AMPS Update – June 2011

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NSF UCAR and Lower Atmosphere Facilities Oversight Section

New This Year

- New CTAM one-way nest
  - Central Trans-Antarctic Mountains
  - Continuing Palmer one-way nest
  - Repeat of LARISSA one-way nest
- Plotting window following the Nathaniel B. Palmer
- Updating meteograms
- Upgrade from WRF version 3.0.1.1 to WRF version 3.2.1
  - 12 UTC, 27 April 2011

AMPS window following Nathaniel B. Palmer

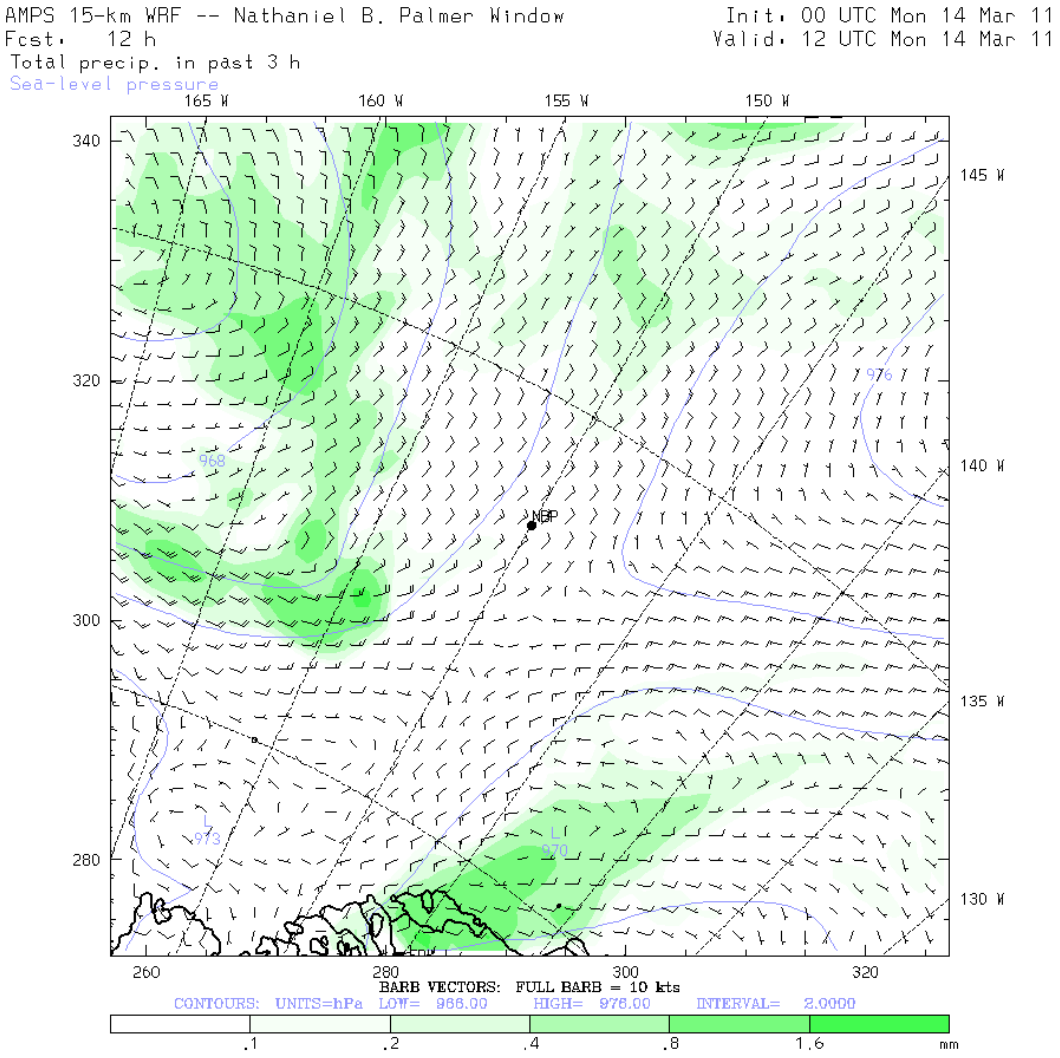
Implemented at the request from NSF

Location of NBP updated for each forecast

New plotting window of the AMPS 15-km grid (grid 2) created for each forecast, centered on the most recent ship location

AMPS wind/SLP/precipitation chart sent via e-mail directly to ship

Will likely add this capability for the Laurence M. Gould this upcoming season

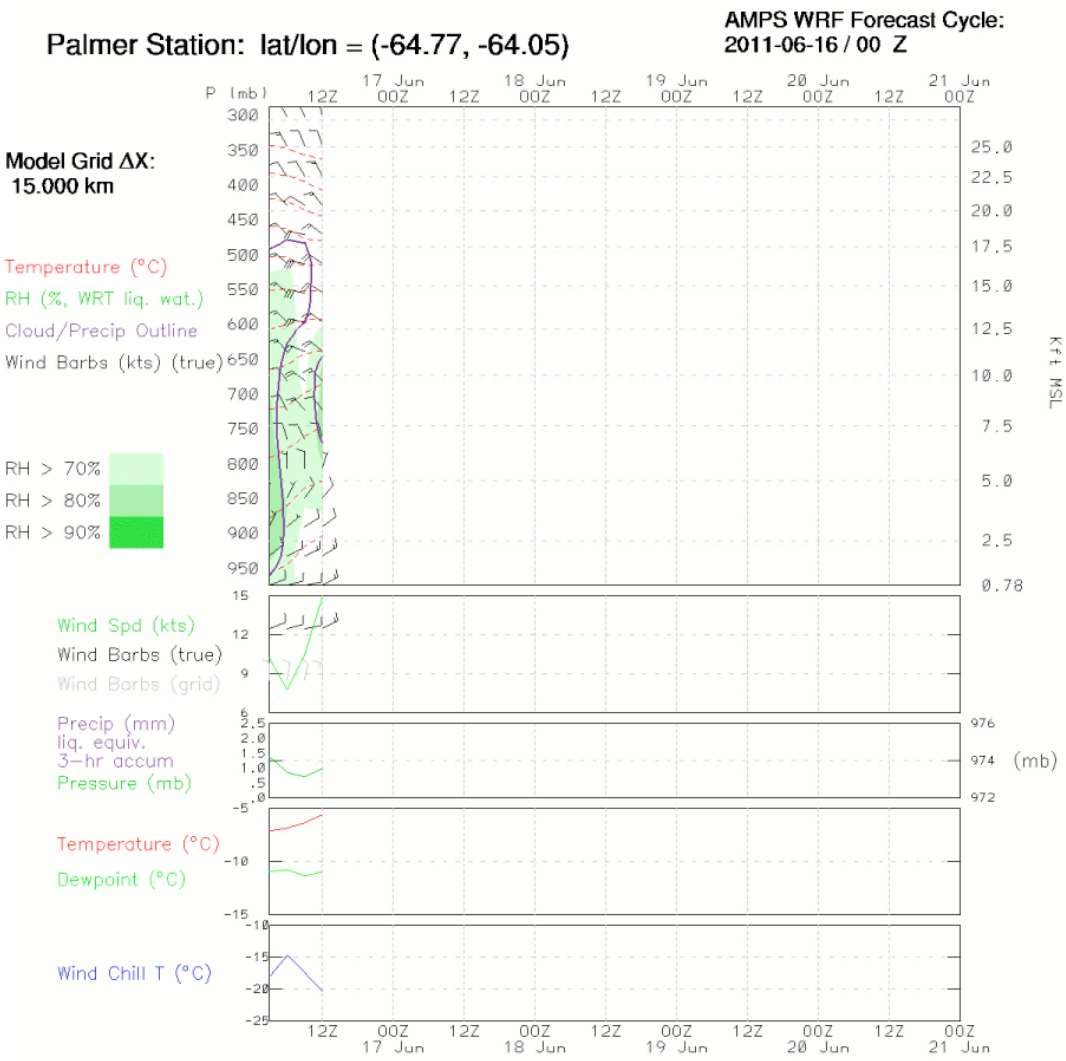


Updating Meteograms

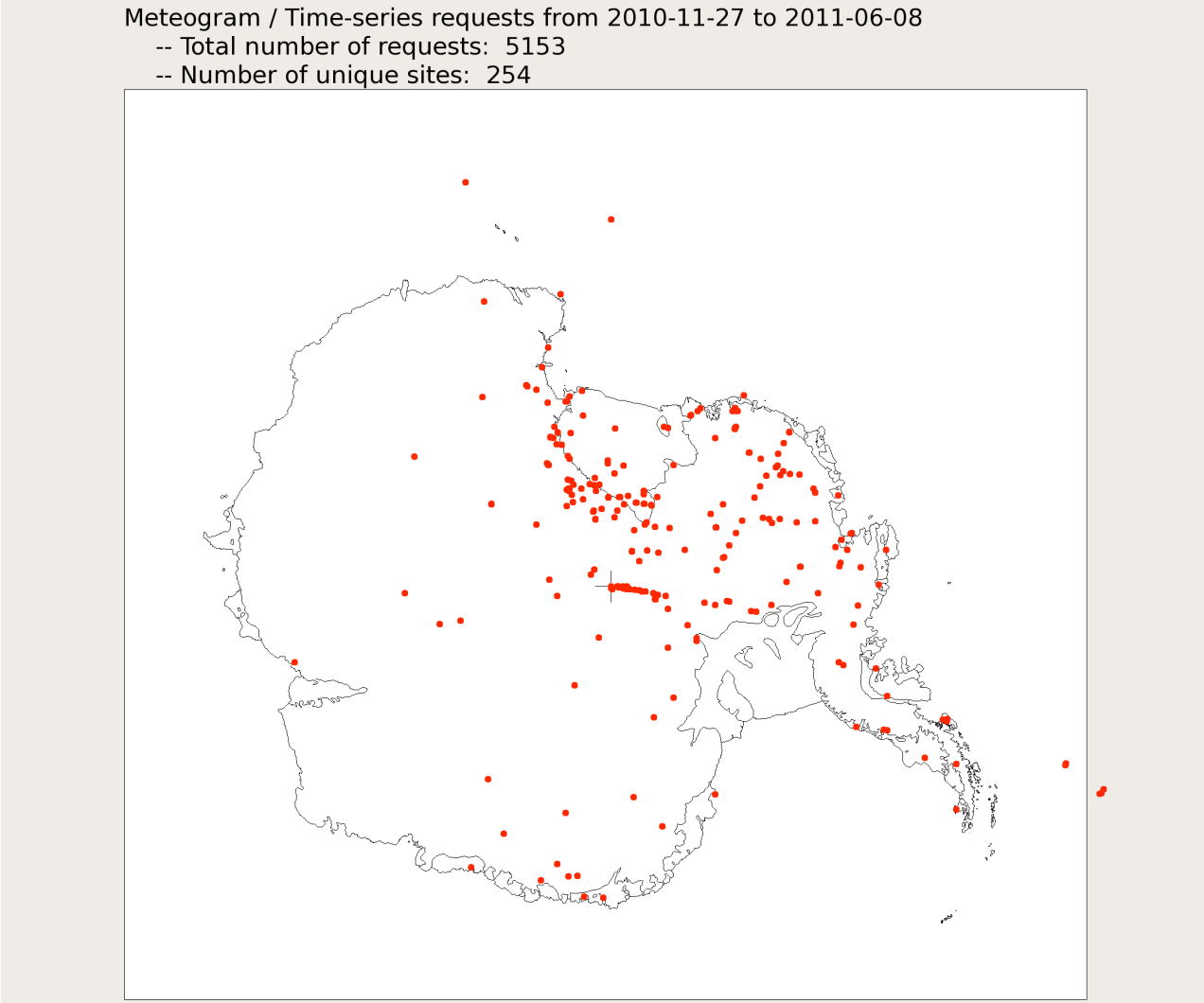
In the past, meteograms were the last AMPS products created. Meteograms were not produced until the model had finished its 5-day forecast.

This meant that even to see early forecast hours in the meteogram format, forecasters needed to wait for the model integration to complete (4-5 hours)

Meteograms are now updated periodically as the forecast progresses



Meteogram on Demand

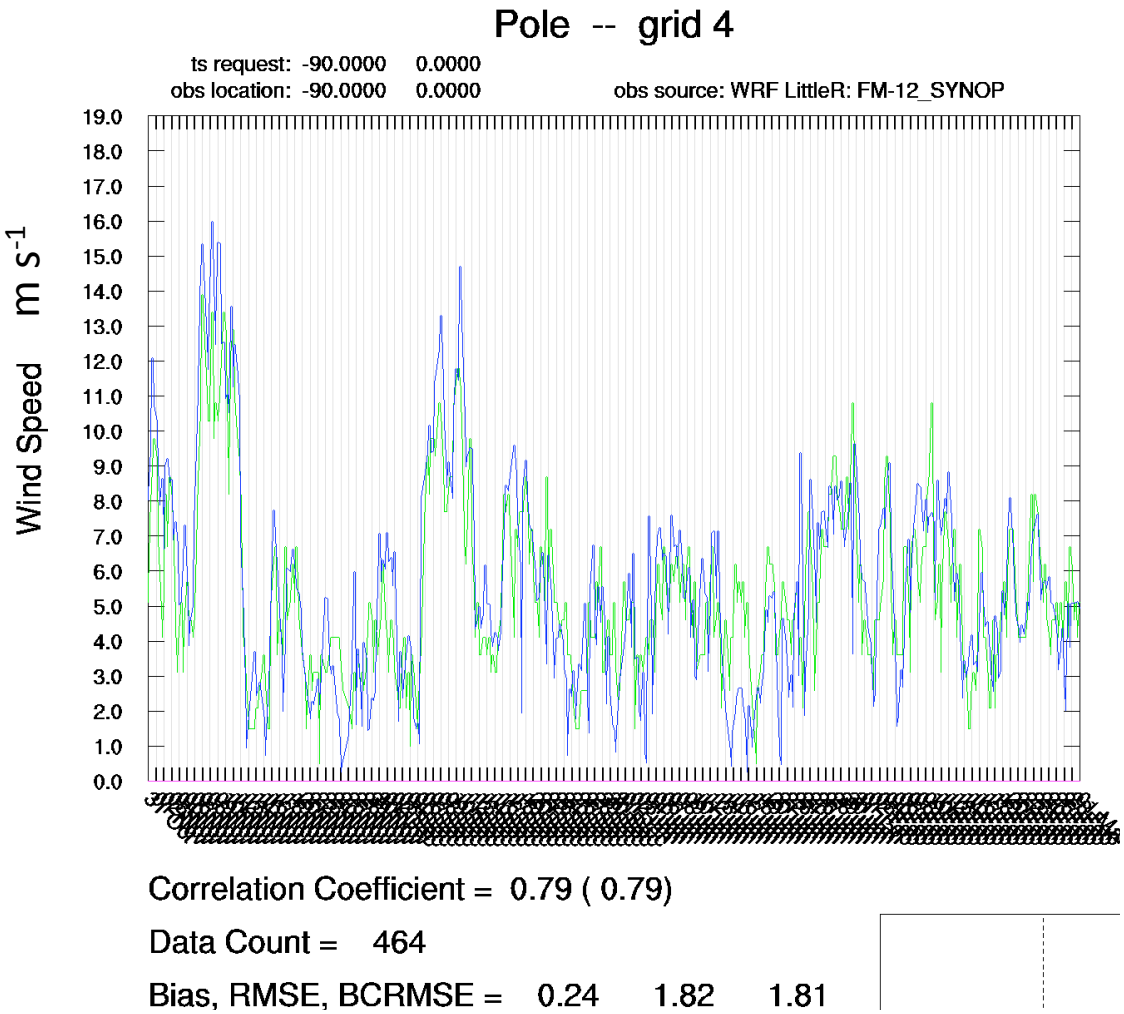


2010/2011 Season
AMPS Statistics

- Nov, Dec, Jan, Feb
- Before the upgrade to WRF v3.2.1

Thanks to AMRC for all they do in collecting Antarctic observations and making them accessible

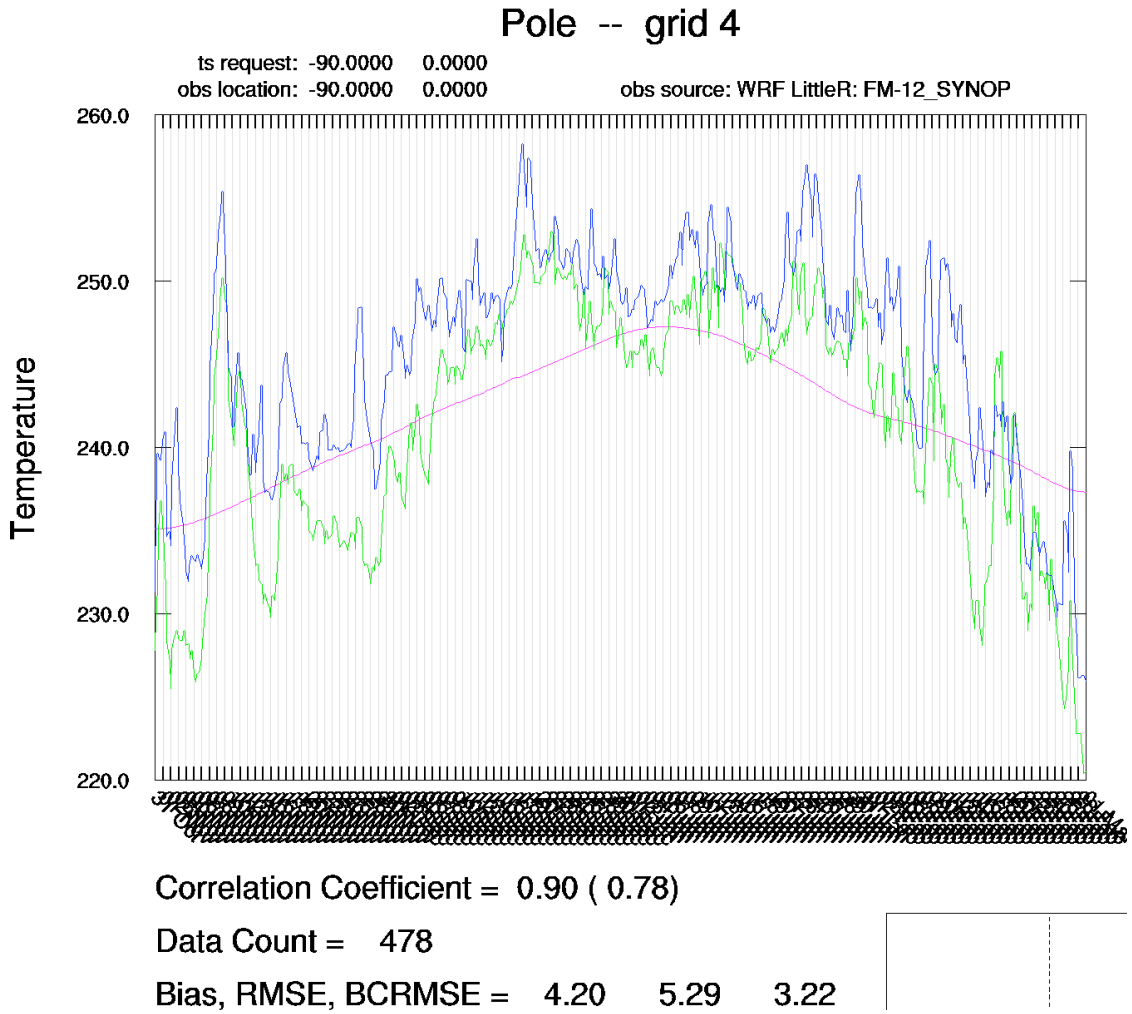
AMPS 18-30 hour forecasts
31 Oct 2010 through 01 Mar 2011



Green: Obs

Blue: AMPS 18-30 hour forecasts

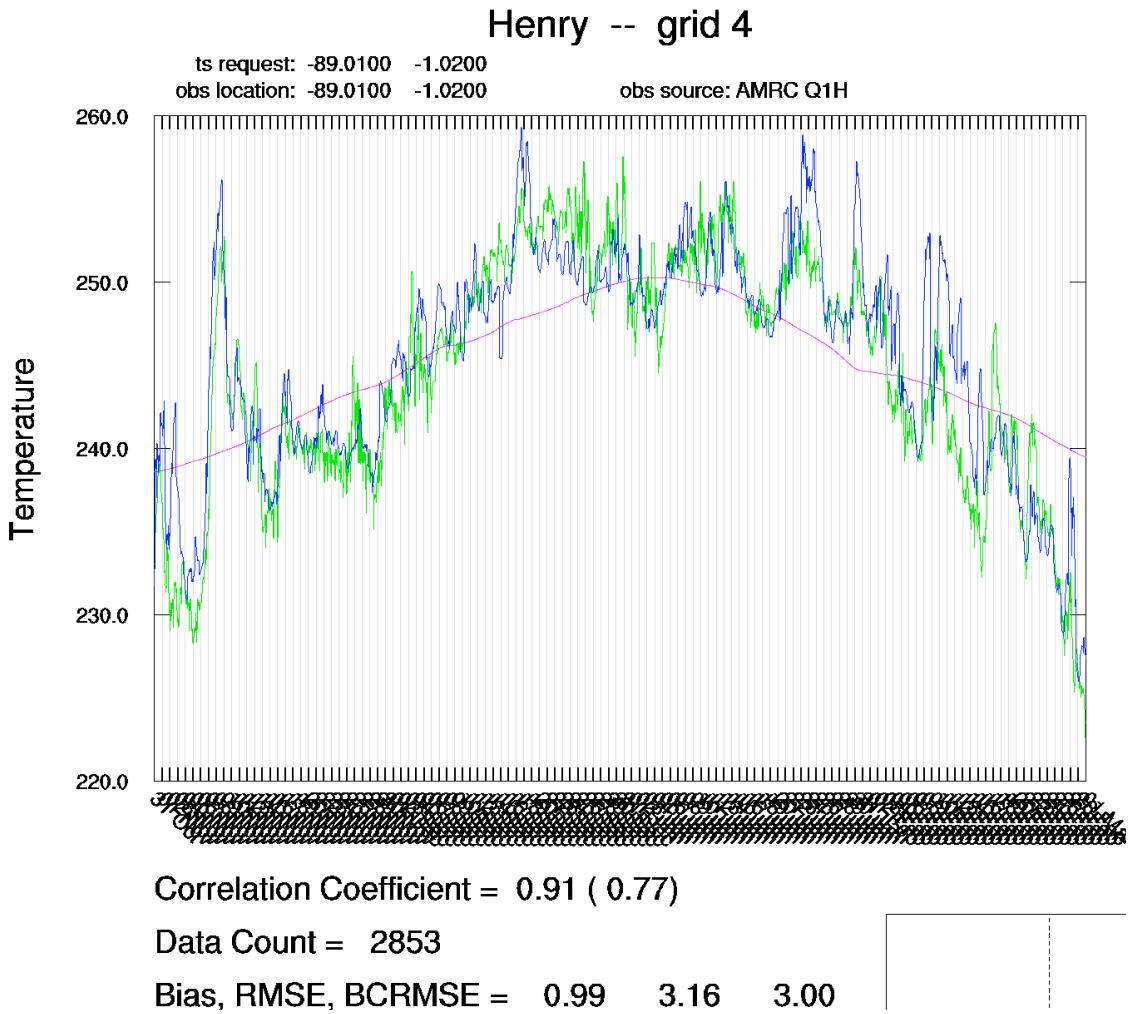
AMPS 18-30 hour forecasts
31 Oct 2010 through 01 Mar 2011



Green: Obs

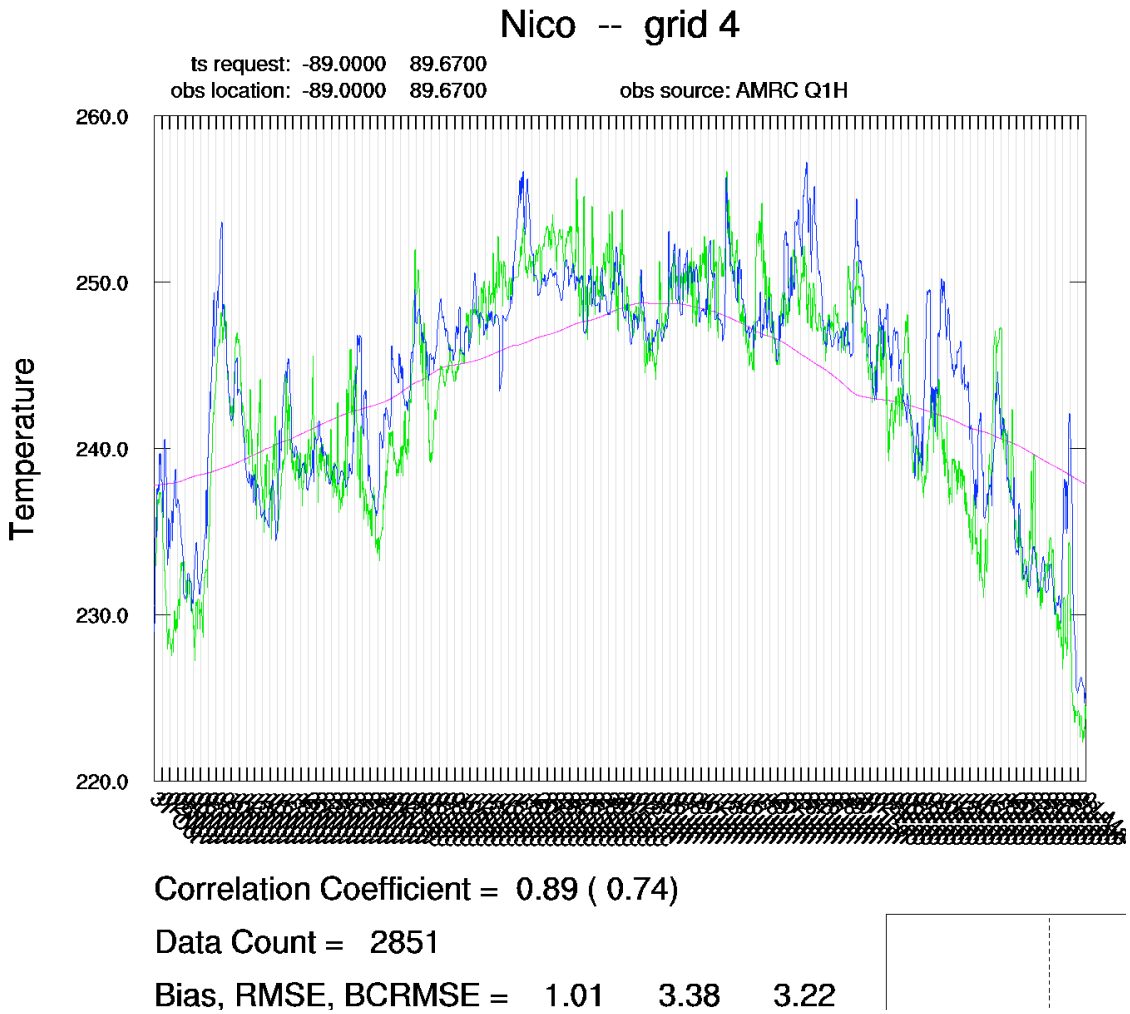
Blue: AMPS 18-30 hour forecasts

AMPS 18-30 hour forecasts
31 Oct 2010 through 01 Mar 2011



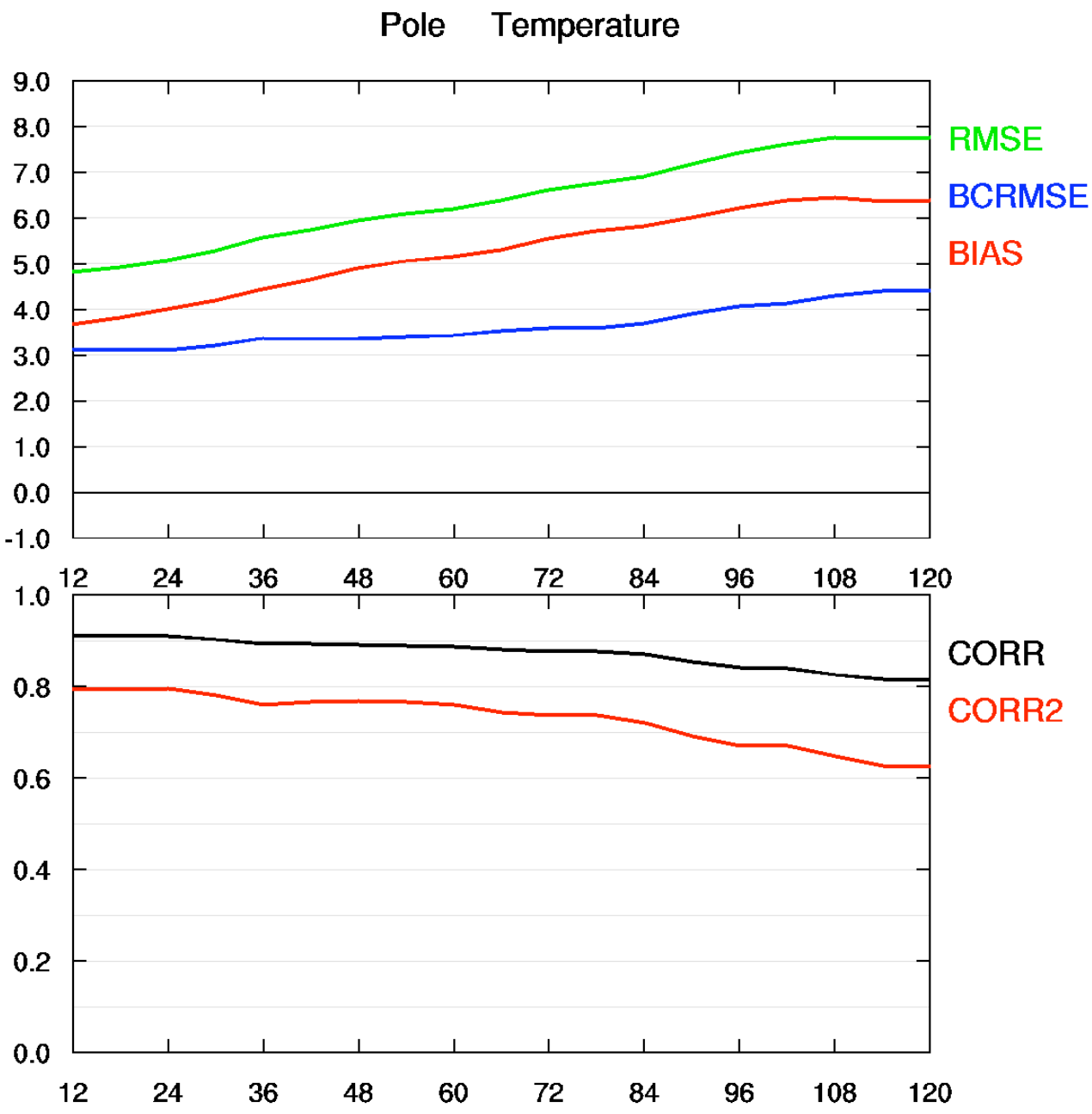
Green: Obs
Blue: AMPS

AMPS 18-30 hour forecasts
31 Oct 2010 through 01 Mar 2011



Green: Obs
Blue: AMPS

- Behavior at Pole different from Henry and Nico
  - Influence of human activity?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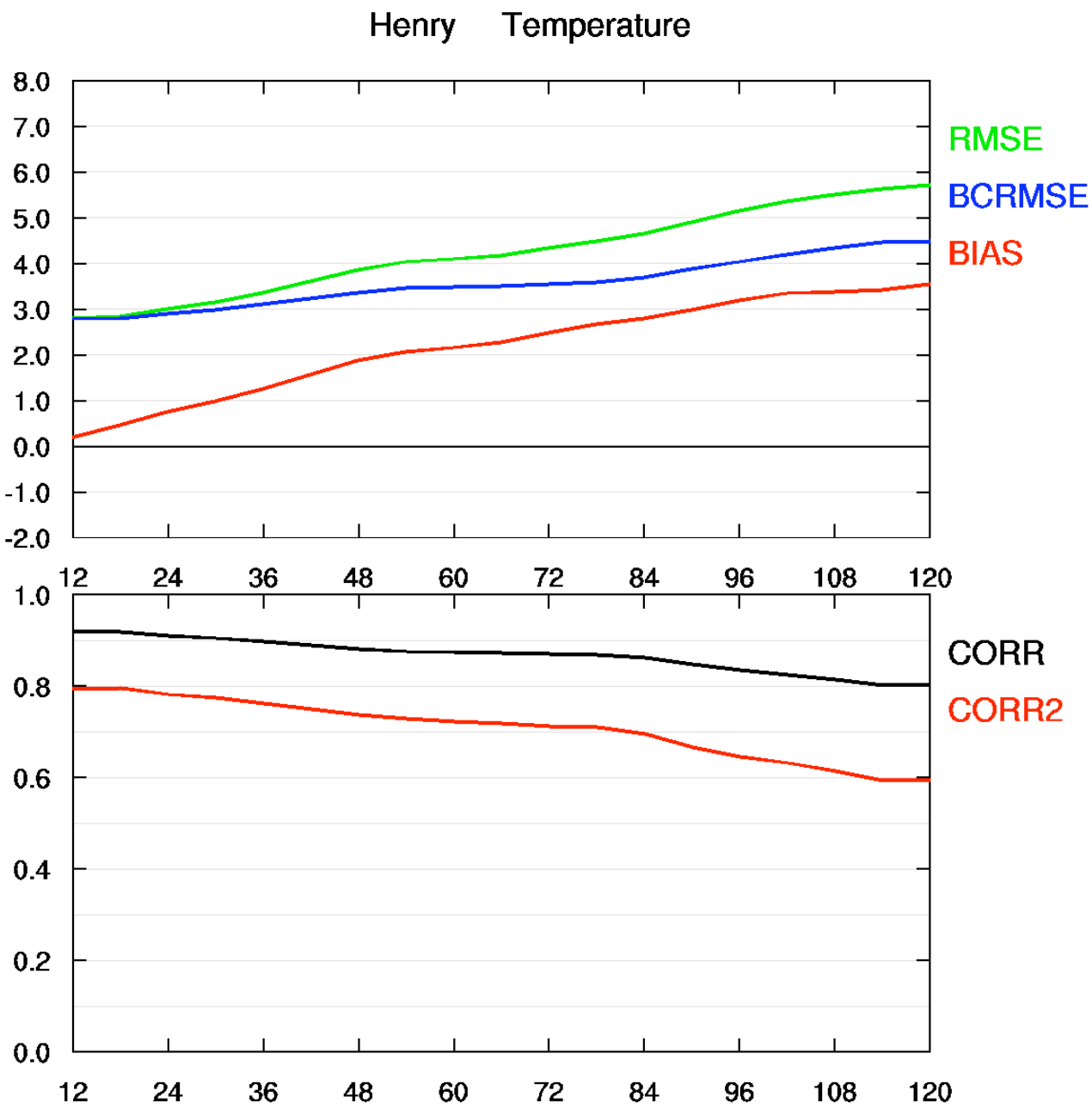
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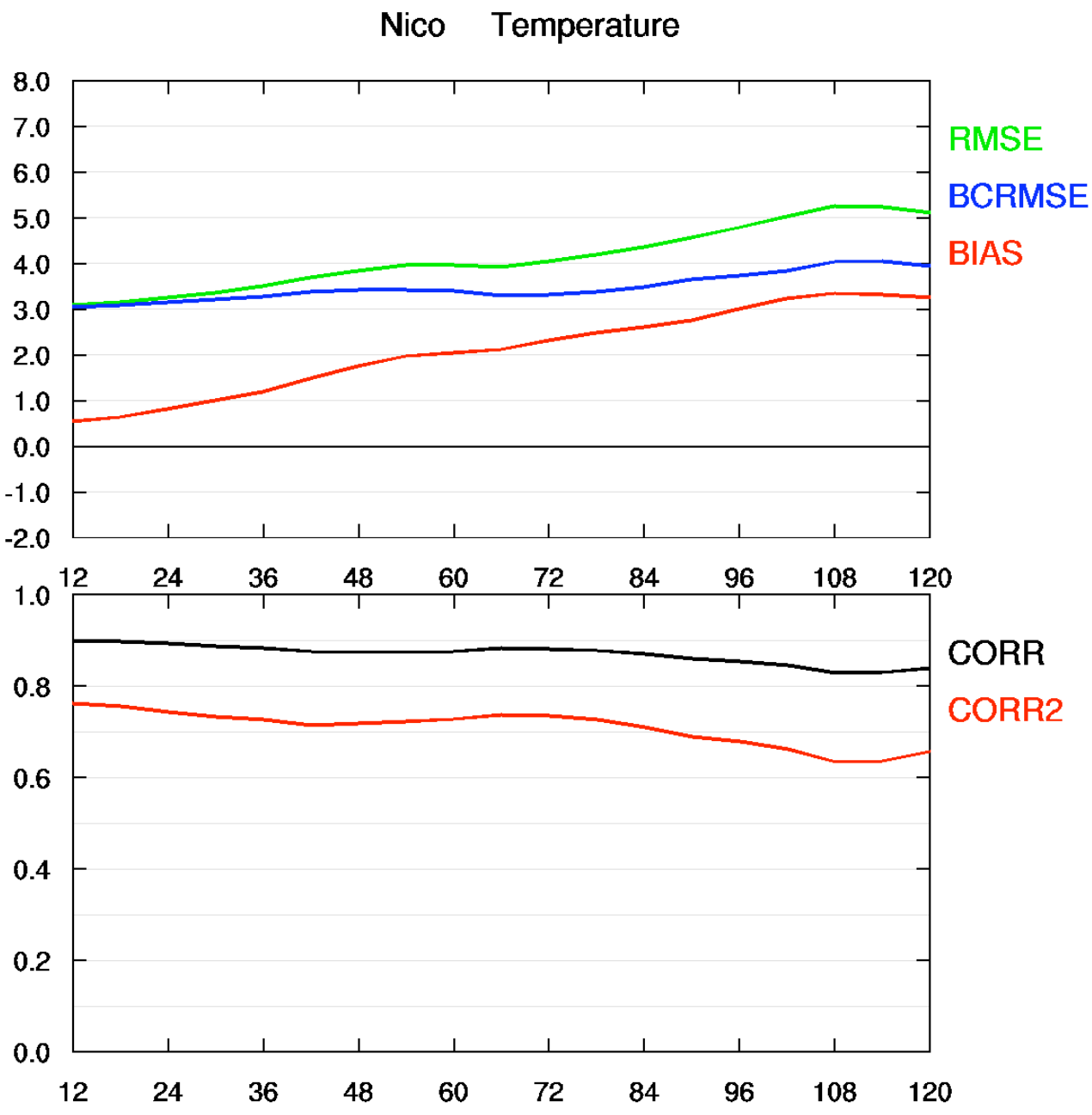
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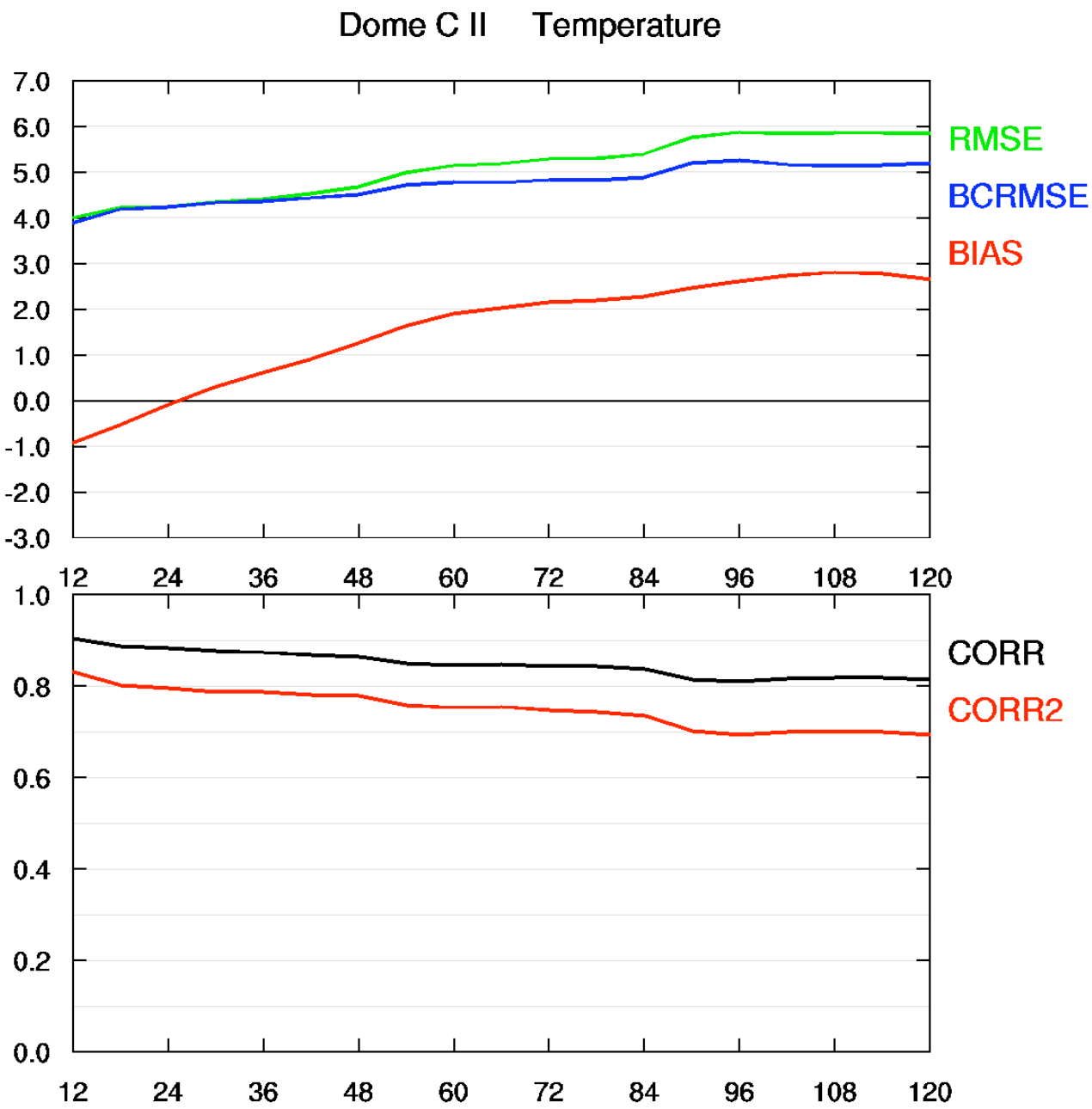
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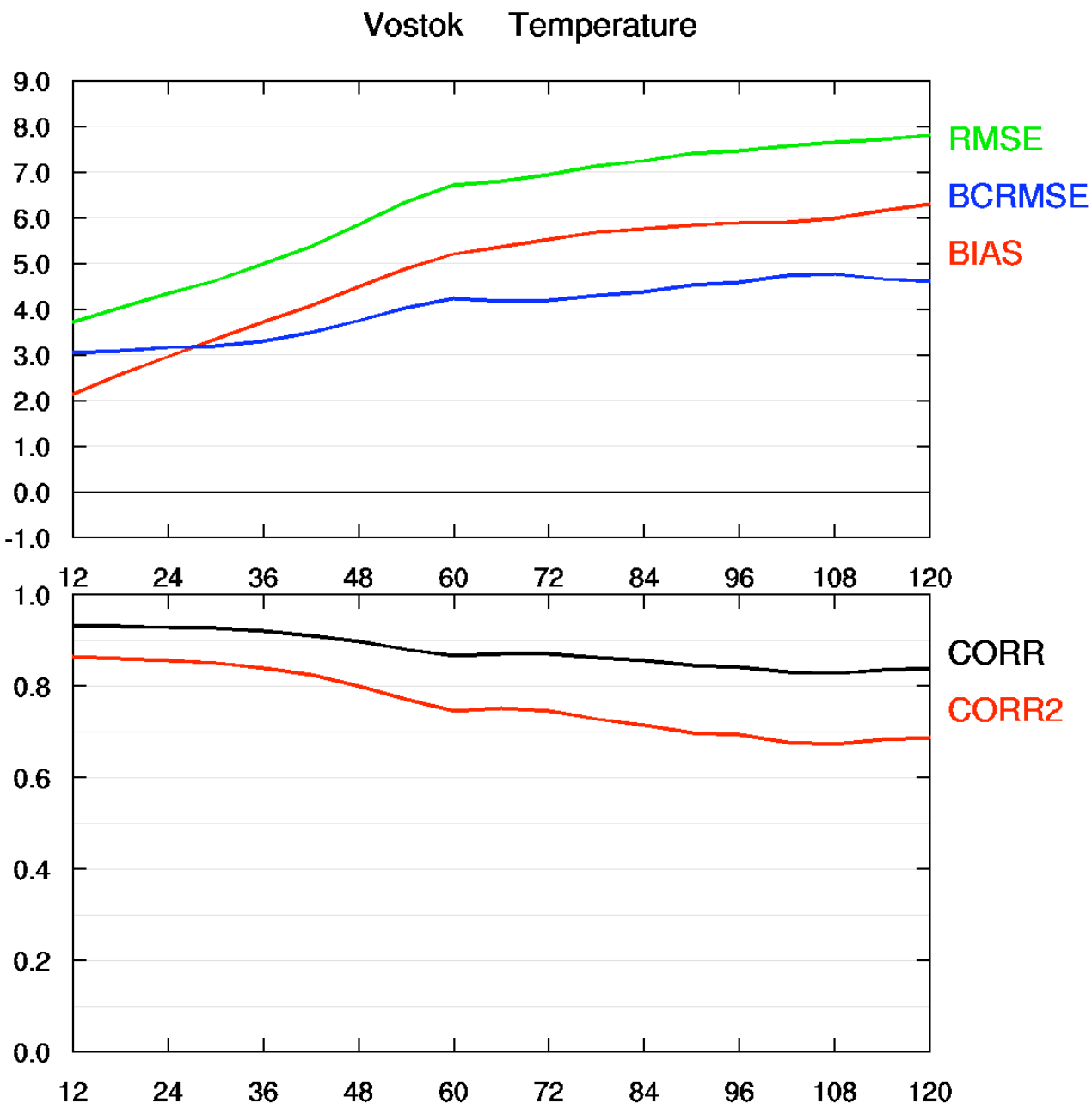
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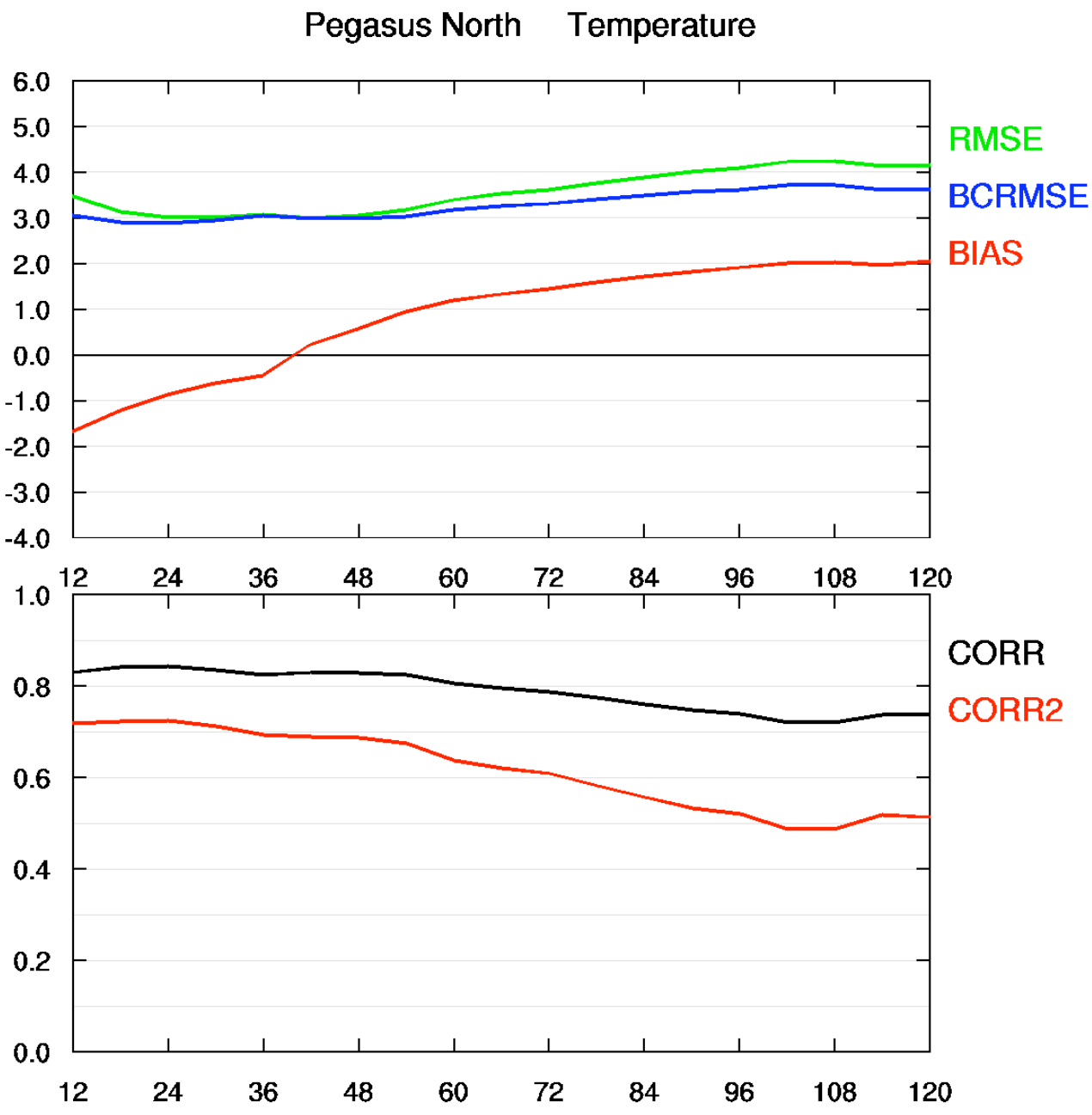
Pegasus North Temperature
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CORR
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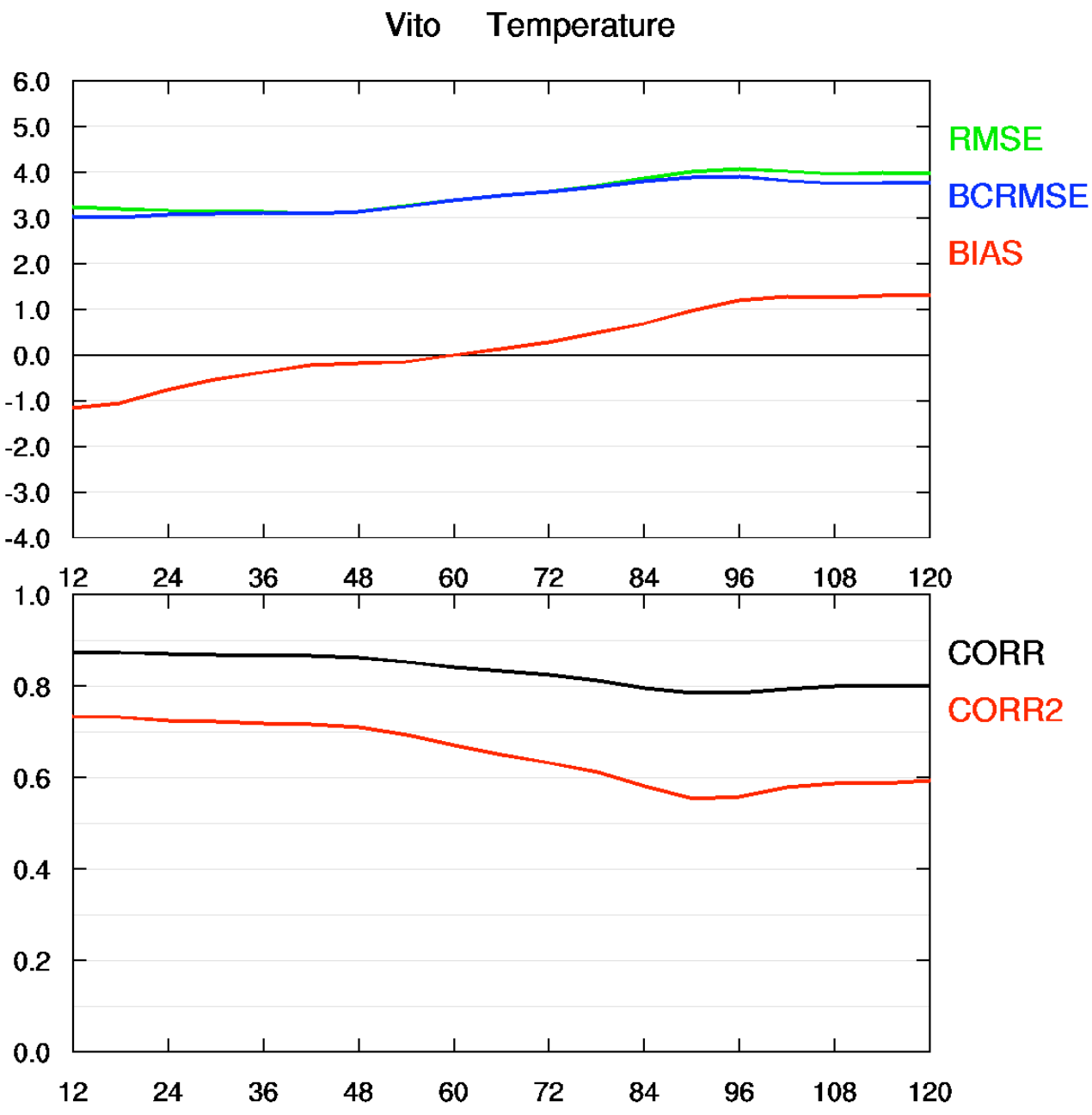
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CORR
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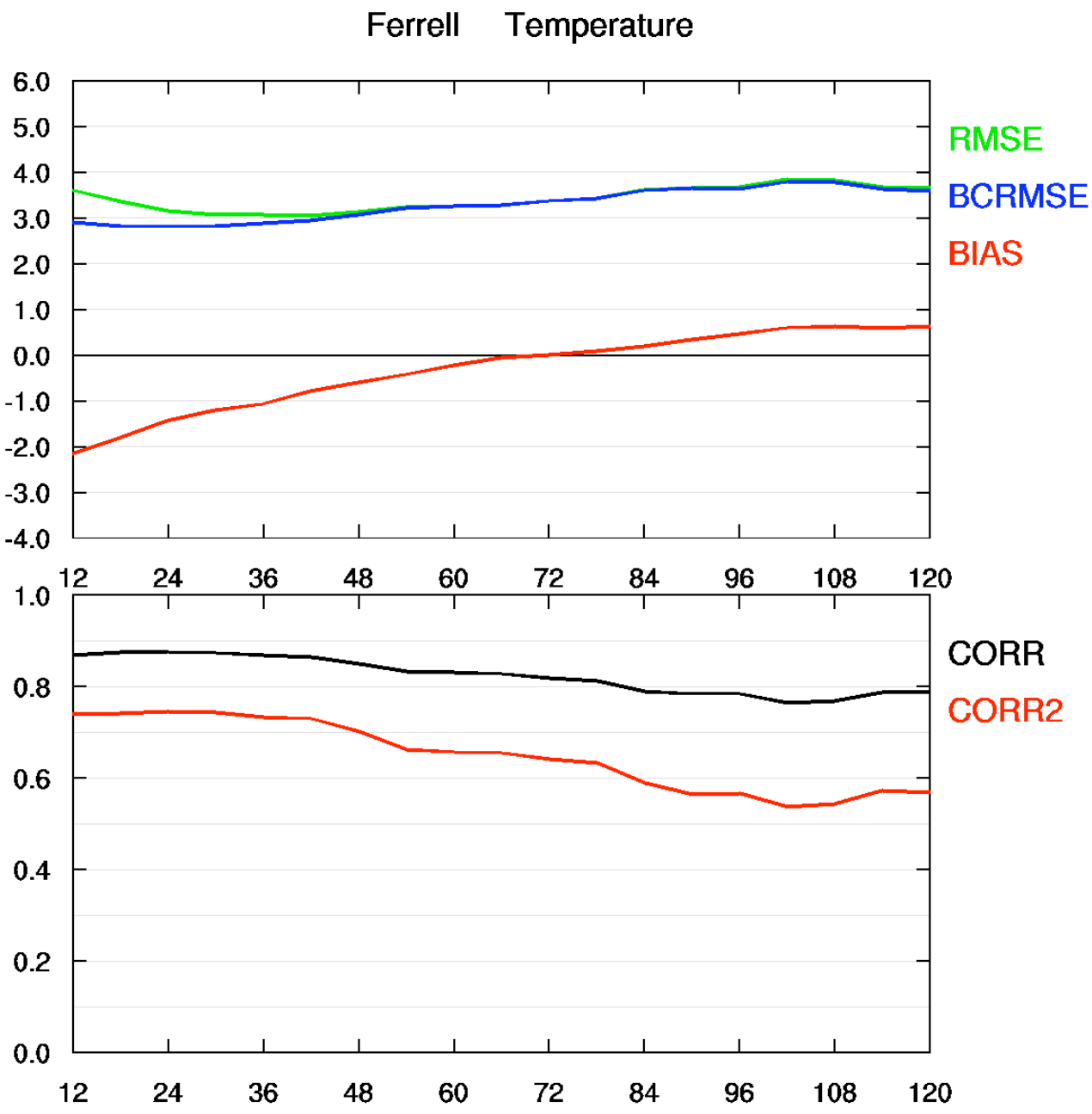
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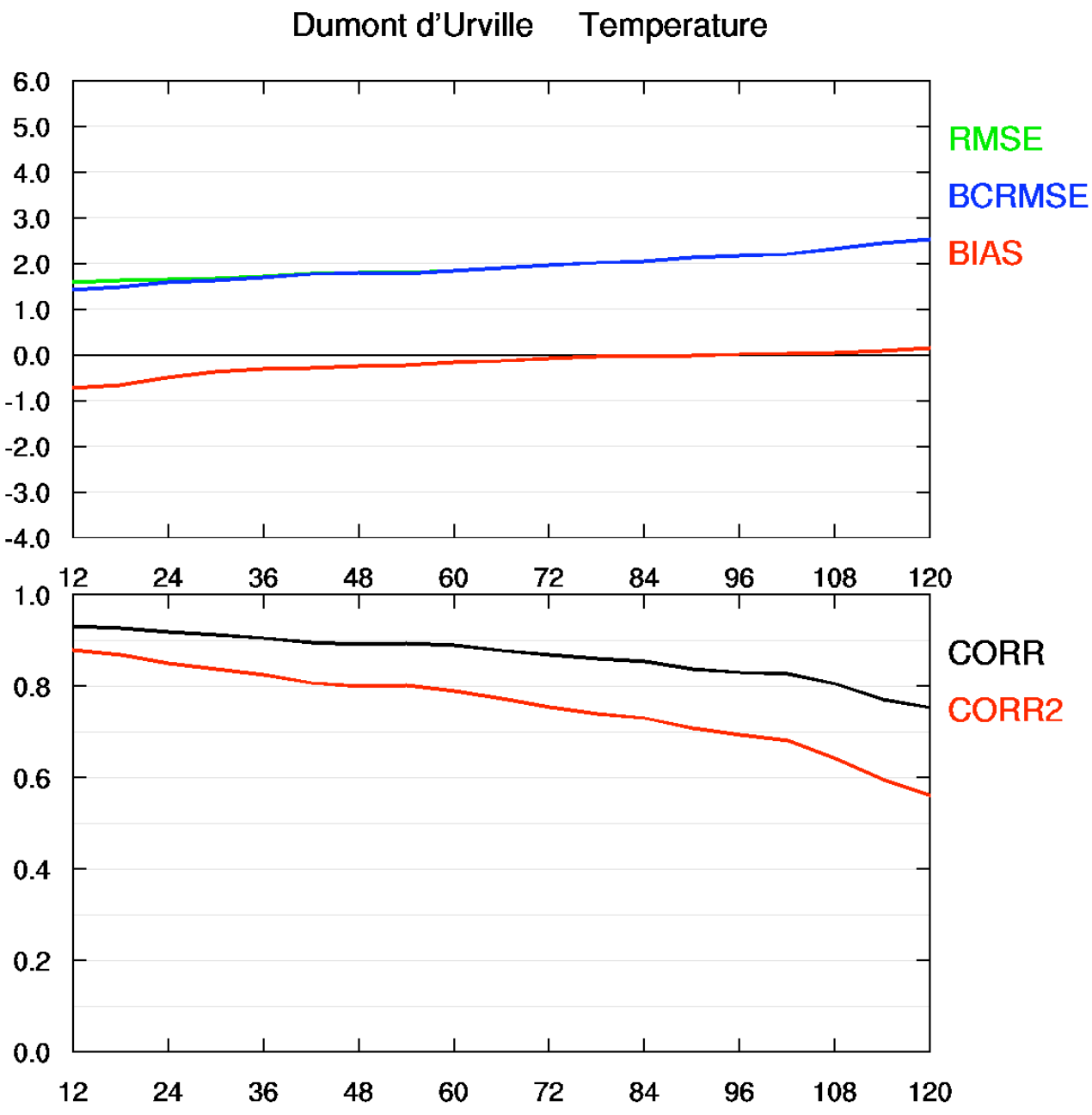
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BIAS
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CORR
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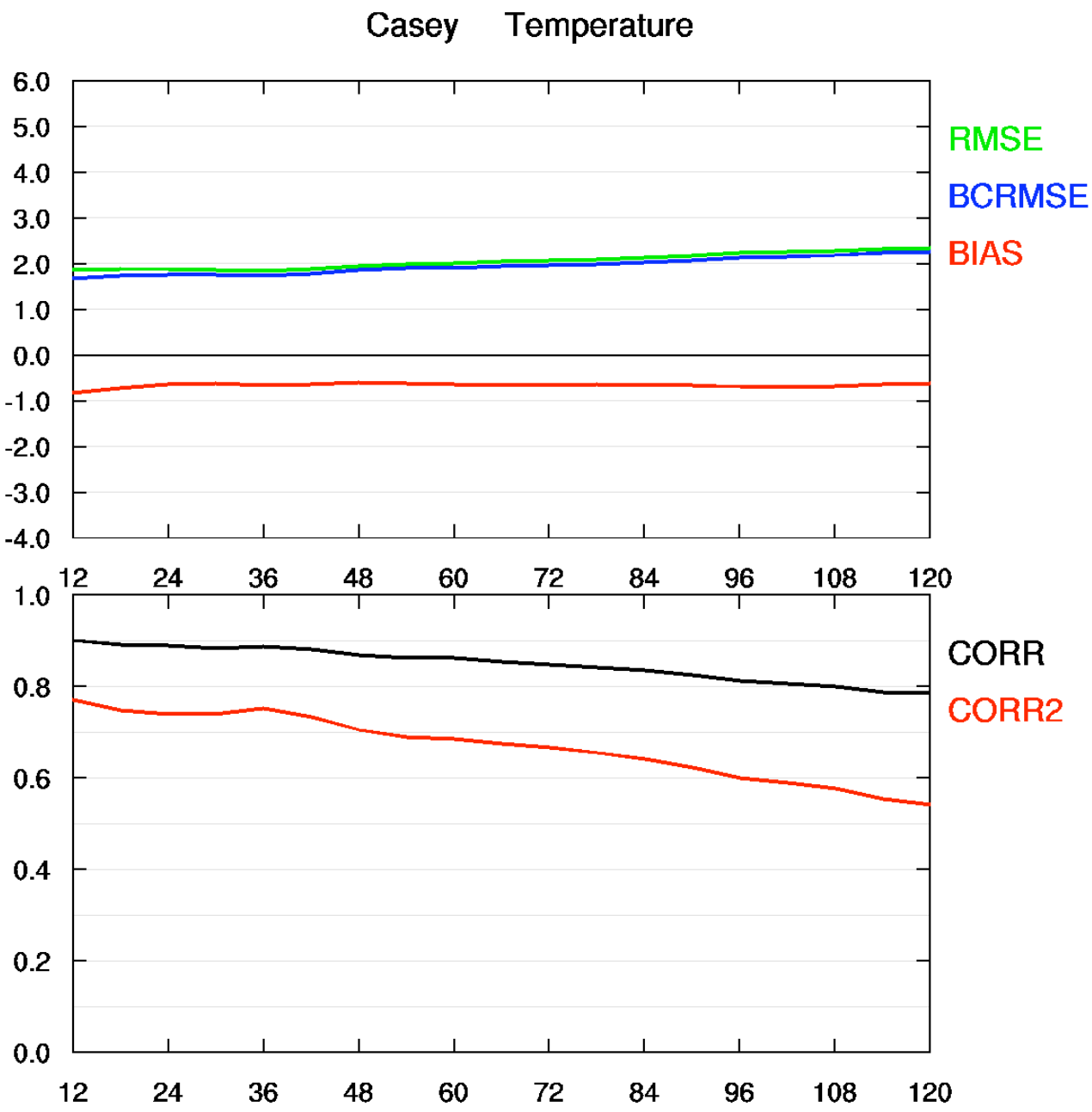
Casey Temperature
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BIAS
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CORR
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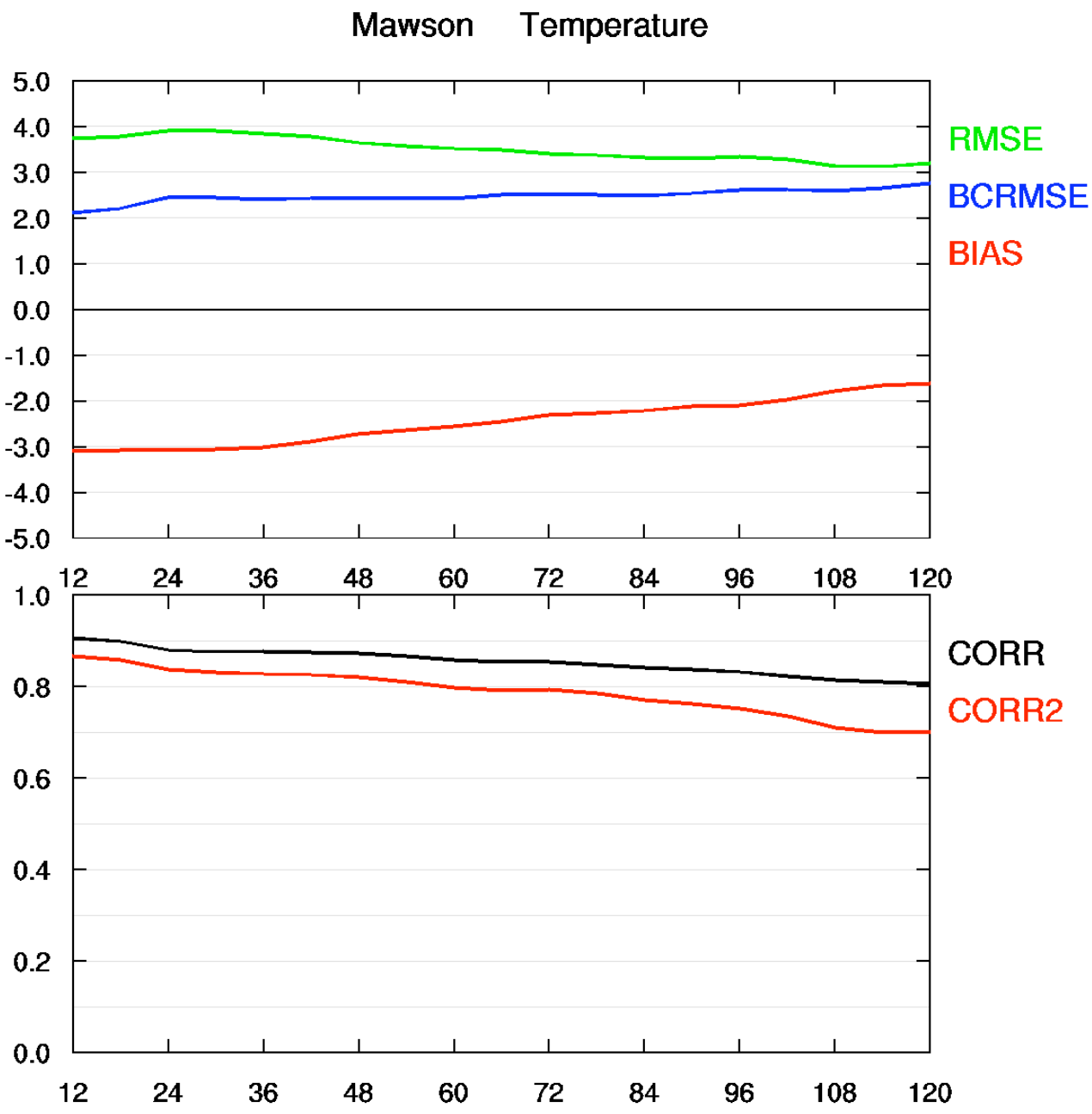
Mawson Temperature
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BIAS
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CORR
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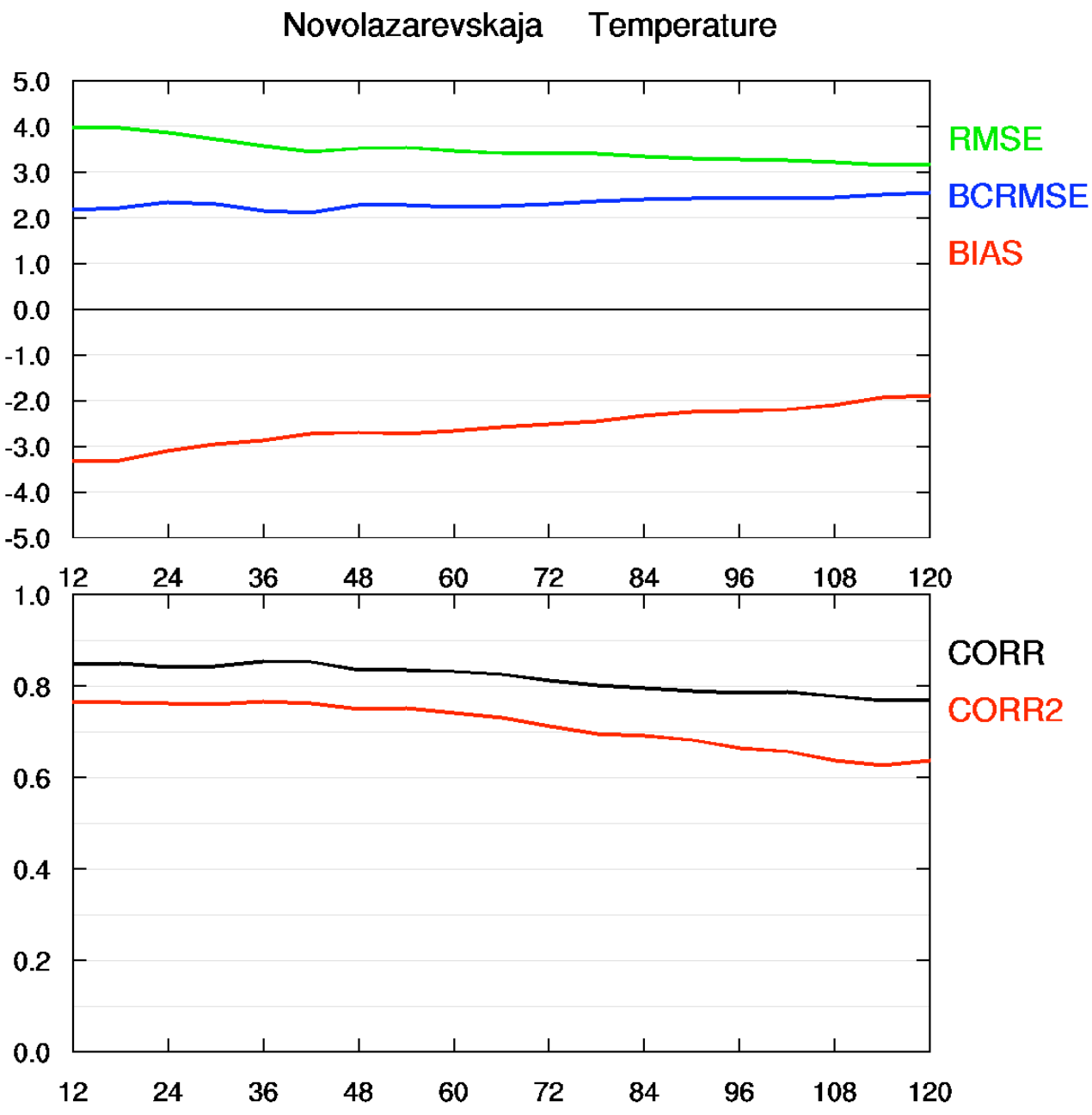
Novolazarevskaja Temperature
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BIAS
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CORR
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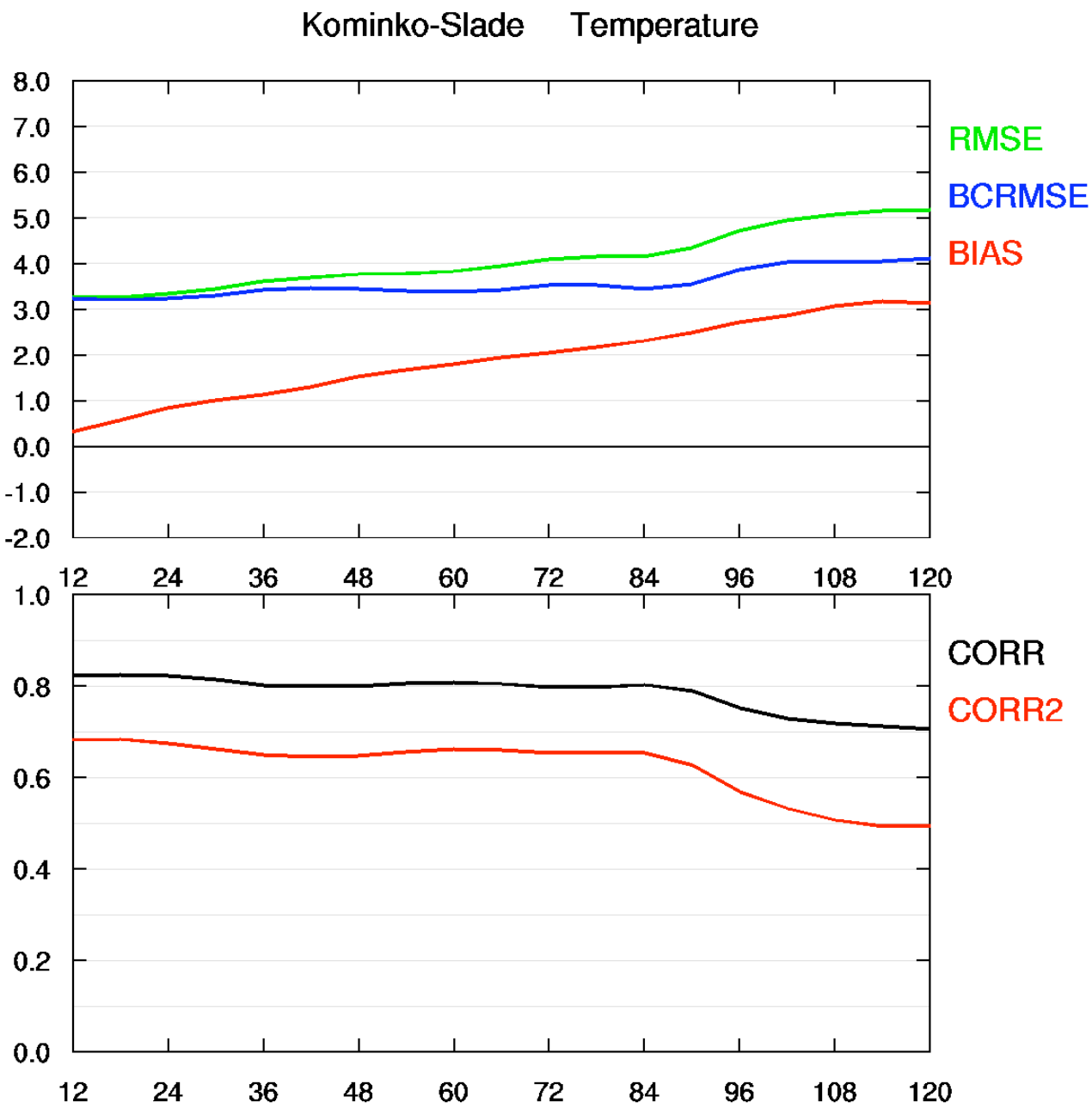
Kominko-Slade Temperature
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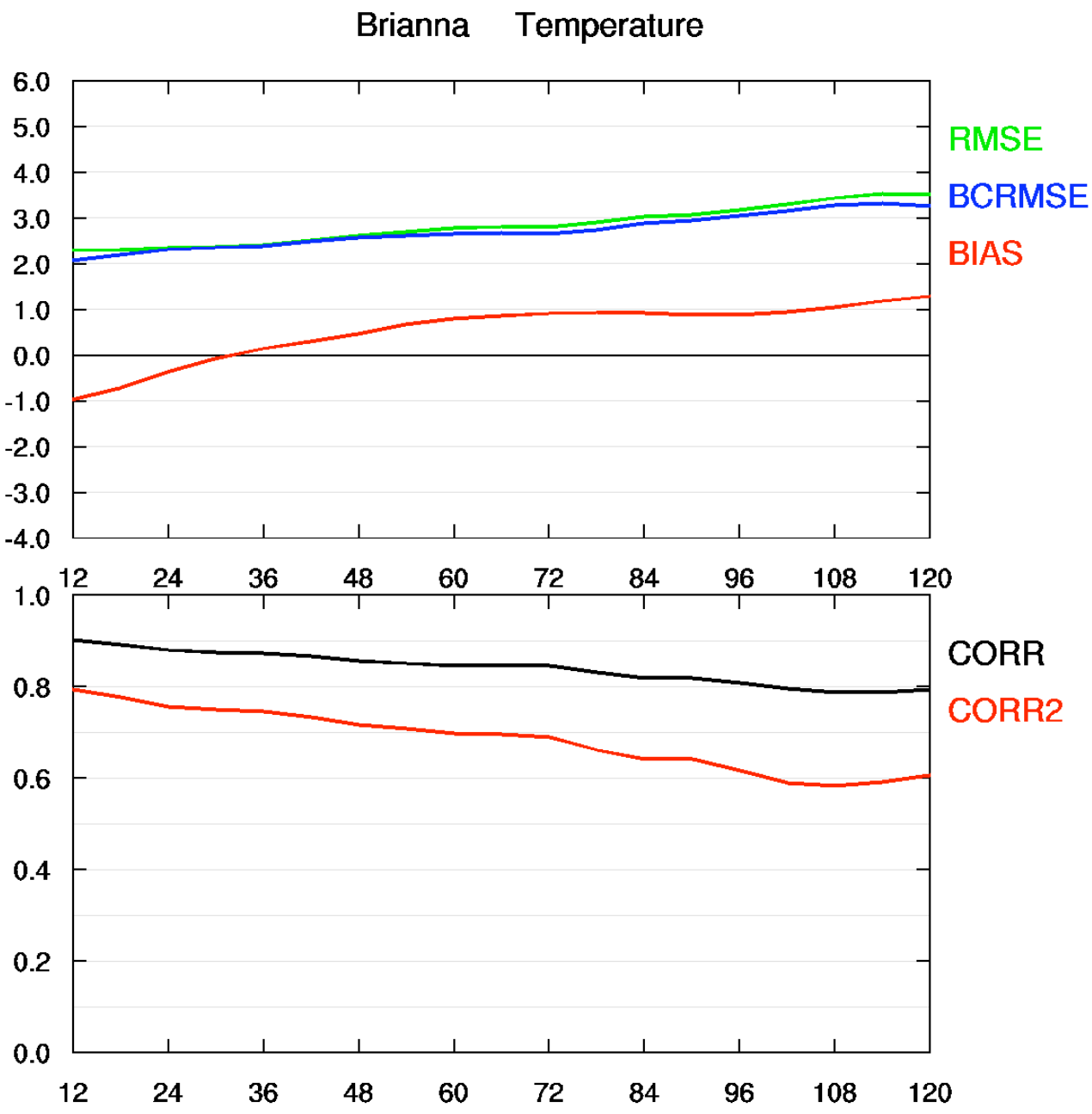
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RMSE
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BIAS
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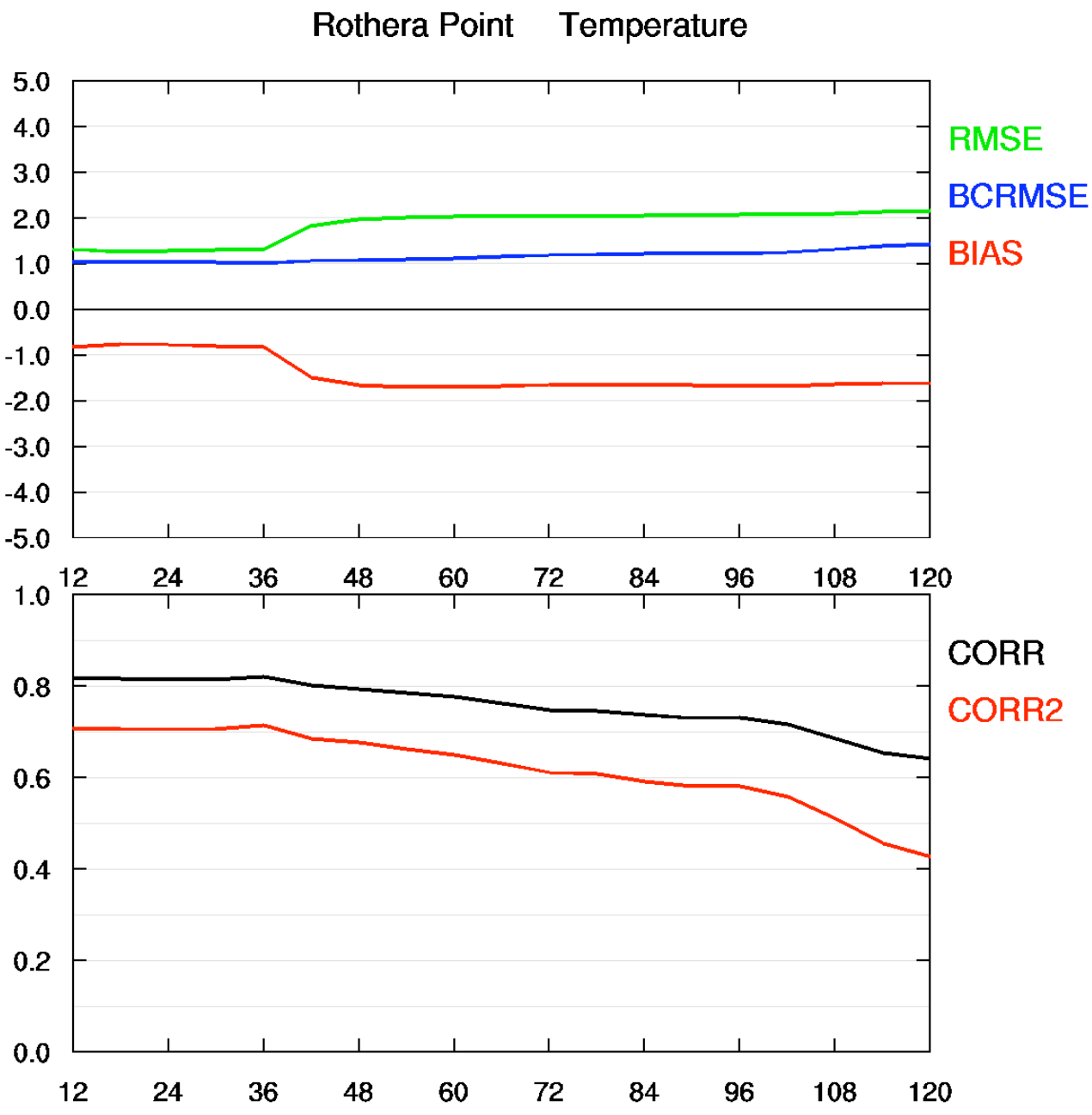
CORR
CORR2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RMSE
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BIAS
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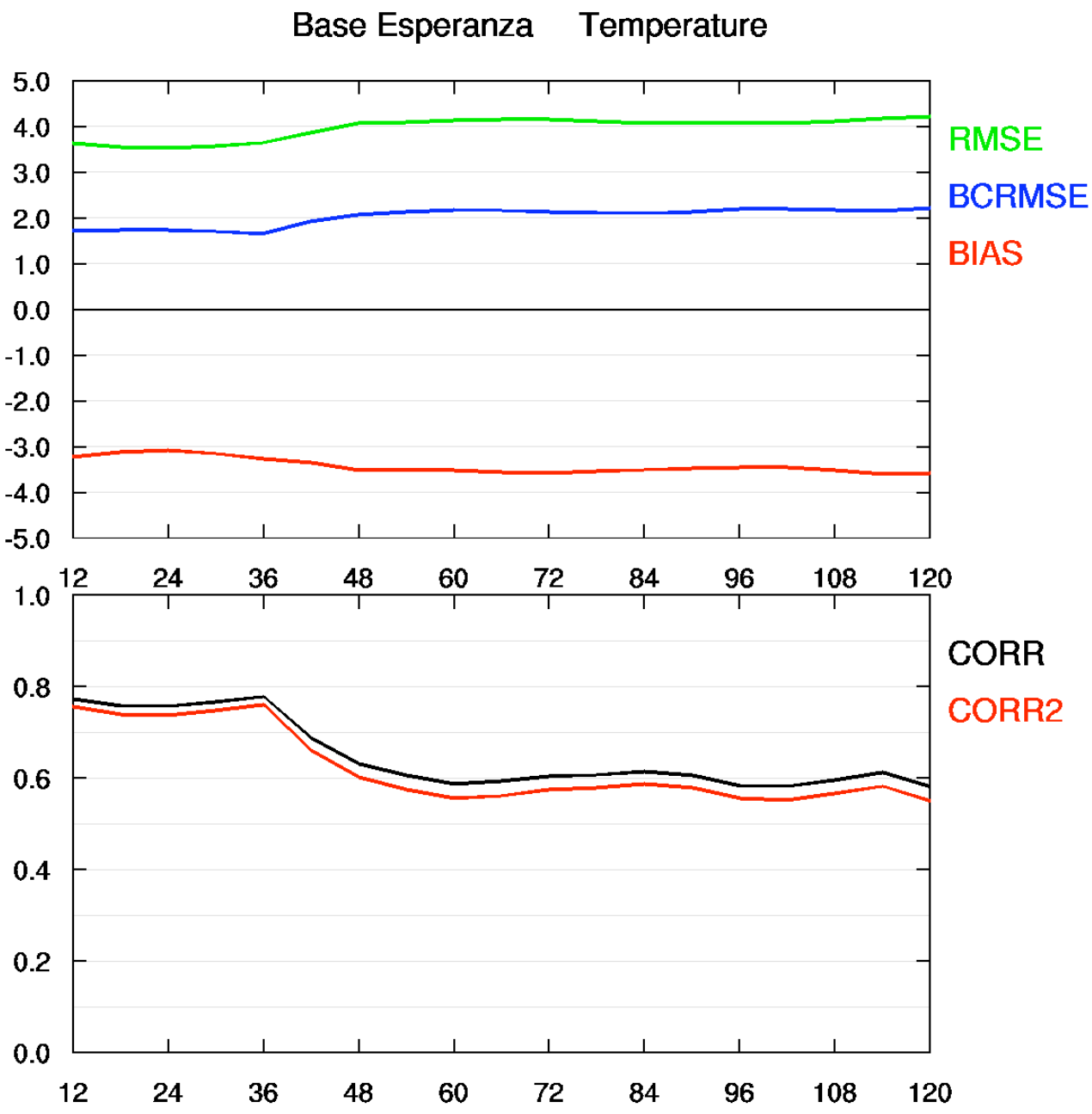
CORR
CORR2


Base Esperanza Temperature
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CORR
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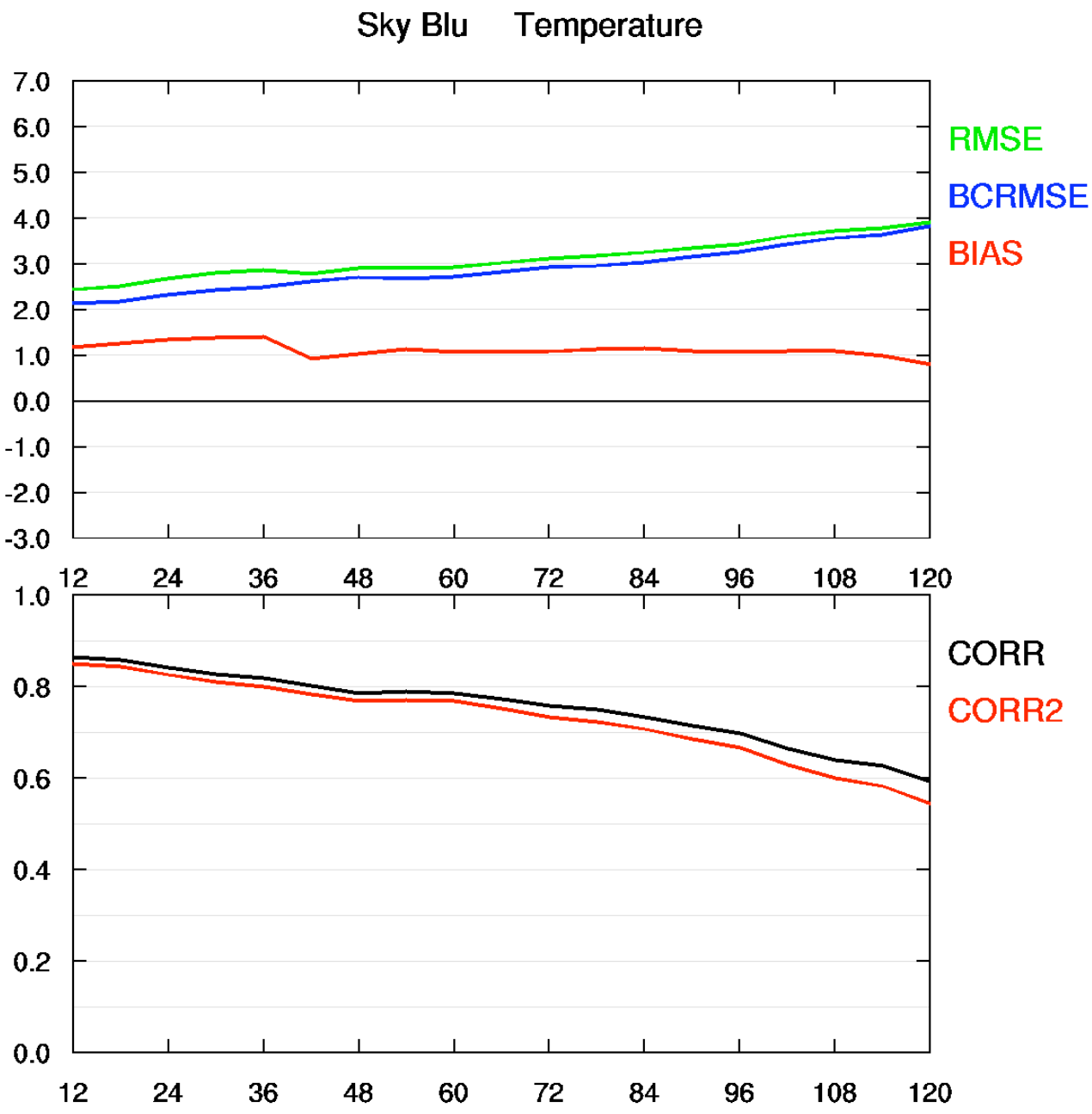
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RMSE
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CORR
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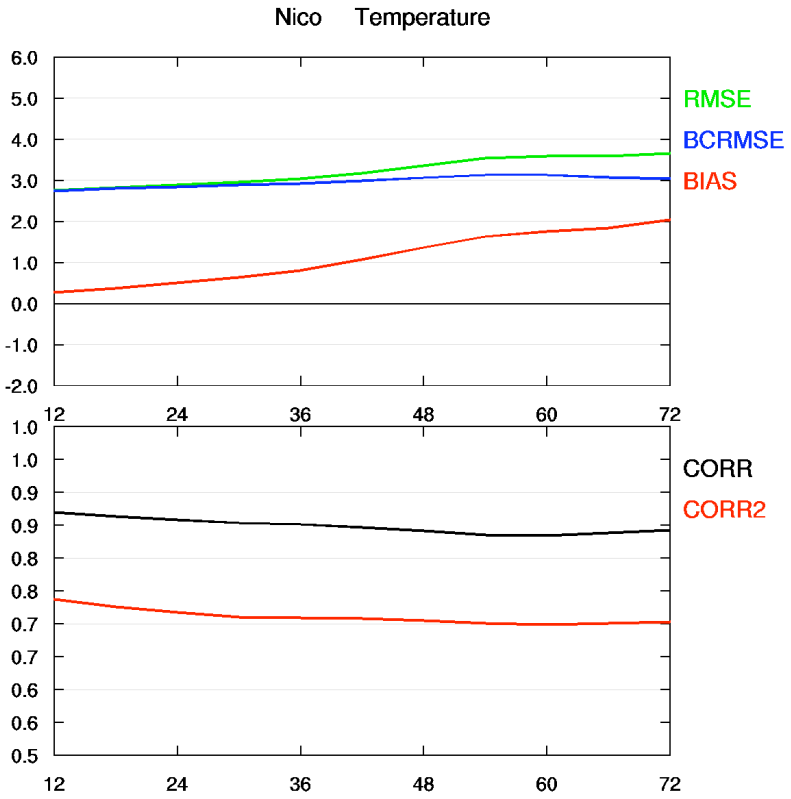
- AMPS shows consistent warming trend over 120-hour forecast
  - Except Antarctic Peninsula, some coastal stations
- AMPS shows rising pressure trend over East Antarctic Plateau, falling trend over Ross Ice Shelf region, mixed results elsewhere
- Consistent behavior between 2009/2010 and 2010/2011 seasons

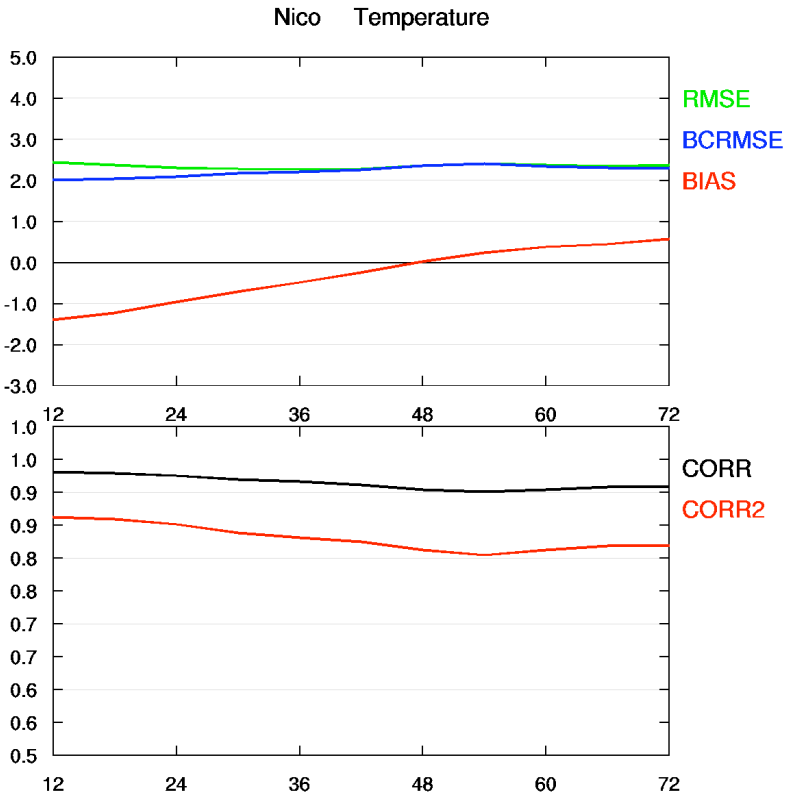
- These statistics computed from AMPS real-time runs with WRF version 3.0.1.1
  - What happens with the newer WRF version 3.2.1?

Comparison to WRF 3.2.1 Temperature Statistics

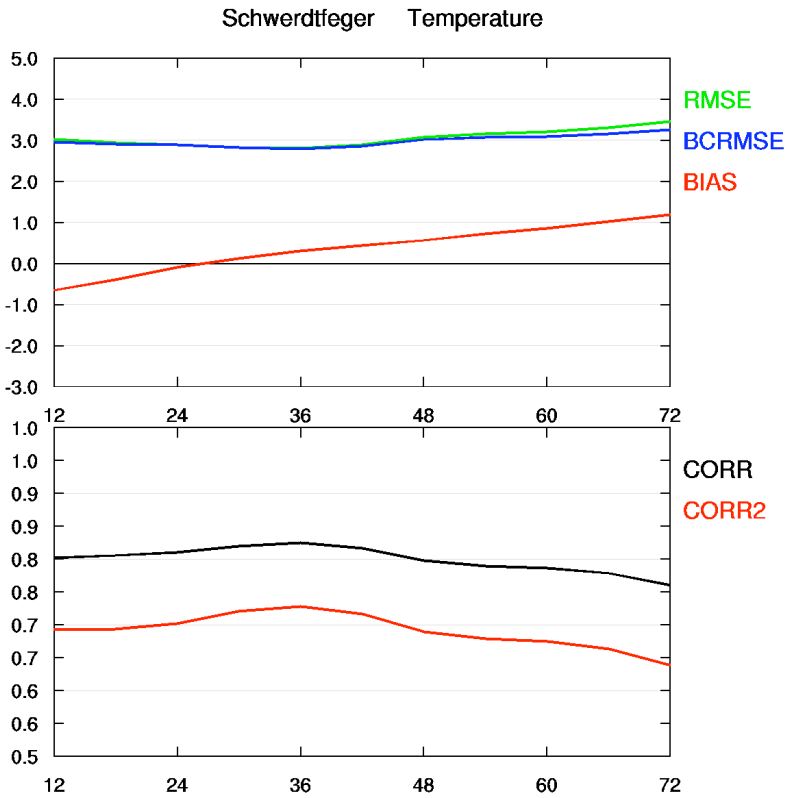
RT 2010 AMPS



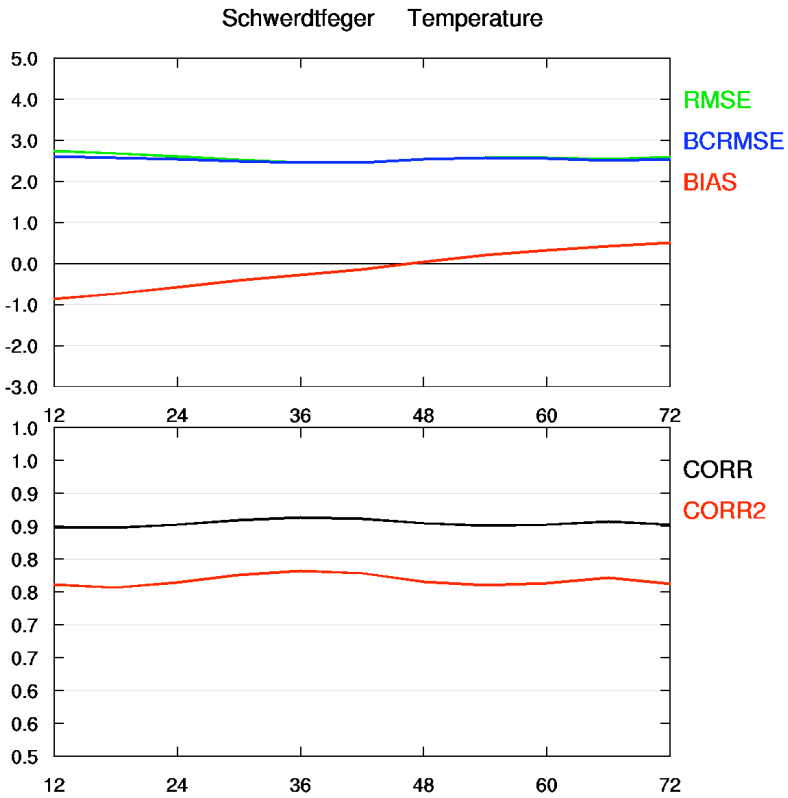
3.2.1 Rerun



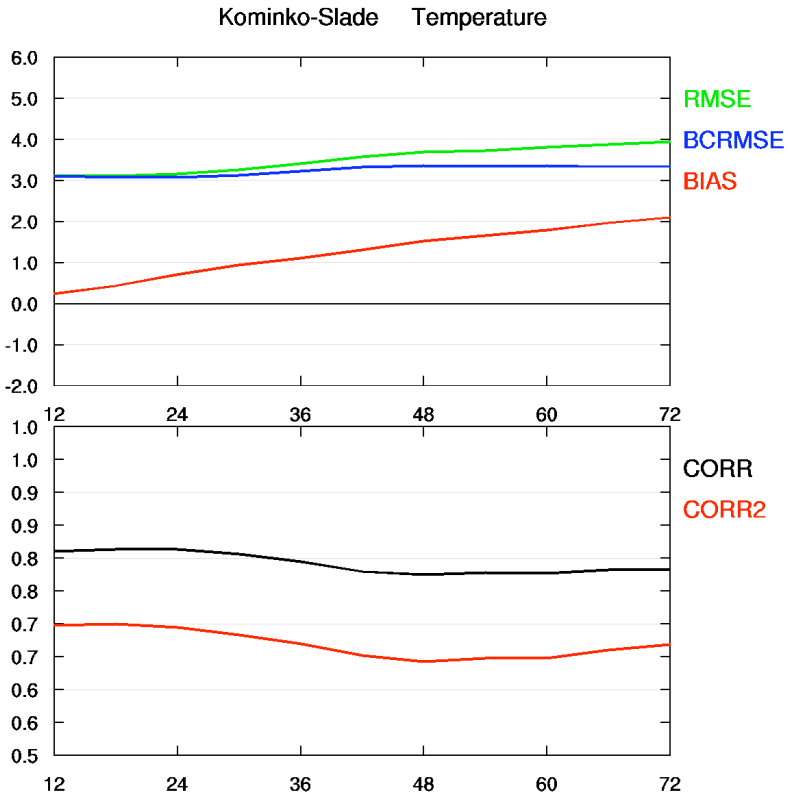
RT 2010 AMPS (3.0.1.1)



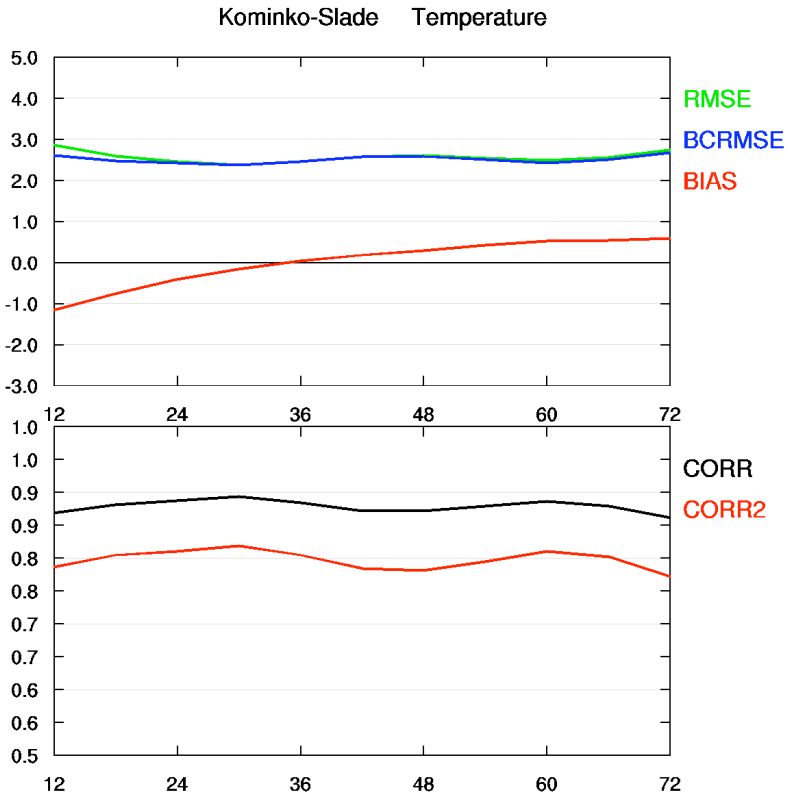
3.2.1 Rerun



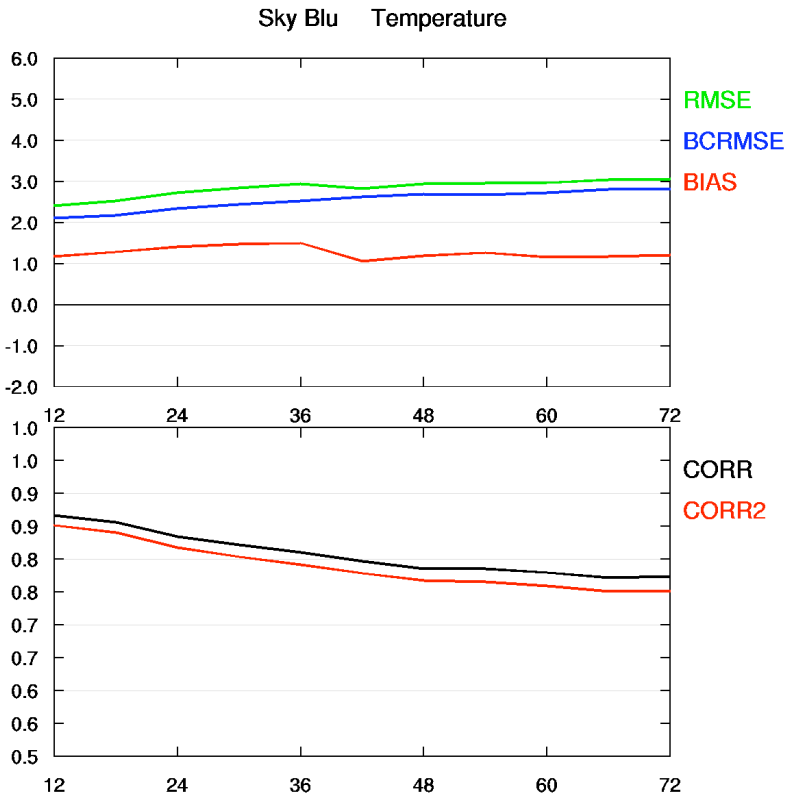
RT 2010 AMPS



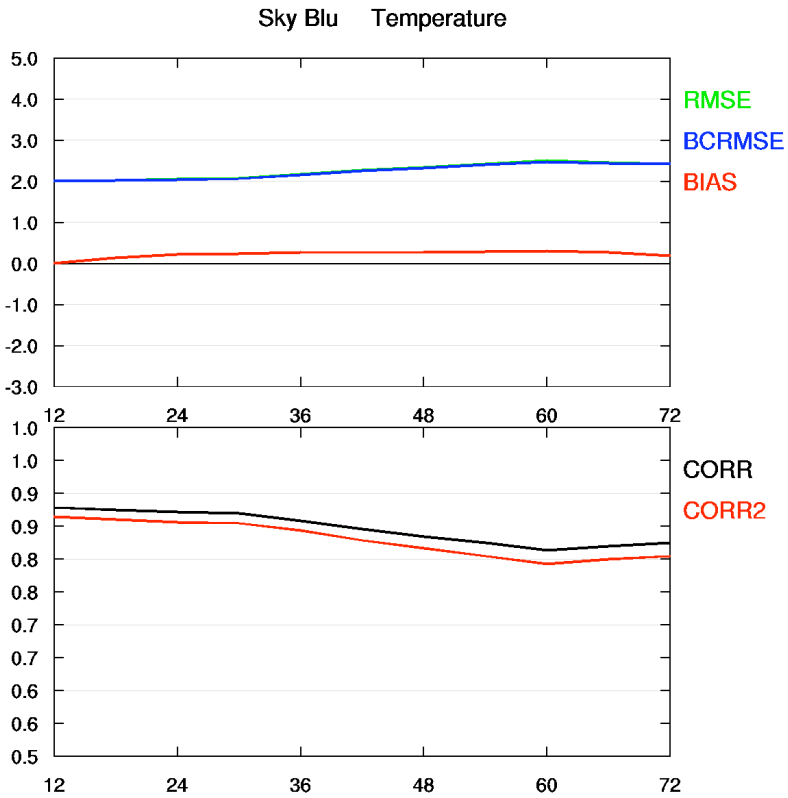
3.2.1 Rerun



RT 2010 AMPS



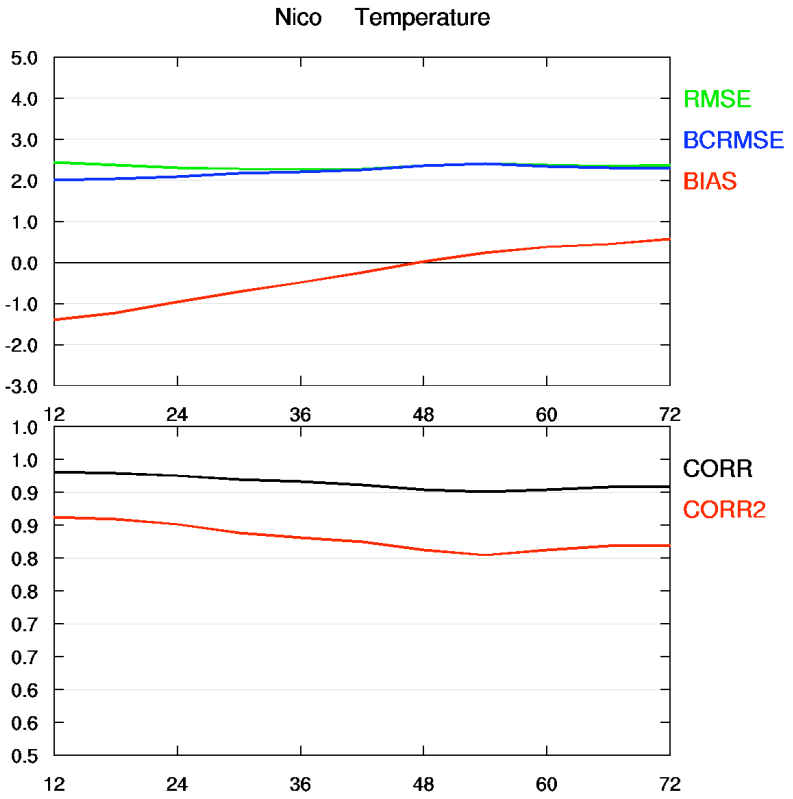
3.2.1 Rerun



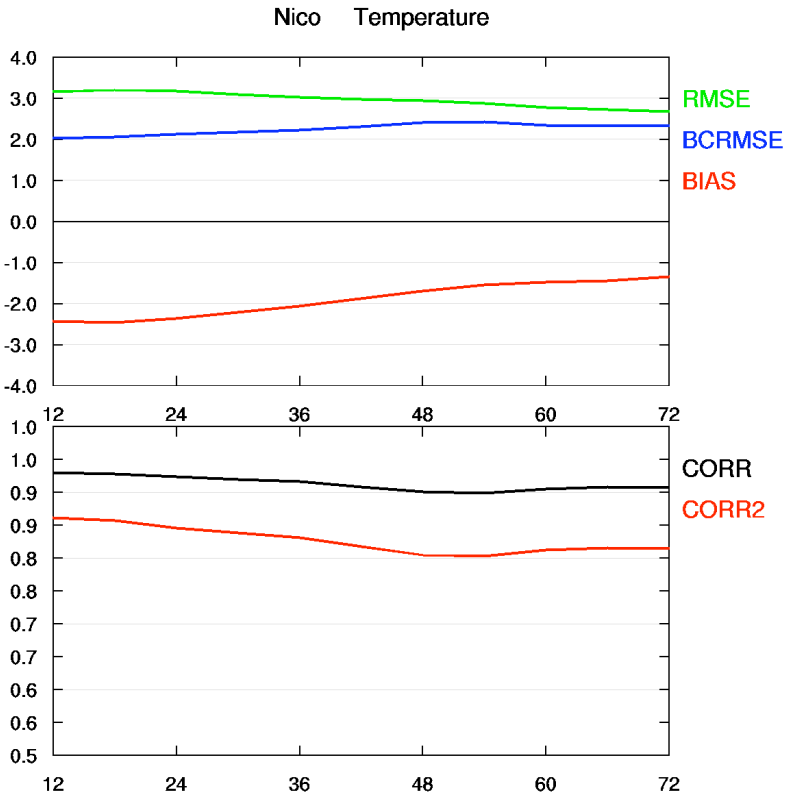
- WRF 3.2.1 statistics improved over WRF 3.0.1.1
  - New RRTMG long-wave radiation scheme?
- Average warming trend during forecast period is about the same between the two versions

3.2.1 Sensitivity to Radiation Schemes

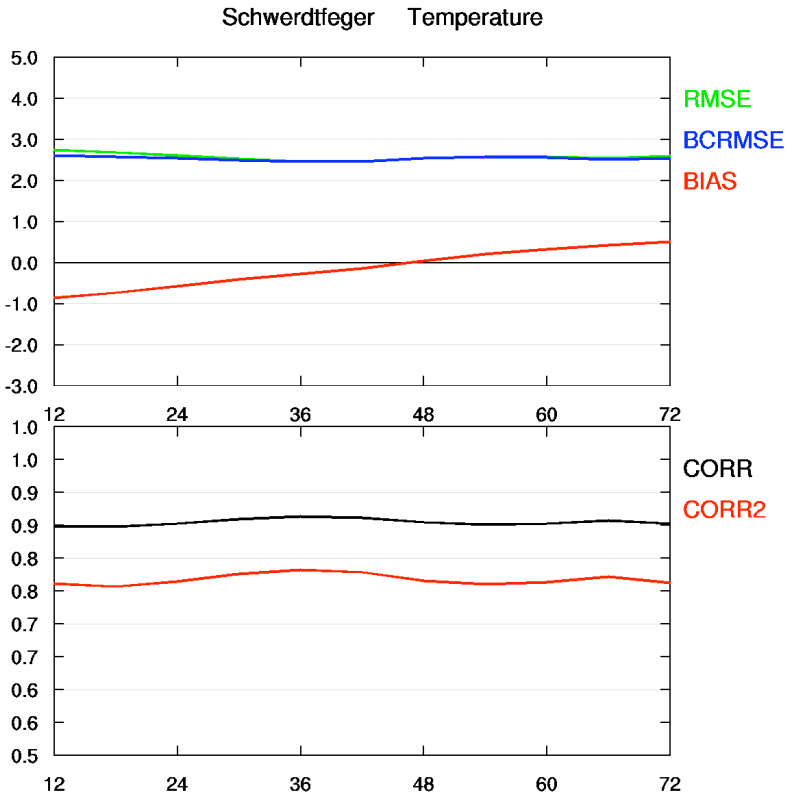
Goddard SW and RRTMG LW



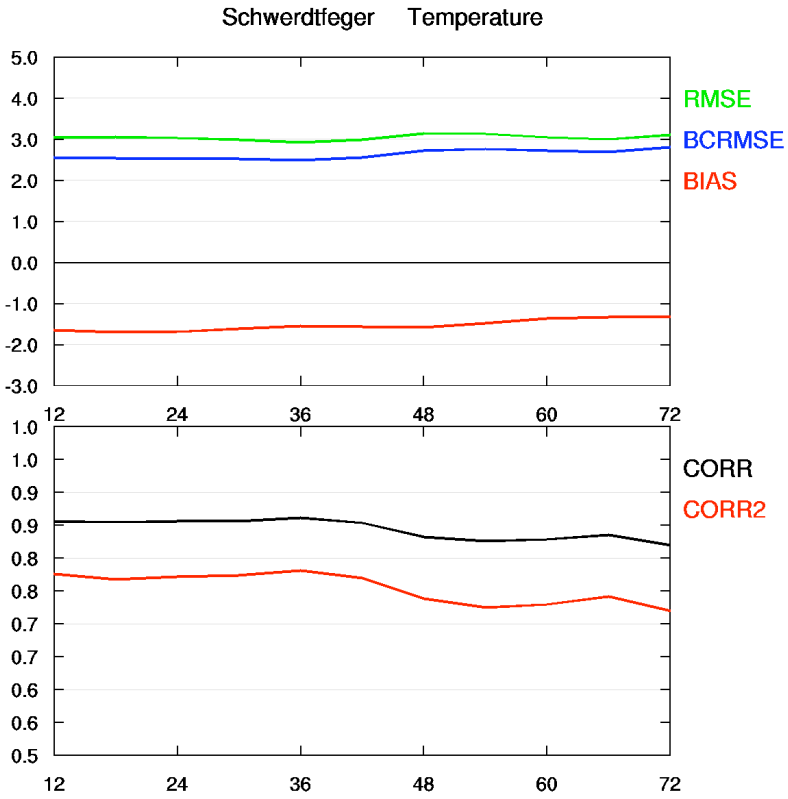
CAM SW and LW



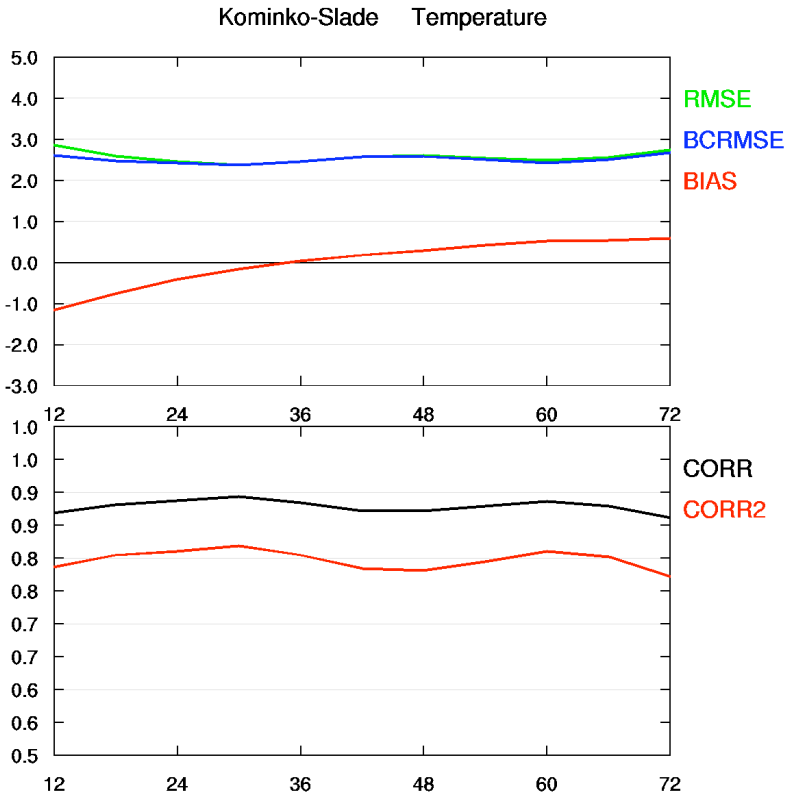
Goddard SW and RRTMG LW



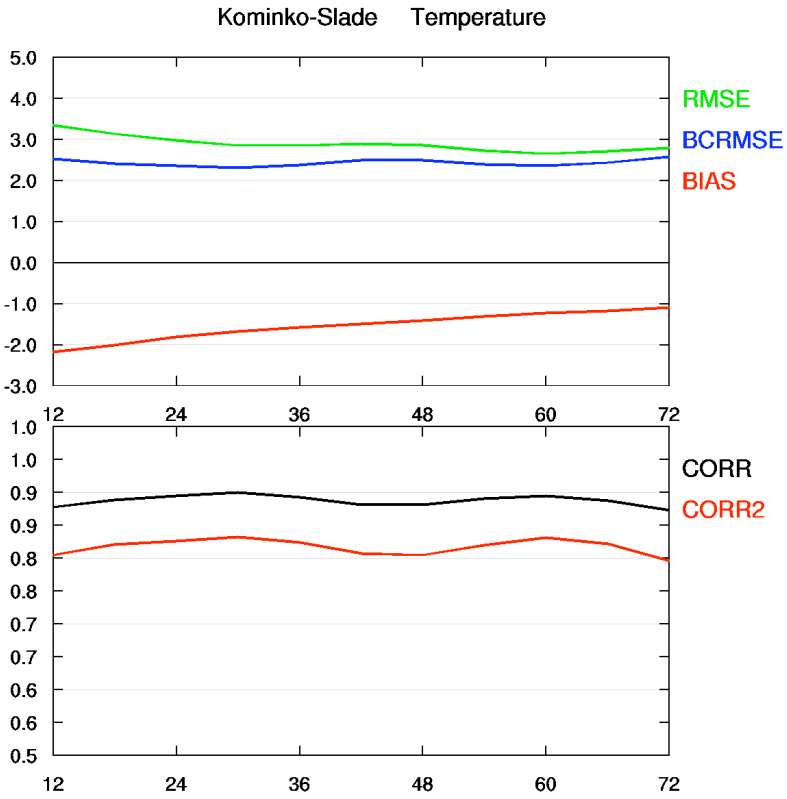
CAM LW and SW



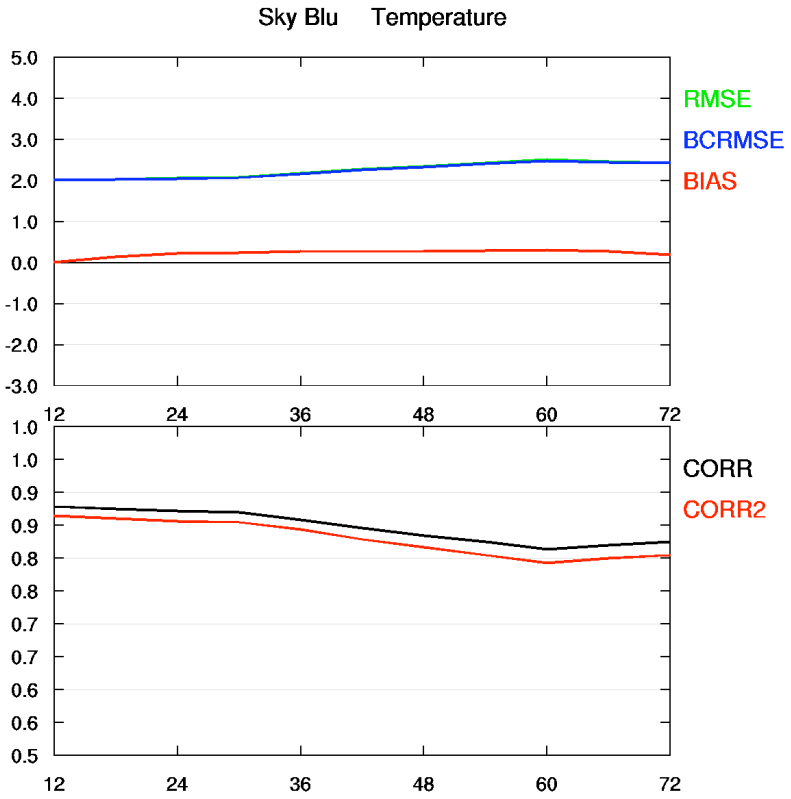
Goddard SW and RRTMG LW



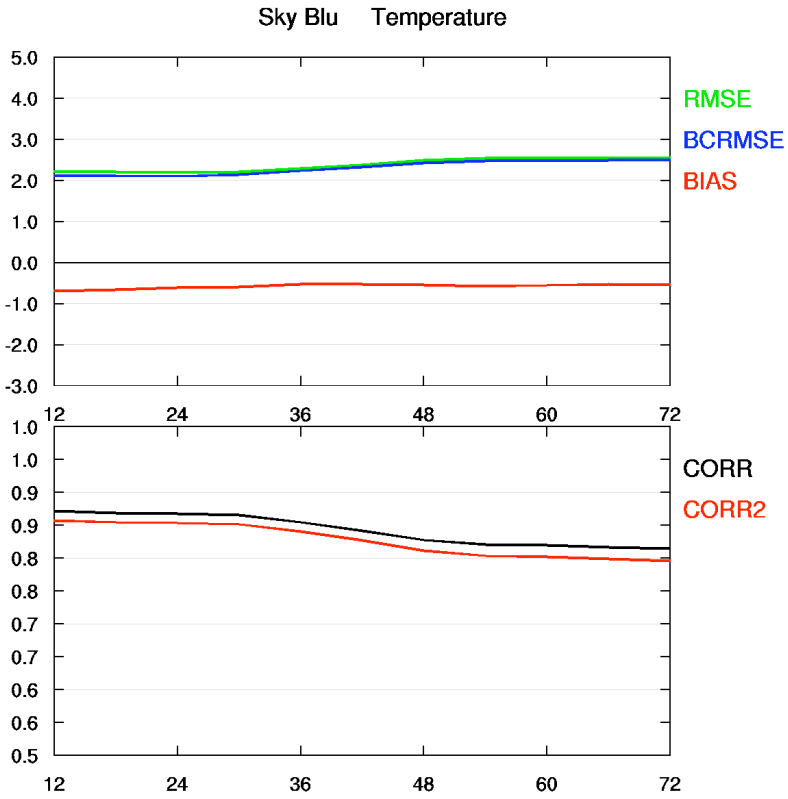
CAM LW and SW



Goddard SW and RTTMG LW



CAM SW and LW



- CAM radiation schemes reduce the warming trend during forecast
- CAM radiation schemes appear to produce colder results overall
  - Larger (absolute) bias
  - Poorer scores

Summary

- AMPS work is ongoing:
  - Updates to WRF model
  - Updates to polar modifications to WRF
  - No lack of avenues to investigate AMPS temperature behavior
    - Suggestions?
  - Expect an increase in computing power in about a year

2-m T Statistics
15-day period in Jan 2010

Bias, RMSC, MAE,
and bias-corrected RMSE, as compared to AWS reports for WRF 3.2.1, WRF 3.0.1.1, and the difference

Differences color-coded:

WRF 3.0.1.1 is better

WRF 3.2.1 is better

3.2.1 T2					3.0.1.1 T2				Difference 3011T2			
STN ID	Avg Bias	Avg RMSE	Avg MAE	Avg BC_RMSE	Avg Bias	Avg RMSE	Avg MAE	Avg BC_RMSE	Avg Bias	Avg RMSE	Avg MAE	Avg BC_RMSE
IRENE	-1.00	3.24	2.48	2.98	1.06	3.61	2.88	3.32	-0.05	-0.37	-0.40	-0.34
GIULI	0.30	5.16	4.45	5.10	2.37	6.10	5.09	5.59	-2.07	-0.94	-0.64	-0.49
SOFIA	-6.19	6.81	6.20	2.80	-4.30	5.50	4.70	3.32	1.89	1.31	1.50	-0.53
ALESS	-2.99	3.53	3.20	1.81	-2.28	3.09	2.71	1.99	0.71	0.44	0.49	-0.18
ZORAI	-5.17	5.45	5.19	1.67	-4.25	4.68	4.32	1.85	0.91	0.77	0.87	-0.18
ENEID	-3.81	4.54	3.86	2.46	-3.40	4.36	3.50	2.72	0.41	0.18	0.36	-0.26
RITA_	-1.41	2.67	2.08	2.25	-0.99	2.73	2.13	2.50	0.41	-0.06	-0.06	-0.26
MODES	1.74	2.83	2.29	2.16	3.58	4.49	3.84	2.68	-1.85	-1.67	-1.54	-0.52
LOLA_	1.94	2.70	2.32	1.86	2.75	3.43	2.98	2.03	-0.81	-0.73	-0.66	-0.17
ARELI	-2.28	2.90	2.42	1.76	-1.49	2.52	1.98	1.99	0.79	0.38	0.44	-0.23
VITO_	-0.54	2.53	1.95	2.38	0.80	2.53	2.14	2.32	-0.26	-0.01	-0.19	0.06
ERIC_	0.45	2.20	1.81	2.05	1.13	2.61	2.17	2.30	-0.69	-0.41	-0.36	-0.25
CAROL	-0.02	2.21	1.75	2.16	1.52	2.82	2.33	2.33	-1.50	-0.61	-0.58	-0.18
HARRY	0.10	1.81	1.47	1.79	1.05	2.34	1.91	2.06	-0.96	-0.53	-0.44	-0.27
CBIRD	5.62	5.71	5.62	1.00	6.27	6.34	6.27	0.93	-0.65	-0.63	-0.65	0.07
BUTLR	-0.03	2.07	1.71	2.00	0.89	2.21	1.79	1.94	-0.86	-0.14	-0.08	0.06
MARBL	-3.25	3.88	3.36	2.10	-2.37	3.28	2.72	2.23	0.88	0.60	0.64	-0.13
8910	1.13	2.29	1.91	1.88	2.57	3.35	2.82	2.10	-1.44	-1.06	-0.91	-0.22
GILL_	-0.17	2.38	1.92	2.28	1.29	2.87	2.34	2.46	-1.11	-0.49	-0.42	-0.18
E66__	-1.38	2.63	2.16	2.17	0.34	2.90	2.29	2.85	1.03	-0.26	-0.13	-0.68
SCHWE	-0.39	2.62	2.05	2.54	1.01	2.92	2.40	2.70	-0.62	-0.30	-0.35	-0.15
8915	0.92	2.29	1.90	2.03	1.28	2.50	2.06	2.10	-0.36	-0.21	-0.17	-0.06
SKYBL	0.15	1.70	1.41	1.67	0.67	2.19	1.81	2.04	-0.52	-0.49	-0.39	-0.37
FOSSL	-2.45	3.06	2.54	1.81	-2.65	3.26	2.71	1.89	-0.19	-0.20	-0.17	-0.08
8921	-3.56	3.86	3.56	1.47	-3.70	4.05	3.70	1.63	-0.14	-0.19	-0.14	-0.16
NICO_	-1.46	2.24	1.81	1.63	0.92	2.56	2.03	2.33	0.54	-0.33	-0.21	-0.70
LIMBR	-0.39	2.15	1.75	2.08	-0.08	2.07	1.69	2.05	0.31	0.08	0.06	0.03
LARSN	-2.50	3.43	2.64	2.33	-1.58	2.62	1.97	2.08	0.92	0.81	0.67	0.25
SWITH	-1.04	2.13	1.67	1.78	0.24	2.43	1.86	2.31	0.80	-0.30	-0.19	-0.53
8928	0.35	2.33	1.87	2.21	1.40	2.83	2.31	2.38	-1.05	-0.50	-0.43	-0.16
FERRL	-1.81	3.25	2.64	2.68	-0.63	2.93	2.48	2.85	1.18	0.32	0.16	-0.17
BRIAN	-0.01	2.24	1.73	2.17	0.69	2.46	1.86	2.26	-0.68	-0.22	-0.13	-0.10
MARIL	-1.01	2.84	2.20	2.63	0.04	2.90	2.40	2.88	0.96	-0.06	-0.19	-0.25
8935	0.23	0.87	0.72	0.83	0.19	0.88	0.71	0.85	0.04	-0.01	0.01	-0.02
PEGSO	-0.23	2.43	1.97	2.39	0.65	2.60	2.11	2.50	-0.41	-0.17	-0.14	-0.11
SIPLD	-0.25	2.36	1.94	2.26	0.47	2.63	2.14	2.49	-0.22	-0.27	-0.20	-0.23
MINNA	4.26	5.20	4.46	2.94	5.32	6.22	5.45	3.21	-1.06	-1.03	-0.99	-0.27
EMILI	-0.30	2.90	2.43	2.84	1.16	3.18	2.71	2.92	-0.86	-0.28	-0.28	-0.09
WINDL	-1.92	3.30	2.52	2.66	-1.01	2.87	2.21	2.67	0.91	0.43	0.31	0.00
MARY_	0.23	2.21	1.78	2.11	1.04	2.62	2.14	2.36	-0.81	-0.41	-0.36	-0.25
POSSE	-4.67	5.00	4.67	1.77	-4.51	4.85	4.51	1.78	0.16	0.15	0.16	-0.01
HENRY	-1.08	1.85	1.55	1.38	1.18	2.53	1.97	2.15	-0.11	-0.68	-0.42	-0.77
8986	-0.37	2.67	1.97	2.58	1.67	3.91	3.01	3.47	-1.30	-1.24	-1.03	-0.90
DOMEC	-3.49	4.42	3.75	2.59	-1.96	4.00	3.27	3.33	1.53	0.42	0.48	-0.73
9116	0.96	1.71	1.39	1.37	2.63	3.26	2.73	1.87	-1.67	-1.54	-1.33	-0.51
KOHNE	0.21	2.23	1.66	2.15	2.15	3.61	2.84	2.84	-1.94	-1.38	-1.18	-0.69
AGO_3	-5.45	6.26	5.54	3.02	-3.84	5.25	4.50	3.52	1.61	1.00	1.04	-0.50
AGO_1	-1.64	2.50	1.95	1.85	-0.60	2.16	1.65	1.97	1.04	0.34	0.30	-0.11
21356	-1.77	3.19	2.56	2.63	-0.49	2.75	2.28	2.69	1.28	0.44	0.28	-0.06
THERE	-4.33	4.61	4.34	1.56	-2.90	3.57	3.11	1.99	1.43	1.04	1.24	-0.43
MIZUH	-1.59	2.83	2.01	2.32	-0.12	2.73	2.13	2.68	1.47	0.10	-0.11	-0.36
LAURI	0.24	2.86	2.41	2.82	1.23	3.34	2.79	3.10	-1.00	-0.49	-0.39	-0.28
ELIZA	-0.37	2.09	1.65	1.97	0.32	2.25	1.74	2.10	0.05	-0.15	-0.09	-0.12
LINDA	-1.08	2.89	2.36	2.66	0.08	2.76	2.34	2.74	1.00	0.13	0.03	-0.08
ERIN_	-1.23	2.02	1.66	1.56	-0.44	2.08	1.68	1.96	0.79	-0.06	-0.02	-0.40
21364	-0.76	2.19	1.68	2.01	1.03	2.49	1.98	2.23	-0.28	-0.30	-0.31	-0.22
24427	-0.21	1.89	1.33	1.87	0.64	2.22	1.72	2.11	-0.43	-0.33	-0.40	-0.24
26078	-0.89	1.60	1.20	1.32	-0.24	1.30	0.94	1.27	0.65	0.30	0.26	0.05
DOMEA	0.80	1.89	1.53	1.65	3.69	4.50	3.89	2.55	-2.89	-2.61	-2.36	-0.90
EAGLE	0.09	2.32	1.96	2.22	1.93	3.84	3.05	3.24	-1.84	-1.51	-1.09	-1.03
NASCE	2.81	3.66	3.13	2.32	3.41	4.12	3.57	2.30	-0.60	-0.46	-0.44	0.02
FRIIS	0.97	2.31	1.96	2.00	2.06	3.11	2.74	2.24	-1.09	-0.80	-0.78	-0.24
JASE_	0.96	2.38	1.90	2.13	3.47	4.45	3.73	2.75	-2.52	-2.06	-1.82	-0.62
30374	-2.10	2.54	2.19	1.41	-1.80	2.46	2.02	1.67	0.31	0.08	0.17	-0.27
MTFLM	-3.17	3.79	3.22	2.07	-1.61	2.87	2.19	2.31	1.56	0.92	1.03	-0.24
30477	-0.63	2.63	2.16	2.53	0.32	2.75	2.28	2.71	0.31	-0.11	-0.11	-0.18
89009	1.67	2.47	2.03	1.77	3.94	4.55	4.01	2.26	-2.26	-2.08	-1.98	-0.50

10-m Wind Speed Statistics
15-day period in Jan 2010

Bias, RMSC, MAE,
and bias-corrected RMSE,
as compared to AWS reports,
for WRF 3.2.1, WRF 3.0.1.1,
and the difference

Differences color-coded:

WRF 3.0.1.1 is better

WRF 3.2.1 is better

3.2.1 WSPD10

STN ID	Avg Bias	Avg RMSE	Avg MAE	Avg BC_RMSE
IRENE	0.91	2.15	1.74	1.93
GIULI	0.32	2.45	1.93	2.37
WASA_	0.42	2.15	1.78	2.08
SOFIA	-1.85	5.53	4.45	5.17
ALESS	3.16	4.22	3.44	2.76
ZORAI	1.09	4.46	3.75	4.29
ENEID	1.88	5.02	3.71	4.57
RITA_	-0.74	6.52	4.55	6.45
MODES	0.56	2.59	1.92	2.48
LOLA_	2.81	5.47	4.23	4.65
ARELI	-1.14	3.54	2.77	3.26
AGO_2	4.28	4.46	4.28	1.22
VITO_	0.01	1.48	1.18	1.45
ERIC_	0.02	1.79	1.40	1.76
CAROL	-0.48	1.53	1.23	1.43
HARRY	1.43	2.22	1.81	1.68
CBIRD	0.46	3.27	2.32	3.19
BUTLR	-0.64	1.93	1.51	1.80
MARBL	-1.02	2.55	1.94	2.28
8910	-0.67	1.63	1.19	1.47
GILL_	0.03	1.43	1.12	1.39
E66__	1.31	2.14	1.78	1.61
SCHWE	-0.20	1.40	1.10	1.36
8915	0.21	1.93	1.51	1.89
SKYBL	0.11	2.60	1.99	2.54
FOSSL	1.16	3.18	2.68	2.87
8921	5.62	7.89	6.41	5.52
NICO_	0.19	1.29	1.04	1.26
LIMBR	-0.48	1.84	1.43	1.76
LARSN	0.85	2.34	1.79	2.15
SWITH	0.62	1.87	1.42	1.76
8928	0.67	1.46	1.20	1.26
FERRL	0.15	1.95	1.56	1.91
BRIAN	1.13	1.89	1.54	1.49
MARIL	-0.17	1.49	1.16	1.44
8935	-1.46	4.20	3.37	3.91
PEGSO	0.05	2.63	2.02	2.62
SIPLD	0.50	1.57	1.26	1.49
MINNA	1.51	3.79	2.90	3.46
EMILI	0.08	1.73	1.42	1.70
WINDL	0.65	2.25	1.78	2.10
MARY_	-0.13	1.51	1.17	1.48
HENRY	0.24	1.30	1.04	1.26
8986	1.24	2.02	1.71	1.51
DOMEC	0.94	1.79	1.48	1.51
9116	-0.06	1.42	1.09	1.39
KOHNE	0.62	1.59	1.30	1.45
AGO_3	0.19	1.27	1.06	1.23
AGO_1	0.97	1.56	1.29	1.16
21356	-0.42	2.10	1.64	2.03
THERE	1.41	2.48	2.06	1.91
MIZUH	1.73	3.10	2.17	2.54
LAURI	0.99	2.28	1.77	2.03
ELIZA	1.55	1.96	1.63	1.19
LINDA	-0.20	2.50	1.91	2.47
ERIN_	0.77	2.22	1.85	2.05
21364	0.22	1.77	1.44	1.73
24427	1.18	2.89	2.32	2.63
26078	2.51	4.14	3.34	3.23
DOMEA	0.73	1.43	1.17	1.19
EAGLE	2.90	3.39	3.05	1.71
NASCE	1.25	2.23	1.80	1.81
CPHAL	4.49	6.18	4.75	4.21
FRIIS	2.12	4.03	3.08	3.40
JASE_	0.47	1.31	1.03	1.20
30374	4.35	5.63	4.70	3.52
MTFLM	-0.15	3.34	2.70	3.29
30477	0.53	2.35	1.74	2.27
89009	-0.20	1.11	0.89	1.08

3.0.1.1 WSPD10

Avg Bias	Avg RMSE	Avg MAE	Avg BC_RMSE
0.88	2.33	1.88	2.13
0.73	2.69	2.11	2.55
0.31	2.28	1.85	2.23
-1.63	5.64	4.63	5.35
3.26	4.38	3.56	2.89
0.55	4.40	3.57	4.31
1.48	4.61	3.38	4.27
-1.16	6.52	4.33	6.39
0.81	2.90	2.21	2.75
2.46	5.17	3.99	4.48
-1.09	3.56	2.77	3.34
4.29	4.50	4.29	1.34
0.23	1.57	1.21	1.54
-0.01	1.68	1.32	1.65
-0.36	1.62	1.31	1.56
1.14	2.14	1.70	1.80
0.53	3.19	2.27	3.13
-0.36	2.00	1.55	1.96
-0.87	2.53	1.90	2.35
-0.54	1.75	1.28	1.65
0.29	1.53	1.20	1.49
1.19	2.23	1.82	1.81
-0.05	1.49	1.16	1.46
0.15	1.94	1.50	1.92
0.12	2.74	2.08	2.68
1.39	3.37	2.87	2.99
5.74	8.10	6.58	5.70
0.50	1.64	1.33	1.55
-0.40	1.88	1.47	1.82
0.93	2.47	1.89	2.26
0.51	2.02	1.52	1.94
0.74	1.63	1.32	1.42
0.37	1.95	1.55	1.89
0.80	1.91	1.50	1.71
-0.18	1.53	1.20	1.47
-1.35	4.39	3.57	4.14
0.34	2.62	2.03	2.59
0.83	1.83	1.46	1.62
1.32	3.92	2.99	3.67
0.25	1.80	1.45	1.76
0.92	2.43	1.89	2.21
-0.06	1.57	1.25	1.54
0.44	1.66	1.29	1.58
1.38	2.18	1.82	1.63
1.15	2.05	1.68	1.68
0.17	1.75	1.29	1.72
0.93	2.00	1.62	1.75
0.05	1.40	1.11	1.38
0.72	1.52	1.24	1.26
-0.26	2.06	1.58	2.02
0.65	2.27	1.83	2.06
1.32	3.13	2.20	2.81
1.13	2.41	1.82	2.11
1.66	2.20	1.77	1.42
0.00	2.55	1.92	2.53
0.02	2.22	1.82	2.18
0.51	2.03	1.61	1.94
1.46	3.15	2.48	2.78
2.34	4.13	3.33	3.32
1.28	2.13	1.70	1.68
2.55	3.13	2.76	1.79
1.11	2.19	1.75	1.85
4.58	6.37	4.87	4.38
1.75	3.86	2.91	3.43
0.92	1.91	1.46	1.66
3.54	5.19	4.22	3.73
-0.37	3.47	2.85	3.42
0.64	2.38	1.79	2.27
0.11	1.60	1.26	1.58

Difference

Avg Bias	Avg RMSE	Avg MAE	Avg BC_RMSE
0.03	-0.18	-0.14	-0.20
-0.41	-0.24	-0.18	-0.18
0.12	-0.12	-0.07	-0.15
0.21	-0.11	-0.18	-0.18
-0.10	-0.16	-0.12	-0.13
0.54	0.07	0.18	-0.02
0.40	0.41	0.33	0.30
-0.42	0.00	0.22	0.06
-0.24	-0.31	-0.28	-0.27
0.35	0.30	0.24	0.17
0.05	-0.02	0.01	-0.08
0.00	-0.04	-0.01	-0.12
-0.22	-0.09	-0.03	-0.09
0.02	0.11	0.08	0.11
0.12	-0.09	-0.08	-0.13
0.30	0.08	0.11	-0.12
-0.06	0.08	0.05	0.06
0.29	-0.07	-0.04	-0.15
0.15	0.02	0.05	-0.07
0.13	-0.12	-0.08	-0.18
-0.26	-0.11	-0.08	-0.10
0.12	-0.09	-0.05	-0.19
0.15	-0.09	-0.06	-0.10
0.06	-0.01	0.01	-0.03
-0.01	-0.14	-0.09	-0.14
-0.23	-0.19	-0.19	-0.12
-0.12	-0.21	-0.17	-0.18
-0.31	-0.36	-0.30	-0.29
0.07	-0.04	-0.04	-0.05
-0.07	-0.13	-0.10	-0.11
0.12	-0.15	-0.10	-0.19
-0.07	-0.17	-0.12	-0.16
-0.22	0.01	0.00	0.02
0.33	-0.02	0.04	-0.22
0.00	-0.04	-0.04	-0.03
0.11	-0.19	-0.20	-0.23
-0.29	0.01	-0.01	0.03
-0.33	-0.26	-0.19	-0.14
0.19	-0.12	-0.09	-0.21
-0.17	-0.06	-0.04	-0.06
-0.27	-0.18	-0.11	-0.11
0.07	-0.06	-0.08	-0.06
-0.20	-0.36	-0.25	-0.32
-0.14	-0.17	-0.11	-0.12
-0.21	-0.26	-0.19	-0.18
-0.11	-0.33	-0.20	-0.33
-0.31	-0.40	-0.33	-0.30
0.14	-0.13	-0.05	-0.15
0.25	0.04	0.05	-0.10
0.16	0.04	0.06	0.01
0.75	0.21	0.23	-0.14
0.41	-0.03	-0.03	-0.27
-0.15	-0.13	-0.05	-0.09
-0.11	-0.24	-0.14	-0.23
0.20	-0.05	-0.01	-0.06
0.75	0.00	0.03	-0.14
-0.29	-0.26	-0.17	-0.21
-0.28	-0.26	-0.16	-0.15
0.17	0.02	0.01	-0.10
-0.54	-0.70	-0.53	-0.49
0.36	0.25	0.28	-0.08
0.13	0.04	0.06	-0.04
-0.09	-0.18	-0.12	-0.18
0.37	0.16	0.17	-0.03
-0.45	-0.60	-0.43	-0.46
0.80	0.45	0.48	-0.21
-0.21	-0.13	-0.16	-0.13
-0.11	-0.03	-0.04	-0.01
0.08	-0.49	-0.37	-0.50