Ex: Data Sheet (note old equipment shown here so some calibrations /names are not current).

Site Description: Open ground site @ snow dump

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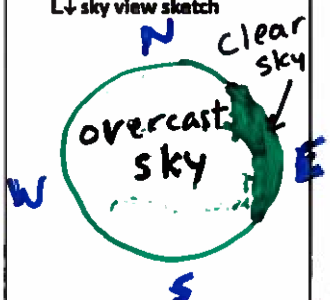
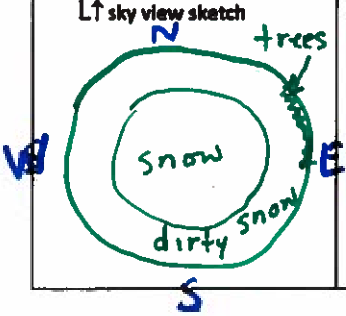
TABLE 1: Enclosed Site – Recorder: Sunny Storm Date & Class Time: Jan 14 2013

Instrument (include type & serial #)	Rad'n Component	Calibration Coefficient (include units)	Instrument Output (include units)	Calculated Radiation Value in Wm^{-2} (show an example of each calculation)	Reading Time	Weather Conditions & Comments
Net Radiometer type & serial # REBS #1	Q*	~~+8.43~~ + 8.50 $\frac{Wm^{-2}}{mV}$ – 12.84 $\frac{Wm^{-2}}{mV}$	3.11 mV		10:30 am	grey - overcast overhead; some patchy cloud to the east
Pyranometer type & serial # 003763 Kipp + Zonen CMP3	K↓	18.73 × 10^{-6} $\frac{V}{Wm^{-2}}$			10:50	completely overcast
Pyranometer type & serial # 003763 Kipp+Zonen CMP3	K↑	18.73×10^{-6} $\frac{V}{Wm^{-2}}$			10:40	? forgot to note
IR Radiation Thermometer type Mikron IR thermometer L↓ sky view sketch	L↓	Report the proportion of the site and temperature for each proportion here. (On the back of this page, calculate the weighted average and final radiation value from these values. Show your method and work clearly.) **Object** / **Temperature °C** / **% Coverage** overcast sky / – 20°c / 85% clear sky / > – 50°c / 15%			10:55	over head completely Overcast but eastern sky is clear
IR Radiation Thermometer type L↑ sky view sketch	L↑	Report the proportion of the site and temperature for each proportion here. (On the back of this page, calculate the weighted average and final radiation value from these values. Show your method and work clearly.) **Object** / **Temperature °C** / **% Coverage** snow / – 18°c / 70% dirty snow / – 5°C / 30% trees (<5% so ignore) / — / —			11:10	as above but more clear sky now

L↓ sky view sketch



L↑ sky view sketch



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Calibration Values:

Net Radiometers; Q* readings

REBS #1

On purpure disk

$8.50 \frac{Wm^{-2}}{mV}$ for positive readings

or

$12.84 \frac{Wm^{-2}}{mV}$ for negative readings

REB #2

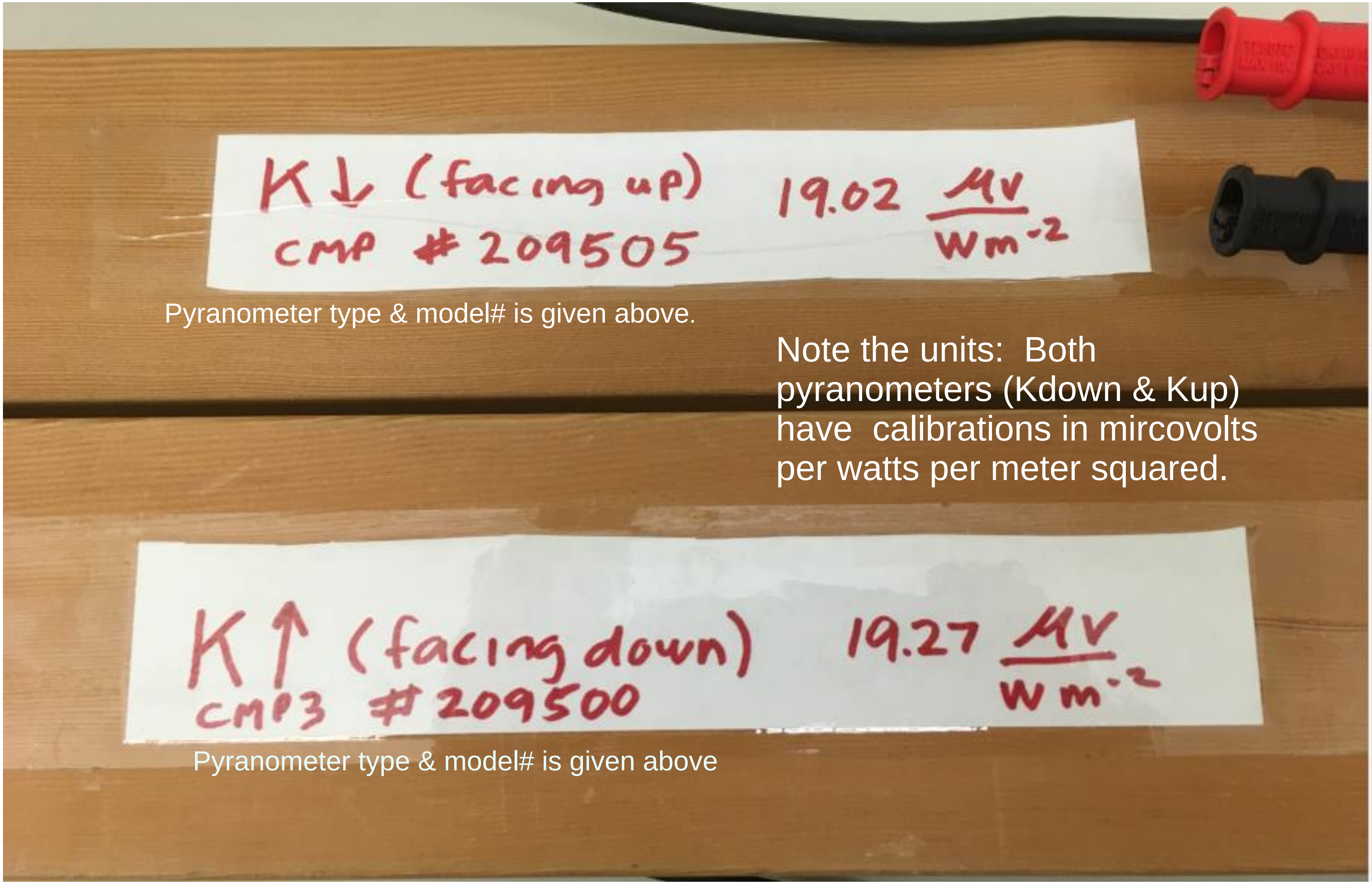
On yellow disk

$8.43 \frac{Wm^{-2}}{mV}$ for positive readings

or

$12.74 \frac{Wm^{-2}}{mV}$ for negative readings

Pyranometer Calibrations:



Pyranometer type & model# is given above.

Note the units: Both pyranometers (Kdown & Kup) have calibrations in mircovolts per watts per meter squared.

Pyranometer type & model# is given above

Example: Weighted Averages (for L↓)

and Lup values in W/m2

1. Find objects that emit IR towards the surface (ground) + measure.

Object	Open sky	Clouds	Buildings (on horizon)	Trees (on horizon)
Temp Measurement	-35 °C	-12 °C -8 °C -15 °C	33 °C 14 °C 16 °C 29 °C	10 °C 14 °C
Average	-35 °C	-12 °C	23 °C	12 °C

2. Determine the proportion of the "sky" represented by these objects

Proportion of Sky (%) made up of these objects	75%	10%	10%	5%
Weighted temperatures	0.75 x -35 °C = -26 °C	0.10 x -12 °C = -1.2 °C	0.10 x 23 °C = 2.3 °C	0.05 x 12 °C = 0.6 °C

3. Sum these weighted temperatures to get the Average sky temperature for your site

(-26 °C) + (-1.2 °C) + 2.3 °C + 0.6 °C = -24 °C ← site temp in °C

4. Convert to W/m⁻² using L↑ (or L↓) = σT4 (Stephan Boltzmann)

Longwave Radiation using Stefan Boltzmann's Law

example for $L\downarrow$:

$L\downarrow = \sigma T^4$ where $\sigma = 5.67 \times 10^{-8} \frac{W}{K^4 m^2}$

(T) must be in Kelvins (K)

$T = -24°C$

$= -24 + 273 = 249\,K$

$= -24 + 273.15 = 249.15\,K$

$L\downarrow = 5.67 \times 10^{-8} \frac{W}{K^4 m^2} (249\,K)^4$

$L\downarrow = 218.\ \frac{W}{m^2}$

Use the following to help understand your measurments:

Very roughly expected radiation value ranges:

	Q* (Wm^{-2}) midday ↔ late day	K↓ (Wm^{-2}) midday ↔ late day ↔ 0 (at sundown)	L↓ (Wm^{-2}) Little diurnal / seasonal change.
Clear sky	300 ↔ 50 ↔ - 50 (goes negative at night)	Winter: 300 ↔ 0 Summer (solstice): 900 ↔ 200 ↔ 0	300
Cloudy sky	Depends on the net result of K's and L's. Typically clear skies produce the greatest positive (daytime) or negative (nighttime) Q* values 100 ↔ more strongly negative at night	Winter: 50 ↔ 0 Summer: 300 ↔100 ↔0 (sundown)	400 Under cloudy conditions get higher cloud temperatures so more L↓
K↑ is dependant on the type of surface material and always a proportion of K↓			
L↑ is dependant on the temperature of the material being measured			