StrataRossLAPEm Resource

From: Ben Schiffer [bschiffer@wwcengineering.com]
Sent: Monday, February 28, 2011 5:21 PM
To: Saxton, John
Cc: Chris Pugsley
Subject: Re: Ross ISR, Docket # 040-09091, Limited Additional Data Submittal, Email #5
Attachments: Addendum 3.6-B Tables and Figures.pdf

John--
Please see updated ER Addendum 3.6-B Site Specific Meterology and Climatology Data.

Ben

On 2/28/2011 2:01 PM, Saxton, John wrote:
Ben,

Thanks for the update and will be looking forward to receiving the submittals.

John

From: Ben Schiffer [mailto:bschiffer@wwcengineering.com]
Sent: Monday, February 28, 2011 3:13 PM
To: Saxton, John
Cc: Chris Pugsley
Subject: Ross ISR, Docket # 040-09091, Limited Additional Data Submittal

John--
I believe we have things assembled and prepared for emailing. Chris Pugsley with Thompson and Pugsley will be providing the revised affidavit to you while I'll be transmitting the updated figures and addenda. I hope all is well with you and let me know if you have any questions.

Ben
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From: Ben Schiffer

Created By: bschiffer@wwcengineering.com

Recipients:
"Chris Pugsley" <cpugsley@athompsonlaw.com>
Tracking Status: None
"Saxton, John" <John.Saxton@nrc.gov>
Tracking Status: None

Post Office: wwcengineering.com

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ADDENDUM 3.6-B

SITE – SPECIFIC METEOROLOGY AND CLIMATOLOGY

DATA

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Table 1. Ross ISR Maximum, Minimum, and Average Monthly Temperatures

MONTH	Average Temperature (°F)	Minimum Temperature (°F)	Maximum Temperature (°F)
Jan	22.1	-15.9	43.2
Feb	20.8	-8.6	40.8
Mar	37.5	19.2	67.0
Apr	42.9	25.5	66.7
May	51.1	32.1	81.9
Jun	60.9	42.6	90.0
Jul	68.5	47.0	92.6
Aug	70.5	46.0	98.0
Sep	59.6	35.6	88.3
Oct	51.8	24.9	85.2
Nov	28.7	-7.5	71.7
Dec	22.2	-5.5	42.5
Year-Round	44.7	-15.9	98.0

Source: IML (2011)

Table 2. Ross ISR Joint Frequency Distribution for 2010

Ross ISR Project — Frequency Distribution — IML Air Science
Oshoto, Wyoming — Hourly Average Wind Speed, Wind Direction and Sigma — Sheridan, WY

Calm Readings 19 Total Readings 8570 Possible Readings 8950 Data Capture 95.8%

From 1/5/2010 To 1/12/2011

Stability Class A **Wind Speed (mph)**

Direction	< 3.4	3.4 – 6.9	6.9 – 11.5	11.5 - 18.4	18.4 - 24.0	> 24.0	Row Total
N	0.00036	0.00198	0.00093				0.00328
NNE	0.00012	0.00187	0.00070				0.00269
NE	0.00060	0.00233	0.00105				0.00399
ENE	0.00097	0.00152	0.00082	0.00023			0.00353
E	0.00073	0.00140	0.00012	0.00012			0.00236
ESE	0.00060	0.00152					0.00212
SE	0.00060	0.00152	0.00035				0.00247
SSE	0.00121	0.00187	0.00093	0.00012			0.00413
S	0.00145	0.00105	0.00070	0.00012	0.00012		0.00343
SSW	0.00085	0.00128	0.00105				0.00318
SW	0.00073	0.00210	0.00140	0.00012	0.00012		0.00446
WSW	0.00036	0.00222	0.00210	0.00012			0.00480
W	0.00036	0.00257	0.00117	0.00012			0.00421
WNW	0.00048	0.00257	0.00198	0.00012			0.00515
NW	0.00024	0.00280	0.00187		0.00012		0.00503
NNW	0.00048	0.00268	0.00152	0.00012			0.00480
Sum	0.01016	0.03127	0.01669	0.00117	0.00035		0.05963

Table 2. Ross ISR Joint Frequency Distribution for 2010 (Continued)

From 1/5/2010 To 1/12/2011

Stability Class B **Wind Speed (mph)**

Direction	< 3.4	3.4 – 6.9	6.9 – 11.5	11.5 - 18.4	18.4 - 24.0	> 24.0	Row Total
N	0.00024	0.00035	0.00082	0.00023			0.00164
NNE	0.00024		0.00035				0.00059
NE	0.00036	0.00035	0.00035	0.00023			0.00130
ENE	0.00012	0.00047	0.00023				0.00082
E	0.00012	0.00012					0.00024
ESE	0.00012	0.00047	0.00012				0.00070
SE	0.00012	0.00035	0.00023	0.00012			0.00082
SSE	0.00073	0.00105	0.00082	0.00058			0.00318
S	0.00060	0.00140	0.00105	0.00047			0.00352
SSW	0.00048	0.00070	0.00082	0.00035			0.00235
SW		0.00058	0.00117	0.00023	0.00012		0.00210
WSW	0.00036		0.00082	0.00035			0.00153
W		0.00047	0.00128				0.00175
WNW	0.00024	0.00023	0.00105	0.00012	0.00012	0.00012	0.00188
NW	0.00012	0.00058	0.00198	0.00058			0.00327
NNW	0.00024	0.00023	0.00117	0.00035		0.00012	0.00211
Sum	0.00411	0.00735	0.01225	0.00362	0.00023	0.00023	0.02780

Table 2. Ross ISR Joint Frequency Distribution for 2010 (Continued)

From 1/5/2010 To 1/12/2011

Stability Class C **Wind Speed (mph)**

Direction	< 3.4	3.4 – 6.9	6.9 – 11.5	11.5 - 18.4	18.4 - 24.0	> 24.0	Row Total
N		0.00047	0.00128	0.00233	0.00012		0.00420
NNE	0.00024	0.00035	0.00070	0.00140		0.00012	0.00281
NE	0.00012		0.00152	0.00012			0.00175
ENE	0.00036	0.00012	0.00047				0.00095
E	0.00024	0.00023	0.00012				0.00059
ESE	0.00012	0.00070	0.00012	0.00012			0.00105
SE	0.00060	0.00070	0.00047	0.00035	0.00012		0.00224
SSE	0.00036	0.00152	0.00187	0.00233	0.00023		0.00631
S	0.00060	0.00222	0.00397	0.00187	0.00012		0.00877
SSW	0.00073	0.00128	0.00175	0.00198			0.00574
SW	0.00060	0.00082	0.00047	0.00163	0.00047		0.00399
WSW	0.00012	0.00058	0.00070	0.00070			0.00210
W		0.00058	0.00070	0.00047			0.00175
WNW		0.00117	0.00140	0.00245	0.00035		0.00537
NW		0.00023	0.00198	0.00245	0.00023	0.00012	0.00502
NNW		0.00023	0.00093	0.00222	0.00023		0.00362
Sum	0.00411	0.01120	0.01844	0.02042	0.00187	0.00023	0.05627

Table 2. Ross ISR Joint Frequency Distribution for 2010 (Continued)

From 1/5/2010 To 1/12/2011

Stability Class D **Wind Speed (mph)**

Direction	< 3.4	3.4 – 6.9	6.9 – 11.5	11.5 - 18.4	18.4 - 24.0	> 24.0	Row Total
N	0.00036	0.00233	0.00852	0.02614	0.00782	0.00140	0.04657
NNE	0.00085	0.00175	0.00513	0.01202	0.00327	0.00140	0.02442
NE	0.00060	0.00175	0.00292	0.00665	0.00128		0.01321
ENE	0.00012	0.00198	0.00385	0.00490	0.00082	0.00023	0.01191
E	0.00024	0.00268	0.00210	0.00140			0.00643
ESE	0.00048	0.00233	0.00163	0.00035			0.00480
SE	0.00012	0.00268	0.00280	0.00257	0.00023	0.00012	0.00852
SSE	0.00073	0.00933	0.01354	0.02812	0.02042	0.01179	0.08392
S	0.00254	0.02205	0.03757	0.06138	0.02369	0.01039	0.15761
SSW	0.00278	0.01797	0.01400	0.00968	0.00222	0.00280	0.04945
SW	0.00169	0.00583	0.00257	0.00385	0.00233	0.00292	0.01920
WSW	0.00060	0.00292	0.00630	0.01435	0.00117	0.00082	0.02616
W		0.00117	0.00525	0.02380	0.00385	0.00222	0.03629
WNW		0.00257	0.00548	0.02007	0.00922	0.00548	0.04282
NW		0.00268	0.00630	0.02719	0.00945	0.00793	0.05356
NNW	0.00024	0.00233	0.00735	0.02649	0.00875	0.00432	0.04948
Sum	0.01136	0.08238	0.12532	0.26896	0.09452	0.05181	0.63435

Table 2. Ross ISR Joint Frequency Distribution for 2010 (Continued)

From 1/5/2010 To 1/12/2011

Stability Class E **Wind Speed (mph)**

Direction	< 3.4	3.4 – 6.9	6.9 – 11.5	11.5 - 18.4	18.4 - 24.0	> 24.0	Row Total
N	0.00048	0.00268	0.00898				0.01215
NNE	0.00024	0.00280	0.00793				0.01098
NE	0.00036	0.00198	0.00455				0.00690
ENE		0.00222	0.00222				0.00443
E	0.00048	0.00187	0.00093				0.00328
ESE	0.00048	0.00058	0.00047				0.00153
SE	0.00085	0.00082	0.00152				0.00318
SSE	0.00145	0.00455	0.00572				0.01172
S	0.00206	0.01120	0.01505				0.02831
SSW	0.00242	0.00898	0.00537				0.01677
SW	0.00145	0.00373	0.00105				0.00623
WSW	0.00024	0.00222	0.01085				0.01331
W	0.00024	0.00152	0.01120				0.01296
WNW	0.00048	0.00198	0.01015				0.01262
NW	0.00048	0.00245	0.01214				0.01507
NNW	0.00024	0.00292	0.01237				0.01553
Sum	0.01197	0.05251	0.11050				0.17498

Table 2. Ross ISR Joint Frequency Distribution for 2010 (Continued)

From 1/5/2010 To 1/12/2011

Stability Class F **Wind Speed (mph)**

Direction	< 3.4	3.4 – 6.9	6.9 – 11.5	11.5 - 18.4	18.4 - 24.0	> 24.0	Row Total
N	0.00097	0.00280					0.00377
NNE	0.00097	0.00105					0.00202
NE	0.00157	0.00070					0.00227
ENE	0.00073	0.00175					0.00248
E	0.00157	0.00082					0.00239
ESE	0.00193	0.00117					0.00310
SE	0.00181	0.00093					0.00275
SSE	0.00145	0.00245					0.00390
S	0.00278	0.00327					0.00605
SSW	0.00266	0.00280					0.00546
SW	0.00097	0.00128					0.00225
WSW	0.00085	0.00128					0.00213
W	0.00085	0.00140					0.00225
WNW	0.00085	0.00093					0.00178
NW	0.00097	0.00175					0.00272
NNW	0.00109	0.00058					0.00167
Sum	0.02200	0.02497					0.04697

Source: IML (2011)

Table 3. Ross ISR 1st Quarter Joint Frequency Distribution
Source: IML (2011)

Stability Class	Wind Direction	Wind Speed (Knots) - 1st Quarter 2010						Row Total
		< 3	3 - 6	6 - 10	10 - 16	16 - 21	> 21	
A	N							
	NNE	0.000525						0.000525
	NE							
	ENE	0.001576	0.000978					0.002553
	E	0.000525						0.000525
	ESE	0.000525	0.001955					0.002480
	SE		0.000978					0.000978
	SSE	0.001051	0.000978					0.002028
	S	0.002626	0.000489	0.000978				0.004093
	SSW	0.001576		0.001466				0.003042
	SW	0.000525	0.001466	0.000978				0.002969
	WSW	0.001051	0.000978	0.001466				0.003494
	W		0.000978					0.000978
	WNW		0.000978	0.001466				0.002444
	NW	0.001051	0.000489					0.001539
	NNW	0.000525	0.001955					0.002480
B	N		0.000489		0.000489			0.000978
	NNE							
	NE	0.000525	0.000489					0.001014
	ENE		0.000489					0.000489
	E	0.000525	0.000489					0.001014
	ESE		0.001466					0.001466
	SE		0.000489					0.000489
	SSE	0.001576	0.000978					0.002553
	S	0.001576	0.001955	0.000489	0.000489			0.004508
	SSW		0.001466					0.001466
	SW		0.001466	0.000978	0.000978			0.003421
	WSW			0.000978				0.000978
	W		0.000489	0.000978				0.001466
	WNW	0.000525					0.000489	0.001014
	NW	0.000525	0.000489					0.001014
	NNW		0.000489					0.000489
C	N			0.000489	0.000978			0.001466
	NNE							
	NE							
	ENE	0.000525						0.000525
	E		0.000489					0.000489
	ESE	0.000525						0.000525
	SE	0.001051	0.001466					0.002517
	SSE		0.002933	0.000489				0.003421
	S	0.001051	0.002933	0.001466	0.000978			0.006427
	SSW	0.001051	0.003421	0.000489	0.000978			0.005938
	SW	0.001051	0.000978	0.000489	0.000489	0.000489		0.003494
	WSW	0.000525	0.000489		0.000489			0.001503
	W							
	WNW		0.001955		0.000489			0.002444
	NW		0.000489		0.000978			0.001466
	NNW				0.000978			0.000978

Table 3. Ross ISR 1st Quarter Joint Frequency Distribution (continued)

Stability Class	Wind Direction	Wind Speed (Knots) - 1st Quarter 2010						
		< 3	3 - 6	6 - 10	10 - 16	16 - 21	> 21	Row Total
D	N	0.000525	0.003910	0.008798	0.036168	0.011241		0.060643
	NNE	0.001576	0.000489	0.001955	0.009286	0.001955		0.015261
	NE	0.001576	0.002933		0.000978			0.005486
	ENE		0.001466					0.001466
	E		0.001955	0.000489				0.002444
	ESE	0.001051	0.002444	0.000489				0.003983
	SE		0.002933	0.003421	0.000489			0.006843
	SSE	0.002101	0.010264	0.014174	0.021505	0.010753	0.000489	0.059286
	S	0.004202	0.032258	0.044966	0.081134	0.024927	0.007331	0.194818
	SSW	0.004202	0.032747	0.022483	0.012219	0.001466	0.000978	0.074095
	SW	0.002626	0.009286	0.001466	0.003421	0.002444	0.001955	0.021199
	WSW	0.000525	0.003421	0.004888	0.009775		0.000978	0.019587
	W		0.000978	0.004888	0.017107	0.002444	0.000489	0.025904
	WNW		0.004399	0.001466	0.020039	0.006354	0.002444	0.034702
	NW		0.003910	0.003910	0.022972	0.008798	0.017595	0.057185
	NNW	0.001051	0.004888	0.006843	0.034702	0.007331	0.002444	0.057258
E	N	0.001051	0.005865	0.009286				0.016202
	NNE	0.000525	0.002933	0.002444				0.005902
	NE	0.000525	0.001466	0.000978				0.002969
	ENE		0.001466	0.000489				0.001955
	E	0.000525	0.001955					0.002480
	ESE	0.001051	0.000489	0.000489				0.002028
	SE	0.001051	0.000489	0.000978				0.002517
	SSE	0.002101	0.006843	0.006354				0.015298
	S	0.002101	0.015640	0.024438				0.042179
	SSW	0.005778	0.018084	0.013685				0.037547
	SW	0.003152	0.004399	0.001955				0.009506
	WSW	0.000525	0.002933	0.012708				0.016166
	W	0.000525	0.001955	0.012708				0.015188
	WNW	0.001051	0.003910	0.014174				0.019135
	NW	0.002101	0.002444	0.018573				0.023118
	NNW	0.000525	0.004399	0.015152				0.020076
F	N							
	NNE	0.001576						0.001576
	NE	0.002101	0.000489					0.002590
	ENE		0.000489					0.000489
	E	0.001576						0.001576
	ESE	0.002626	0.000978					0.003604
	SE	0.002101	0.000978					0.003079
	SSE	0.001051	0.003421					0.004472
	S	0.003677	0.002933					0.006609
	SSW	0.004202	0.001466					0.005668
	SW	0.001576	0.000978					0.002553
	WSW	0.001051	0.001955					0.003006
	W	0.002101	0.000978					0.003079
	WNW	0.000525	0.000978					0.001503
	NW	0.002101	0.000978					0.003079
	NNW	0.000525	0.000489					0.001014

Table 4. Ross ISR 2nd Quarter Joint Frequency Distribution
Source: IML (2011)

Stability Class	Wind Direction	Wind Speed (Knots) - 2nd Quarter 2010						Row Total
		< 3	3 - 6	6 - 10	10 - 16	16 - 21	> 21	
A	N	0.000496	0.001489					0.001985
	NNE		0.002481	0.000993				0.003474
	NE		0.003970	0.000993				0.004963
	ENE		0.001489	0.000496				0.001985
	E	0.000993	0.002481					0.003474
	ESE		0.001985					0.001985
	SE	0.001489	0.001489	0.000993				0.003970
	SSE	0.000496	0.002481	0.000993	0.000496			0.004467
	S	0.000993	0.000993	0.000993				0.002978
	SSW		0.000993	0.000993				0.001985
	SW		0.001985	0.000496				0.002481
	WSW		0.000496	0.000496				0.000993
	W		0.001985	0.001985				0.003970
	WNW	0.000993	0.001985	0.001489	0.000496			0.004963
	NW		0.003474	0.000496				0.003970
	NNW		0.001489	0.000993				0.002481
B	N		0.000993	0.001489				0.002481
	NNE			0.000496				0.000496
	NE			0.000993	0.000496			0.001489
	ENE			0.000496				0.000496
	E							
	ESE			0.000496				0.000496
	SE		0.000993	0.000496				0.001489
	SSE	0.001489	0.000496	0.000993	0.000993			0.003970
	S		0.001489	0.000496	0.000496			0.002481
	SSW	0.000496	0.000496	0.001489				0.002481
	SW		0.000993	0.000993				0.001985
	WSW			0.000993	0.001489			0.002481
	W			0.000496				0.000496
	WNW			0.000993	0.000496			0.001489
	NW			0.002481	0.000496			0.002978
	NNW			0.000993	0.000993		0.000496	0.002481
C	N		0.000496	0.000496	0.001489			0.002481
	NNE		0.000993	0.000993	0.000993			0.002978
	NE			0.002978				0.002978
	ENE		0.000496	0.000496				0.000993
	E	0.000993	0.000496	0.000496				0.001985
	ESE		0.001985	0.000496	0.000496			0.002978
	SE		0.000993	0.000993	0.001489			0.003474
	SSE	0.000496	0.000993	0.002978	0.005459			0.009926
	S		0.001985	0.006452	0.002481			0.010918
	SSW	0.000496		0.001489	0.001985			0.003970
	SW	0.000496	0.000993	0.000496	0.004963	0.001489		0.008437
	WSW			0.001489	0.002481			0.003970
	W			0.001489	0.001985			0.003474
	WNW		0.000496	0.001489	0.006948	0.000496		0.009429
	NW		0.000496	0.002978	0.003474			0.006948
	NNW		0.000496	0.001489	0.003474	0.000993		0.006452

Table 4. Ross ISR 2nd Quarter Joint Frequency Distribution (continued)

Stability Class	Wind Direction	Wind Speed (Knots) - 2nd Quarter 2010						
		< 3	3 - 6	6 - 10	10 - 16	16 - 21	> 21	Row Total
D	N		0.001489	0.008437	0.022829	0.004963	0.001489	0.039206
	NNE		0.001985	0.009429	0.018362	0.004963	0.001985	0.036725
	NE	0.000496	0.002978	0.004963	0.012903	0.002481		0.023821
	ENE	0.000496	0.001489	0.008437	0.009926	0.001985	0.000993	0.023325
	E	0.000993	0.003474	0.003970	0.002978			0.011414
	ESE	0.000993	0.002978	0.000993	0.000496			0.005459
	SE	0.000496	0.002978	0.002978	0.005955	0.000496		0.012903
	SSE	0.000496	0.008437	0.011414	0.041687	0.033747	0.037221	0.133002
	S	0.000496	0.014392	0.016873	0.039702	0.025310	0.012407	0.109181
	SSW	0.001985	0.009926	0.005955	0.006452	0.000993	0.003474	0.028784
	SW	0.001985	0.003970	0.004467	0.004963	0.002978	0.004467	0.022829
	WSW	0.000993	0.002978	0.004963	0.014888	0.003474	0.001985	0.029280
	W		0.000993	0.005955	0.013896	0.005955	0.008437	0.035236
	WNW		0.001985	0.008933	0.016873	0.009429	0.013400	0.050620
	NW		0.001985	0.005955	0.022829	0.006948	0.000496	0.038213
	NNW		0.000496	0.007444	0.024814	0.013400	0.008933	0.055087
E	N		0.001985	0.008933				0.010918
	NNE		0.000993	0.011911				0.012903
	NE		0.001985	0.007444				0.009429
	ENE		0.001985	0.004963				0.006948
	E	0.000993	0.002978	0.001985				0.005955
	ESE	0.000496	0.000993	0.000496				0.001985
	SE	0.001489	0.001985	0.002978				0.006452
	SSE		0.002481	0.007444				0.009926
	S	0.001489	0.006452	0.012903				0.020844
	SSW	0.000496	0.003474	0.002481				0.006452
	SW	0.000496	0.002481	0.000993				0.003970
	WSW	0.000496	0.001489	0.007444				0.009429
	W	0.000496	0.001489	0.008437				0.010422
	WNW	0.000496	0.000496	0.004467				0.005459
	NW		0.001489	0.006948				0.008437
	NNW		0.002481	0.015881				0.018362
F	N	0.000496	0.001985					0.002481
	NNE	0.000993	0.001985					0.002978
	NE	0.000496	0.000496					0.000993
	ENE	0.000496	0.001985					0.002481
	E	0.000993	0.000496					0.001489
	ESE	0.001985	0.000993					0.002978
	SE	0.001489	0.001489					0.002978
	SSE	0.000993	0.000993					0.001985
	S	0.002481	0.001985					0.004467
	SSW	0.000993	0.003474					0.004467
	SW	0.001985	0.000496					0.002481
	WSW	0.000993	0.000993					0.001985
	W	0.000993	0.001985					0.002978
	WNW		0.000496					0.000496
	NW		0.001489					0.001489
	NNW	0.000496	0.000496					0.000993

Table 5. Ross ISR 3rd Quarter Joint Frequency Distribution
Source: IML (2011)

Stability Class	Wind Direction	Wind Speed (Knots) - 3rd Quarter 2010						Row Total
		< 3	3 - 6	6 - 10	10 - 16	16 - 21	> 21	
A	N	0.000497	0.006907	0.003947				0.011351
	NNE		0.005427	0.001973				0.007400
	NE	0.001492	0.005427	0.002960				0.009879
	ENE	0.000497	0.002960	0.002960	0.000987			0.007404
	E	0.000995	0.001973	0.000493				0.003461
	ESE	0.001989	0.001480					0.003469
	SE	0.000995	0.002960	0.000493				0.004448
	SSE	0.001989	0.003453	0.002467				0.007909
	S	0.000497	0.002467	0.000493				0.003457
	SSW		0.001973	0.001480				0.003453
	SW	0.001989	0.004440	0.004440	0.000493	0.000493		0.011856
	WSW	0.000497	0.005427	0.006413	0.000493			0.012831
	W	0.000497	0.005920	0.002960	0.000493			0.009871
	WNW		0.007893	0.004933				0.012827
	NW		0.006413	0.006413				0.012827
	NNW	0.000497	0.007400	0.005427	0.000493			0.013818
B	N			0.001973				0.001973
	NNE	0.000497		0.000987				0.001484
	NE		0.000987	0.000493				0.001480
	ENE		0.001480	0.000493				0.001973
	E							
	ESE	0.000497						0.000497
	SE	0.000497			0.000493			0.000991
	SSE		0.000987	0.001480	0.001480			0.003947
	S		0.000987	0.001973				0.002960
	SSW	0.000497	0.000493	0.001973	0.001480			0.004444
	SW			0.001480		0.000493		0.001973
	WSW	0.000497		0.000987				0.001484
	W		0.001480	0.001480				0.002960
	WNW		0.000987	0.001973		0.000493		0.003453
	NW		0.000987	0.003453	0.001973			0.006413
	NNW		0.000493	0.003947	0.000493			0.004933
C	N		0.000493	0.003947	0.006413	0.000493		0.011347
	NNE	0.000497	0.000493	0.001973	0.003453		0.000493	0.006911
	NE			0.002960	0.000493			0.003453
	ENE			0.000987				0.000987
	E							
	ESE		0.000493					0.000493
	SE		0.000493	0.000987		0.000493		0.001973
	SSE	0.000497	0.000493	0.002960	0.003947	0.000987		0.008884
	S	0.000497	0.001973	0.005427	0.004440	0.000493		0.012831
	SSW	0.000497	0.000987	0.004933	0.004440			0.010857
	SW		0.000987	0.000987	0.001480			0.003453
	WSW		0.000493	0.000493				0.000987
	W			0.000987				0.000987
	WNW		0.001480	0.002467	0.001480	0.000987		0.006413
	NW			0.003453	0.002467	0.000987	0.000493	0.007400
	NNW			0.001973	0.003453			0.005427

Table 5. Ross ISR 3rd Quarter Joint Frequency Distribution (continued)

Stability Class	Wind Direction	Wind Speed (Knots) - 3rd Quarter 2010						Row Total
		< 3	3 - 6	6 - 10	10 - 16	16 - 21	> 21	
D	N		0.001480	0.013814	0.030587	0.005427	0.002467	0.053774
	NNE	0.001492	0.002467	0.009373	0.017267	0.006907	0.003947	0.041453
	NE	0.000497	0.000987	0.004933	0.012333	0.002960		0.021711
	ENE		0.003453	0.007400	0.008387	0.001480		0.020720
	E		0.003947	0.003947	0.002960			0.010853
	ESE		0.001480	0.003453	0.000987			0.005920
	SE		0.004440	0.002960	0.003947	0.000493	0.000493	0.012333
	SSE	0.000497	0.007893	0.010360	0.028614	0.026147	0.001973	0.075485
	S	0.001989	0.012827	0.028614	0.055254	0.020720	0.004933	0.124338
	SSW	0.002984	0.013320	0.011840	0.009373	0.004440	0.003947	0.045905
	SW	0.001492	0.005920	0.002960	0.001480	0.001973	0.002960	0.016786
	WSW	0.000497	0.003947	0.005920	0.003947	0.000987	0.000493	0.015791
	W		0.001973	0.004440	0.006907			0.013320
	WNW		0.001480	0.003453	0.009867	0.004933	0.000493	0.020227
	NW		0.001973	0.005920	0.023680	0.003453	0.001973	0.037000
	NNW		0.000987	0.009867	0.019734	0.003453	0.000987	0.035027
E	N		0.001480	0.004933				0.006413
	NNE	0.000497	0.005427	0.013320				0.019244
	NE	0.000995	0.003453	0.007400				0.011848
	ENE		0.003947	0.003947				0.007893
	E	0.000497	0.002467	0.001973				0.004937
	ESE		0.000493	0.000987				0.001480
	SE	0.000497	0.000987	0.001480				0.002964
	SSE	0.002487	0.004933	0.004933				0.012354
	S	0.000995	0.005427	0.007400				0.013822
	SSW	0.001492	0.004440	0.001973				0.007905
	SW	0.000995	0.003453					0.004448
	WSW		0.001480	0.006413				0.007893
	W		0.000987	0.004440				0.005427
	WNW		0.001480	0.003453				0.004933
	NW		0.002960	0.008880				0.011840
	NNW		0.001480	0.004933				0.006413
F	N	0.000497	0.003453					0.003951
	NNE	0.000497	0.002467					0.002964
	NE	0.002487	0.001973					0.004460
	ENE	0.001989	0.003453					0.005443
	E	0.002487	0.002467					0.004953
	ESE	0.002487	0.002467					0.004953
	SE	0.003481	0.000493					0.003975
	SSE	0.002984	0.002960					0.005944
	S	0.002487	0.001973					0.004460
	SSW	0.002487	0.001973					0.004460
	SW		0.001973					0.001973
	WSW	0.000497	0.000987					0.001484
	W		0.001480					0.001480
	WNW	0.001492	0.000987					0.002479
	NW	0.000995	0.002960					0.003955
	NNW	0.001492	0.001480					0.002972

Table 6. Ross ISR 4th Quarter Joint Frequency Distribution
Source: IML (2011)

Stability Class	Wind Direction	Wind Speed (Knots) - 4th Quarter 2010						Row Total
		< 3	3 - 6	6 - 10	10 - 16	16 - 21	> 21	
A	N	0.000465						0.000465
	NNE							
	NE	0.000929	0.000448	0.000448				0.001826
	ENE	0.001859	0.000896					0.002755
	E	0.000465	0.001345		0.000448			0.002258
	ESE		0.000896					0.000896
	SE		0.000896					0.000896
	SSE	0.000929	0.000896	0.000448				0.002274
	S	0.001859	0.000448	0.000448	0.000448			0.003204
	SSW	0.000465	0.002241	0.000448				0.003154
	SW	0.000465	0.000896					0.001361
	WSW		0.002241	0.000448				0.002689
	W	0.000929	0.001793					0.002722
	WNW	0.000929		0.000448				0.001378
	NW		0.001345	0.000896		0.000448		0.002689
	NNW	0.000929	0.000448					0.001378
B	N	0.000929						0.000929
	NNE	0.000465						0.000465
	NE	0.000929			0.000448			0.001378
	ENE	0.000465						0.000465
	E							
	ESE		0.000448					0.000448
	SE			0.000448				0.000448
	SSE		0.001793	0.000896				0.002689
	S	0.000929	0.001345	0.001345	0.000896			0.004515
	SSW	0.000929	0.000448					0.001378
	SW			0.001345				0.001345
	WSW	0.000465		0.000448				0.000913
	W			0.002241				0.002241
	WNW	0.000465		0.001345				0.001809
	NW		0.000896	0.002241				0.003138
	NNW	0.000929						0.000929
C	N		0.000896	0.000448	0.000896			0.002241
	NNE				0.001345			0.001345
	NE	0.000465		0.000448				0.000913
	ENE	0.000465		0.000448				0.000913
	E							
	ESE		0.000448					0.000448
	SE	0.001394						0.001394
	SSE	0.000465	0.001793	0.001345	0.000448			0.004051
	S	0.000929	0.002241	0.003138				0.006308
	SSW	0.000929	0.000896	0.000448	0.000896			0.003171
	SW	0.000465	0.000448					0.000913
	WSW		0.001345					0.001345
	W		0.002241	0.000448				0.002689
	WNW		0.000896	0.001793	0.001345			0.004034
	NW			0.001793	0.002689			0.004482
	NNW		0.000448	0.000448	0.001345			0.002241

Table 6. Ross ISR 4th Quarter Joint Frequency Distribution (continued)

Stability Class	Wind Direction	Wind Speed (Knots) - 4th Quarter 2010						
		< 3	3 - 6	6 - 10	10 - 16	16 - 21	> 21	Row Total
D	N	0.000929	0.001345	0.003586	0.011654	0.005379	0.000896	0.023789
	NNE	0.000465	0.002241	0.000448	0.004482			0.007636
	NE		0.000448	0.002241	0.001793			0.004482
	ENE		0.001793	0.000448	0.002241			0.004482
	E		0.001793	0.000448				0.002241
	ESE		0.002689	0.001793				0.004482
	SE		0.000896	0.002241	0.000448			0.003586
	SSE		0.011206	0.018377	0.024653	0.014343	0.009413	0.077992
	S	0.003253	0.029583	0.059615	0.072165	0.024653	0.016136	0.205404
	SSW	0.002324	0.017033	0.016584	0.011654	0.002241	0.003138	0.052973
	SW	0.000929	0.004482	0.001345	0.005827	0.002241	0.002689	0.017514
	WSW	0.000465	0.001793	0.008068	0.019274	0.000448		0.030048
	W		0.000896	0.005379	0.045719	0.002241	0.000448	0.054684
	WNW		0.002689	0.007620	0.028238	0.010309	0.005827	0.054684
	NW		0.003138	0.009413	0.038548	0.018377	0.012102	0.081578
	NNW		0.003138	0.005379	0.029135	0.009861	0.004931	0.052443
E	N	0.000929	0.001345	0.010758				0.013032
	NNE		0.001345	0.004034				0.005379
	NE		0.000896	0.003138				0.004034
	ENE		0.001793					0.001793
	E		0.000448					0.000448
	ESE	0.000465	0.000448					0.000913
	SE	0.000465		0.000896				0.001361
	SSE	0.001394	0.004482	0.004482				0.010359
	S	0.003718	0.017929	0.015240				0.036887
	SSW	0.002324	0.009861	0.004034				0.016219
	SW	0.001394	0.004482	0.001345				0.007221
	WSW		0.003138	0.012550				0.015688
	W		0.001793	0.017033				0.018826
	WNW	0.000465	0.002241	0.016584				0.019290
	NW		0.003138	0.014792				0.017929
	NNW	0.000465	0.002241	0.014343				0.017049
F	N	0.002788	0.003138					0.005926
	NNE	0.000929						0.000929
	NE	0.001394						0.001394
	ENE	0.000465	0.001345					0.001809
	E	0.001394	0.000448					0.001842
	ESE	0.000929	0.000448					0.001378
	SE	0.000465	0.000896					0.001361
	SSE	0.000929	0.002689					0.003619
	S	0.002788	0.005379					0.008167
	SSW	0.003253	0.003586					0.006839
	SW	0.000465	0.000896					0.001361
	WSW	0.000929	0.001345					0.002274
	W	0.000465	0.001345					0.001809
	WNW	0.001394	0.001345					0.002739
	NW	0.000929	0.001793					0.002722
	NNW	0.001859						0.001859

Ross ISR

Meteorological Data Summary

1/5/2010 - 1/12/2011

Hourly Data

	Average/Total	Max	Min
Wind Speed (mph)	11.6	45.6	0.5
Sigma-Theta (°)	11.4	74.0	0.3
Temperature (F)	44.0	98.0	-15.9
Relative Humidity (%)	66.7	99.7	7.0
Precipitation (in)	10.69	0.29	

Predominant wind direction was from the S sector,
accounting for 20.8% of the possible winds

Data Recovery

Parameter	Possible (hours)	Reported (hours)	Recovery
Wind Speed	8923	8570	96.04%
Wind Direction	8923	8570	96.04%
Sigma-Theta	8923	8570	96.04%
Temperature	8923	8749	98.05%
Relative Humidity	8923	8749	98.05%
Precipitation	8923	8749	98.05%

Figure 1. Ross ISR Meteorological Summary for 2010
Source: IML (2011)

Gillette Airport

Meteorological Data Summary

1/5/2010 - 1/12/2011

Hourly Data

	Average/Total	Max	Min
Wind Speed (mph)	10.0	41.0	0.0
Sigma-Theta (°)	9.5	10.0	0.3
Temperature (F)	45.2	98.0	-16.0
Relative Humidity (%)	62.5	100.0	8.0
Precipitation (in)	14.20	0.78	
Bar. Pressure (in Hg)	25.5	26.1	24.7

Predominant wind direction was from the N sector,
accounting for 19.7% of the possible winds

Data Recovery

Parameter	Possible (hours)	Reported (hours)	Recovery
Wind Speed	8923	8883	99.55%
Wind Direction	8923	8883	99.55%
Sigma-Theta	8923	8888	99.61%
Temperature	8923	8889	99.62%
Relative Humidity	8923	8879	99.51%
Precipitation	8923	8894	99.67%
Bar. Pressure	8923	8894	99.67%

Figure 2. 2010 Gillette AP Meteorological Summary
Sources: IML (2011), WRCC (2011)

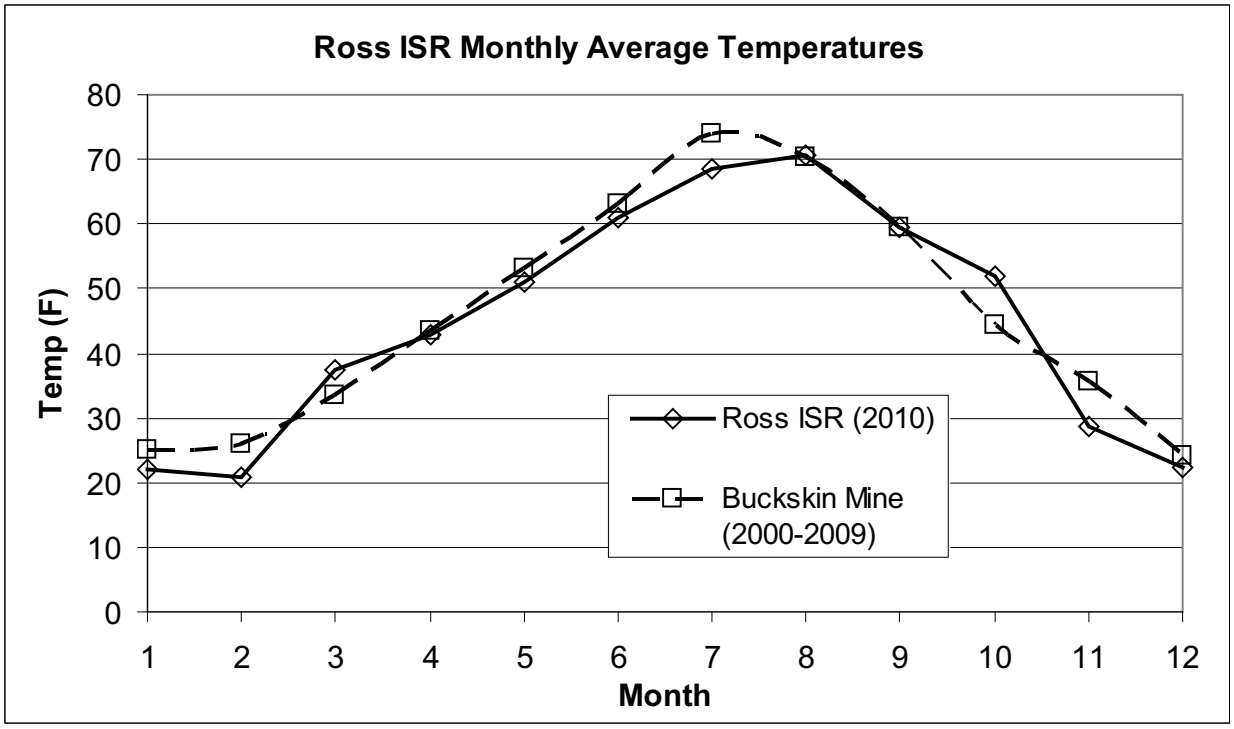

Figure 3. Ross ISR (Oshoto) Monthly Average Temperatures
Sources: IML (2009), IML (2011)

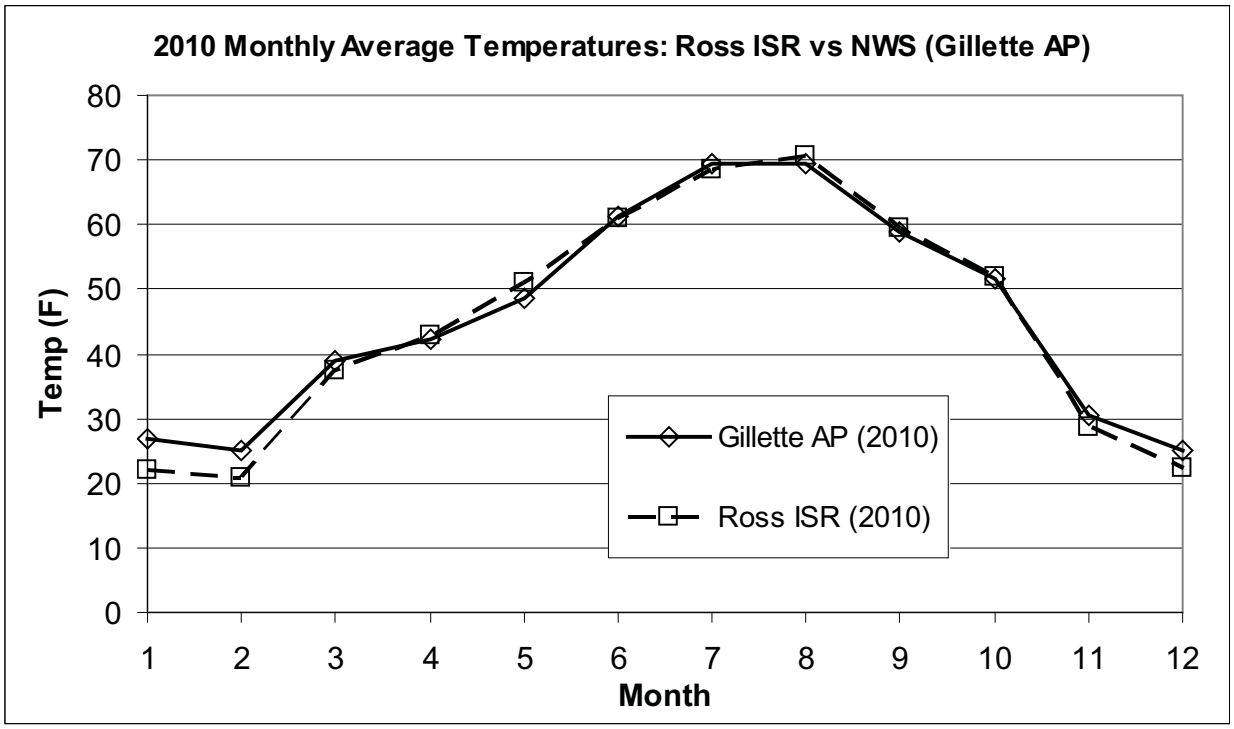

Figure 4. 2010 Average Monthly Temperatures: Ross ISR vs. Gillette AP
Sources: IML (2011), WRCC (2011)

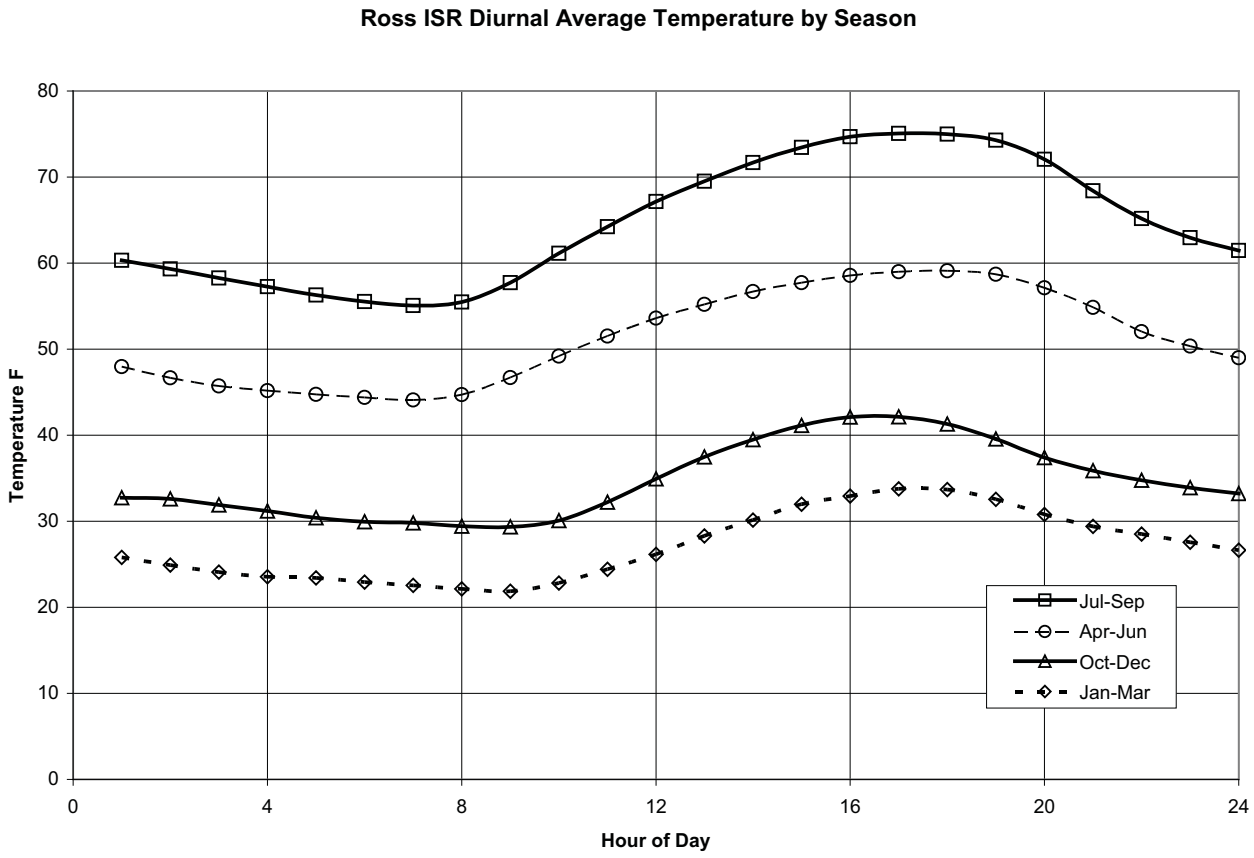

Figure 5. Ross ISR Diurnal Average Temperatures
Source: IML (2011)

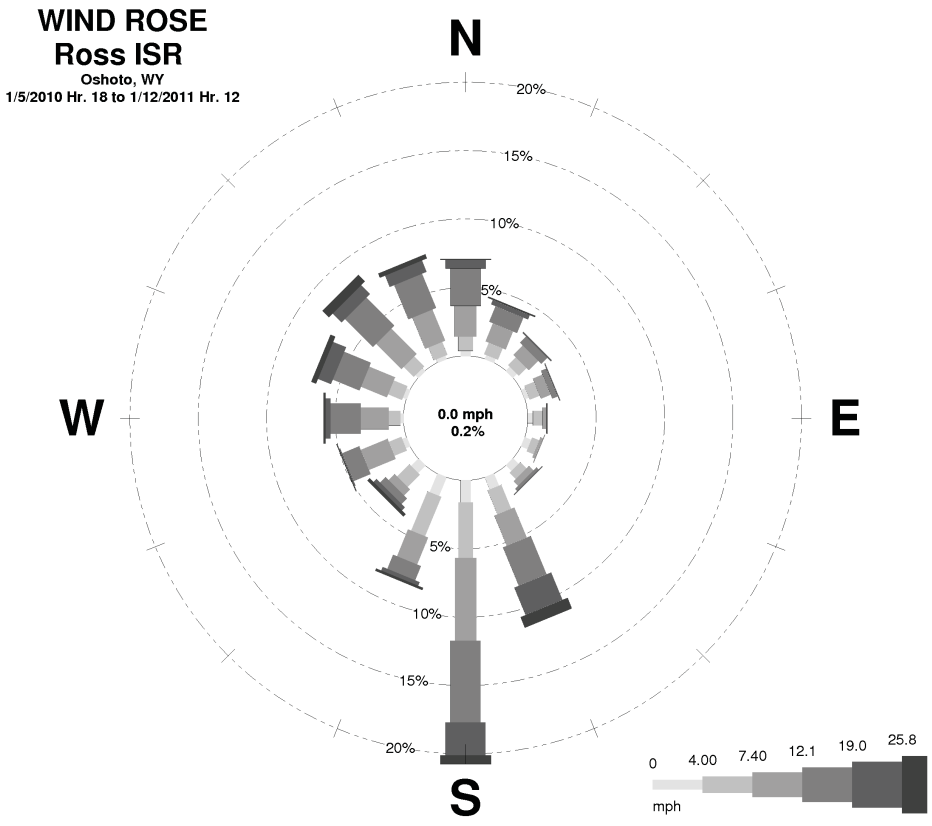

Figure 6. Ross ISR Project Wind Rose
Source: IML (2011)

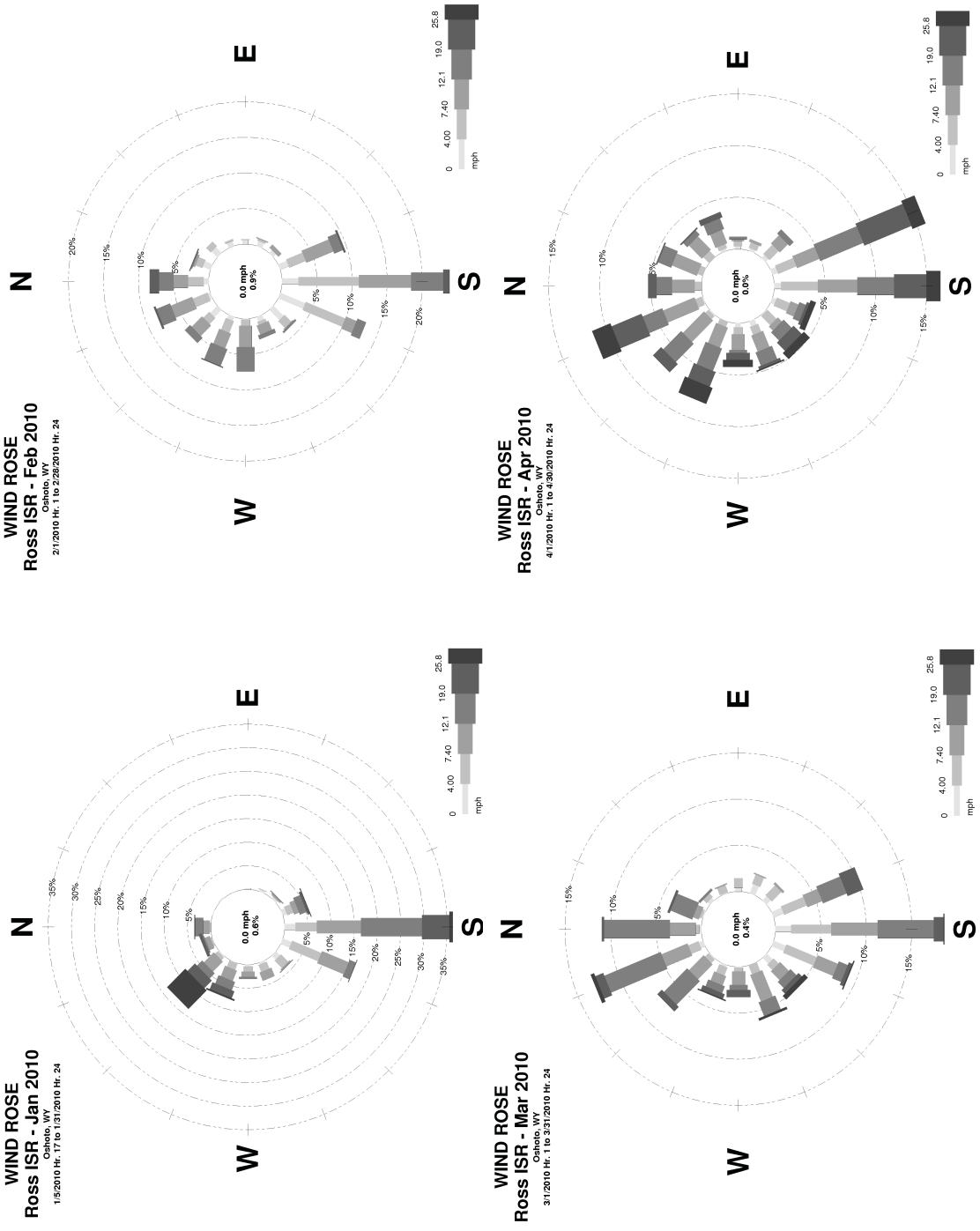

Figure 7. Ross ISR Monthly Wind Roses: January – April
Source: IML (2011)

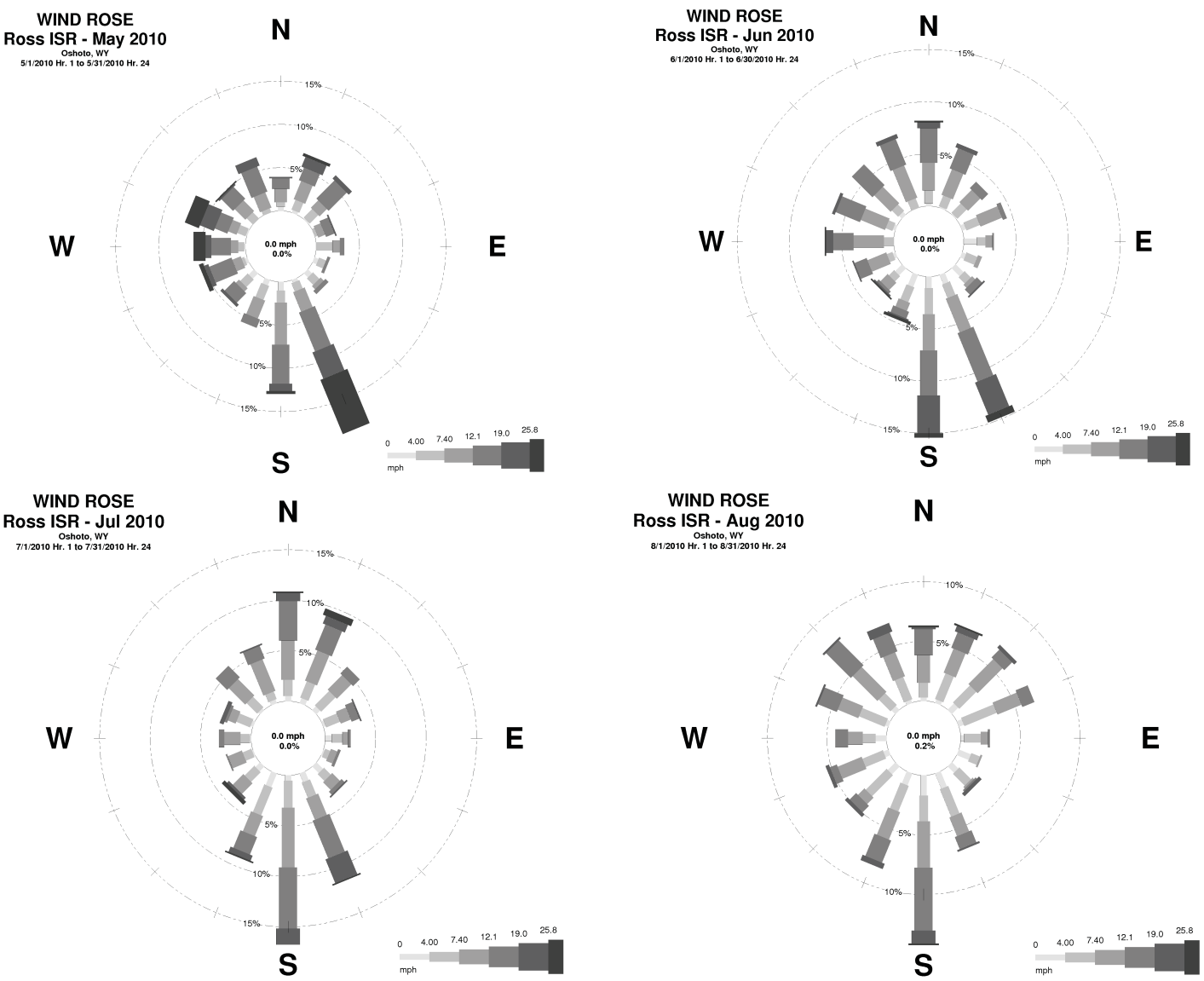

Figure 8. Ross ISR Monthly Wind Roses: May – August
Source: IML (2011)

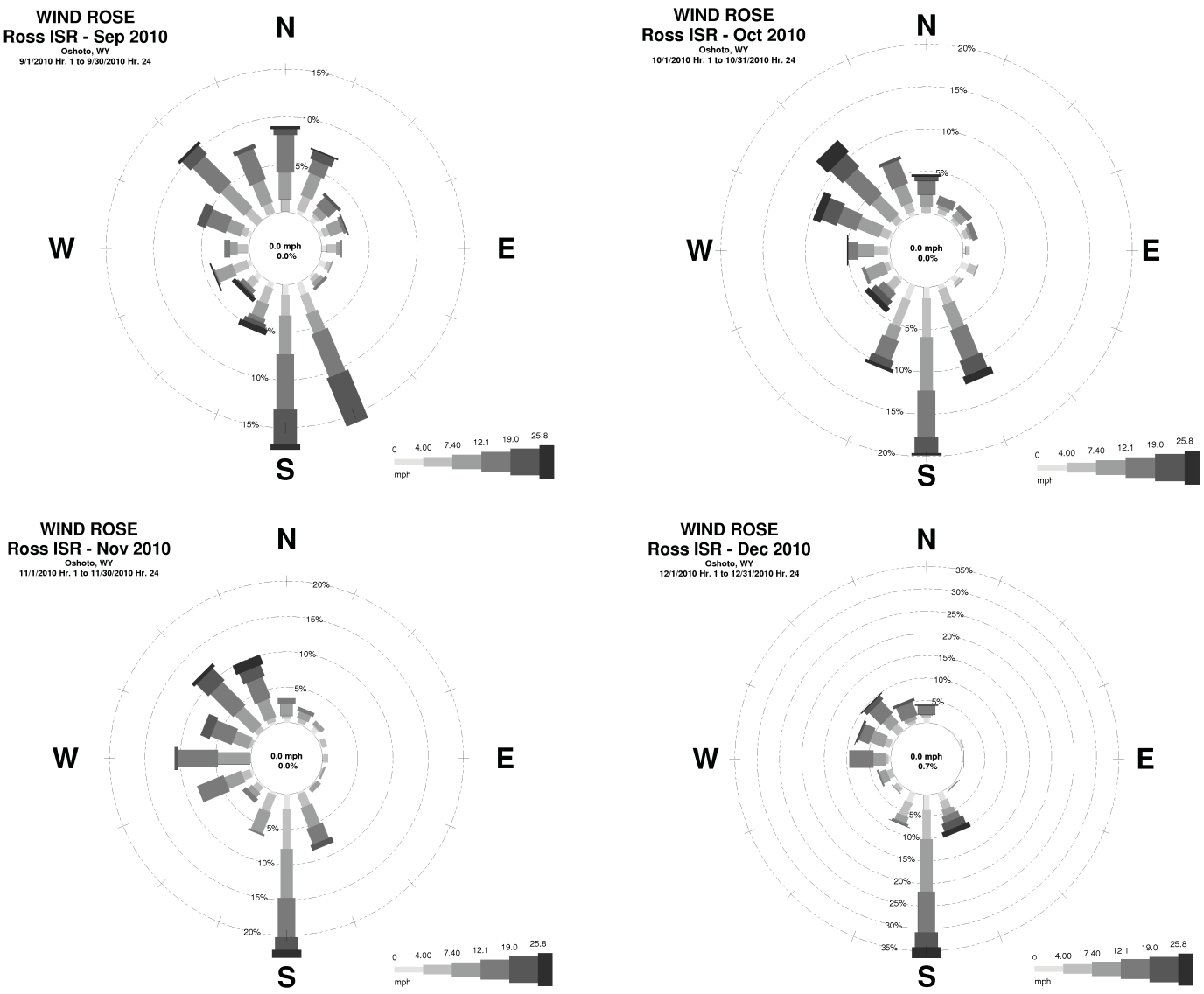

Figure 9. Ross ISR Monthly Wind Roses: September – December
Source: IML (2011)

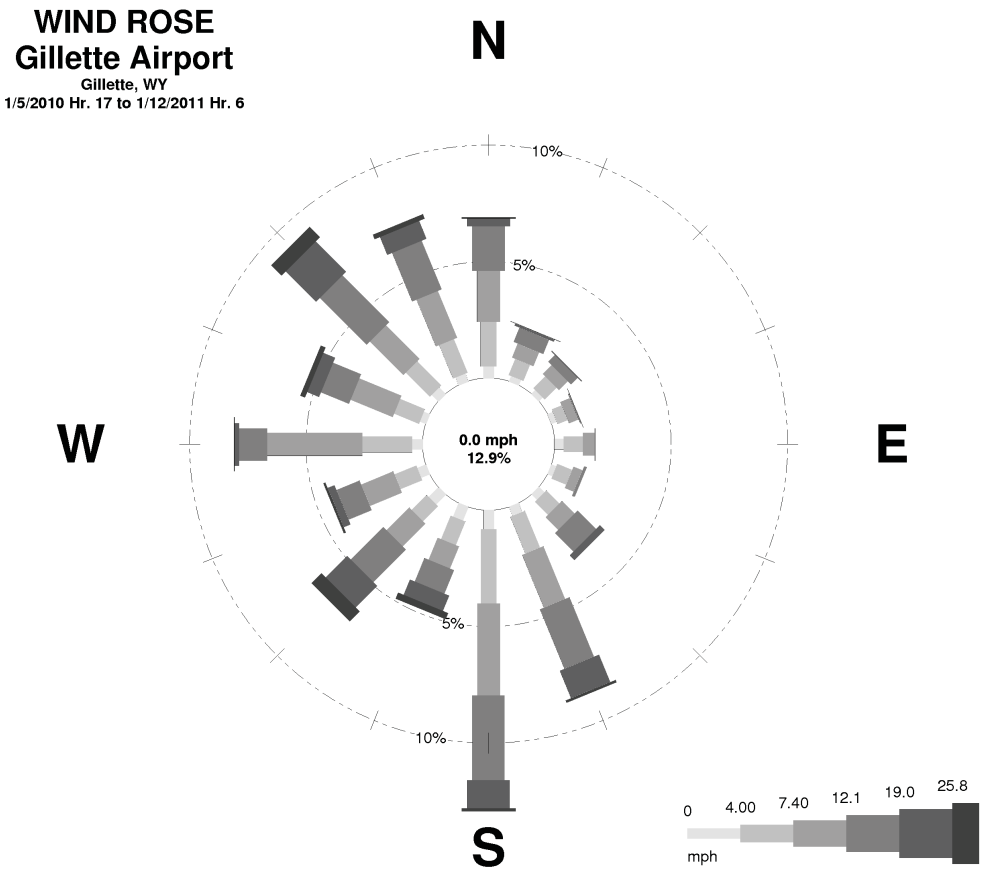

Figure 10. 2010 Gillette AP Wind Rose
Source: WRCC (2011)

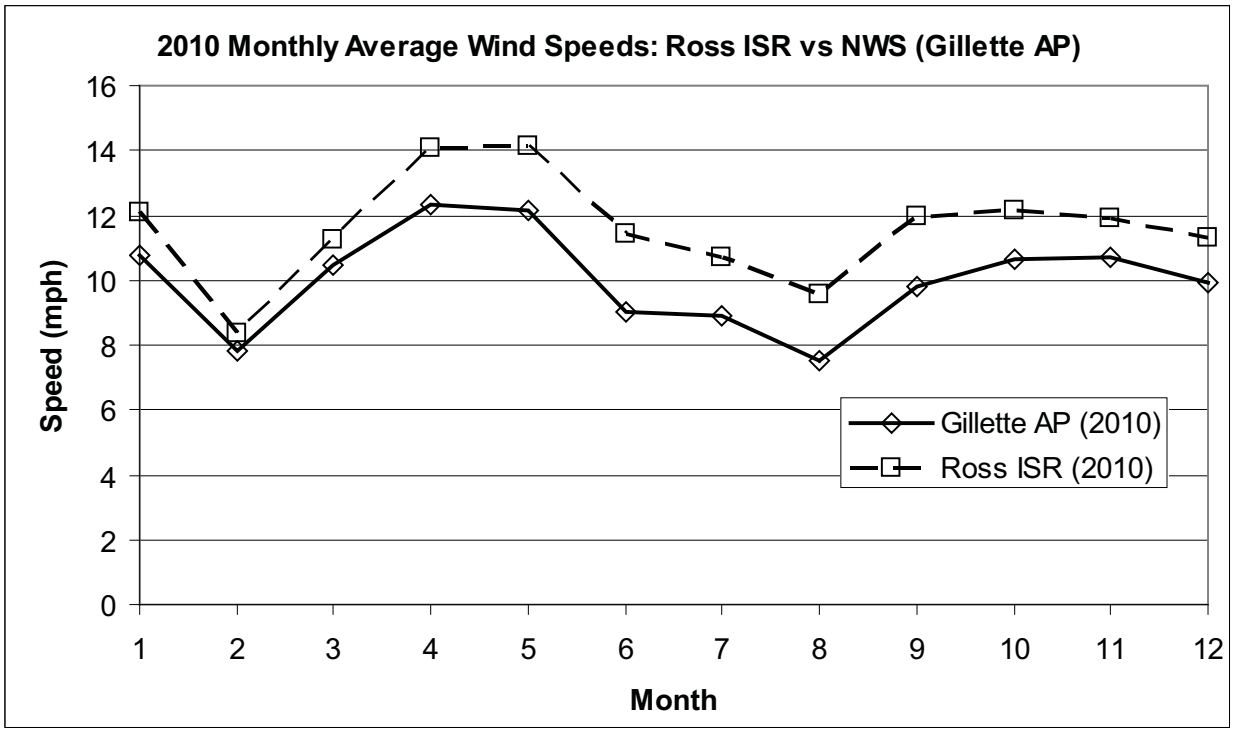

Figure 11. 2010 Average Monthly Wind Speeds: Ross ISR vs. Gillette AP
Sources: IML (2011), WRCC (2011)

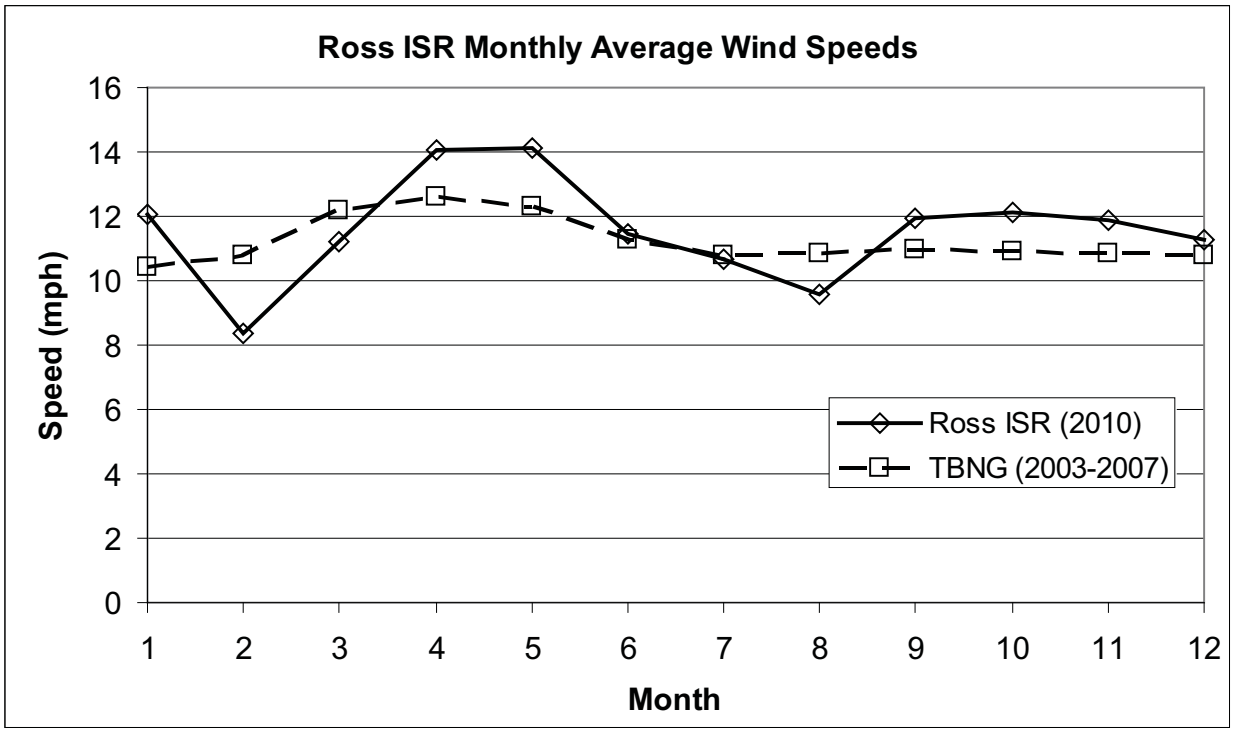

Figure 12. Project Area Monthly Average Wind Speeds
Sources: IML (2011), WDEQ/AQD (2011)

Ross ISR

Wind Data Summary

1/5/2010 5:00:00 PM - 1/12/2011 12:00:00 PM

Hourly Data

	Average	Max	Min
Wind Speed (mph)	11.62	45.63	0.51
Sigma Theta (º)	11.37	73.99	0.29
Wind Direction			
N	12.13	33.04	1.69
NNE	11.16	31.68	0.79
NE	8.99	22.45	0.68
ENE	8.73	24.93	0.94
E	6.23	18.25	0.54
ESE	5.27	17.13	0.73
SE	7.27	25.60	0.93
SSE	13.73	35.96	0.75
S	11.99	35.60	0.51
SSW	8.32	42.43	0.91
SW	10.16	45.63	0.53
WSW	10.42	34.08	1.19
W	12.06	38.01	0.65
WNW	13.34	34.23	0.55
NW	13.84	35.48	1.26
NNW	13.22	40.06	1.18

Predominant wind direction was from the S sector, accounting for 20.8% of the winds, the average wind direction was 228°.

Data Recovery

	Possible (hours)	Reported (hours)	Recovery
Wind Speed	8947	8570	95.79%
Sigma Theta	8947	8570	95.79%
Wind Direction	8947	8570	95.79%

Figure 13. Ross ISR Wind Summary
Source: IML (2011)

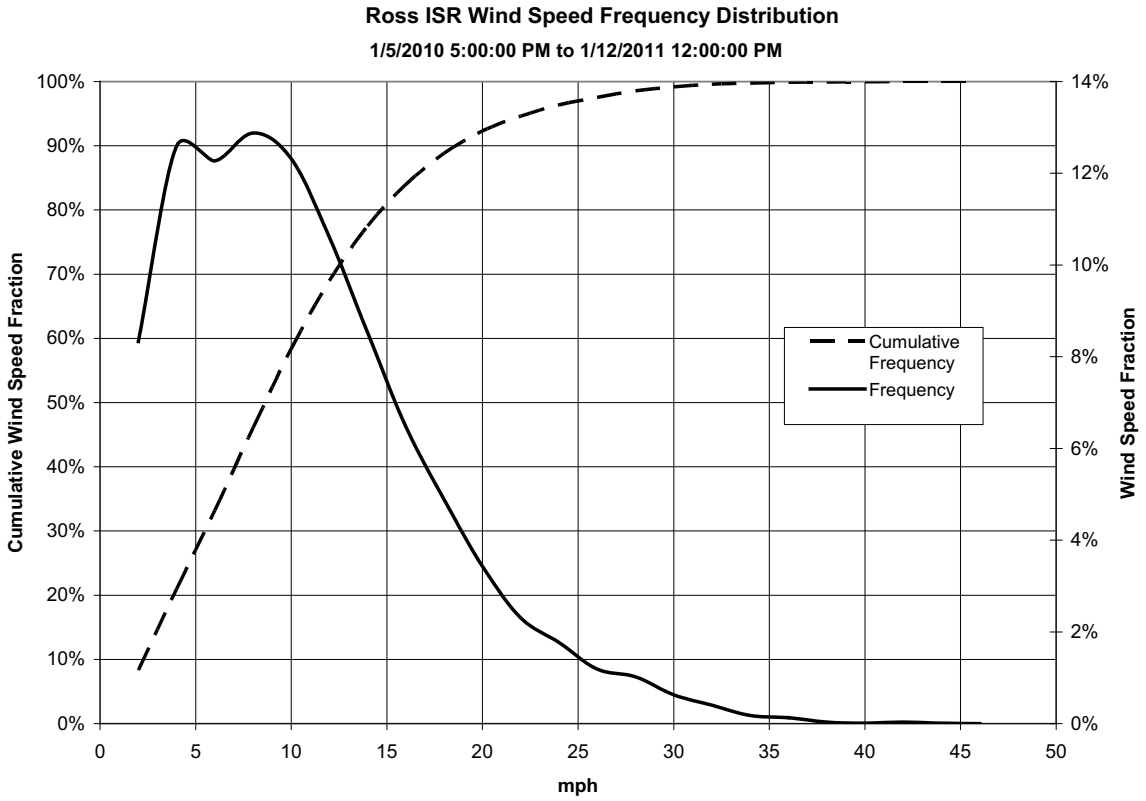

Figure 14. Ross ISR Wind Speed Frequency Distribution
Source: IML (2011)

Ross ISR 1st Quarter

Wind Data Summary

1/5/2010 5:00:00 PM - 3/31/2010

Hourly Data

	Average	Max	Min
Wind Speed (mph)	10.55	43.19	0.51
Sigma Theta (º)	10.02	61.91	1.89
Wind Direction			
N	12.58	23.79	2.47
NNE	10.29	20.50	0.79
NE	4.68	15.95	0.68
ENE	4.29	9.62	0.94
E	3.89	7.22	0.54
ESE	3.97	8.84	0.73
SE	5.67	12.13	2.05
SSE	10.23	27.13	0.98
S	11.14	29.67	0.51
SSW	7.05	26.02	1.10
SW	8.36	43.19	0.53
WSW	9.52	28.31	1.19
W	11.11	24.90	1.48
WNW	11.88	32.76	0.55
NW	15.34	35.17	1.26
NNW	12.16	29.17	2.36

Predominant wind direction was from the S sector, accounting for 25.9% of the winds, the average wind direction was 222°.

Data Recovery

	Possible (hours)	Reported (hours)	Recovery
Wind Speed	2047	2046	99.95%
Sigma Theta	2047	2046	99.95%
Wind Direction	2047	2046	99.95%

Figure 15. Ross ISR 1st Quarter Wind Summary
Source: IML (2011)

Ross ISR 2nd Quarter

Wind Data Summary

4/1/2010 - 6/30/2010

Hourly Data

	Average	Max	Min
Wind Speed (mph)	13.17	45.63	1.36
Sigma Theta (º)	11.33	67.89	2.25
Wind Direction			
N	11.94	28.51	2.00
NNE	11.60	27.27	2.31
NE	10.51	22.37	3.10
ENE	10.50	24.93	1.51
E	6.82	18.25	2.00
ESE	5.85	17.13	1.58
SE	8.08	23.87	2.63
SSE	17.18	35.96	1.64
S	13.19	33.36	1.83
SSW	9.99	42.43	2.68
SW	12.56	45.63	1.73
WSW	12.34	34.08	1.36
W	14.42	38.01	1.37
WNW	15.69	34.23	2.97
NW	12.37	29.94	3.48
NNW	15.12	40.06	2.75

Predominant wind direction was from the SSE sector, accounting for 16.3% of the winds, the average wind direction was 217°.

Data Recovery

	Possible (hours)	Reported (hours)	Recovery
Wind Speed	2184	2015	92.26%
Sigma Theta	2184	2015	92.26%
Wind Direction	2184	2015	92.26%

Figure 16. Ross ISR 2nd Quarter Wind Summary
Source: IML (2011)

Ross ISR 3rd Quarter

Wind Data Summary

7/1/2010 - 9/30/2010

Hourly Data

	Average	Max	Min
Wind Speed (mph)	10.82	37.90	0.95
Sigma Theta (º)	15.16	73.99	0.47
Wind Direction			
N	11.97	33.04	2.68
NNE	11.61	31.68	2.44
NE	9.20	22.45	1.48
ENE	8.69	23.86	1.41
E	6.67	16.71	1.40
ESE	5.79	14.33	1.32
SE	7.81	25.60	1.41
SSE	12.64	27.04	1.97
S	12.53	30.65	1.60
SSW	9.77	37.90	0.95
SW	9.62	36.03	1.36
WSW	8.64	28.70	2.52
W	8.59	17.16	3.00
WNW	10.87	24.97	2.03
NW	11.66	26.98	2.71
NNW	11.11	24.34	1.18

Predominant wind direction was from the S sector, accounting for 16.2% of the winds, the average wind direction was 222°.

Data Recovery

	Possible (hours)	Reported (hours)	Recovery
Wind Speed	2208	2027	91.80%
Sigma Theta	2208	2027	91.80%
Wind Direction	2208	2027	91.80%

Figure 17. Ross ISR 3rd Quarter Wind Summary
Source: IML (2011)

Ross ISR

Wind Data Summary

10/1/2010 - 12/31/2010

Hourly Data

	Average	Max	Min
Wind Speed (mph)	11.79	35.60	0.65
Sigma Theta (º)	9.64	56.17	0.88
Wind Direction			
N	11.76	27.90	1.69
NNE	9.36	17.38	1.56
NE	7.58	16.26	1.63
ENE	6.93	16.11	2.25
E	5.64	15.97	2.26
ESE	5.32	10.01	1.59
SE	5.94	13.83	0.93
SSE	12.74	35.20	0.75
S	11.77	35.60	1.29
SSW	8.25	28.09	0.91
SW	10.78	29.99	1.83
WSW	10.18	18.76	1.98
W	11.57	28.34	0.65
WNW	13.23	29.36	1.60
NW	14.90	35.48	2.50
NNW	13.98	33.21	1.18

Predominant wind direction was from the S sector, accounting for 26.6% of the winds, the average wind direction was 230°.

Data Recovery

	Possible (hours)	Reported (hours)	Recovery
Wind Speed	2208	2208	100.00%
Sigma Theta	2208	2208	100.00%
Wind Direction	2208	2208	100.00%

Figure 18. Ross ISR 4th Quarter Wind Summary
Source: IML (2011)

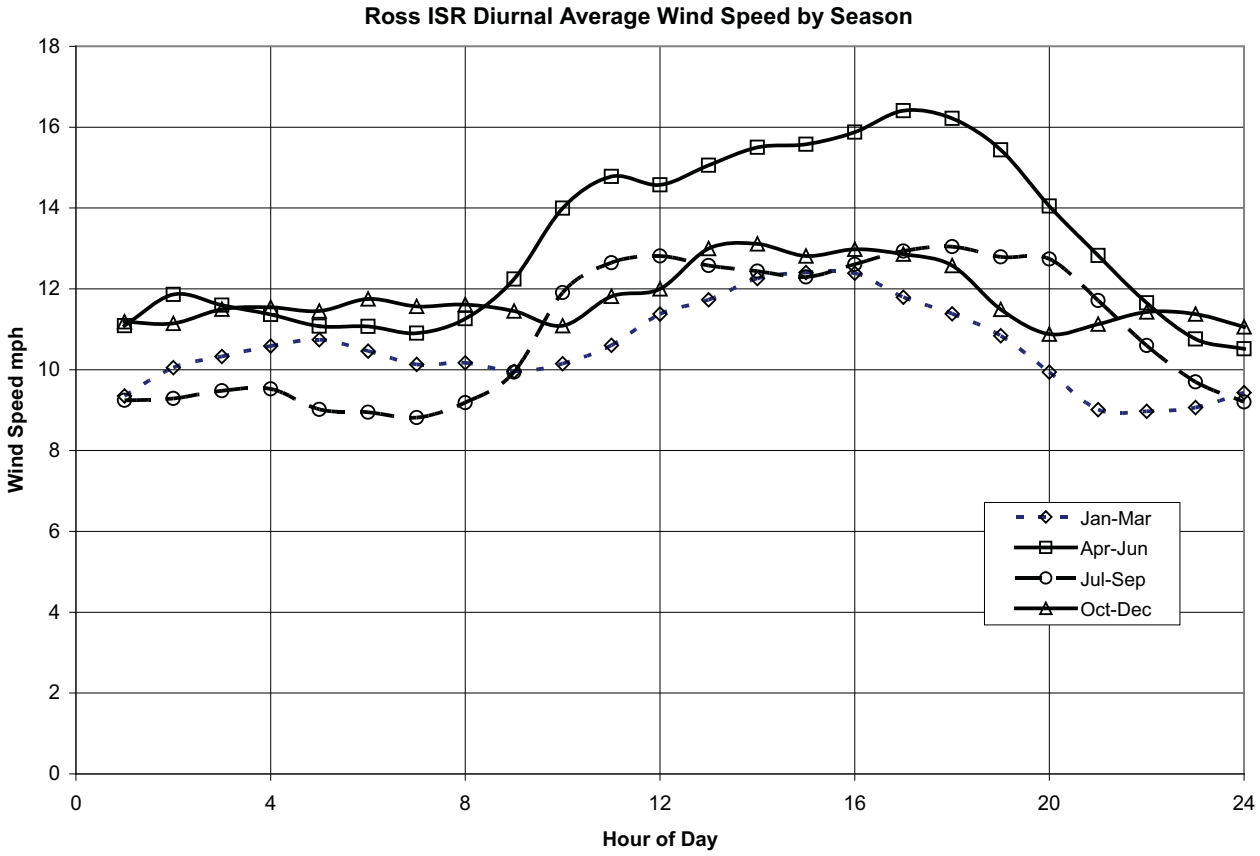

Figure 19. Ross ISR (Oshoto) Diurnal Average Wind Speeds
Source: IML (2011)

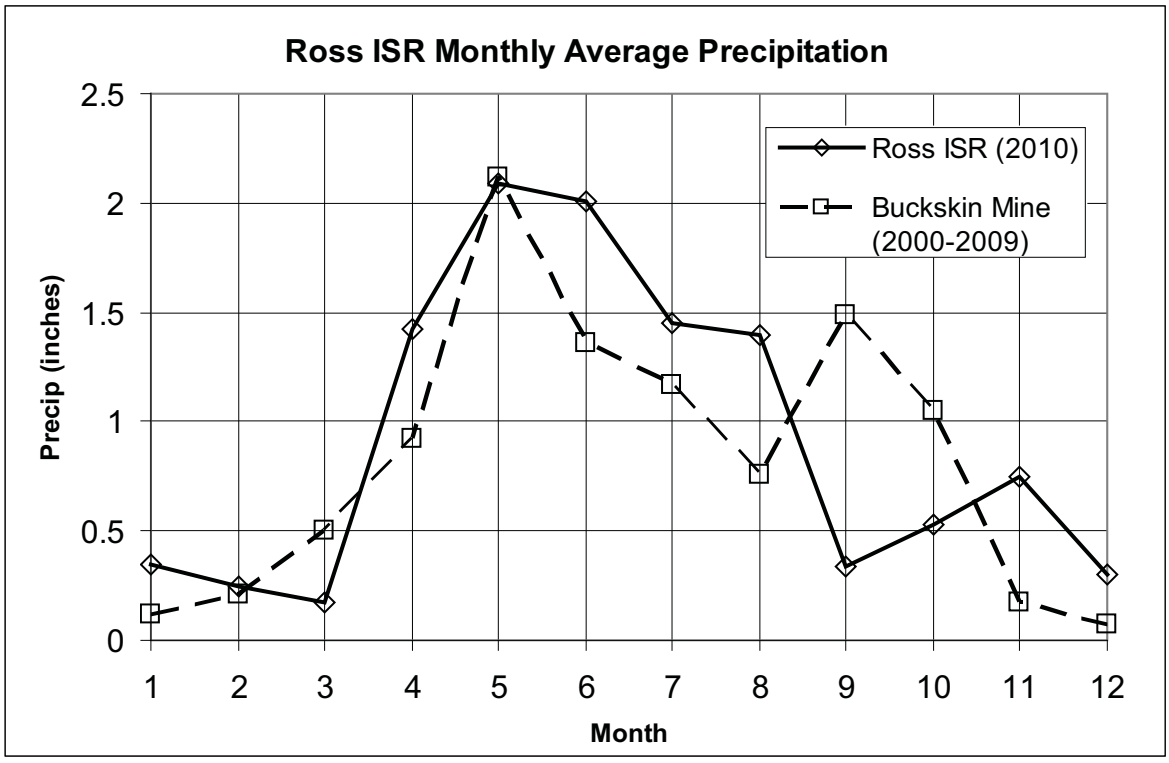

Figure 20. Ross ISR Monthly Precipitation
Sources: IML (2009), IML (2011)

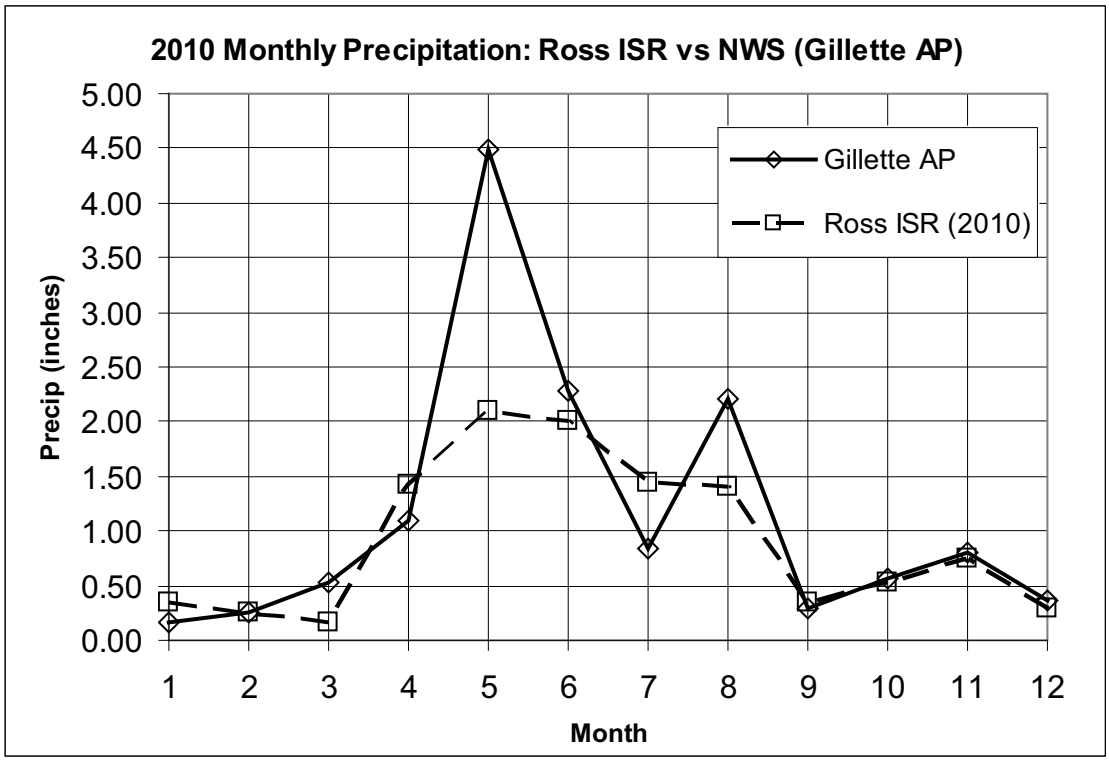

Figure 21. 2010 Monthly Precipitation: Ross ISR vs. Gillette AP
Sources: IML (2011), WRCC (2011)

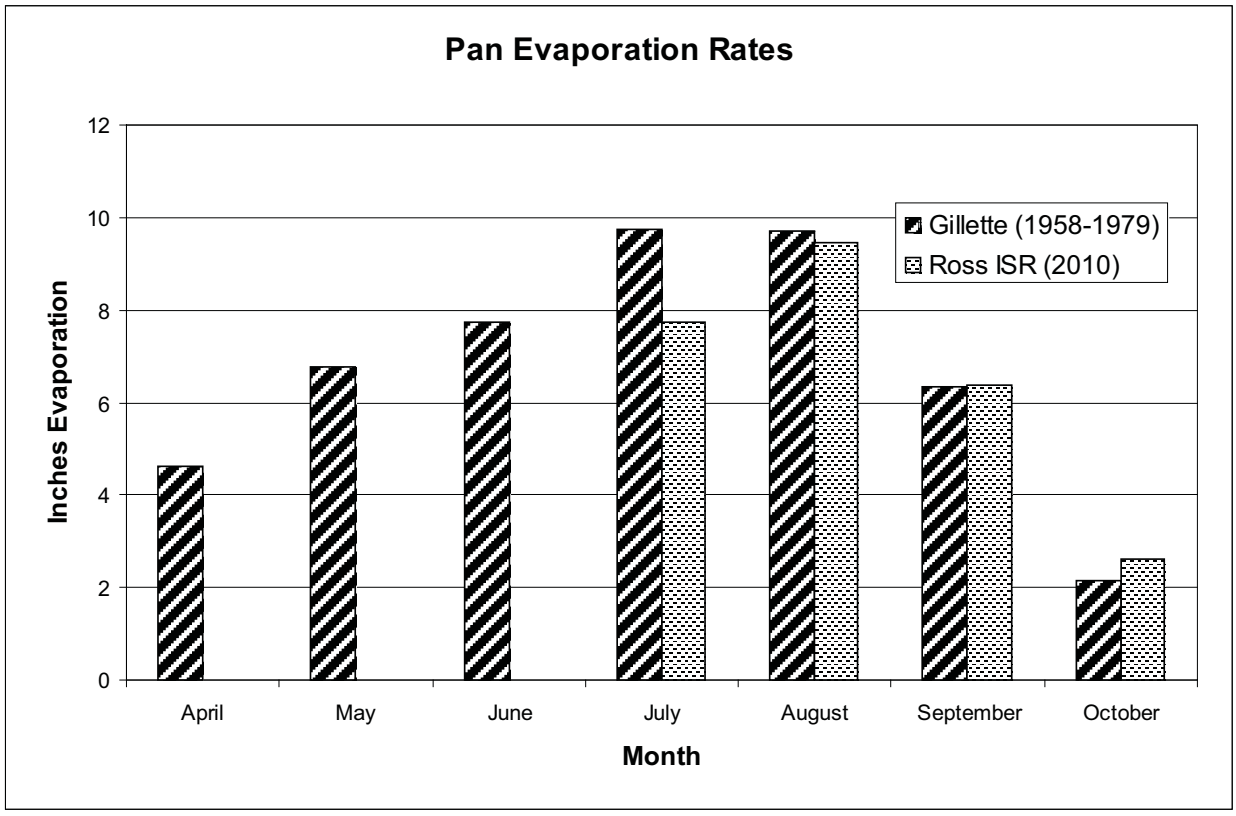

Figure 22. Ross ISR Monthly Evaporation
Sources: IML (2011), Martner (1986)

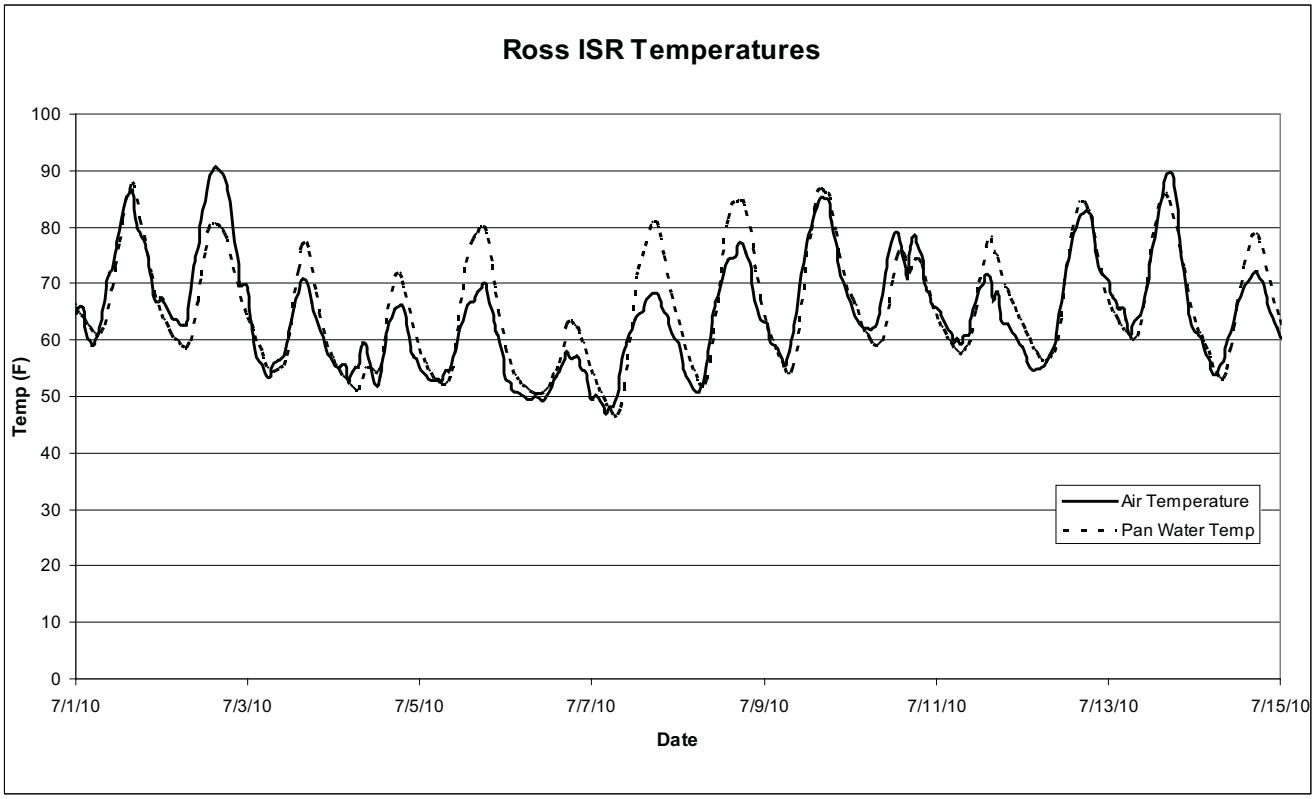

Figure 23. Ross ISR Typical Evaporation Pan Water Temperature Correlation
Source: IML (2011)

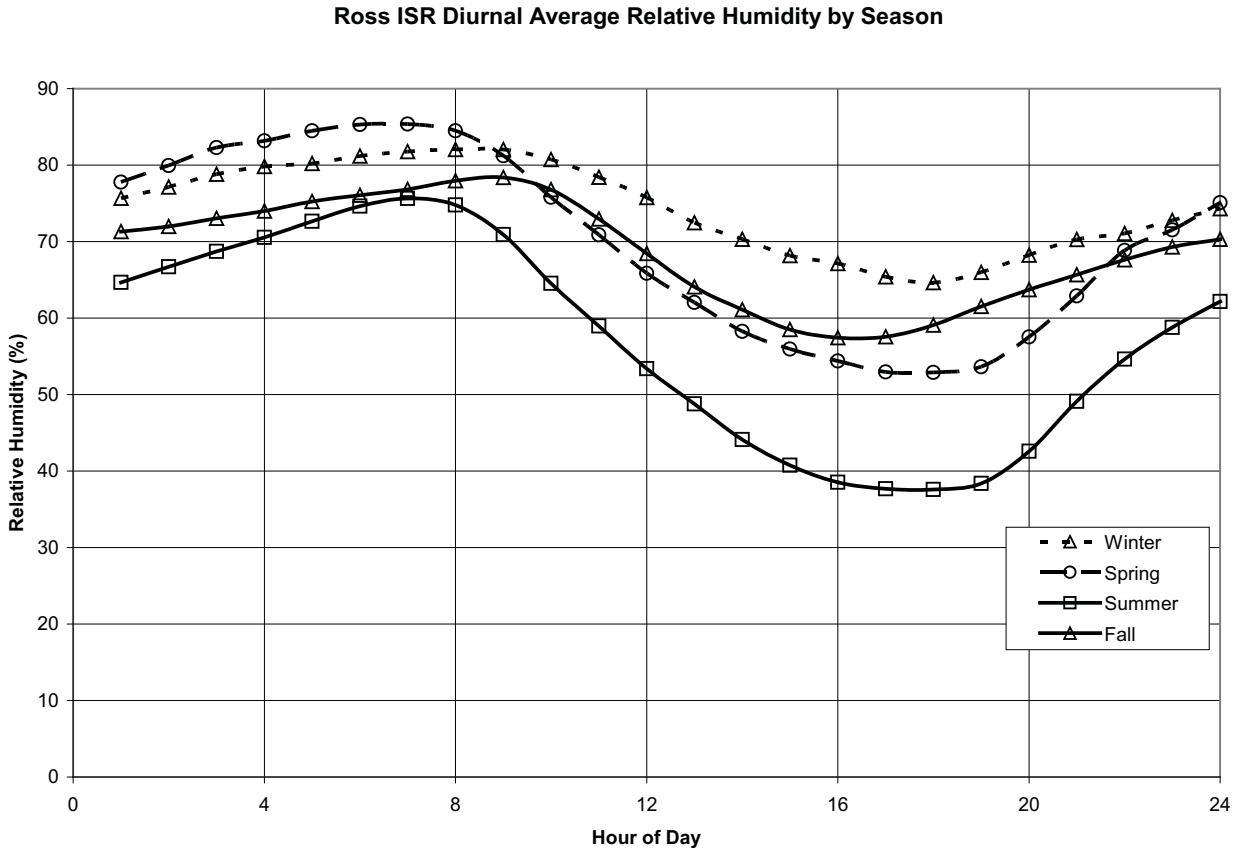

Figure 24. Ross ISR Diurnal Average Relative Humidity
Source: IML (2011)

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