Prediction System (ALAPS).

27.5 km horizontal resolution with 34 sigma levels.

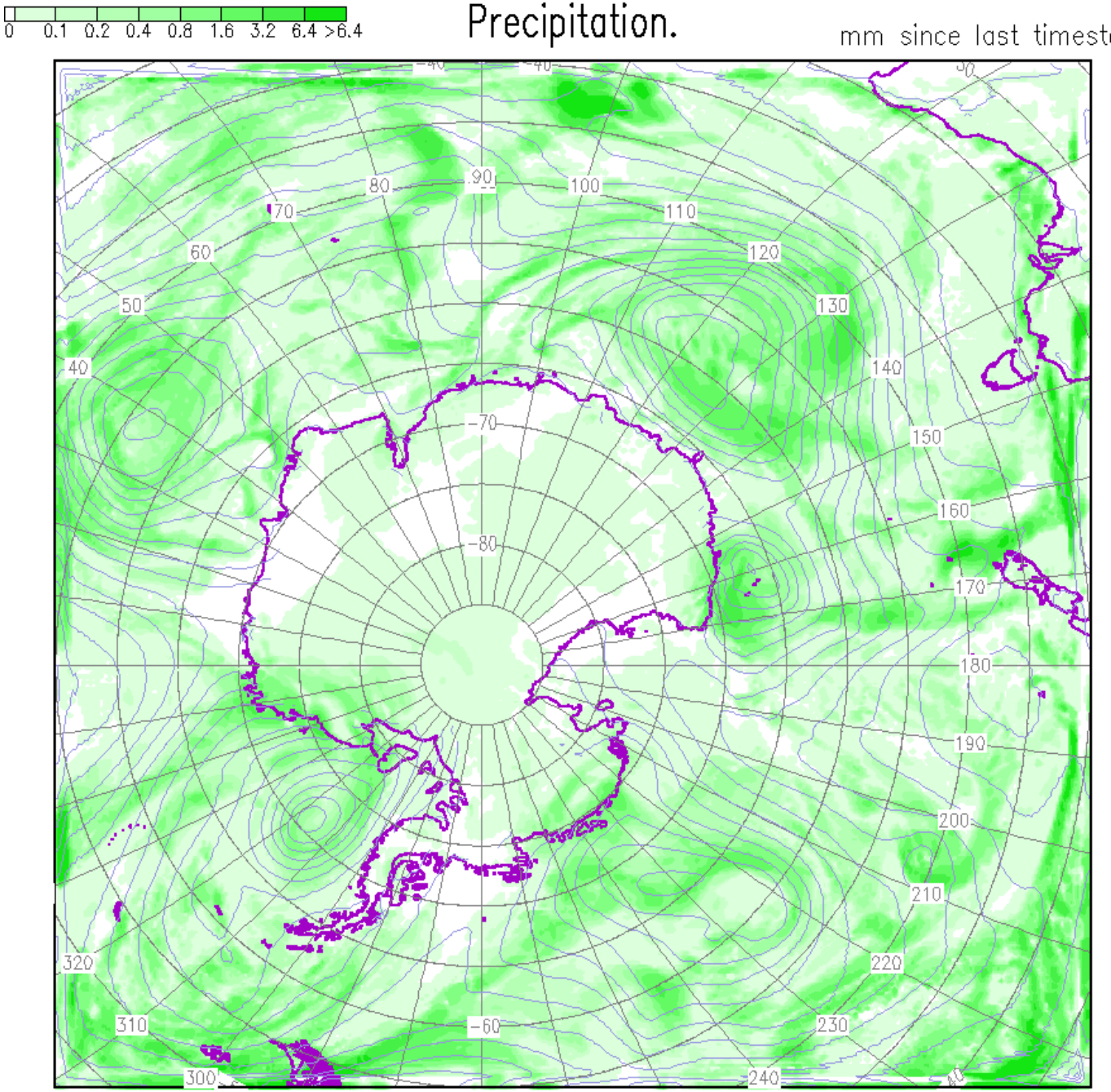
Nested within both the Australian global model (GASP), at 0000 and 1200 UTC,and within the NCEP GFS model at 0000, 0600, 1200 and 1800 UTC.

Model is still hydrostatic. At present no data assimilation is performed.

Vorticity, potential temperature at sigma 0.9988 and MSLP.

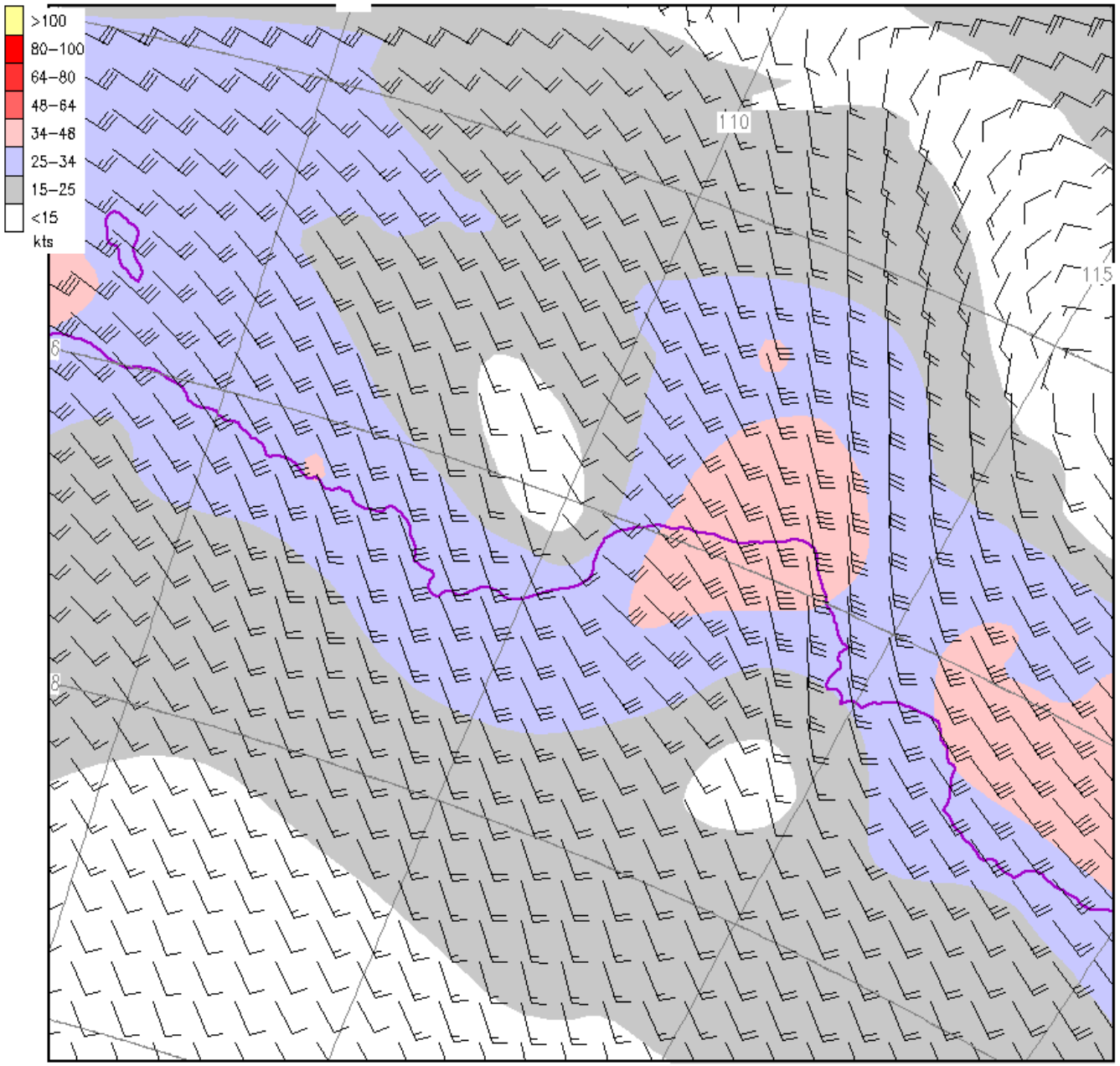


polarLAPS +120HR Prognosis valid at 1200UTC 10 JUN 2006 (base 12Z05JUN2006).



polarLAPS +120HR Prognosis valid at 1200UTC 10 JUN 2006 (base 12Z05JUN2006).

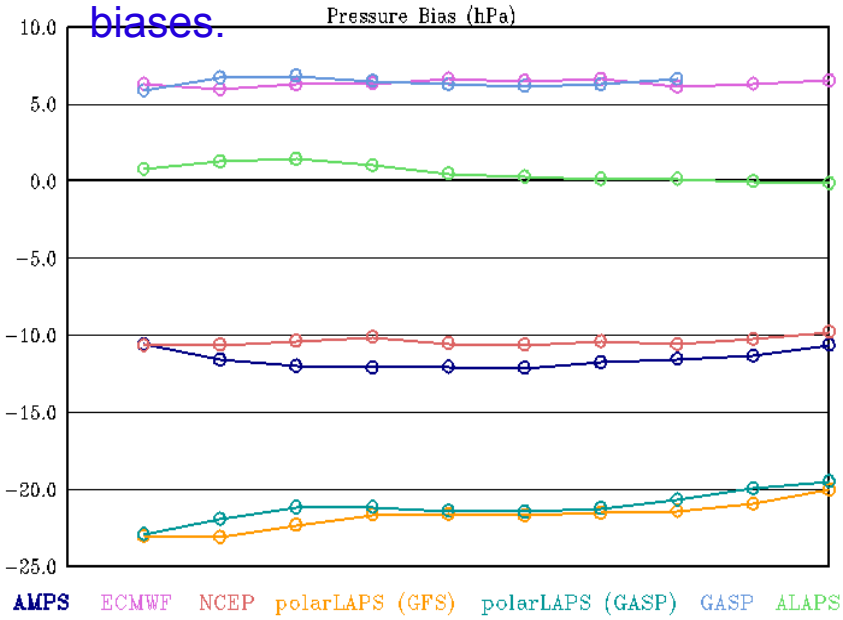
Wind barb analysis at sigma 0.9988 (kts)

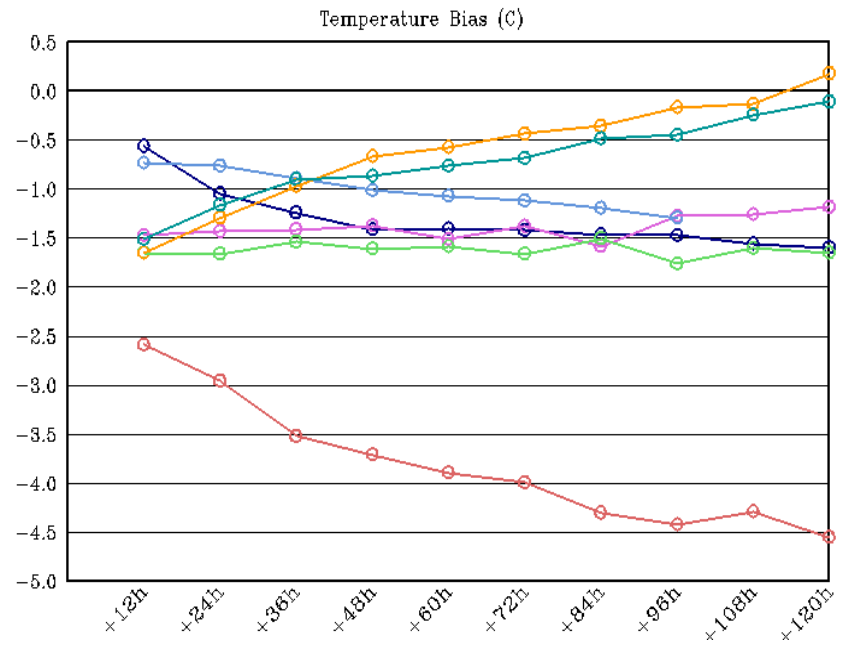


polarLAPS +048HR Prognosis valid at 1200UTC 07 JUN 2006 (base 12Z05JUN2006).

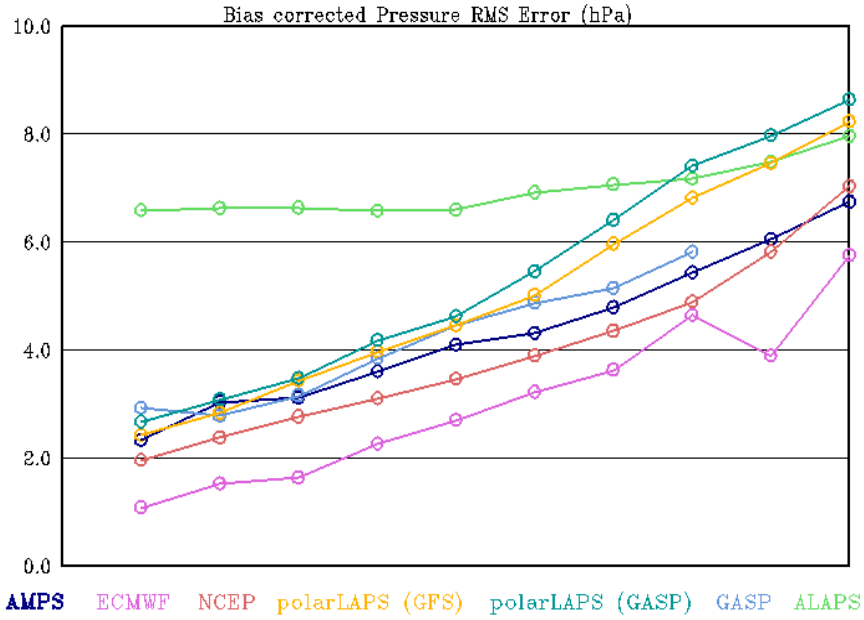
PolarLAPS performance.

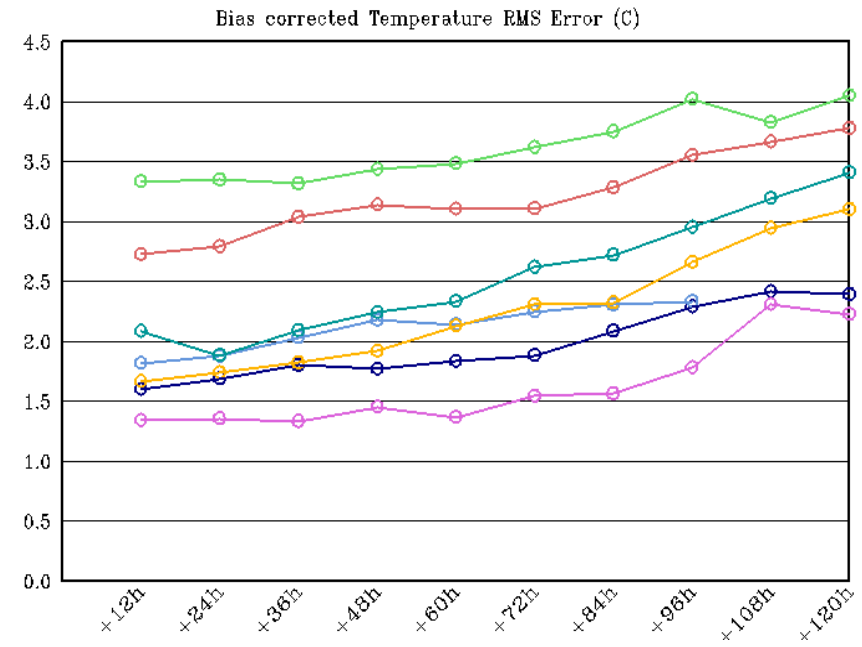
Casey pressure and temperature biases.

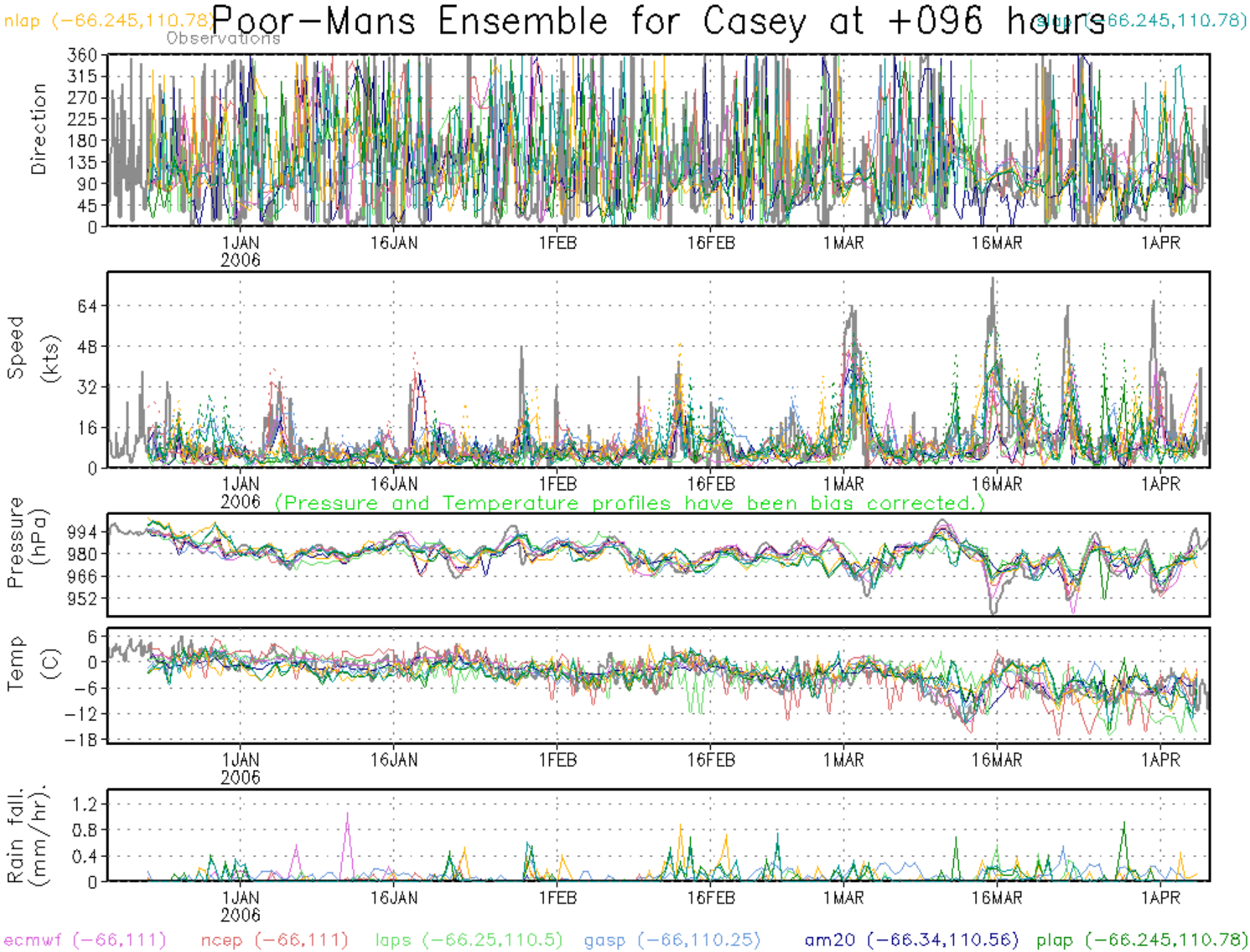


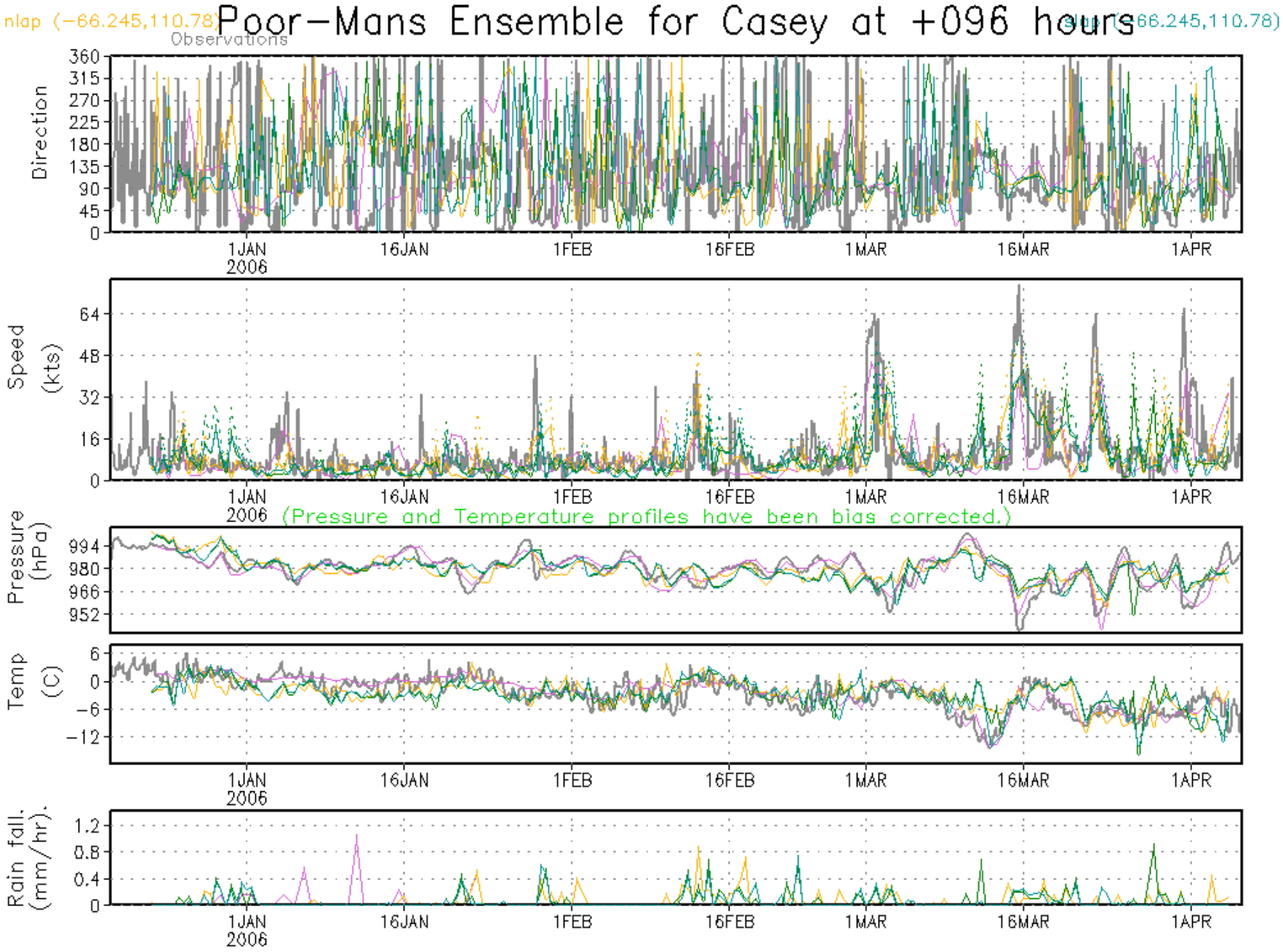


and bias corrected RMS errors.






nlap (−66.245,110.78)
Poor−Mans Ensemble for Casey at +096 hours
Observations
Direction
360
315
270
225
180
135
90
45
0
1JAN
2006
16JAN
1FEB
16FEB
1MAR
16MAR
1APR
Speed
(kts)
64
48
32
16
0
(Pressure and Temperature profiles have been bias corrected.)
Pressure
(hPa)
994
980
966
952
Temp
(C)
6
0
−6
−12
−18
Rain fall.
(mm/hr).
1.2
0.8
0.4
0
ecmwf (−66,111)
ncep (−66,111)
laps (−66.25,110.5)
gasp (−66,110.25)
am20 (−66.34,110.56)
plap (−66.245,110.78)


nlap (−66.245,110.78)
Poor−Mans Ensemble for Casey at +096 hours
Observations
Direction
360
315
270
225
180
135
90
45
0
1JAN
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Pressure
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994
980
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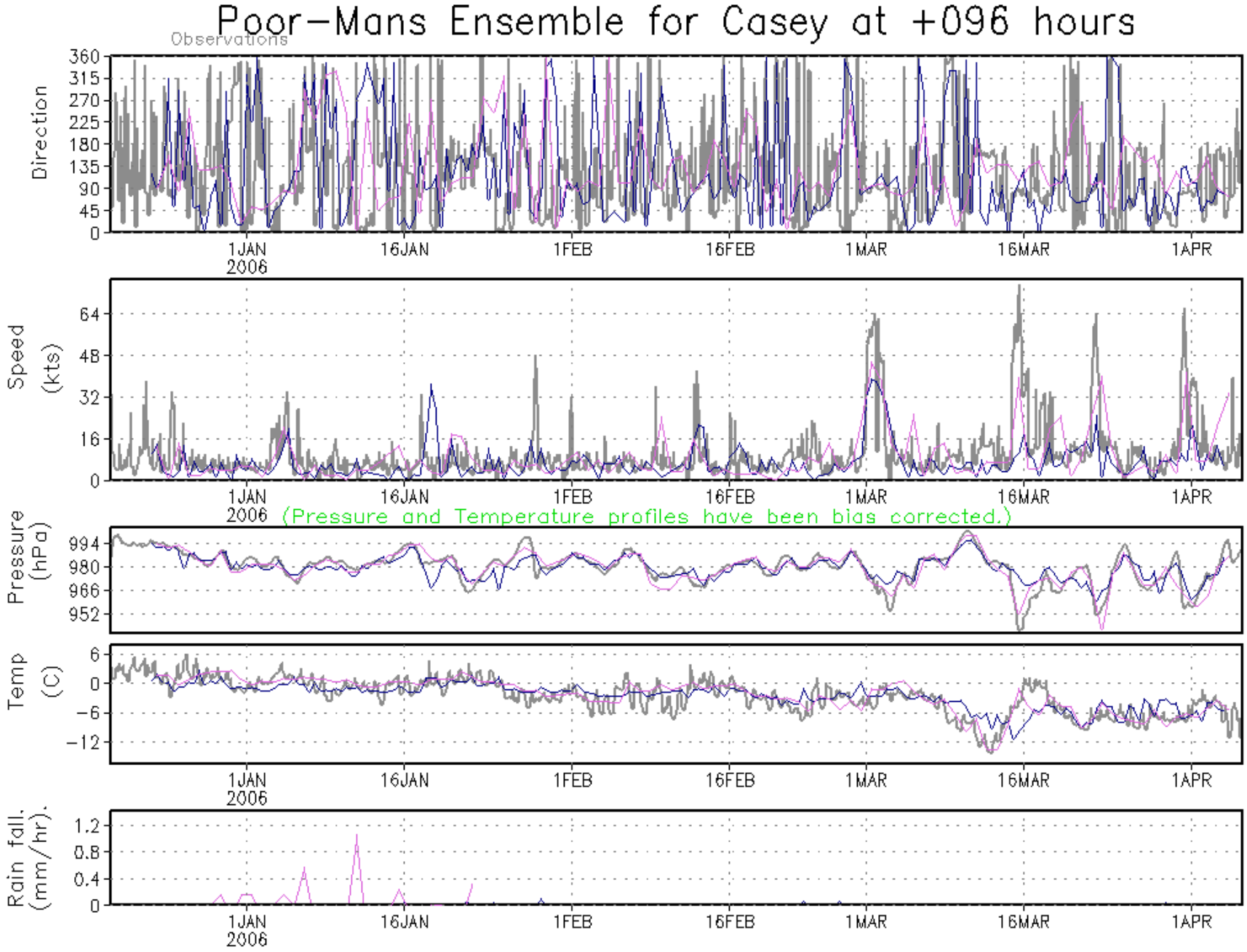
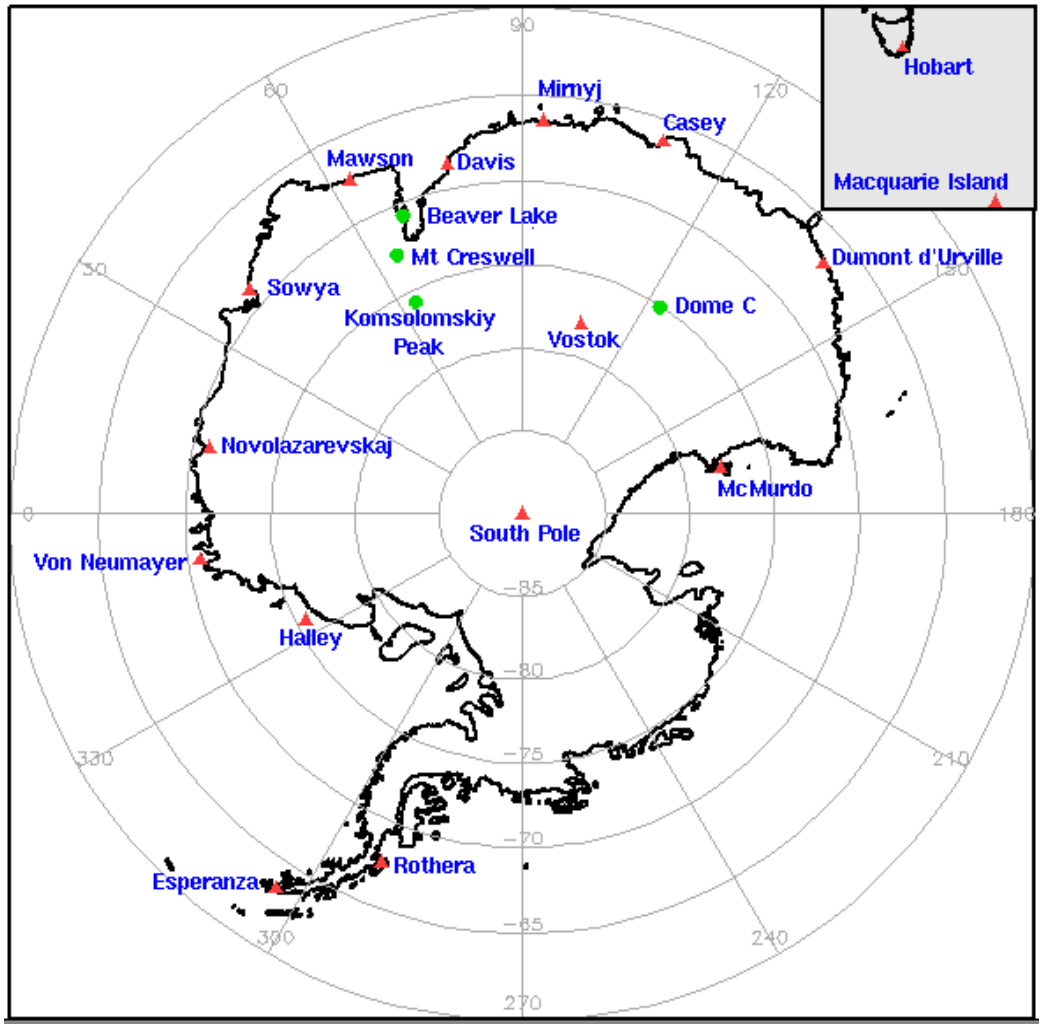
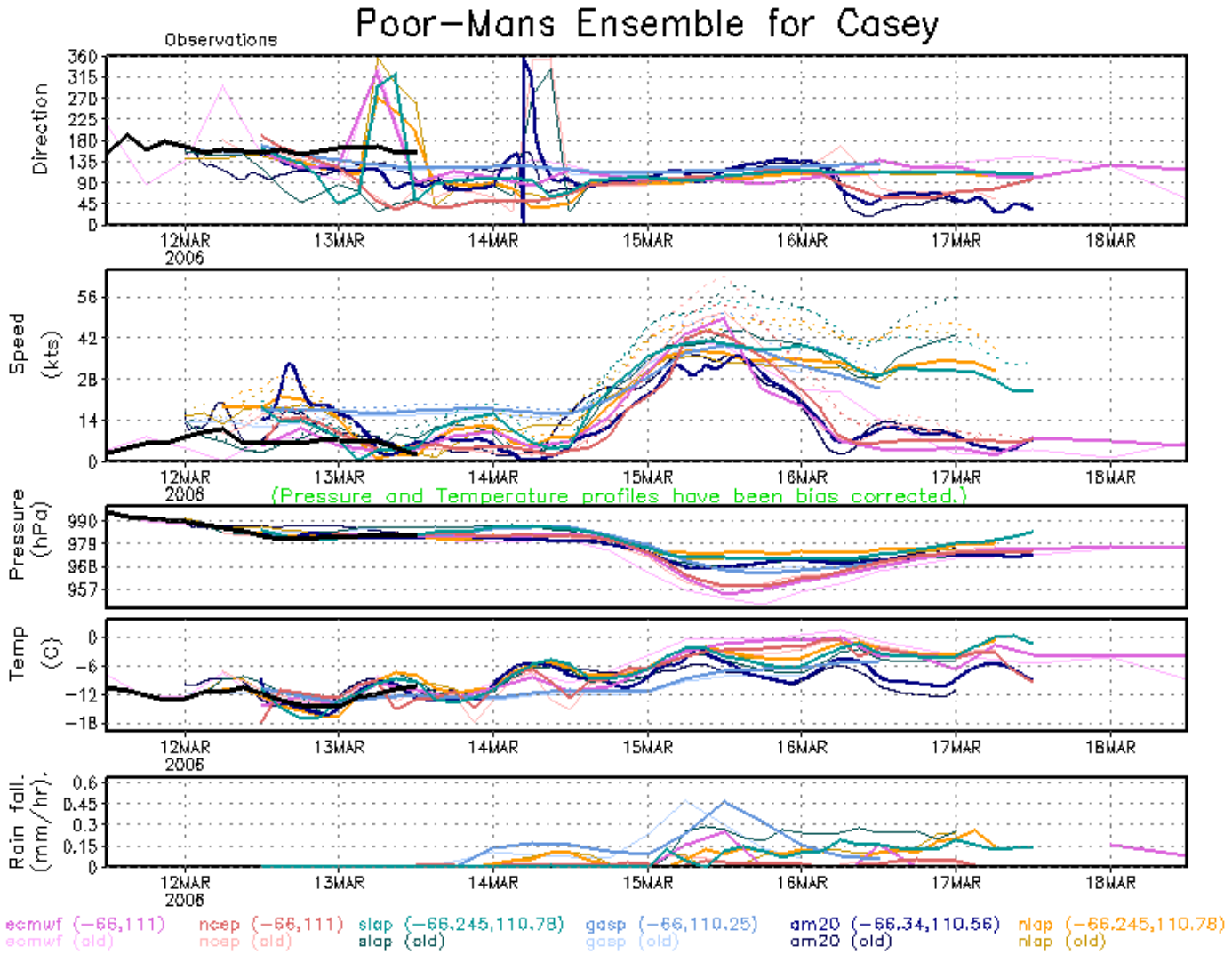
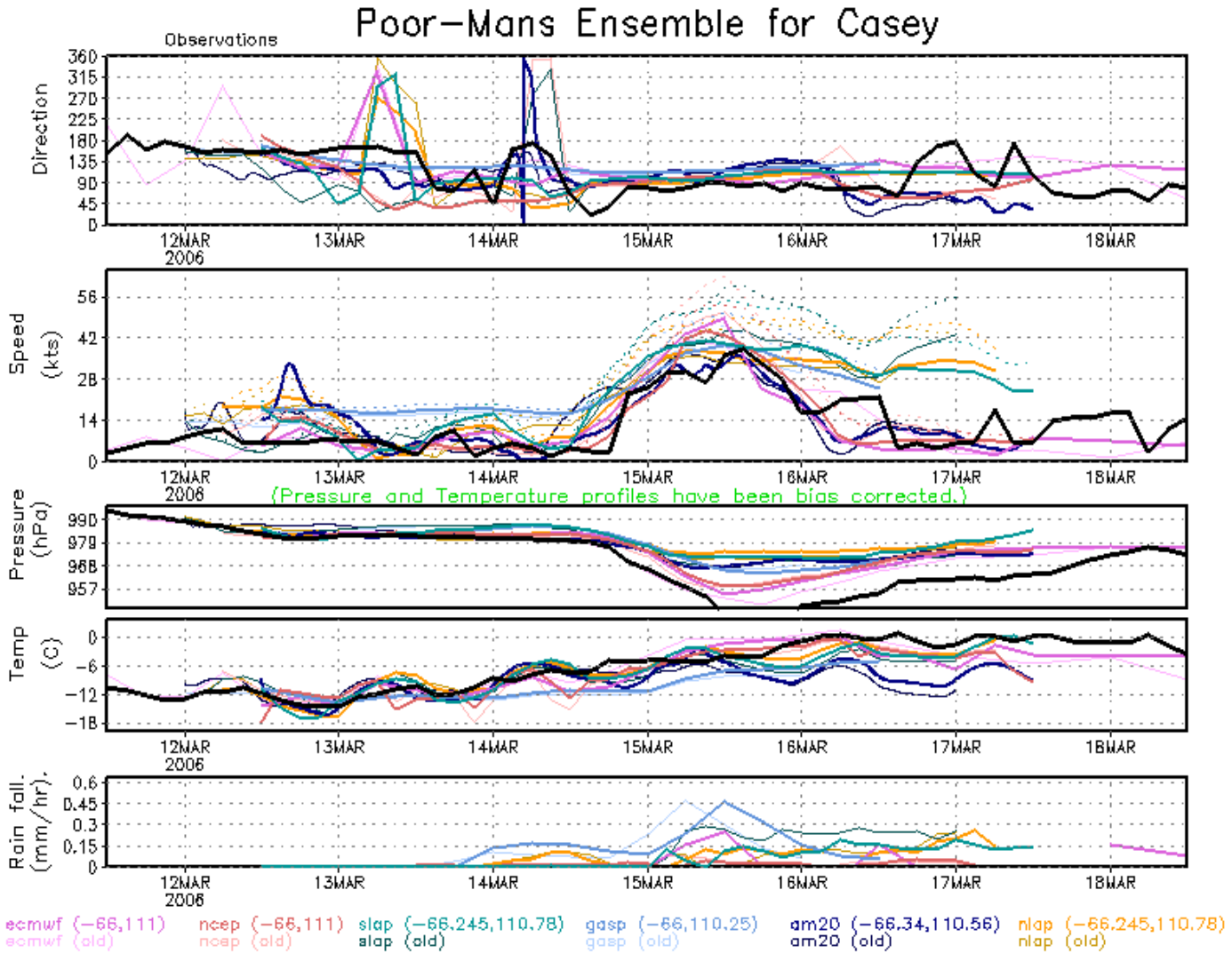
Temp
(C)
6
0
−6
−12
Rain fall.
(mm/hr).
1.2
0.8
0.4
0
ecmwf (−66,111)
plap (−66.245,110.78)

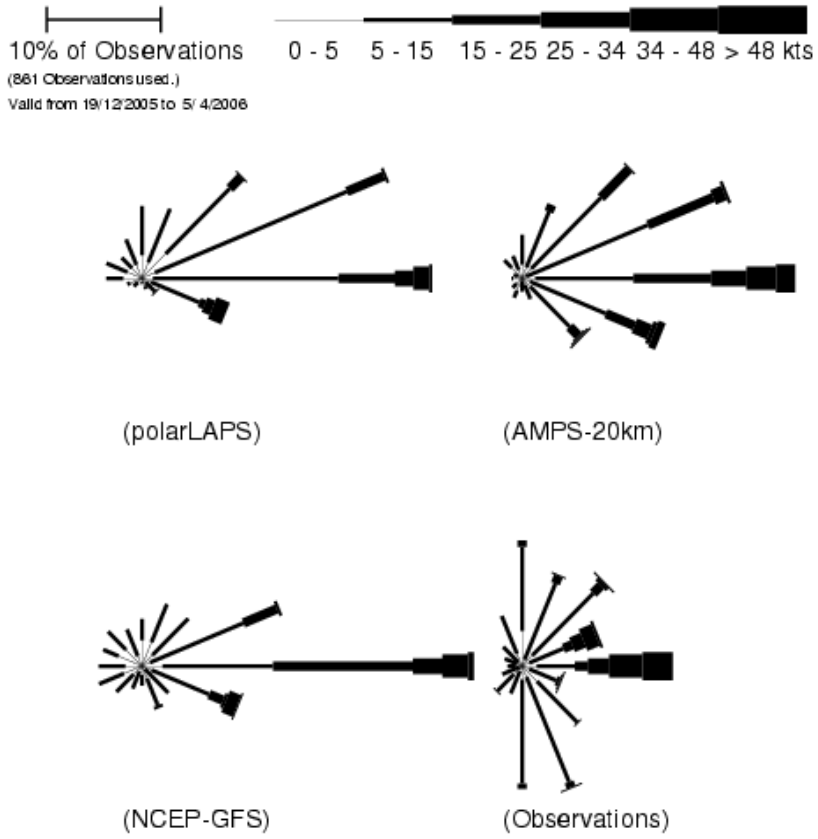

Poor-Mans Ensemble for Casey at +096 hours
Observations
Direction
360
315
270
225
180
135
90
45
0
1JAN
2006
16JAN
1FEB
16FEB
1MAR
16MAR
1APR
Speed
(kts)
64
48
32
16
0
(Pressure and Temperature profiles have been bias corrected.)
Pressure
(hPa)
994
980
966
952
Temp
(C)
6
0
-6
-12
Rain fall.
(mm/hr).
1.2
0.8
0.4
ecmwf (-66,111)
am20 (-66.34,110.56)

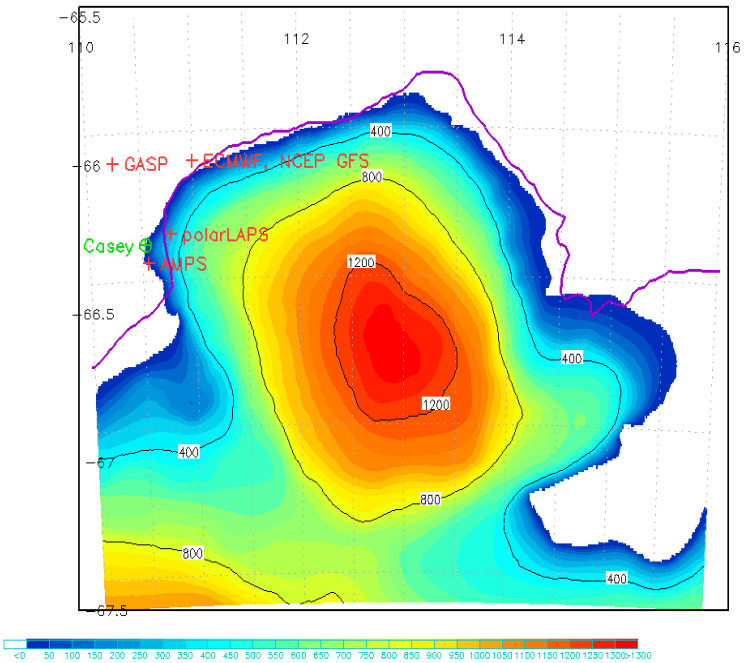
Single Station Forecasting.

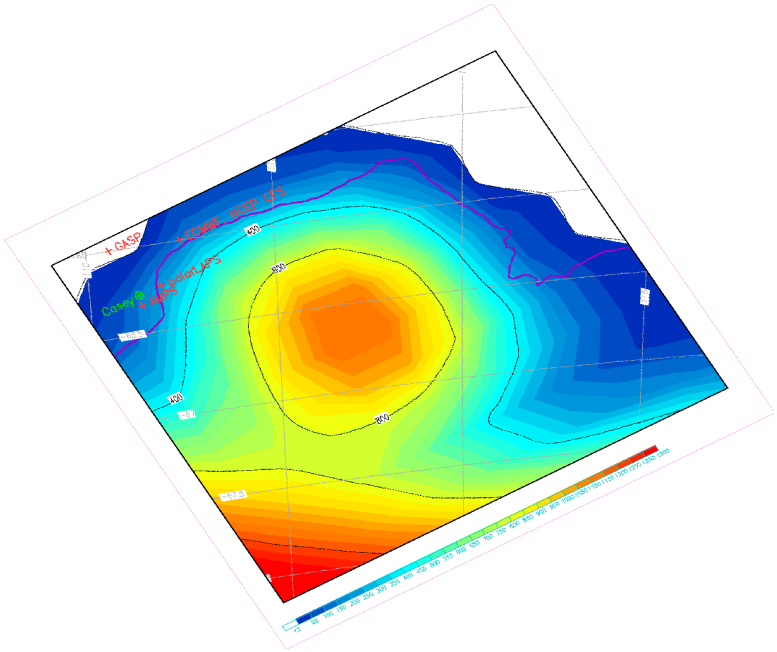


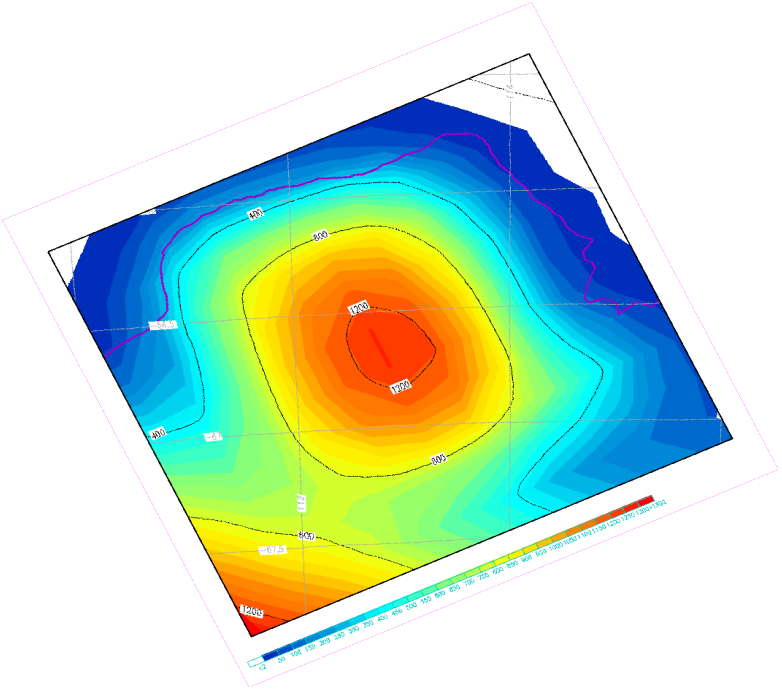

Poor-Mans Ensemble for Casey
Observations
Direction
360
315
270
225
180
135
90
45
0
12MAR 2006
13MAR
14MAR
15MAR
16MAR
17MAR
18MAR
Speed (kts)
56
42
28
14
0
(Pressure and Temperature profiles have been bias corrected.)
Pressure (hPa)
990
979
968
957
Temp (C)
0
-6
-12
-18
Rain fall. (mm/hr).
0.6
0.45
0.3
0.15
0
ecmwf (-66,111)
ecmwf (old)
ncep (-66,111)
ncep (old)
slap (-66.245,110.78)
slap (old)
gasp (-66,110.25)
gasp (old)
am20 (-66.34,110.56)
am20 (old)
nlap (-66.245,110.78)
nlap (old)

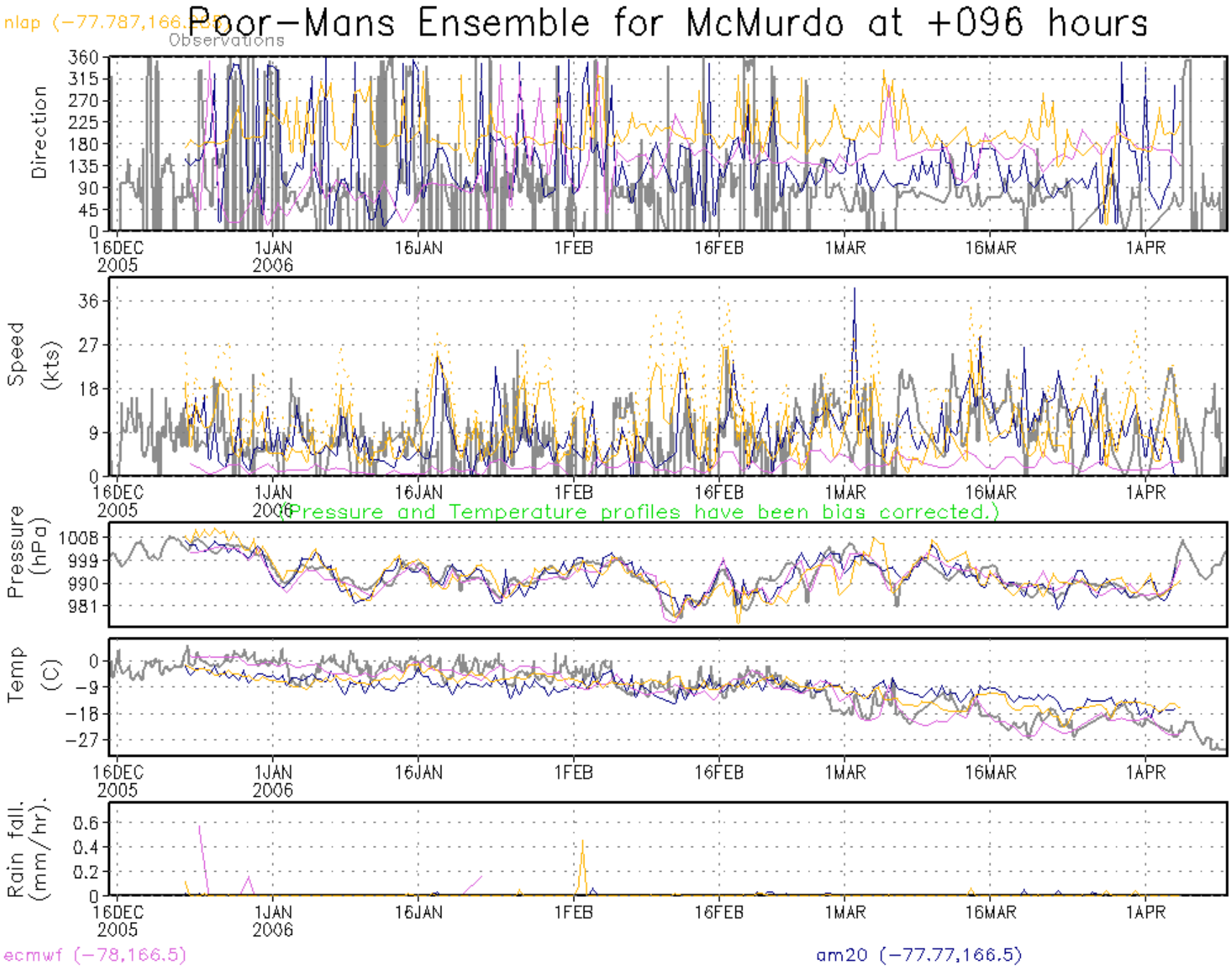

Poor-Mans Ensemble for Casey
Observations
Direction
360
315
270
225
180
135
90
45
0
12MAR 2006
13MAR
14MAR
15MAR
16MAR
17MAR
18MAR
Speed (kts)
56
42
28
14
0
(Pressure and Temperature profiles have been bias corrected.)
Pressure (hPa)
990
979
968
957
Temp (C)
0
-6
-12
-18
Rain fall. (mm/hr).
0.6
0.45
0.3
0.15
0
ecmwf (-66,111)
ecmwf (old)
ncep (-66,111)
ncep (old)
slap (-66.245,110.78)
slap (old)
gasp (-66,110.25)
gasp (old)
am20 (-66.34,110.56)
am20 (old)
nlap (-66.245,110.78)
nlap (old)

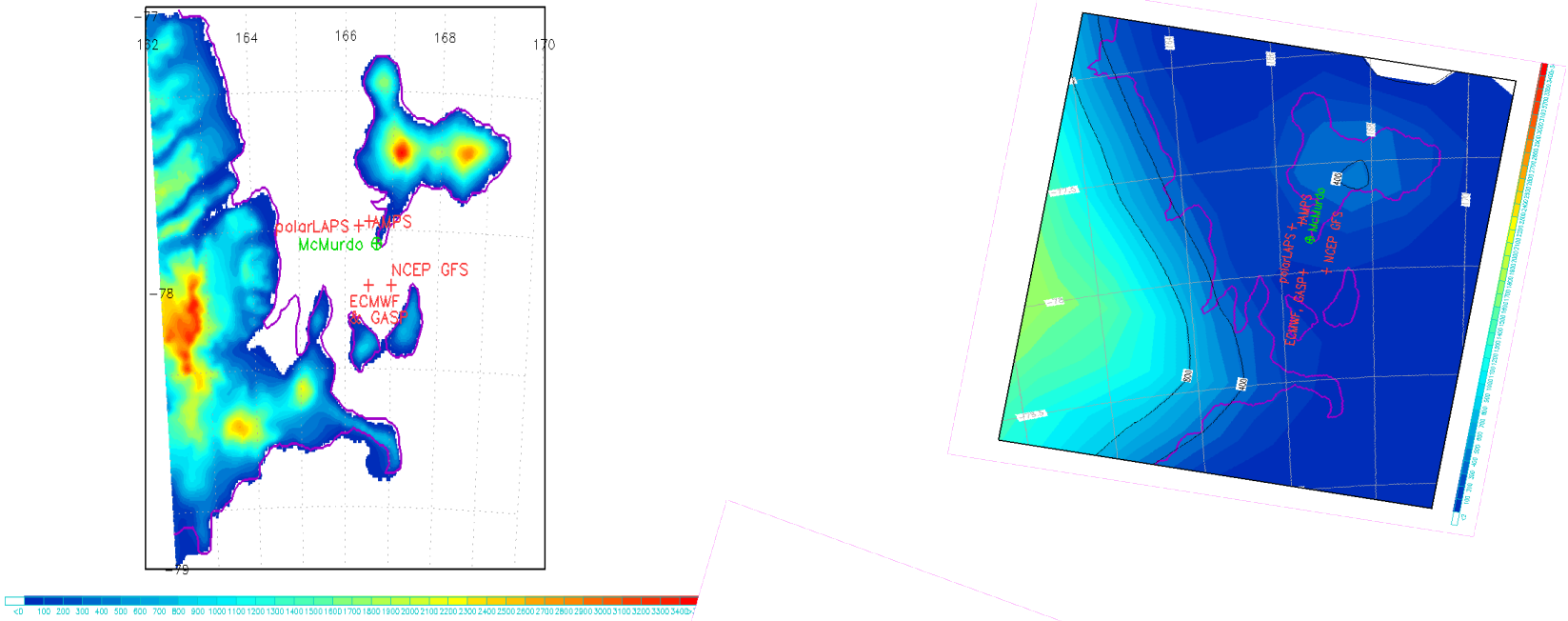

10% of Observations
(861 Observations used.)
Valid from 19/12/2005 to 5/ 4/2006
0 - 5
5 - 15
15 - 25
25 - 34
34 - 48
> 48 kts
(polarLAPS)
(AMPS-20km)
(NCEP-GFS)
(Observations)


-65.5
110
112
114
116
-66
-66.5
-67
-67.5
+GASP
+ECMWF
+NCEP GFS
Casey
+polarLAPS
+LAMPS
400
800
1200
<0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 >1300

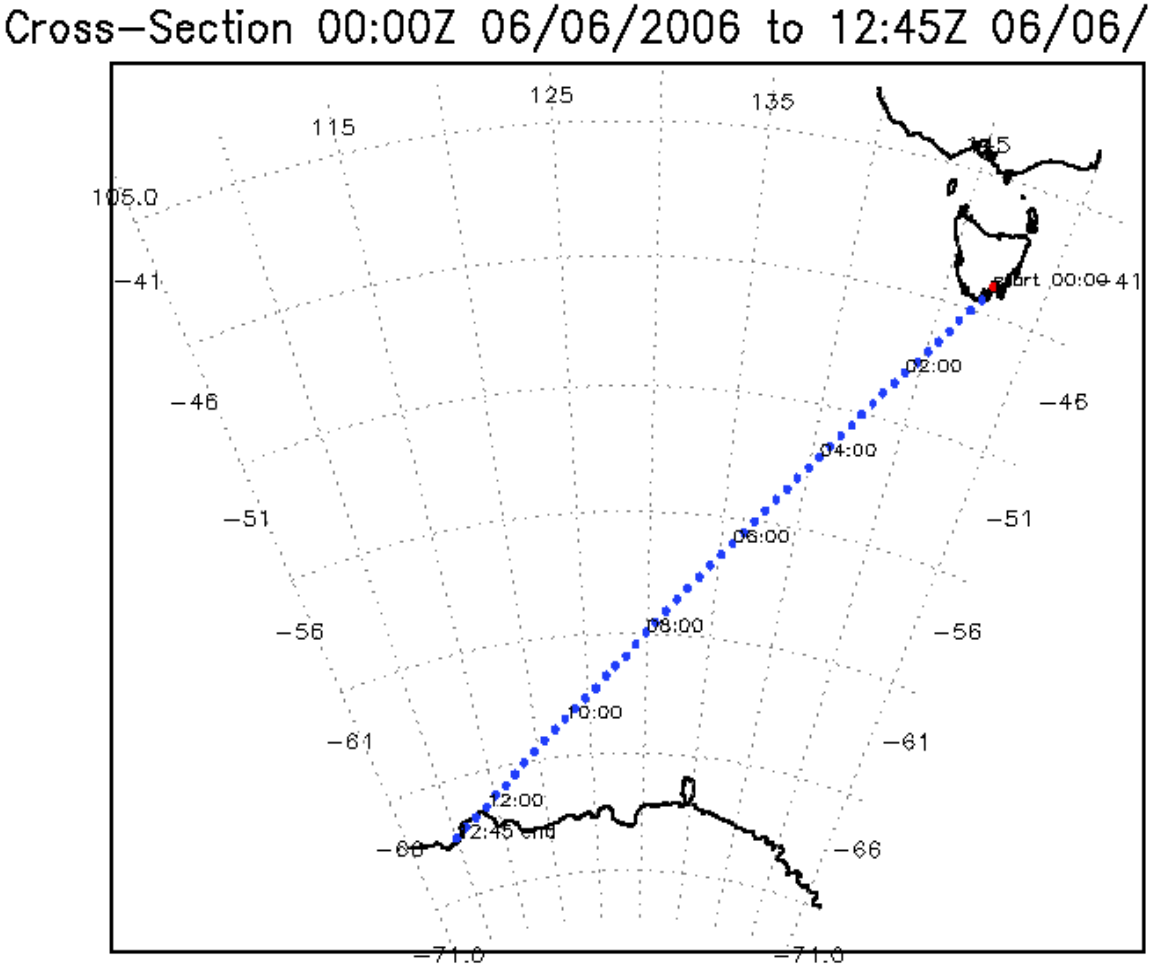




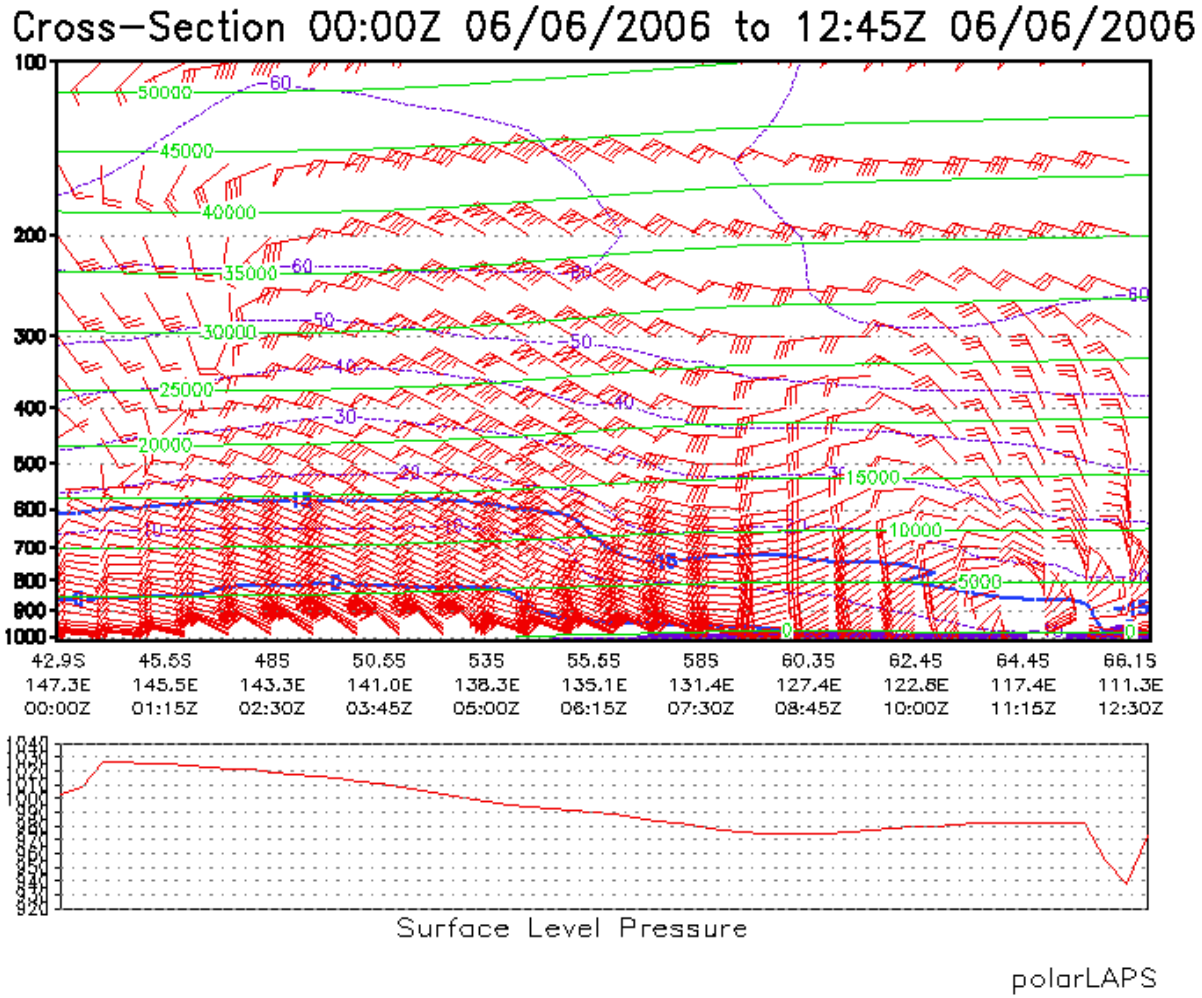

Poor-Mans Ensemble for McMurdo at +096 hours
nlap (-77.787,166.383)
Observations
Direction
360
315
270
225
180
135
90
45
0
16DEC 2005
1JAN 2006
16JAN
1FEB
16FEB
1MAR
16MAR
1APR
Speed (kts)
36
27
18
9
0
(Pressure and Temperature profiles have been bias corrected.)
Pressure (hPa)
1008
999
990
981
Temp (C)
0
-9
-18
-27
Rain fall. (mm/hr).
0.6
0.4
0.2
0
ecmwf (-78,166.5)
am20 (-77.77,166.5)


164
166
168
170
-78
-79
PolarLAPS + MAPS
McMurdo
NCEP GFS
ECMWF
GASP

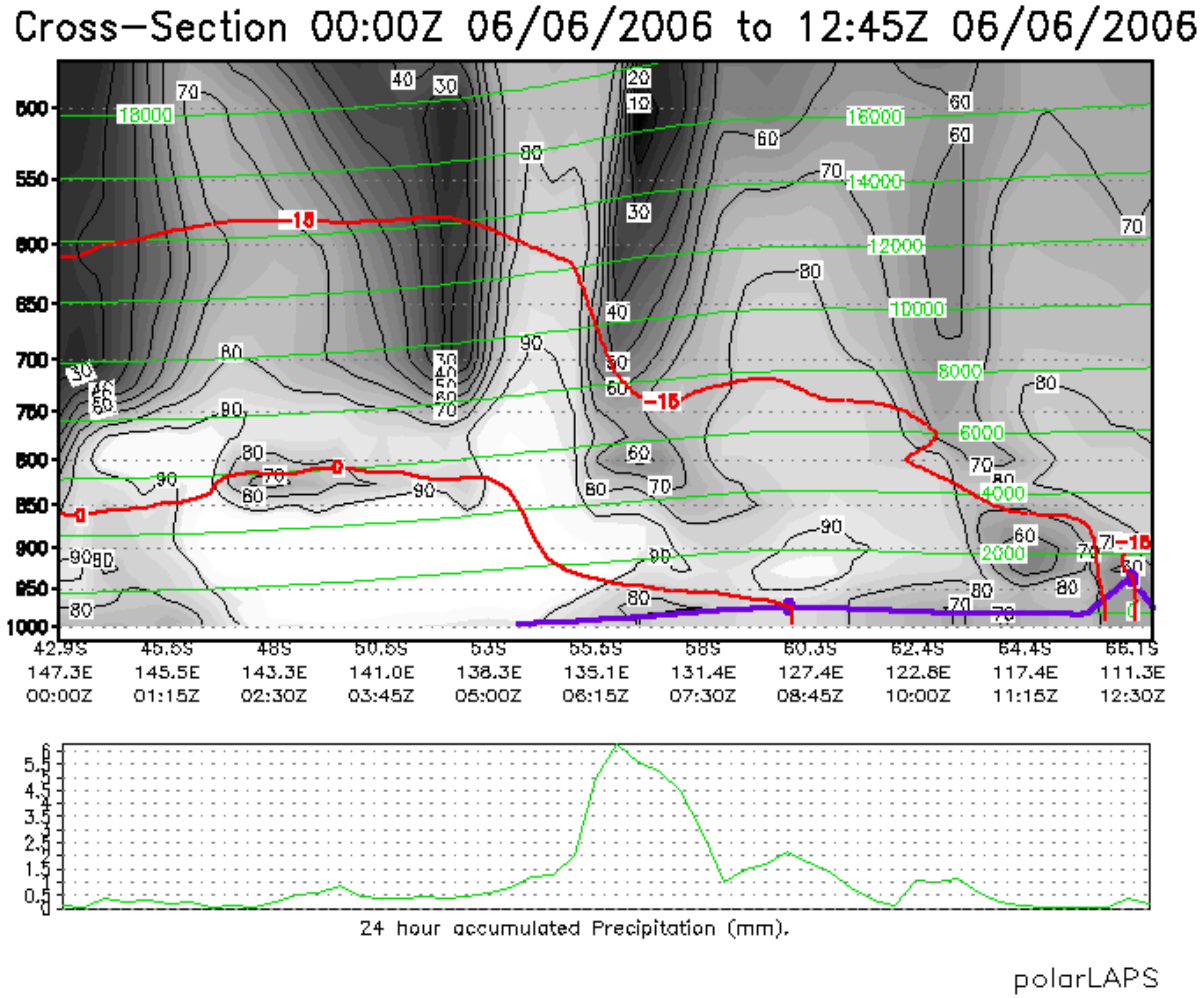
Route forecasting for aviation, marine and terrestrial users.



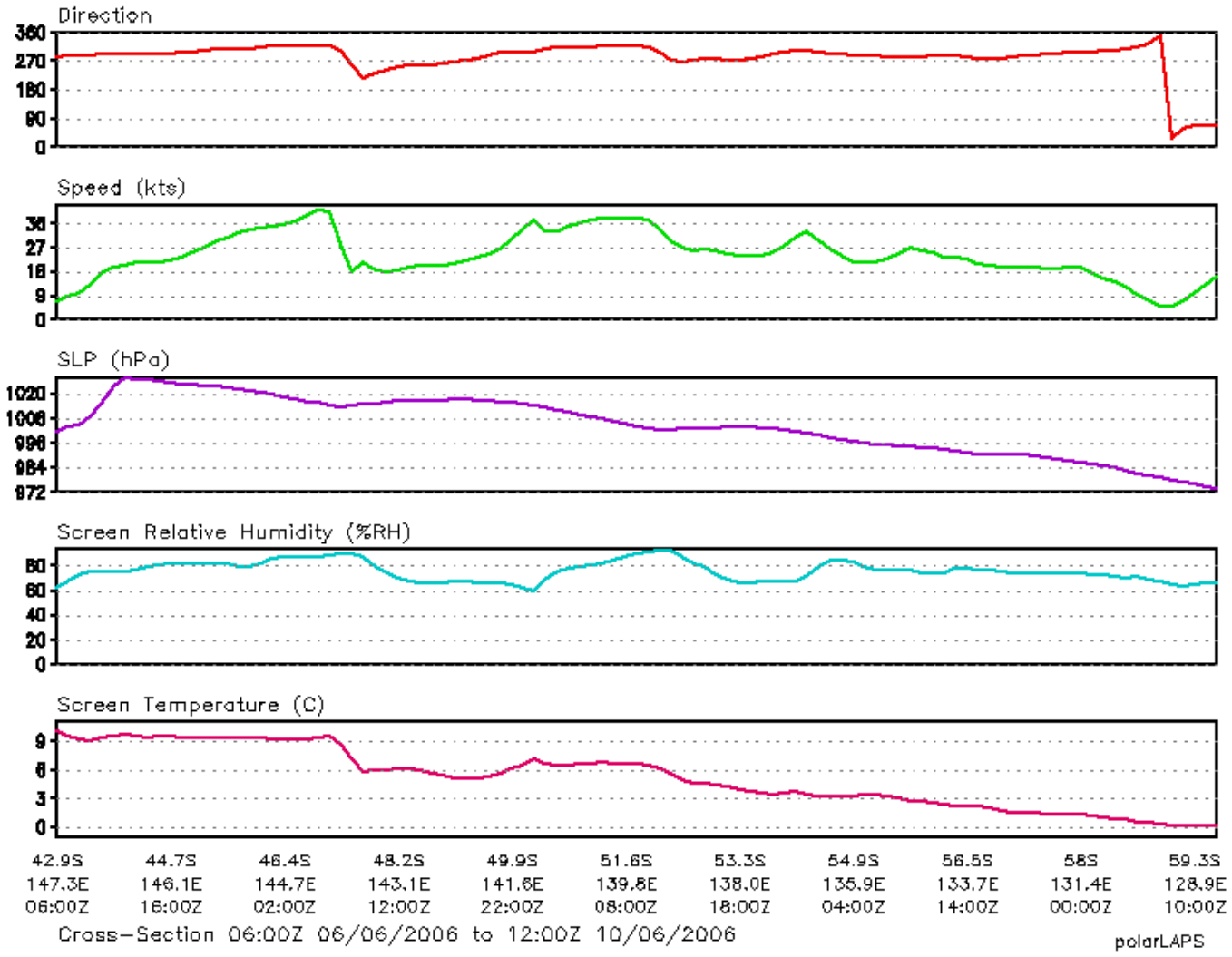
Track waypoint and timing data.



Wind, temperature and surface pressure forecast along track.



Humidity and precipitation forecast along track.



Near surface wind, pressure, relative humidity and temperature forecast along track.

Conclusions and Comments.

1. NWP has made remarkable strides in the last 5 years with quite reliable forecast available out to 2 to 3 days, and with good guidance out to nearly a week possible.

2. A continued collaborative approach to Antarctic NWP, with products such as the ensembles highlighted is desirable.
   - a desirable addition to this collaboration would be access to AMPS model data such that Ad-Hoc route forecasts may be prepared.

3. Australian NWP is still moving forward, although slowly due to resource issues.
   - polarLAPS still has no data assimilation nor refined polar physics. However development has ceased.

   Australia is looking to cease current NWP developments in favour of a collaboration with the UK Meteorological Office using the Unified Model.