

DataGrams

Датаграмма

A proposed method for understanding the origin and
processing of data

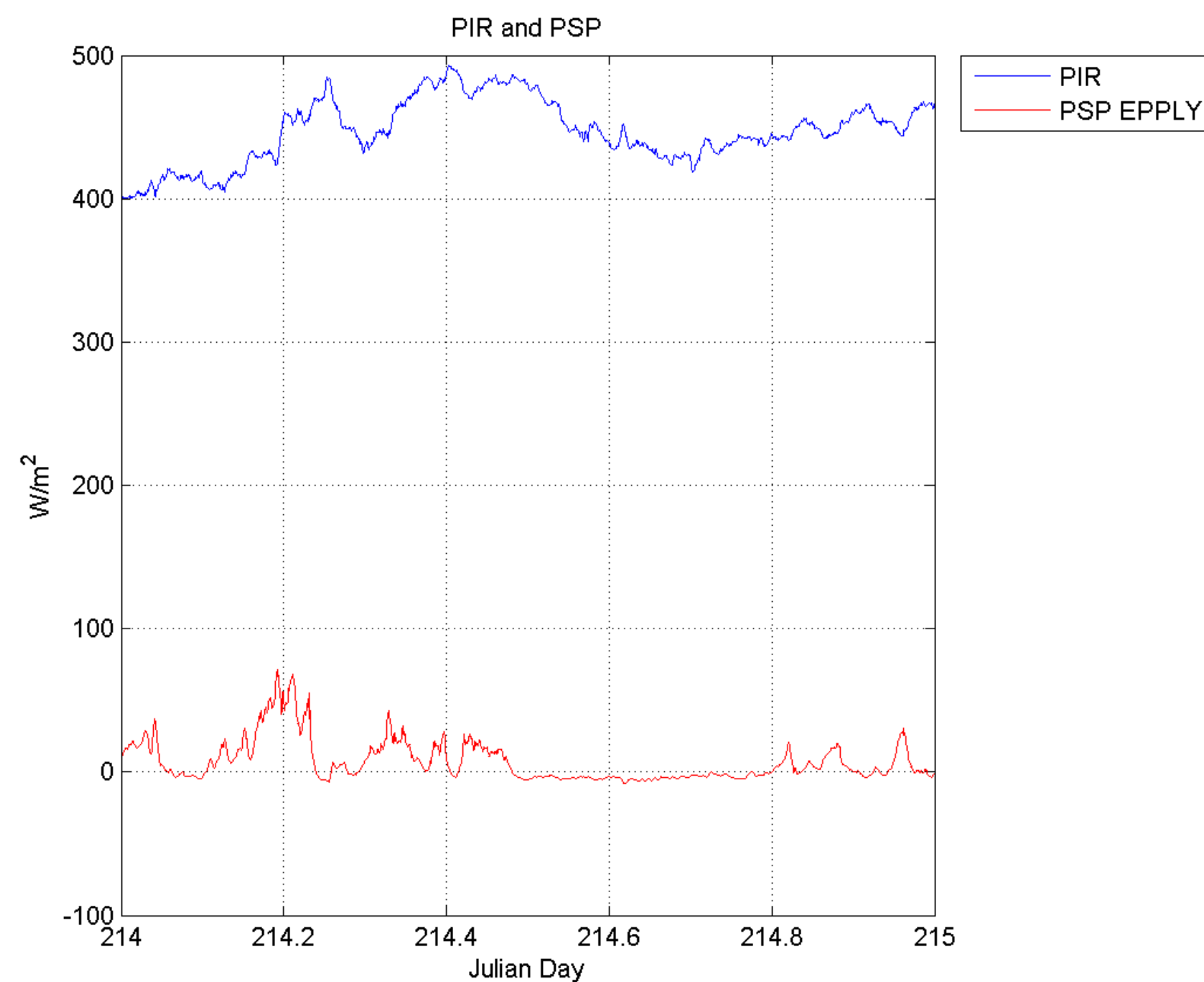
Предлагаемый метод для понимания происхождения и
обработки данных

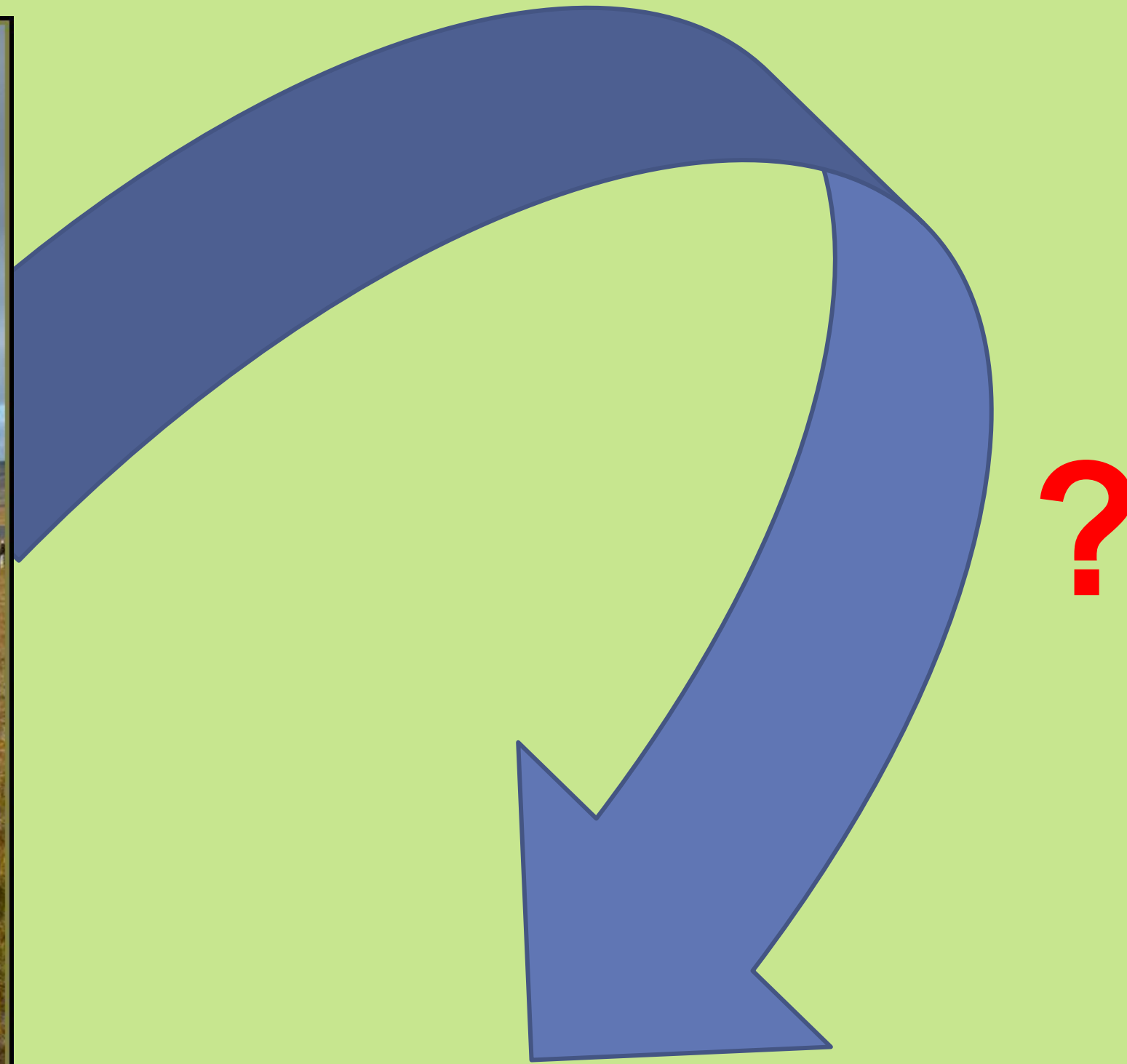
Taneil Uttal

Even the most simple data can have complex origins.

We measure voltage and resistance and attenuation which must be converted to the physical parameter of interest. Calibration coefficients and conversion factors need to be applied. Quality control processing can vary for different applications.

Даже самые простые данные могут иметь сложную природу происхождения. Мы измеряем напряжение, сопротивление и ослабление, которое должно быть преобразовано в интересующий физический параметр. Должны применяться коэффициенты калибровки и коэффициенты преобразования. Обработка контроля качества может меняться для различных применений.





```
tik_a.2012.01.01.05.00.00 - WordPad
Home View
Clipboard Font Paragraph Insert Editing
Courier New 11
B I U abc x x²
Picture Paint drawing Date and time Insert object Find Replace Select all
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101,2012,1,514,14.35,-13.45,0.09187,0.00153,60.24,63.789,-0.03774,0.00048
```

Datagrams: Baseline Surface Radiation Network BSRN - RAD2

Location: Near Polyarka Weather Station:
NOAA Office
File name: tik_aYYYYMMDDHH.dat (as of
3/10/12)
Former File Name: tikYYYYMMDDHH.dat
File location in Tiksi: E:\rad2

10.31.112.101

Campbell CR10X
Data Logger

Instruments:

Epply Pyranometer (PSP)
Radiometer



Platform: Albedo Rack

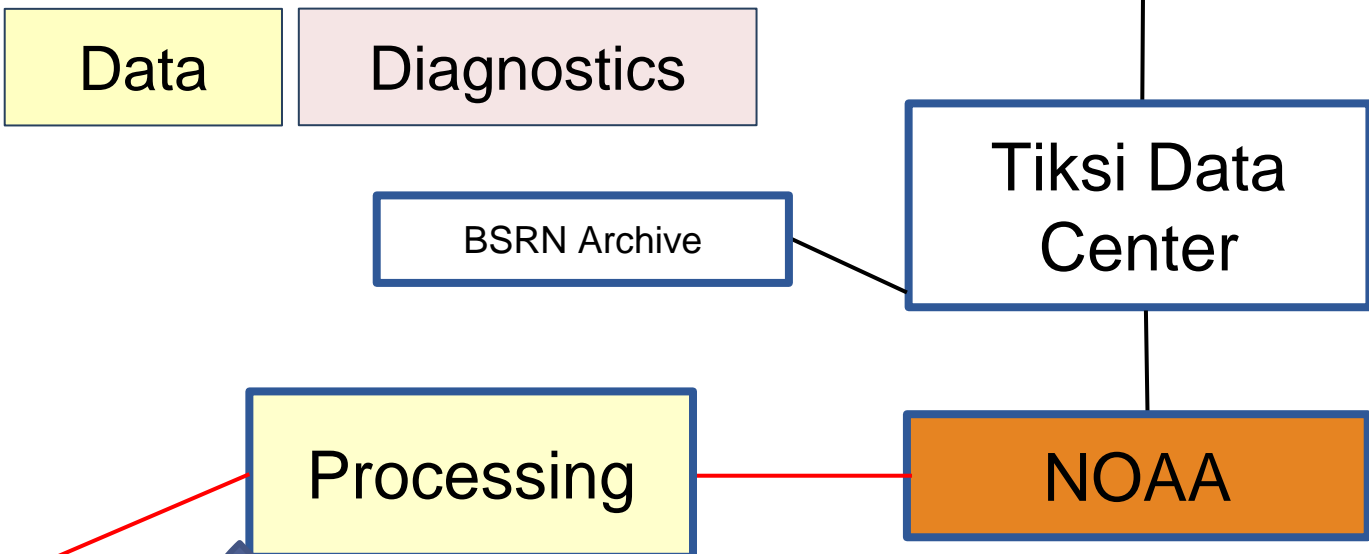
Location: East North
East of Polyarka Wx
Station



Epply Pyrgeometer (PIR)
Radiometer



Line ID	Year	Julian Day	Time	Campbell Battery Voltage	Campbell CR10X temp (deg C)	PIR thermopile (mV)	PIR thermopile std (mV)	PIR temp case (mV)	PIR temp dome (mV)	PSP thermopile (mV)	PSP thermopile std (mV)
101	2012	137	1400	13.97	-1.321	0.06156	0.0008	34.064	34.907	0.03917	0.00039
101	2012	137	1401	13.97	-1.328	0.06181	0.00089	34.076	34.933	0.0394	0.00024
101	2012	137	1402	13.97	-1.342	0.06093	0.00121	34.11	34.925	0.03882	0.00042
101	2012	137	1403	13.97	-1.345	0.05846	0.00098	34.111	34.891	0.03865	0.00049

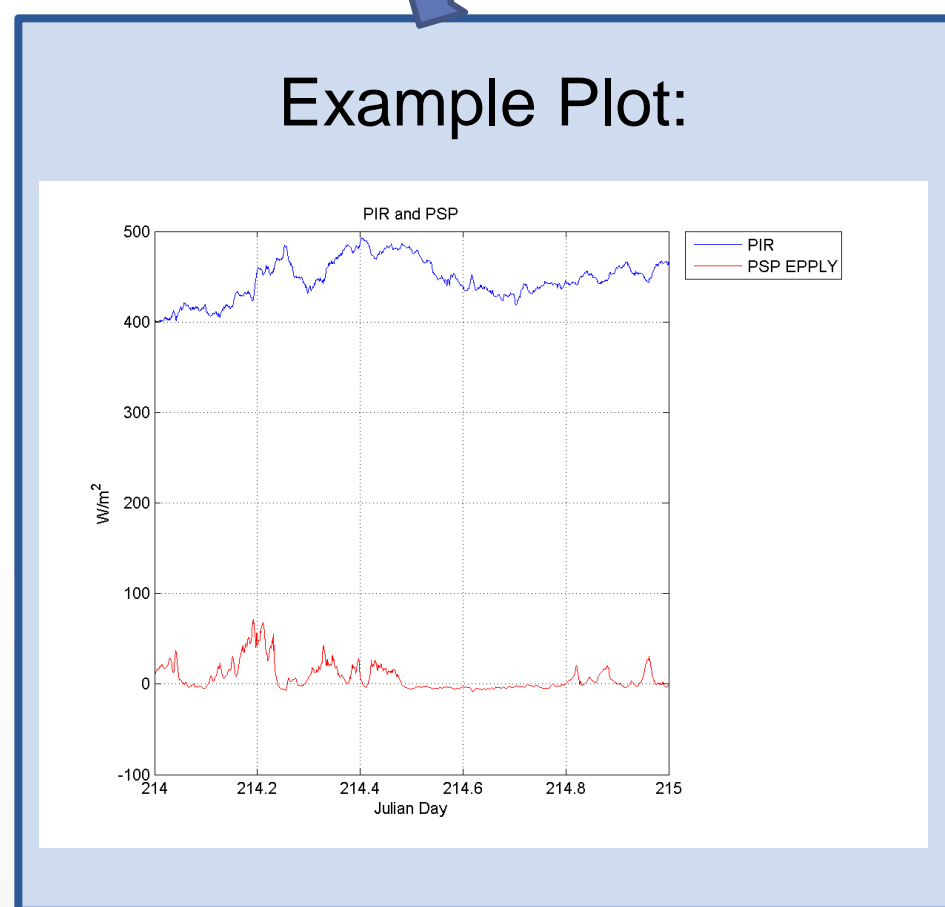


FTP File locations at NOAA:
From Tiksi Data Center to:
<ftp://ftp.etl.noaa.gov/psd3/arctic/tiksi/BSRN/raw/rad2>

Quicklooks

Calibration Values:
<ftp://ftp.etl.noaa.gov/psd3/arctic/tiksi/BSRN/ingest/>
 PIR = 268.42 W/mV/M^2
 PSP = 7.96 microVolts/W/m^2
 Dome Correction Factor (DCF) = 3.8
 Sigma = 5.6704 * 10^(-8)
 E = efficiency = 1

Calculations:
 TCR = Case Temp in mV (For Rad2: **data Column I**)
 TDR = Dome Temp in mV (For Rad2: **data Column J**)
 TC = PIR Temp Conversion = $1 / ((0.0010295 + 0.0002391 * \log(TCR * 1000) + 0.0000001568 * \log(TCR * 1000)^3))$
 TD = PIR Dome Conversion = $1 / ((0.0010295 + 0.0002391 * \log(TDR * 1000) + 0.0000001568 * \log(TDR * 1000)^3))$
 V: **PIR** = data Column G (PIR thermopile in mV), **PSP** = data Column K (PSP thermopile in mV)
 SF: **PIR** = 268.42 W/mV/M^2, **PSP** = 7.96 microVolts/W/m^2
 PSP thermopile (W/m^2) = S = 1000 * V / SF
 PIR thermopile (W/m^2) = S = SF * V + SIGMA * (E * TC^4 + DCF * (TC^4 - TD^4))



	Data Cable
	Wireless Link moxa
	Rsync
	NOAA server

<ftp://ftp.etl.noaa.gov/psd3/arctic/tiksi/BSRN/quicklooks/rad2/>

Datagrams: Baseline Surface Radiation Network BSRN - RAD1



Instruments:

1: "2AP" Sun Tracker

2: Eppley Black&White PSP Pyranometer

3: Eppley PSP Pyranometer

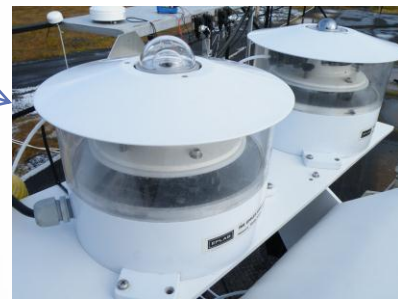
4: Eppley PIR Pyrogeometer

5: Eppley NIP Pyrheliometer

6: "Sun Sensor" Tracker

7: Radiometer Shade Balls

8: Kipp&Zonen CM22 Pyranometer



Campbell CR10X
Data Logger

10.31.112.101

Location: Polyarka Wx Station: NOAA Office
File name: tikYYYYMMDDHH.dat (as of 3/10/12)
File location in Tiksi: E:\rad1

Line ID	Year	Julian Day	Hour/Min	Logger Voltage	Logger Temp	PIR Thermopile	PIR Thermopile standard deviation	PIR Case Temp (mV)	PIR Dome Temp (mV)	NIP mv	NIP mv standard deviation	Eppley PSP mv	Eppley PSP mv STD	Eppley B&W mv	Eppley B&W mv STD	K&Z (Global) mv	K&Z (Global) mv STD	Russian Photometer mv	RTD1 TEMP C	RTD1 r	RTD1 e	RTD1 m	RTD2 TEMP C	RTD2 r	RTD2 e	RTD2 m	Service Switch
101	2012	137	1400	7.70	-1.06	-0.03334	0.00141	37.23	38.73	-99999	0	0.04345	0.0926	0.09351	0.01095	0.08878	0.01588	-0.00944	-6.3347	-2.439	909.90	88.77	-6.2987	-2.425	909.94	88.787	1658.1
101	2012	137	1401	8.69	-1.09	-0.03186	0.00164	37.25	37.92	-99999	0	0.06627	0.10324	0.08737	0.01541	0.09431	0.01498	-0.00186	-6.2218	-2.396	909.86	88.806	-6.3405	-2.442	909.90	88.769	1658.2
101	2012	137	1402	8.57	-1.09	-0.03101	0.00135	37.32	38.94	-99999	0	0.05158	0.08953	0.08737	0.01465	0.08717	0.02127	0.00312	-6.317	-2.432	909.88	88.775	-6.306	-2.428	909.92	88.783	1658

Data Diagnostics

NOAA

BSRN Archive

Tiksi Data Center

FTP File locations at NOAA:

From Tiksi Data Center to:

<ftp://ftp.etl.noaa.gov/psd3/arctic/tiksi/BSRN/incoming/rad1/>

then transferred to:

<ftp://ftp.etl.noaa.gov/psd3/arctic/tiksi/BSRN/raw/rad1/YYYY>

Processing

Calibration Values:

PIR = 329.43 W/mV/M²

PSP B&W = 8.72 microVolts/W/m²

Russian Photometer = 9.13 microVolts/W/m²

Dome Correction Factor (DCF) = 3.8

E = efficiency = 1

PSP Eppley = 8.76 microVolts/W/m²

PSP K&Z = 9.40 microVolts/W/m²

NIP = 8.01 microVolts/W/m²

Sigma = 5.6704 * 10⁽⁻⁸⁾

Calculations:

TCR = Case Temp in mV (For Rad1: **data Column I**)

TDR = Dome Temp in mV (For Rad1: **data Column J**)

TC = PIR Temp Conversion = $1 / ((0.0010295 + 0.0002391 * \log(\text{TCR} * 1000) + 0.0000001568 * \log(\text{TCR} * 1000)^3))$

TD = PIR Dome Conversion = $1 / ((0.0010295 + 0.0002391 * \log(\text{TDR} * 1000) + 0.0000001568 * \log(\text{TDR} * 1000)^3))$

V: **PIR** = data column G (PIR thermopile in mV), **PSP Eppley** = data column M (PSP thermopile in mV),

PSP B&W = data Column O (Eppley B&W in mV), **PSP K&Z** = data Column Q (K&Z Global in mV)

NIP = data Column K (NIP in mV), **Russian** = data Column S (Russian Photometer in mV)

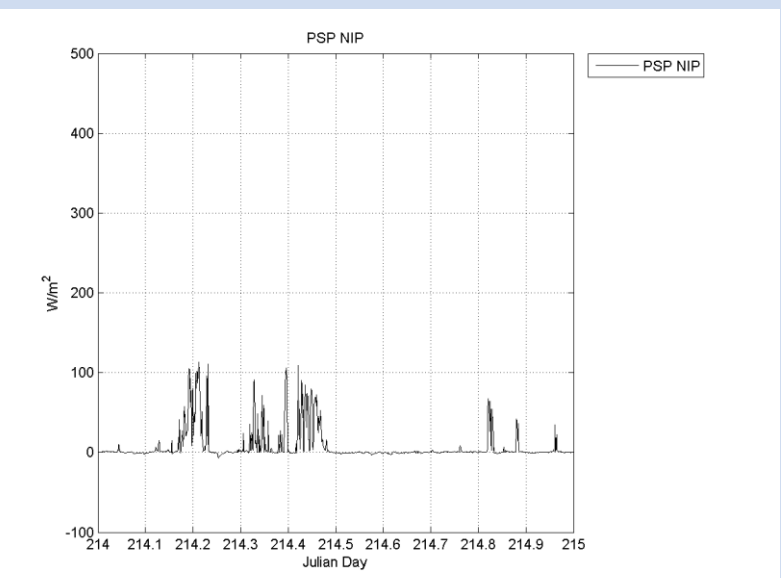
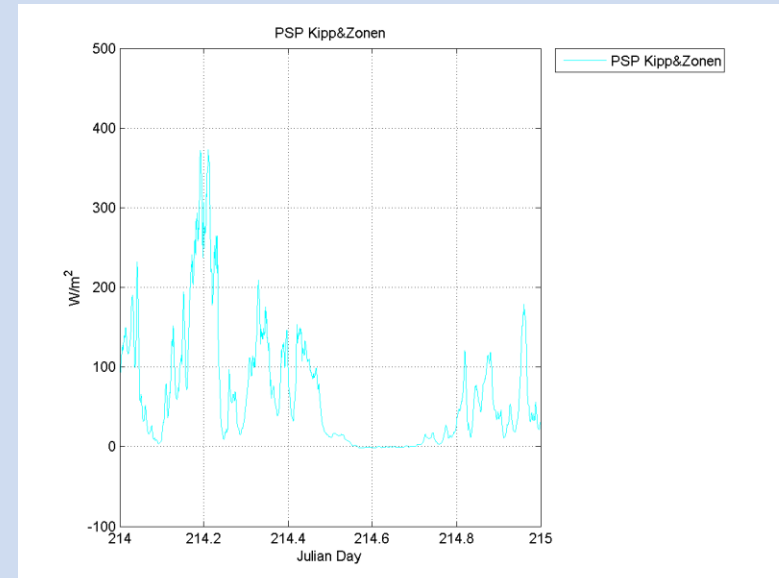
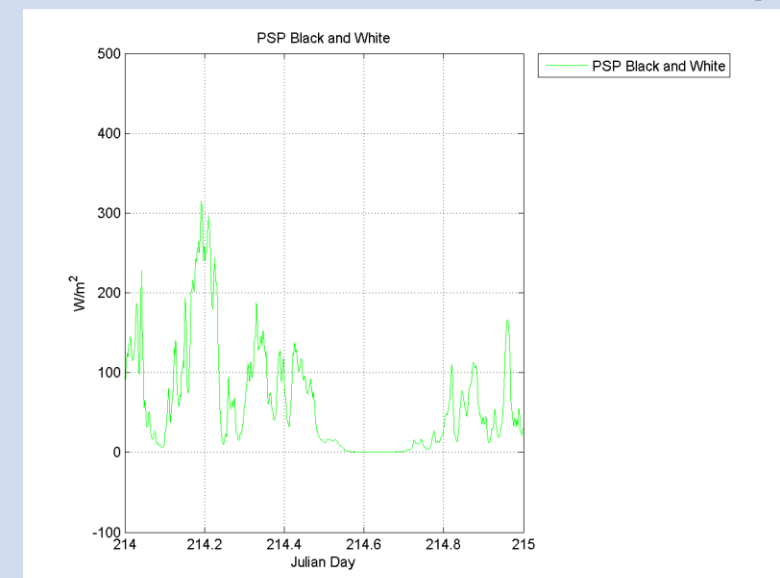
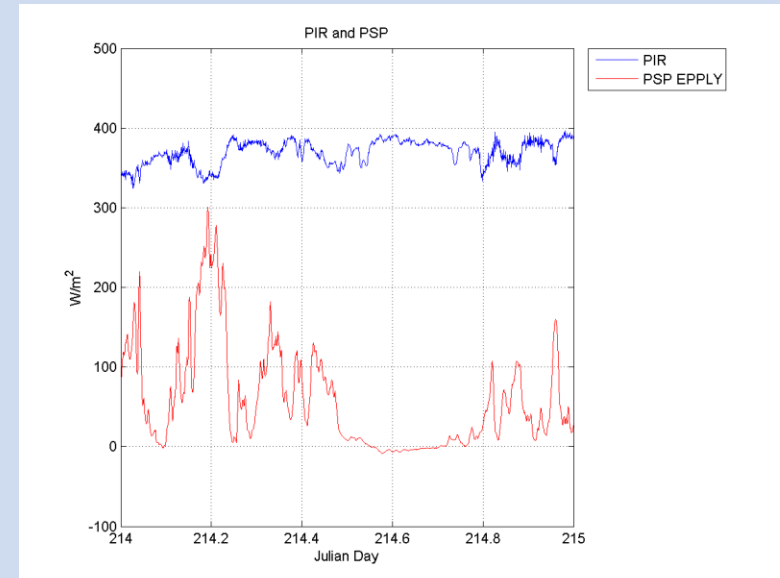
SF: Calibration Values (see above)

PSP thermopile (W/m²) = $S = 1000 * V / SF$

PIR thermopile (W/m²) = $S = SF * V + SIGMA * (E * TC^4 + DCF * (TC^4 - TD^4))$

Quicklooks

Example Plots:



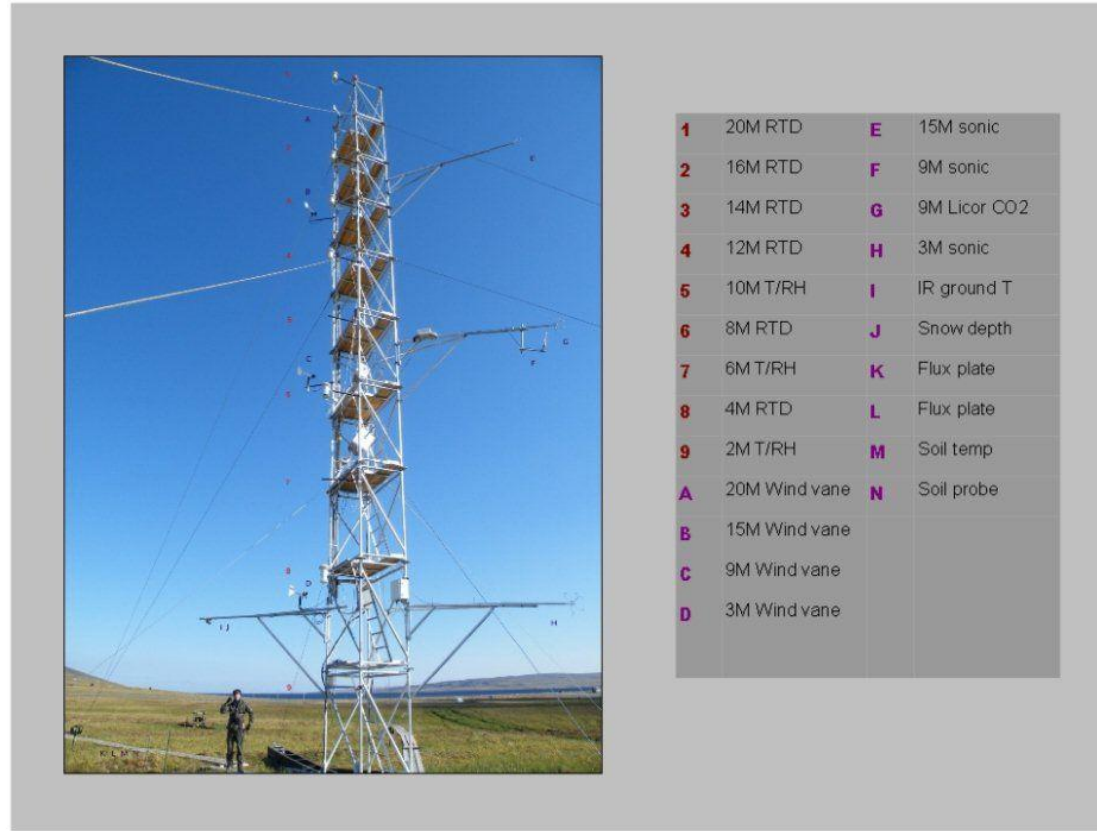
	Data Cable
	Rsync
	NOAA server

Datagrams: FLUXTOWER-met

Campbell CR10X
Data Logger

10.31.112.104

Location: Clean Air Facility Tower Office
File name: tiktwrmetYYDDDDHH.dat (as of 4/09/12)
File location in Tiksi: E:\towermet

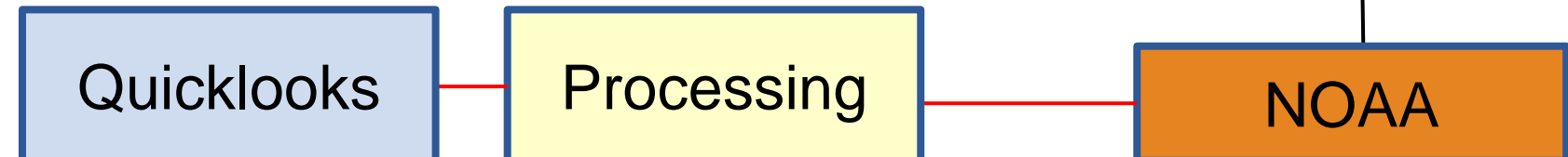


A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB
101	Year	Julian Day	Hour min	Battery	Campbell Temp	PIR mV	PIR mV std	PIR Case Temp Avg	PIR Dome Temp Avg	PIR2 Temp Avg (n/a)	PIR2 Temp std (n/a)	PIR2 Case Temp Avg (n/a)	PIR2 Dome Temp Avg (n/a)	PSP mV	PSP mV std	PSP2 mV (n/a)	PSP2 mV std (n/a)										
301	Year	Julian Day	Hour min	Pressure (mbar)	Pressure (mbar) std	Wind Speed	Wind Direction	Wind Direction sigma theta	Wind Speed std	Wind Direction std																	
311	Year	Julian Day	Hour min	Ex mV	Ex mV std	5cm	10cm	15cm	20cm	25cm	30cm	45cm	70cm	95cm	120cm	REF	5cm std	10cm std	15cm std	20cm std	25cm std	30cm std	45cm std	70cm std	95cm std	120cm std	REF std
320	Year	Julian Day	Hour min	Soil TC	Soil TC std	Flux plate A mV	Flux plate B mV	Flux plate A mV std	Flux plate B mV std	IR1 temp t-pile mV	IR1 temp case mV	IR1 temp t-pile std	IR1 temp case std	Snow depth (mm)	Snow depth std	IR1 Therm Temp in degC	IR1 Case temp in degC										
330	Year	Julian Day	Hour min	hmp155 10M T	hmp155 10M H	hmp155 6M T	hmp155 6M H	hmt330 2M T	hmt330 2M H	10M T std	10M H std	6M T std	6M H std	2M T std	2M H std												
350	Year	Julian Day	Hour min	2M Temp degC	2M R	2M e	2M m	4M Temp degC	4M R	4M e	4M m	12M Temp degC	12M R	12M e	12M m	14M Temp degC	14M R	14M e	14M m	16M Temp degC	16M R	16M e	16M m	20M Temp degC	20M R	20M e	20M m
360	Year	Julian Day	Hour min	4M WD	4M WS	9M WD	9M WS	15M WD	15M WS	21M WD	21M WS																
375	Year	Julian Day	Hour min	High/Low																							
101	2012	93	0	14.62	-15.73	-0.07897	0.03147	76.273	-0.07897	0	0	0	0	0.23774	0.47033	0	0										
301	2012	93	0	1020.9	0.04205	0.02048	316.54	2.0278	0.028	2.8337																	
311	2012	93	0	4956.9	0.72676	194.82	192.85	191.48	186.86	184.43	180.73	175.43	167.22	159.87	152.21	43.722	0.11631	0.12755	0.11523	0.1547	0.11583	0.15213	0.09636	0.12467	0.09347	0.0953	0.03616
320	2012	93	0	-24.982	0.01646	-0.35703	-0.39859	0.0006	0.00049	-0.10396	0.20073	0.00526	0.00053	3326.2	0.40768	-22.372	-20.361										
330	2012	93	0	-26.572	65.711	-26.309	65.684	-66.831	36.805	2.3919	1.1018	1.0972	0.66512	21.338	28.458												
350	2012	93	0	-30.158	-11.613	916.24	80.984	-29.299	-11.282	917.21	81.373	-29.071	-11.194	917.1	81.443	-28.88	-11.121	916.98	81.501	-28.821	-11.098	916.75	81.501	-28.335	-10.911	915.76	81.585
360	2012	93	0	331.55	0.0678	344.52	0.06074	318.67	1.0573	316.05	0.02048																
375	2012	93	0	1665																							

101	Pyrgometer (PIR), Pyranometer (PSP)	
301	Pressure and Wind	
311	Soil Probe	
320	Soil Temp, Flux Plates, Apogee IR ground sensor	
330	Temp, Relative Humidity	
350	Aspirated Temp	
360	Wind Birds	
375	Service Switch	

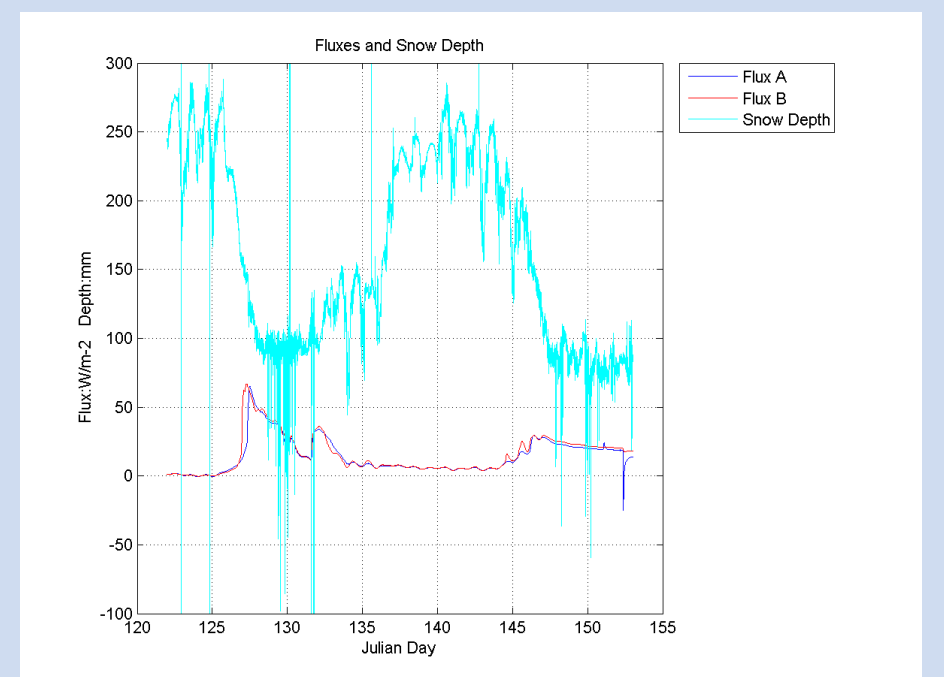
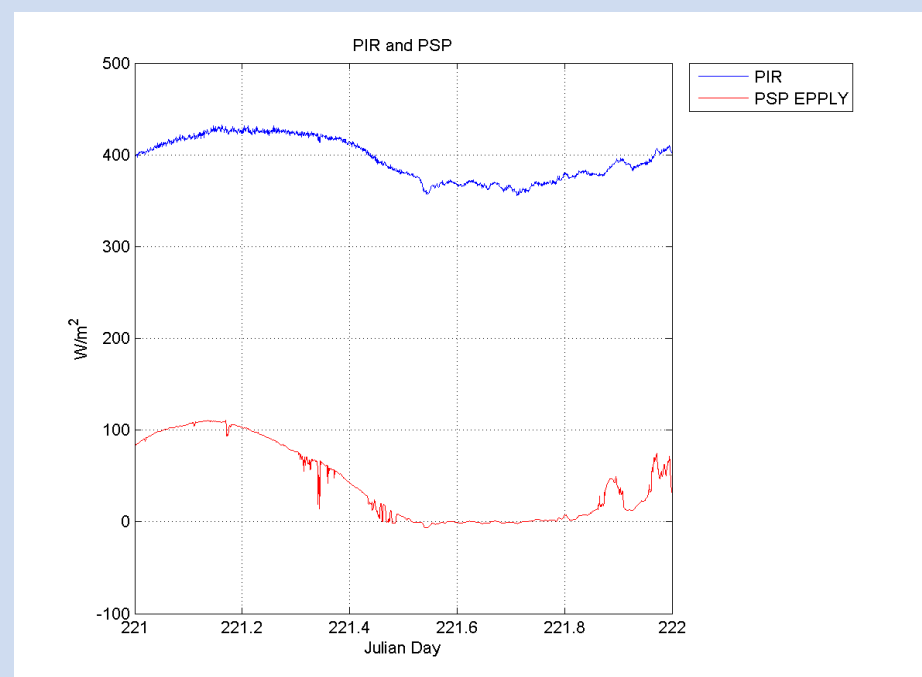
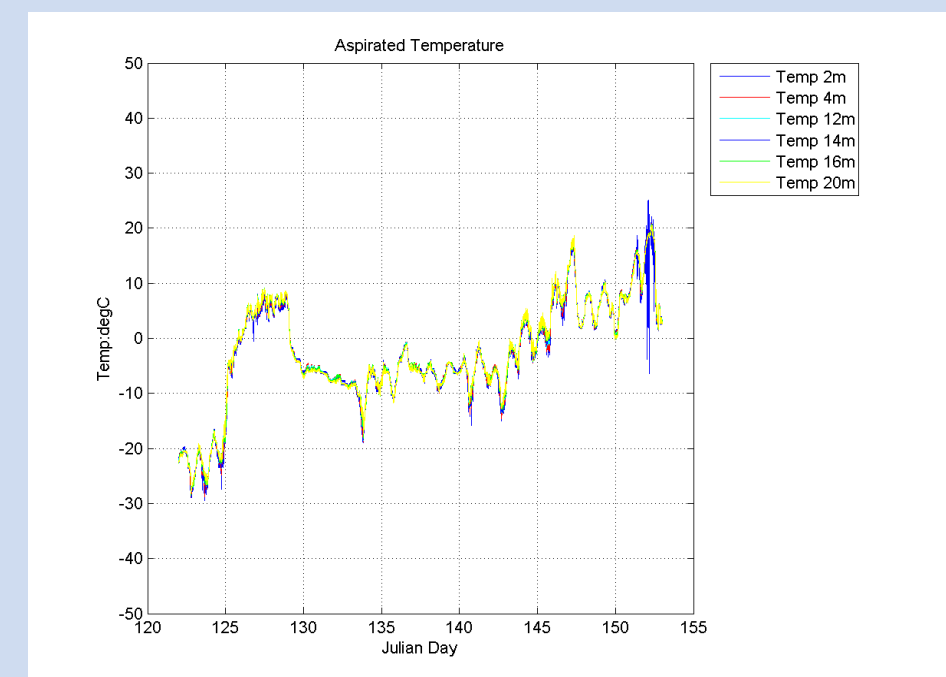
Data Diagnostics

Tiksi Data Center



FTP File locations at NOAA:
From Tiksi Data Center to:
<ftp://ftp.erl.noaa.gov/psd3/arctic/tiksi/FLUXTOWER/ncoring/towermet>
Then transferred to:
<ftp://ftp.erl.noaa.gov/psd3/arctic/tiksi/FLUXTOWER/raw/towermet/YYYY>

Example Plots:



	Data Cable
	Wireless Link moxa
	Rsync
	NOAA server

Processing

Line 101:

Calibration Values:

PIR = 303.03 W/mV/M²
PSP = 8.05 microVolts/W/m²
Dome Correction Factor (DCF) = 3.8
Sigma = 5.6704 * 10⁽⁻⁸⁾
E = efficiency = 1

Calculations:

TCR = Case Temp in mV (**Data Column I**)
TDR = Dome Temp in mV (**Data Column J**)
TC = PIR Temp Conversion = 1/((0.0010295+0.0002391*log(TCR*1000)+0.0000001568*log(TCR*1000)³))
TD = PIR Dome Conversion = 1/((0.0010295+0.0002391*log(TDR*1000)+0.0000001568*log(TDR*1000)³))
V: **PIR** = data Column G (PIR thermopile in mV), **PSP** = data Column O (PSP thermopile in mV)
SF: **PIR** = 303.03 W/mV/M², **PSP** = 8.05 microVolts/W/m²
PSP thermopile (W/m²) = S = 1000*V/SF
PIR thermopile (W/m²) = S = SF*V + SIGMA *(E*TC**4 + DCF*(TC**4 - TD**4))

Line 301:

Calculations:

Pressure (mb) = Pressure (mb) in **Data Column E**
Pressure std (mb) = Pressure std (mb) in **Data Column F**

Line 311:

Calibration Values:

A = 0.002478535
B = 0.0002538399
C = 0.0000002812234

Calculations:

D = (output-(REF-87.15)), where REF = Data Column Q, and output = Data Columns G-P depending on which depth you are calculating (5cm-120cm)
If output > zero Then D = ln(output)
Temp = 1/(A+B*D+C*(D³))

Line 320:

Calibration Values:

Esen plate A = 62.4*10⁽⁻⁶⁾ V*m²/W
Esen plate B = 61.8*10⁽⁻⁶⁾ V*m²/W
Snow depth sensor height = 3300 mm
Snow depth actual zero = 0.48971143 mm

Calculations:

Flux Plates:

Vsen plate A = Flux A (mV) **Data Column G**
Vsen plate B = Flux B (mV) **Data Column H**
Flux Plate A = (Vsen plate A / Esen plate A) / 1000 = (W/m²)
Flux Plate B = (Vsen plate B / Esen plate B) / 1000 = (W/m²)
Snow Depth:
IR Therm Temp (deg C) = **Data Column Q**
Arg = ((IR Therm Temp)+273.15)/273.15
Snow Depth (mm) = (Snow depth sensor height-data*sqrt(Arg))+Snow depth actual zero

Datagrams:
FLUXTOWER-met

Processing

Line 330:

Calculations:

Hmp155 10M Temp (deg C) = **Data Column E**
Hmp155 10M Humidity (%) = **Data Column F**
Hmp155 6M Temp (deg C) = **Data Column G**
Hmp155 6M Humidity (%) = **Data Column H**
Hmt330 2M Temp (deg C) = **Data Column I**
Hmt330 2M Humidity (%) = **Data Column J**

Line 350:

Calculations:

2M Temp (deg C) = **Data Column E**
4M Temp (deg C) = **Data Column I**
12M Temp (deg C) = **Data Column M**
14M Temp (deg C) = **Data Column Q**
16M Temp (deg C) = **Data Column U**
20M Temp (deg C) = **Data Column Y**

Line 360:

Calculations:

4M Wind Direction (degree) = **Data Column E**
4M Wind Speed (m/s) = **Data Column F**
9M Wind Direction (degree) = **Data Column G**
9M Wind Speed (m/s) = **Data Column H**
15M Wind Direction (degree) = **Data Column I**
15M Wind Speed (m/s) = **Data Column J**
21M Wind Direction (degree) = **Data Column K**
21M Wind Speed (m/s) = **Data Column L**

Line 375:

Calculations: (on/off switch)

Data Column E
1665 = off 1666 = on

Datagrams: Surface Ozone TEI-49i

Location: Clean Air Facility Central Room
File names:
tik49i-MMDDYY HHMM.src (as of 9/09/12)
tik49i-MMDDYY HHMM.lrc (as of 9/09/12)
File location in Tiksi: D:\data\ozone\i49_2012\

10.31.112.121



Irc file = long record file

Time	Date	Flags	o ₃ (ozone)	hio ₃	cellai (cell a intensity)	cellbi (cell b intensity)	bncht (bench temp)	lmpt (lamp temp)	o ₃ lt (ozonator lamp temp)	flow cell a	flow cell b	pressure
01:00	8/25/2012	-----	10.0816	0	90096	84239	34.7033	53.5434	67.3273	0.67999	0.677002	727.442
02:00	8/25/2012	-----	10.7308	0	90093	84236	35.0138	53.6835	67.1892	0.67175	0.677002	727.734
03:00	8/25/2012	-----	10.5951	0	90051	84195	35.3163	53.6485	67.3273	0.65721	0.662427	727.151
04:00	8/25/2012	-----	10.4342	0	90044	84193	35.0688	53.6485	67.3273	0.6577	0.660919	727.734
05:00	8/25/2012	-----	10.4859	0	90056	84201	35.0413	53.6485	67.1892	0.66157	0.66494	727.151
06:00	8/25/2012	-----	7.31327	0	90060	84200	35.6188	53.6485	67.0511	0.67563	0.676499	747.843

src file = short record file

Time	Date	Flags	o ₃ (ozone)	hio ₃
18:45	8/27/2012	-----	14.9136	0
18:50	8/27/2012	-----	14.7021	0
18:55	8/27/2012	-----	14.7645	0
19:00	8/27/2012	-----	14.8636	0
19:05	8/27/2012	-----	14.7741	0
19:10	8/27/2012	-----	14.8774	0

Data Diagnostics

Tiksi Data Center

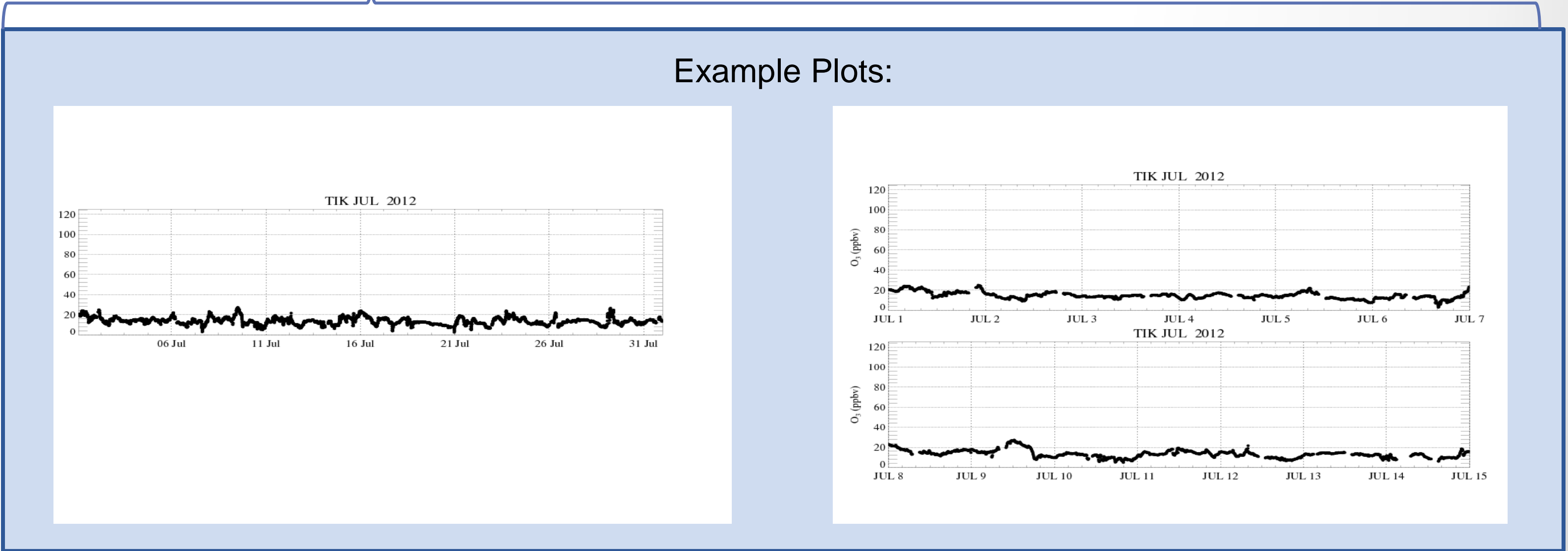
FTP File locations at NOAA:
From Tiksi Data Center to:
<ftp://ftp.etl.noaa.gov/psd3/arcic/tiksi/OZONE/incoming/TEI-49/>
Then transferred to:
<ftp://ftp.etl.noaa.gov/psd3/arcic/tiksi/OZONE/raw/TEI-49/YYYY>

NOAA

Processing

Data files sent to Global Monitoring Division (GMD) within NOAA to be processed using designated software and programs to generate plots and daily, hourly, and minute files.

Quicklooks



	Data Cable
	Wireless Link moxa
	Rsync
	NOAA server

Datagrams: Aethalometer

Location: Polyarka Wx Station (Clean Air Facility): NOAA Office
 File name: ae31_YYYY-MM-DD.csv (as of 9/09/12)
 File location in Tiksi: C:\AE_data\

10.31.112.109



Date	Time	UV	Blue	Green	Yellow	Red	IR1 ('BC')	IR2
4-Jul-12	0:00	-9.3	-3.5	-20	-20.3	14.1	-14.3	-31
4-Jul-12	0:05	10.5	-0.2	-25.7	-26.6	-83	-12.4	-1.1
4-Jul-12	0:10	-3.9	27.2	48	59	28.9	-1.2	-9.6
4-Jul-12	0:15	-20.6	-35	-14.4	-44	0.8	28.7	106

Data Diagnostics

Tiksi Data Center

Processing

NOAA

FTP File locations at NOAA:
 From Tiksi Data Center to:
<ftp://ftp.etl.noaa.gov/psd3/arctic/tiksi/aethalometer/incoming/>
 Then transferred to:
<ftp://ftp.etl.noaa.gov/psd3/arctic/tiksi/aethalometer/raw/YYYY>

Calculations:
 Raw data files are pasted into an Excel spreadsheet where an Aethalometer template has been created to apply smoothing parameters to the data.

Quicklooks

	Data Cable
	Wireless Link moxa
	Rsync
	NOAA server

Example Plots:

