AMPS* Update – June 2007

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http://www.mmm.ucar.edu/rt/amps

* *AMPS is funded by the National Science Foundation, Office of Polar Programs*

** *NCAR is sponsored by the National Science Foundation*

Antarctic Mesoscale Prediction System

- Real-time NWP guidance over Antarctica for:
  - Support of forecast efforts for Antarctic logistics and science
    - Primary users: forecasters in support of US Antarctic Program (USAP) flight operations
  - Support of research and education
    - Antarctic meteorology
    - Meteorological modeling and analysis
- Primary collaborators:
  - NCAR – Mesoscale and Microscale Meteorology Division
  - The Ohio State University – Byrd Polar Research Center

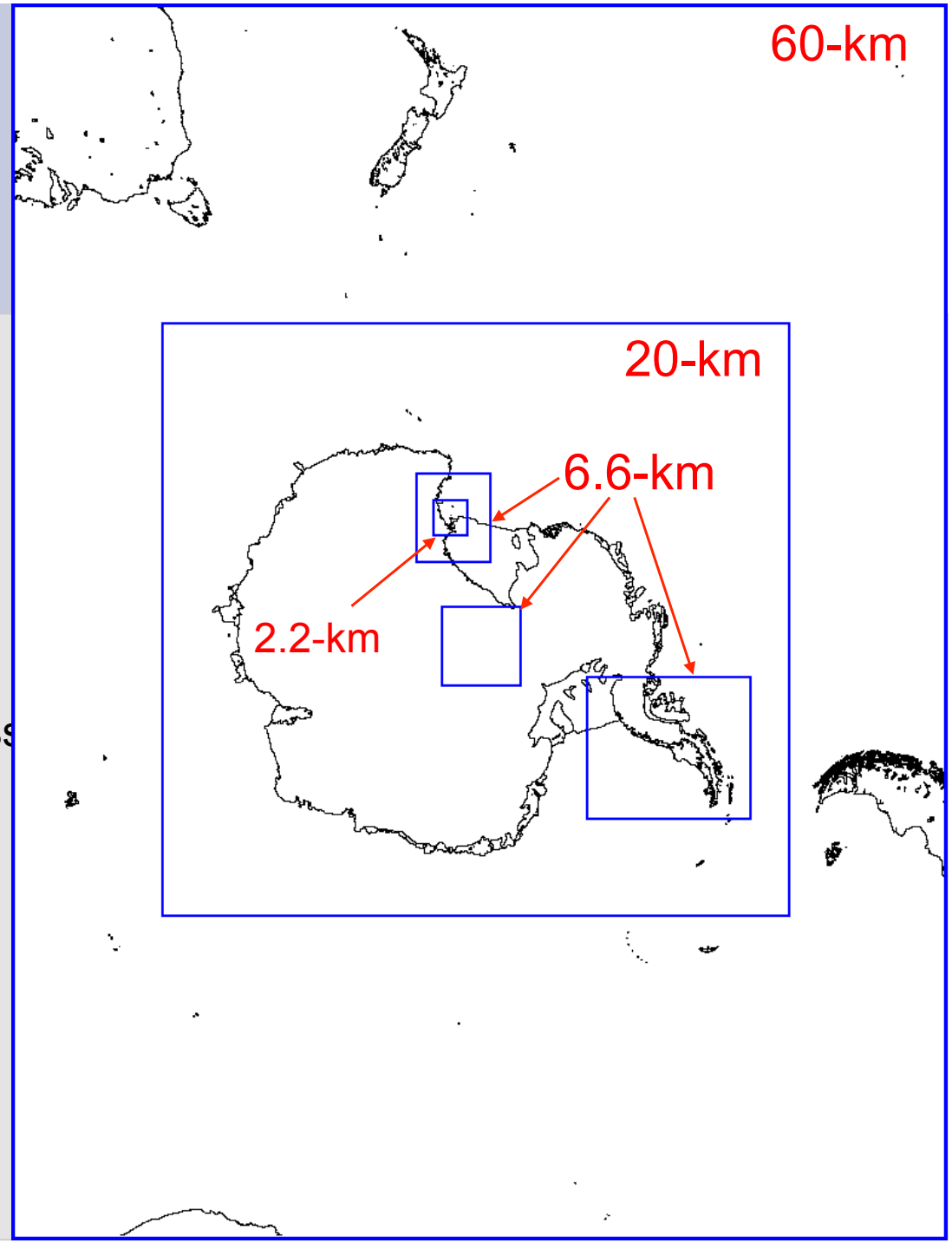
AMPS Models

- NCAR's research models MM5 and WRF
- Models initialized at 00Z and 12Z daily
- WRF-VAR 3D-variational analysis used for data assimilation at initialization (D. M. Barker)
- Model forecasts run out to 5 days
- Dedicated Linux cluster
  - 64 2-processor Opteron nodes
- Model products posted to AMPS web pages
  - http://www.mmm.ucar.edu/rt/amps

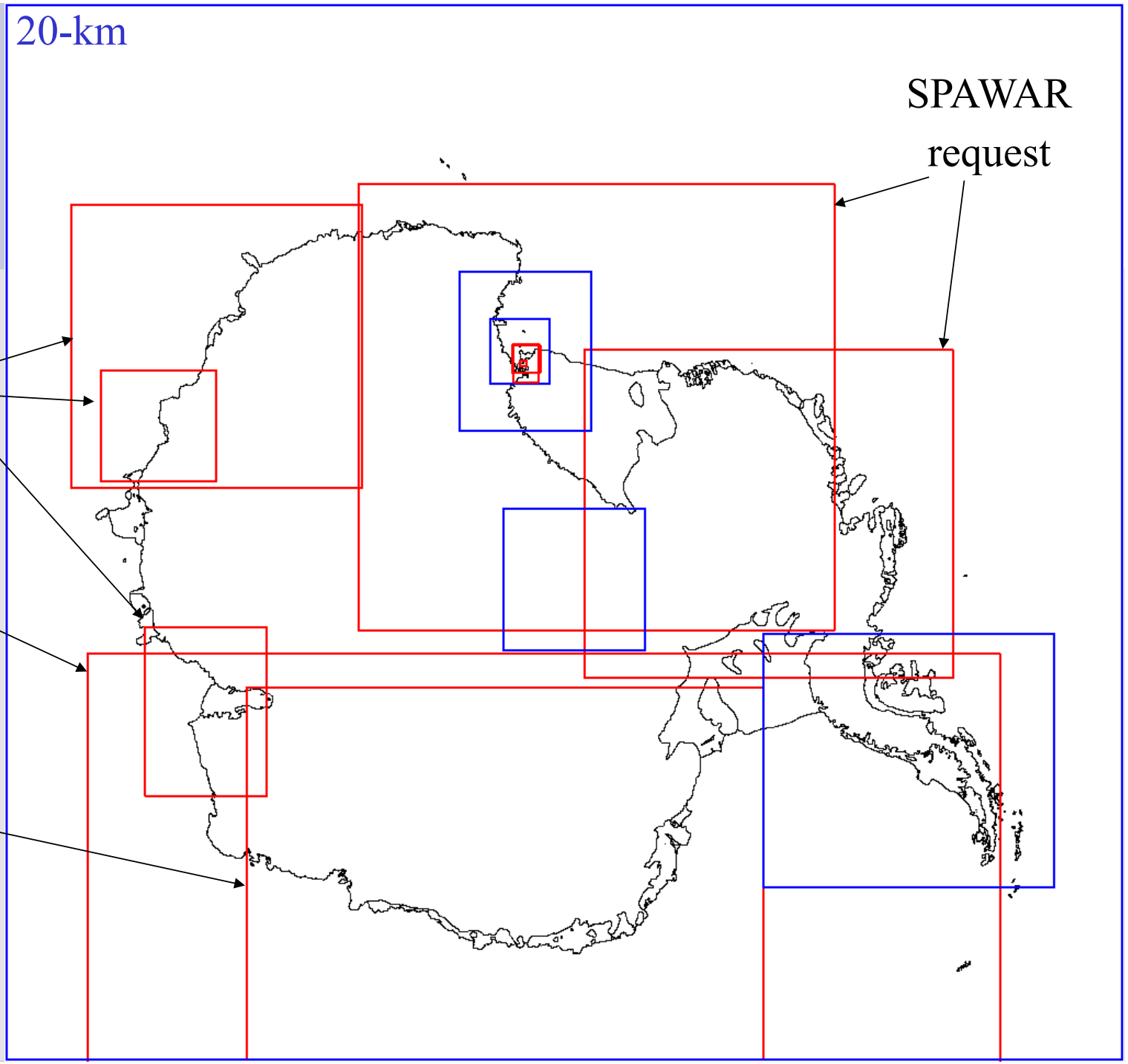
Six Computational grids:

- 60-km to 5 days
  - Antarctica and oceans
- 20-km to 5 days
  - Continental coverage
- 6.6-km to 36 hrs
  - Pole, peninsula, W. Ross
- 2.2-km to 36 hrs
  - Ross island

- Drop-in 1-way nests

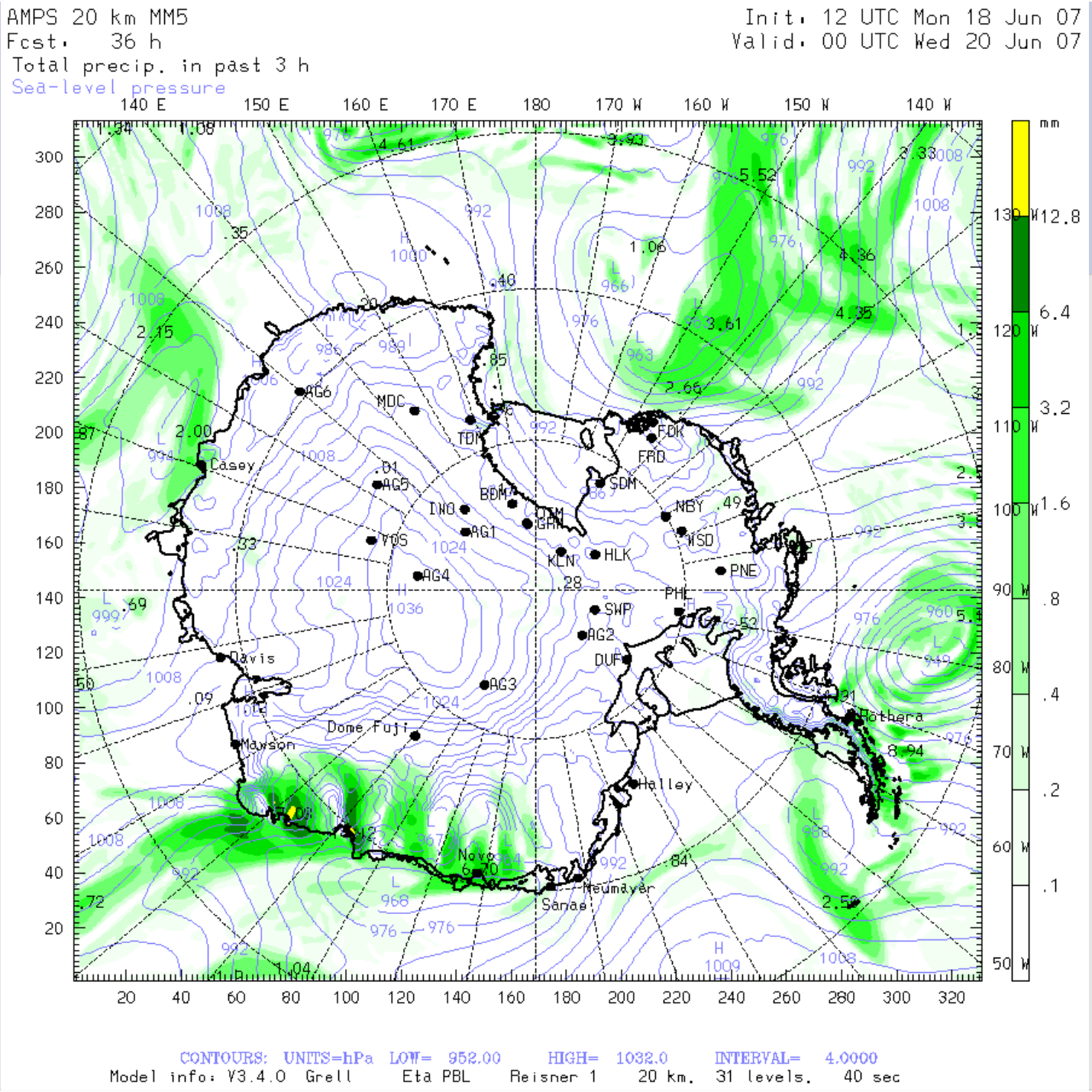


Plotting windows



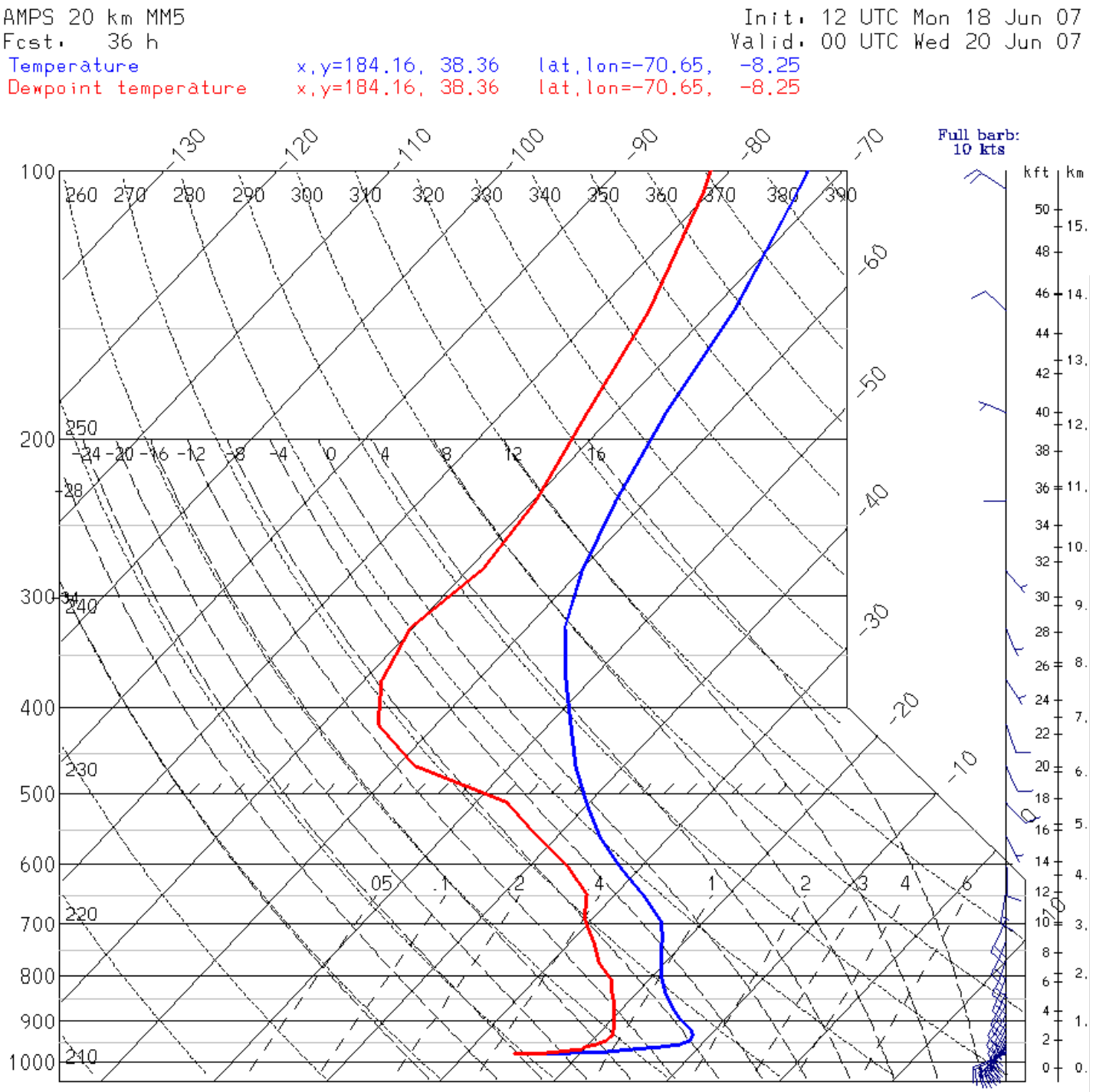
Horizontal maps

E.g. SLP & 3-hr precip



Skew-T diagrams

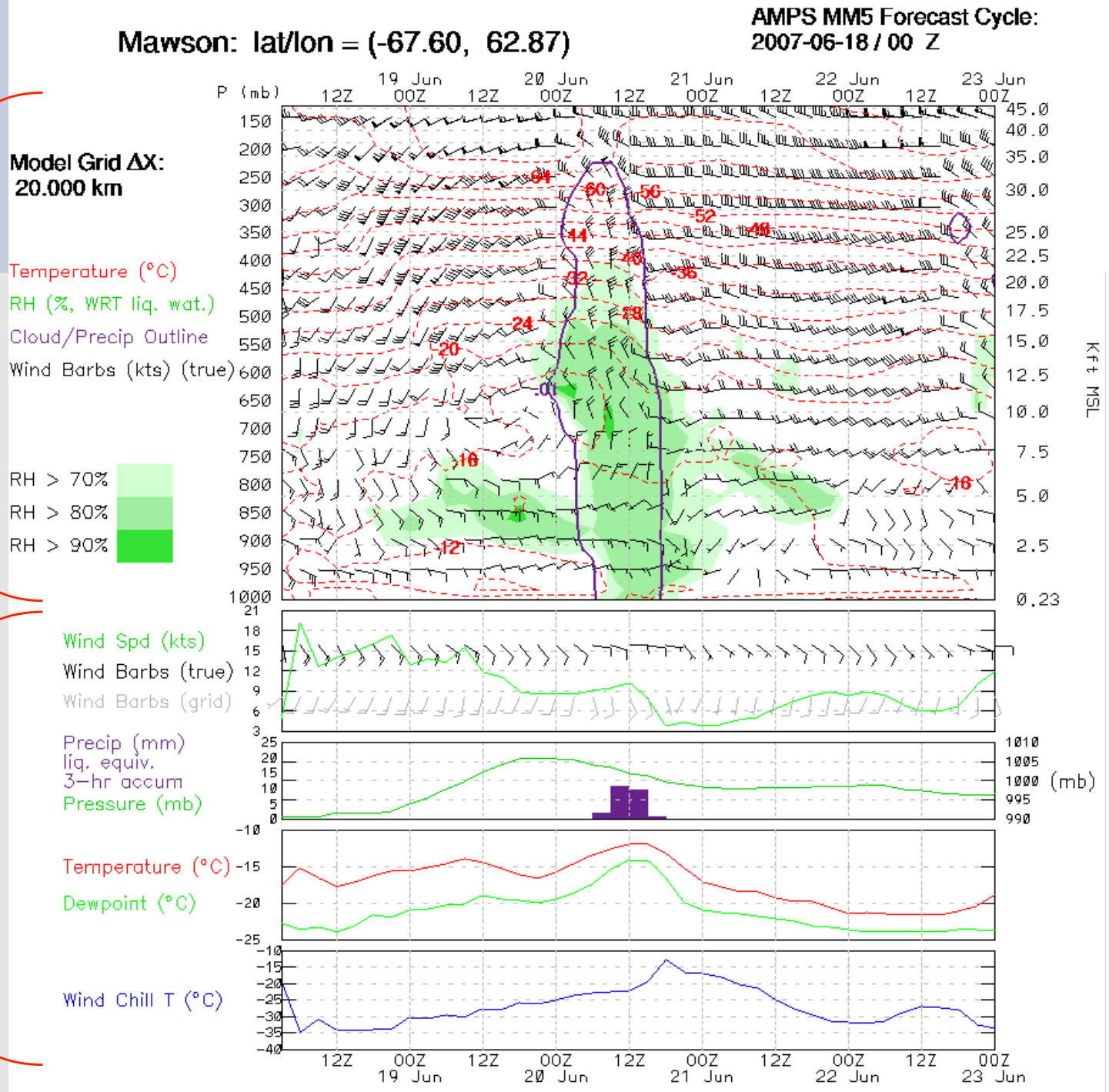
E.g.:
Neumayer forecast sounding



Meteograms

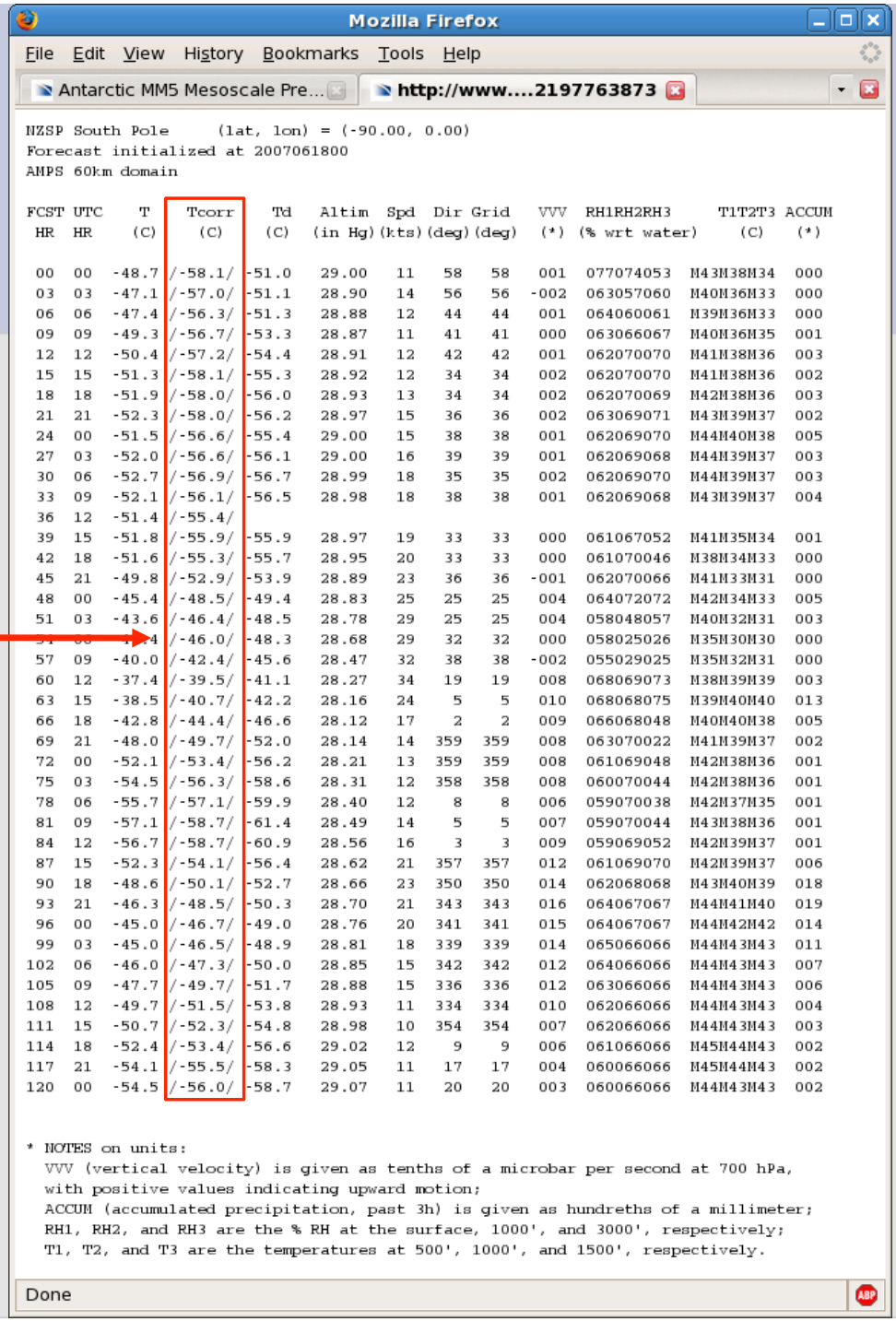
Time/height section

Surface parameters



Tables:

- E.g.: South Pole time-series
- New this year:
  - Temperature bias correction at pole
  - But see M. Duda talk on other methods



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File Edit View History Bookmarks Tools Help

Antarctic MM5 Mesoscale Pre... | http://www....2197763873

NZSP South Pole (lat, lon) = (-90.00, 0.00)
Forecast initialized at 2007061800
AMPS 60km domain

FCST HR	UTC HR	T (C)	Tcorr (C)	Td (C)	Altim (in Hg)	Spd (kts)	Dir (deg)	Grid (deg)	VVV (*)	RH1RH2RH3 (% wrt water)	T1T2T3 (C)	ACCUM (*)
00	00	-48.7	/-58.1/	-51.0	29.00	11	58	58	001	077074053	M43M38M34	000
03	03	-47.1	/-57.0/	-51.1	28.90	14	56	56	-002	063057060	M40M36M33	000
06	06	-47.4	/-56.3/	-51.3	28.88	12	44	44	001	064060061	M39M36M33	000
09	09	-49.3	/-56.7/	-53.3	28.87	11	41	41	000	063066067	M40M36M35	001
12	12	-50.4	/-57.2/	-54.4	28.91	12	42	42	001	062070070	M41M38M36	003
15	15	-51.3	/-58.1/	-55.3	28.92	12	34	34	002	062070070	M41M38M36	002
18	18	-51.9	/-58.0/	-56.0	28.93	13	34	34	002	062070069	M42M38M36	003
21	21	-52.3	/-58.0/	-56.2	28.97	15	36	36	002	063069071	M43M39M37	002
24	00	-51.5	/-56.6/	-55.4	29.00	15	38	38	001	062069070	M44M40M38	005
27	03	-52.0	/-56.6/	-56.1	29.00	16	39	39	001	062069068	M44M39M37	003
30	06	-52.7	/-56.9/	-56.7	28.99	18	35	35	002	062069070	M44M39M37	003
33	09	-52.1	/-56.1/	-56.5	28.98	18	38	38	001	062069068	M43M39M37	004
36	12	-51.4	/-55.4/									
39	15	-51.8	/-55.9/	-55.9	28.97	19	33	33	000	061067052	M41M35M34	001
42	18	-51.6	/-55.3/	-55.7	28.95	20	33	33	000	061070046	M38M34M33	000
45	21	-49.8	/-52.9/	-53.9	28.89	23	36	36	-001	062070066	M41M33M31	000
48	00	-45.4	/-48.5/	-49.4	28.83	25	25	25	004	064072072	M42M34M33	005
51	03	-43.6	/-46.4/	-48.5	28.78	29	25	25	004	058048057	M40M32M31	003
[illegible]		[illegible]	/-46.0/	-48.3	28.68	29	32	32	000	058025026	M35M30M30	000
57	09	-40.0	/-42.4/	-45.6	28.47	32	38	38	-002	055029025	M35M32M31	000
60	12	-37.4	/-39.5/	-41.1	28.27	34	19	19	008	068069073	M38M39M39	003
63	15	-38.5	/-40.7/	-42.2	28.16	24	5	5	010	068068075	M39M40M40	013
66	18	-42.8	/-44.4/	-46.6	28.12	17	2	2	009	066068048	M40M40M38	005
69	21	-48.0	/-49.7/	-52.0	28.14	14	359	359	008	063070022	M41M39M37	002
72	00	-52.1	/-53.4/	-56.2	28.21	13	359	359	008	061069048	M42M38M36	001
75	03	-54.5	/-56.3/	-58.6	28.31	12	358	358	008	060070044	M42M38M36	001
78	06	-55.7	/-57.1/	-59.9	28.40	12	8	8	006	059070038	M42M37M35	001
81	09	-57.1	/-58.7/	-61.4	28.49	14	5	5	007	059070044	M43M38M36	001
84	12	-56.7	/-58.7/	-60.9	28.56	16	3	3	009	059069052	M42M39M37	001
87	15	-52.3	/-54.1/	-56.4	28.62	21	357	357	012	061069070	M42M39M37	006
90	18	-48.6	/-50.1/	-52.7	28.66	23	350	350	014	062068068	M43M40M39	018
93	21	-46.3	/-48.5/	-50.3	28.70	21	343	343	016	064067067	M44M41M40	019
96	00	-45.0	/-46.7/	-49.0	28.76	20	341	341	015	064067067	M44M42M42	014
99	03	-45.0	/-46.5/	-48.9	28.81	18	339	339	014	065066066	M44M43M43	011
102	06	-46.0	/-47.3/	-50.0	28.85	15	342	342	012	064066066	M44M43M43	007
105	09	-47.7	/-49.7/	-51.7	28.88	15	336	336	012	063066066	M44M43M43	006
108	12	-49.7	/-51.5/	-53.8	28.93	11	334	334	010	062066066	M44M43M43	004
111	15	-50.7	/-52.3/	-54.8	28.98	10	354	354	007	062066066	M44M43M43	003
114	18	-52.4	/-53.4/	-56.6	29.02	12	9	9	006	061066066	M45M44M43	002
117	21	-54.1	/-55.5/	-58.3	29.05	11	17	17	004	060066066	M45M44M43	002
120	00	-54.5	/-56.0/	-58.7	29.07	11	20	20	003	060066066	M44M43M43	002

* NOTES on units:
VVV (vertical velocity) is given as tenths of a microbar per second at 700 hPa, with positive values indicating upward motion;
ACCUM (accumulated precipitation, past 3h) is given as hundreths of a millimeter;
RH1, RH2, and RH3 are the % RH at the surface, 1000', and 3000', respectively;
T1, T2, and T3 are the temperatures at 500', 1000', and 1500', respectively.

Done

Antarctic MM5 Mesoscal...

AMPS | AMPS WRF | MM5 | Polar MM5 | Events | NCAR

http://www.mmm.ucar.edu/rt/amps

Forecast Hr	Grid Selection	Initial Time	Field
36 h	Ross-Beardmore (20 km)	2007061800	SFC Sfc RH Precip Cloud base Cross sections (none)
Animations		Go Left	3k RH Soundings Tables
AMPS Info		Go Right	wind Sea ice Meteogram

Grid Selection:
- 60 km MM5
- 20 km MM5
- Ross-Beardmore (20 km)
- 6.7 km Western Ross Sea MM5
- Ross Is. (6.7 km)
- 6.7 km Antarctic Peninsula MM5
- 6.7 km SP MM5
- 2.2 km MM5
- Ross Is. (2.2 km)
- Marie Byrd Land (20 km)
- Queen Maud Land (20 km)
- Casey (20 km)
- Casey-Dumont (20 km)
- Davis/Mawson (20 km)
- South Atlantic (60 km)
- Palmer 1-way Nest (15 km)

Field (3k RH):
- Upper air
- 1k RH
- 3k RH
- 925
- 850
- 700
- 600
- 500vor
- 500
- 300vor
- 300
- 10k AGL flight lvl
- 15k AGL flight lvl
- 25k MSL flight lvl
- 30k MSL flight lvl
- Altimeter
- Flight reg category

Tables:
- Tables
- AG1 AG01
- AG2 AG02
- AG3 AG03
- AG4 AG04
- AG5 AG05
- AG6 AG06
- BDM Beardmore Gl
- CPH Cape Hallett
- FDK Fosdick Mtns
- FRD Ford Range
- GRM Grosvenor Plateau
- HLK Horlick
- IWO ITASE 6 Winterover
- KLN Klein Glacier
- MGD Megadunes
- MOU Mt Moulton
- MTK Mt Takahe
- NBY Byrd Camp
- NGL Nascent Glacier

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Predict PS) Pag

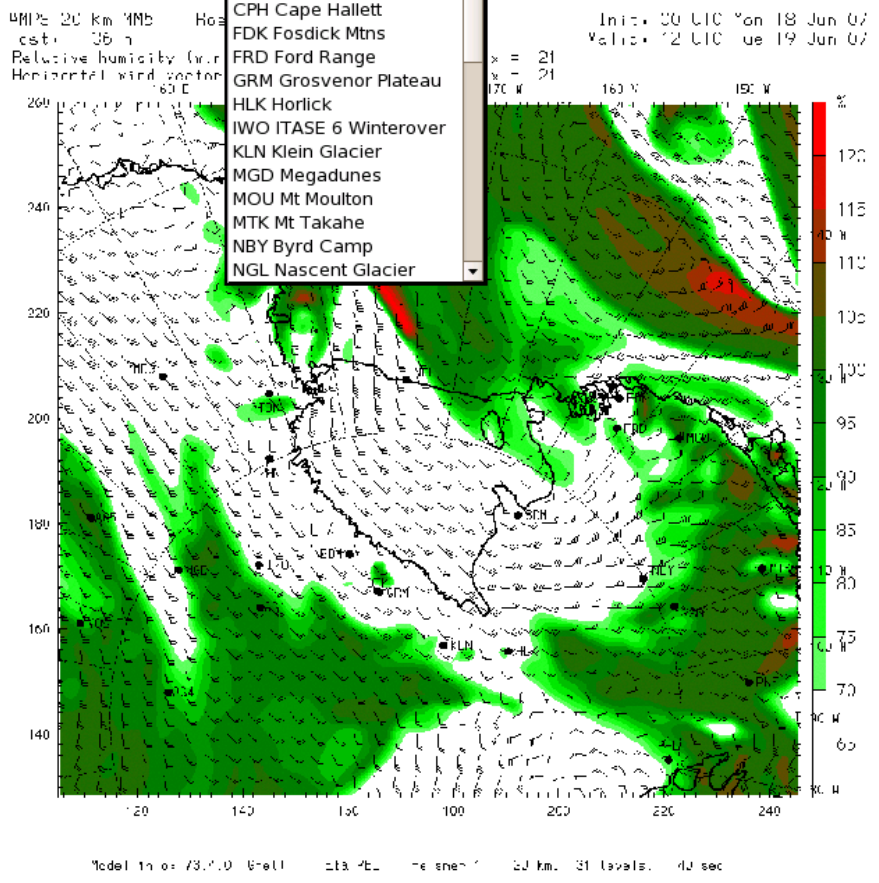
In support of flight operations and forecasters in Antarctica, we are running MM5 on a set of 60-km, 20-km, 6.67-km, and 2.2-km grids over Antarctica twice daily. Under sponsorship from NSF Office of Polar Programs and in collaboration with the Byrd Polar Research Center of Ohio State University these experimental real-time forecasts have been tailored to the needs of the forecasters at McMurdo Station, Antarctica.

AMPS employs the Polar MM5, a version of the MM5 (currently V3.4) developed at the Byrd Polar Research Center. The Polar MM5 contains a number of modifications to better represent processes in the polar troposphere.

All forecasts are produced at NCAR on an "IBM eServer Cluster 1350" cluster of 64 2-processor AMD Opteron nodes. AMPS and its hardware are supported by the National Science Foundation.

Please note that this experimental AMPS and its web page are under ongoing development. Although errors may occur, we attempt to minimize them and design as robust a system as possible.

MM5 for 2007061812 is running and has completed hour 29
Images have been posted through hour 27.



International Users

- Active interaction with NCAR
  - United States
  - Italy
  - Germany
  - Australia
  - United Kingdom
  - Austria
  - South Africa
  - Chile
- Consistent AMPS web page hits:
  - Japan
  - New Zealand
  - Argentina

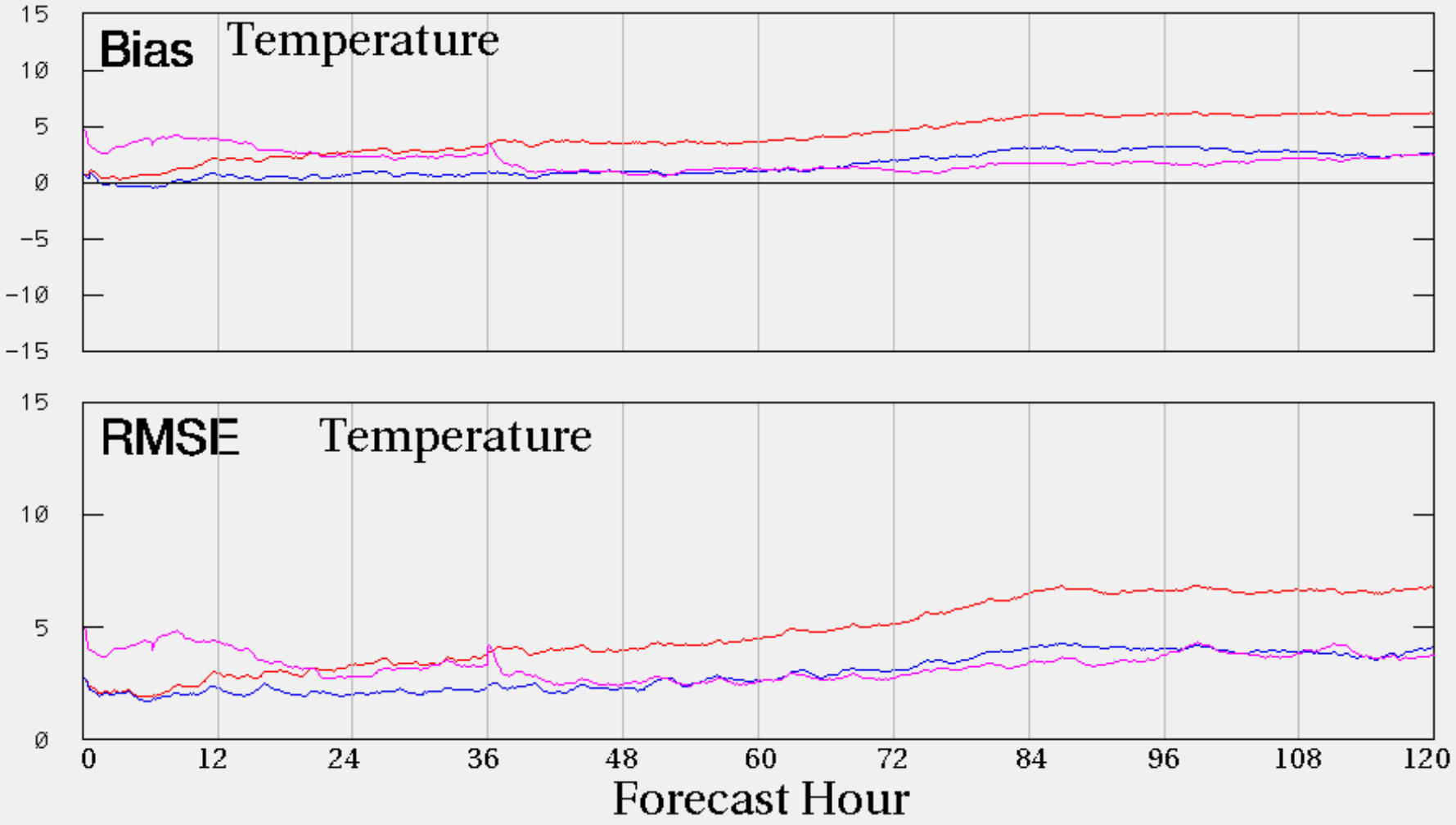
Recent AMPS Developments

- WRF Version 2.2 implementation
  - New WRF Preprocessing System (WPS)
  - ½° NCEP GFS for first-guess and boundary conditions
- Testing of polar modifications for WRF
- Archive reprocessing

Polar modifications to WRF

- Developed at OSU-BPRC
  - Surface processes over ice sheets
  - Details in subsequent Bromwich and Hines presentation
- Testing in Antarctica

Minna Bluff Jan/Feb 2007



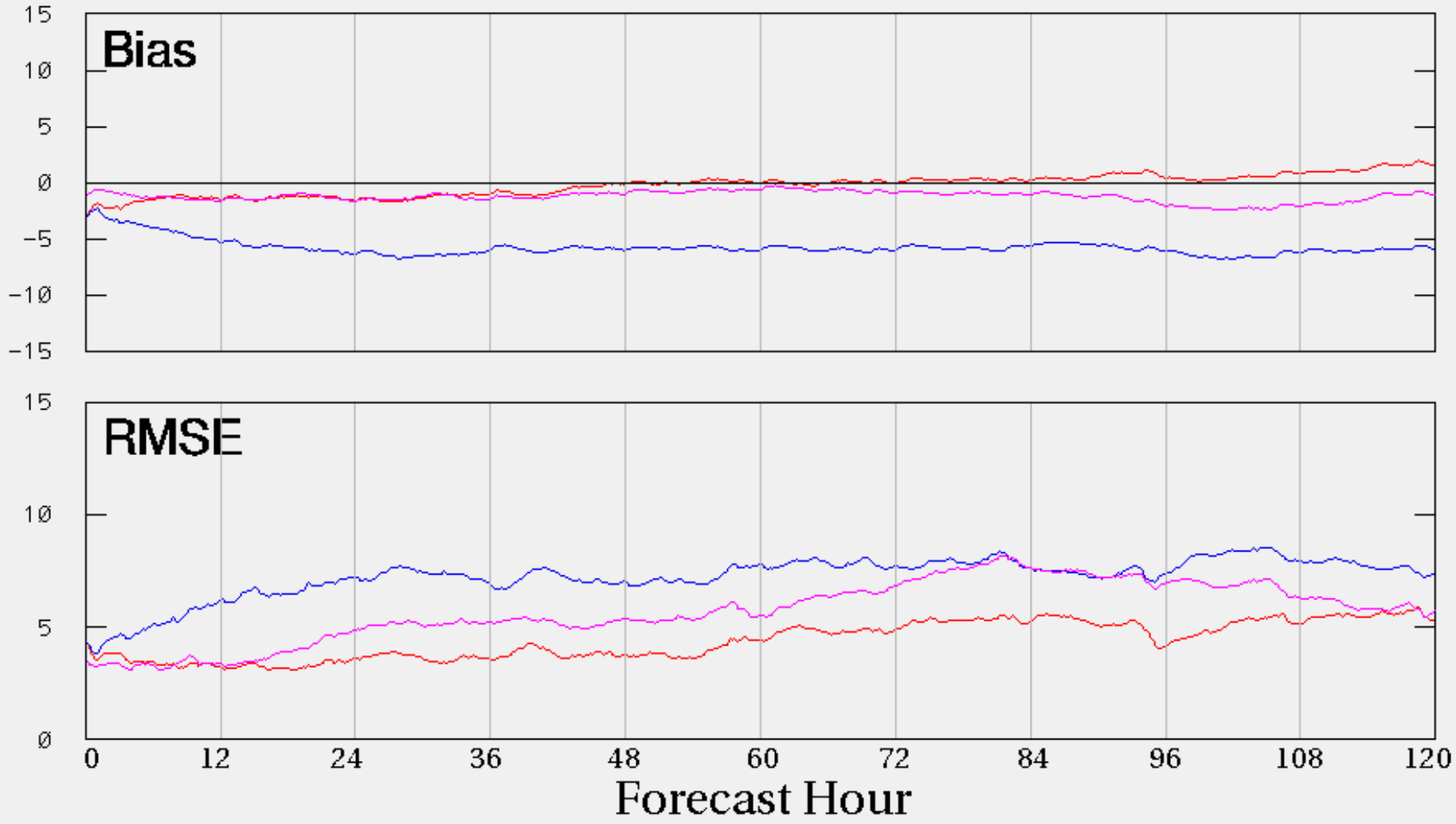
Original WRF

Polar modified WRF

Polar modified MM5

Gill AWS

Jan/Feb 2007

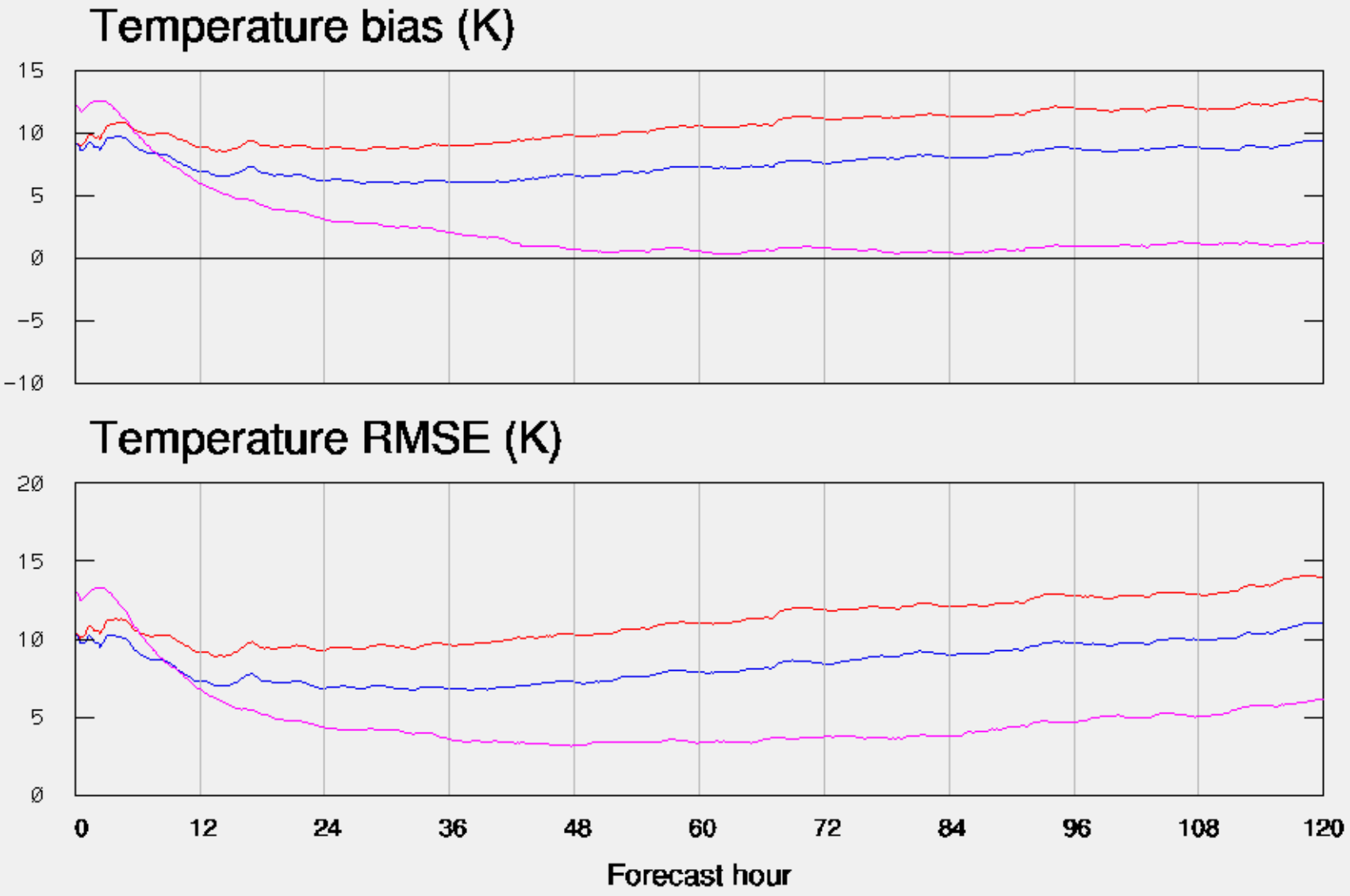


Original WRF

Polar modified WRF

Polar modified MM5

Henry AWS April 2007

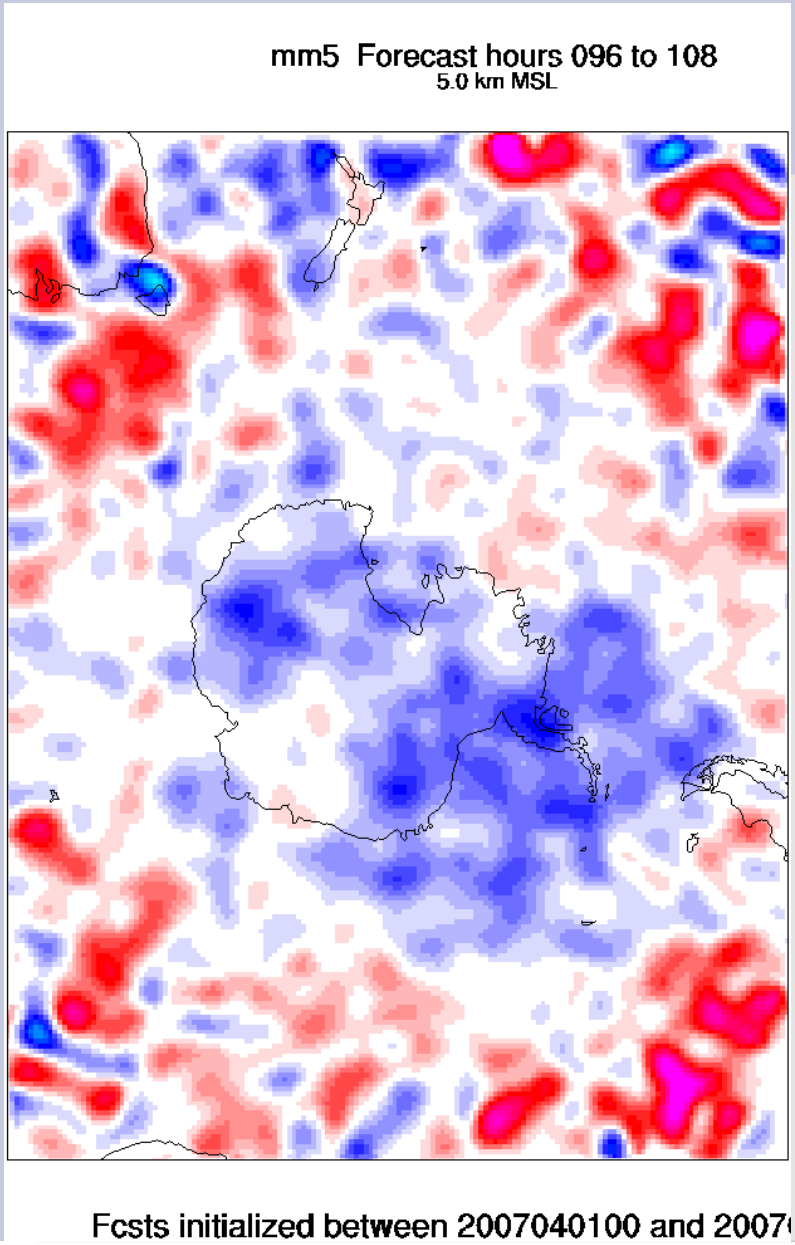


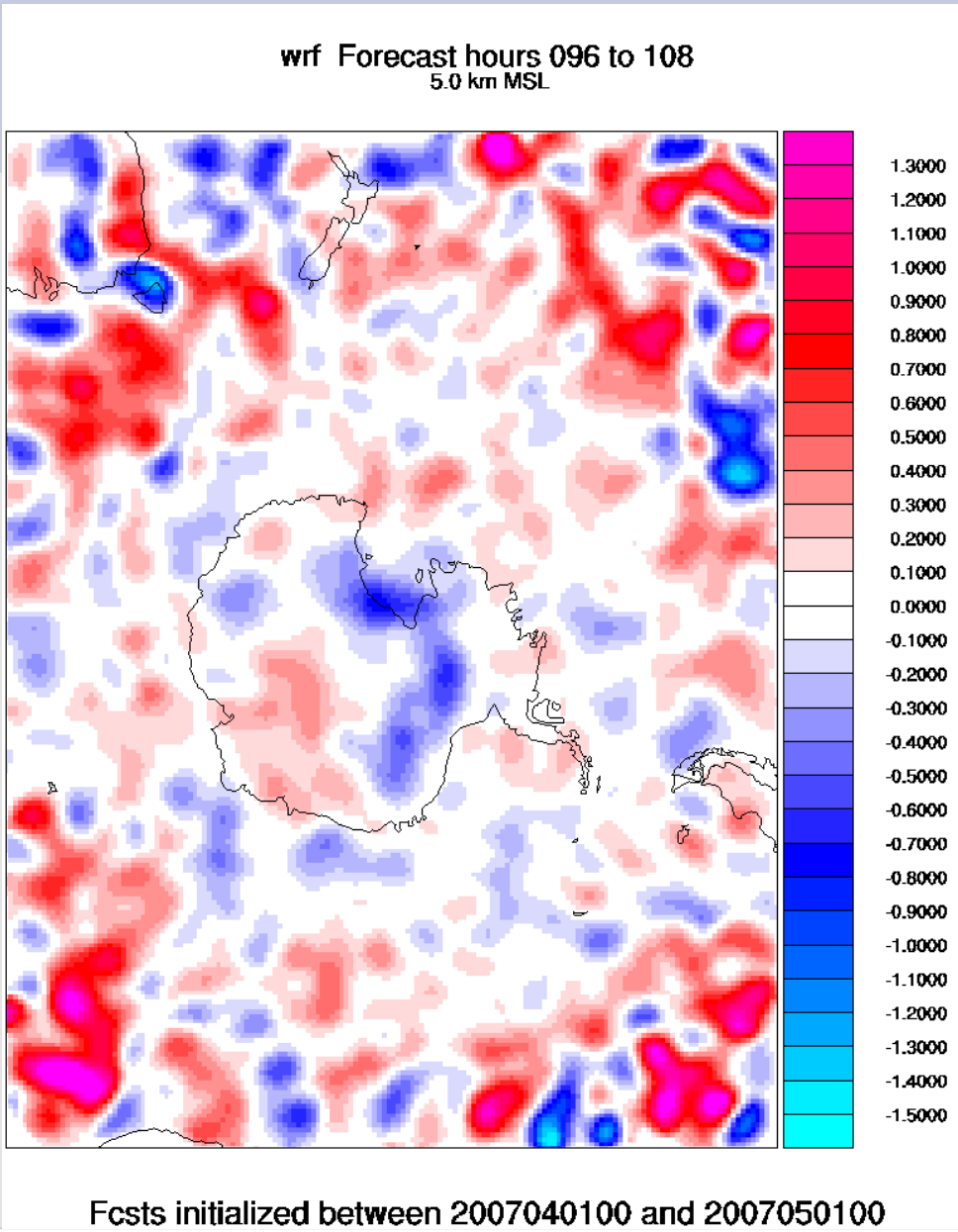
Original WRF

Polar modified WRF

Polar modified MM5

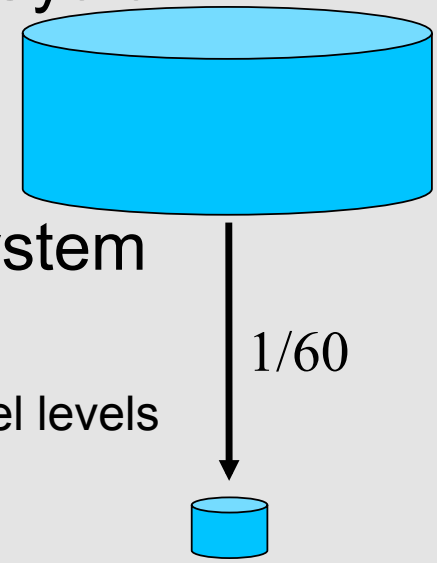
Model error with respect to COSMIC refractivity profiles





Archives of AMPS output

- OSU-BPRC has subset on disk
- NCAR has full archive on Mass Storage System
  - MM5 and WRF model output formats
  - 2001-present: ~ 37 TB
- New subsets on NCAR Mass Storage System
  - GRIB (edition 1) for domains 1 and 2
    - T,Q,U,V,Z at 300,500,850 hPa and selected model levels
    - Other surface variables (e.g.: precip accum)
    - 2001-present: ~ 600 GB
  - ASCII: time series, profiles at selected points



Future

- End MM5; fully transition to WRF
- Implement polar modifications in WRF
  - Continued development and testing of polar modifications
- Data assimilation advances (D. M. Barker talk)
  - COSMIC GPS occultation refractivities
  - Satellite radiances