Varia
2012 02-14 to 2012-04-05

During this period data from sensors attached to the AM16/32 multiplexor were shifted one channel ahead so that channel two was read with the instructions for channel one. This resulted in the first channel on the multiplexor (Pyranometer) to be completely lost. Two channels (HMP45_Tair and CNR1_CMin) were lost because they were read with an incorrect range. Two channels (HMP45_RH and AirPress) were read with the wrong span and offset but were recovered by backing out the wrong values and applying the correct ones. And the two channels from the BF3 diffuse PAR sensors were lost because of a damaged connector that was the likely cause of the problem.

Timeline:

Date	DOY	Time	Notes
2/14/2012	45	8:00	First bad data from multiplexor
2/16/2012	47	9:00	Field visit rewired CNR1 cable
3/2/2012	62	11:00	Field visit - cows had been inside fence, attempted field fix of diffuse PAR
3/19/2012	79	10:00	Field visit, Ameriflux setting up, ~24 hours good data
3/20/2012	80	10:00	Data is bad again
3/21/2012	81	10:00	Field visit - ~24 hours good data
3/22/2012	82	19:30	Data is bad again
3/30/2012	90	7:00	Ameriflux pulling out
4/5/2012	96	9:30	Field visit and multiplexor is fixed
4/19/2012	110	9:30	Field visit - diffuse PAR removed
4/23/2012	114	8:30	Field visit - diffuse PAR reinstalled

Channels affected and the solution:

Channel	Status-fix
Pyranometer	Lost - fill with Tonzi
Rnet	Recovered
PAR_in	Recovered
PAR_out	Recovered
HMP45_Tair	Lost - fill Tonzi Floor HMP45
HMP45_RH	Offset
AirPress	Offset
CM_in	Lost - fill with Tonzi
CG_in	Recovered
CM_out	Recovered
CG_out	Recovered
BF3_PAR	Lost - fill with PAR_in
BF3_Diffuse	Lost - unrecoverable
LED_Red_in	Recovered

LED_NIR_in Recovered
LED_Red_out Recovered
LED_NIR_out Recovered

For the three time periods:
2012-02-14 (045) 08:00 to 2012-03-19 (079) 09:30
2012-03-20 (080) 10:00 to 2012-03-21 (081) 10:00
2012-03-22 (082) 19:30 to 2012-04-05 (096) 09:00

The following steps were used to fix the data:

1) The data from the column zero_mux2 was thrown out
2) Data for the 20 columns from Pyranometer to Nir_out were shifted one column to the right leaving the Pyranometer column empty.
3) The data now in the RH column was collected with the instruction for Tair. The Tair multiplier (0.1) and offset (-40) were removed and the RH multiplier (0.1) and offset (0.0) were applied.
4) The data now in the AirPress column was collected with the instructions for the RH. The RH multiplier (0.1) and offset (0.0) were removed and the AirPress multiplier (0.0184) and offset (60) were applied.

5) The pyranometer data was filled from the Tonzi pyranometer data using a regression (Fig 1). The regression from the Tonzi data is V = 1.0116*t + 0.0223 R2 = 0.98. Some gaps due to missing Tonzi data.

6) The HMP45 air temperature data was filled from the Tonzi Floor HMP45 Tair data using a regression (Fig 2). The regression from the Tonzi data is: V = 0.9413*T + 1.4961 R2 = 0.98. The regression with the Tonzi floor data was even better than the Vaira sonic air temperature additionally there is a lot of missing Vaira flux data due to low solar power during this period.

7) The CNR1 CM (shortwave) incoming data was filled with the Tonzi pyranometer data using a regression (Fig 3). The regression with the Tonzi data is V = 2.0589*T + 0.0031 R2 = 0.99. Some gaps due to missing Tonzi data.

8) The total incoming PAR from the BF3 sensor was filled from the Vaira incoming PAR using a regression (Fig 4). The regression was BF3 = 197.73 * PAR + 1.0691 R2 = 0.997. A lot of the BF3 data was missing because of the broken connector and more historical data could have been used for the regression, but this is a somewhat redundant data column and the regression was strong.

9) Diffuse PAR from the BF3 sensors is unrecoverable for the time period of 2012-03-19 (079) 09:30 and 2012-04-23 (114) 09:00. This was due to the broken connector and no good relationship with other available channels.

Three new files were created with the repaired data. There was no attempt to recreated the standard deviation data that is present in the original files thus all the standard deviation columns contain -9999 values. These file should replace the original files for standard processing:

GR3_2012079.23x – repaired data from 045 08:00 to 079 09:30
GR3_2012081.23x – repaired data from 080 10:00 to 081 10:00
GR3_2012096.23x – repaired data from 082 19:30 to 096 09:00

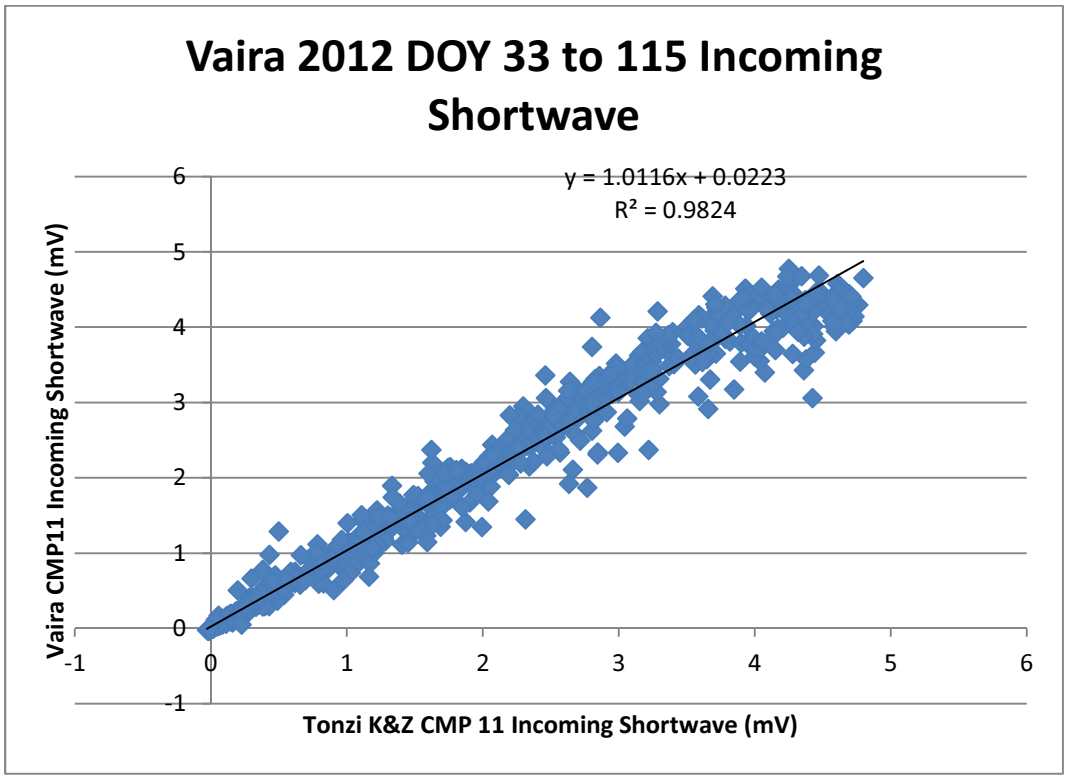

Fig 1. Pyranometer regression

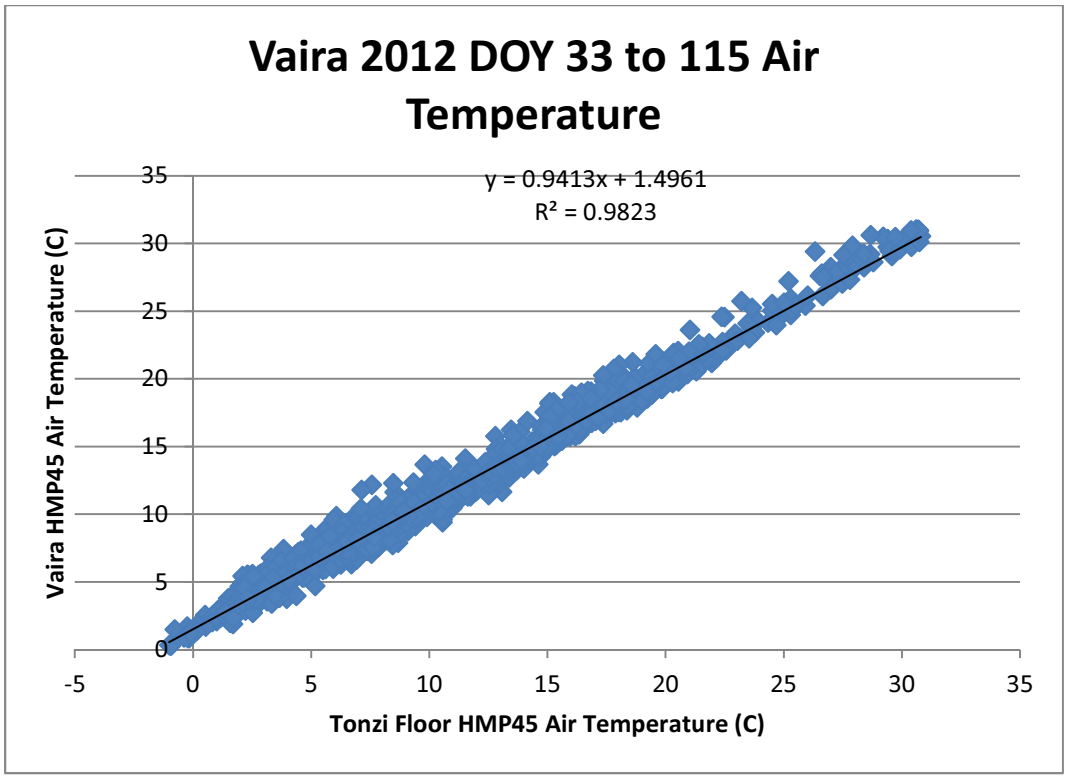

Fig 2. HMP45 Air Temperature Regression

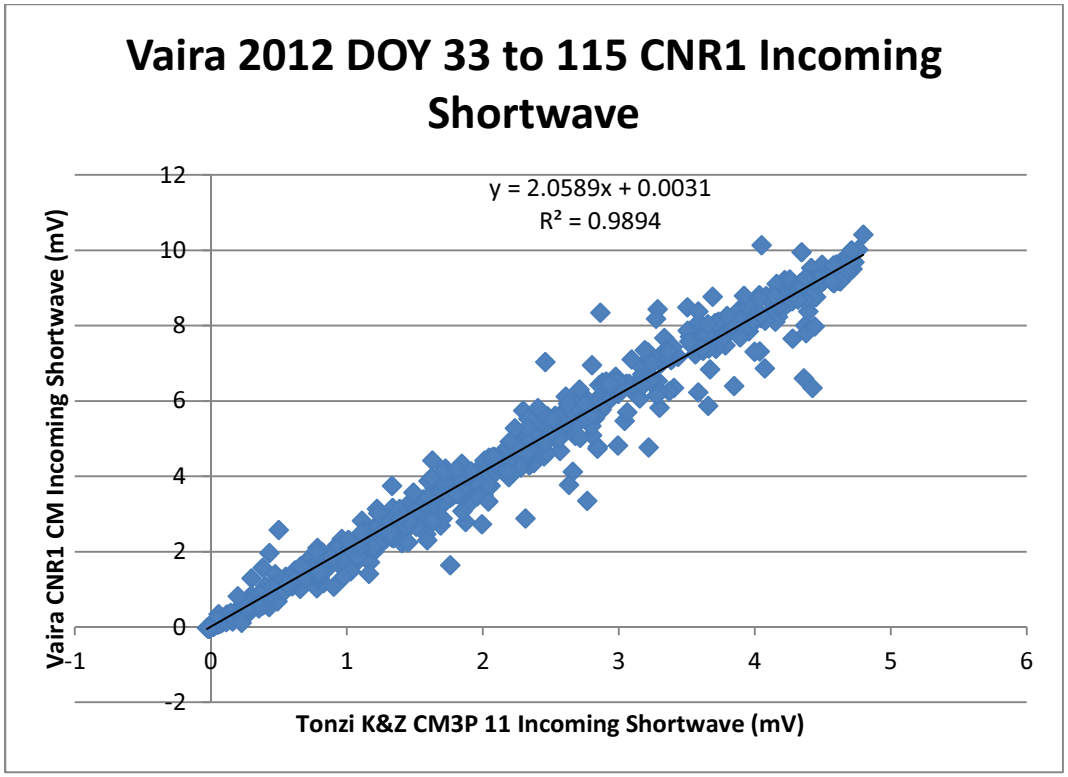

Fig 3. CNR1 Incoming Shortwave regression

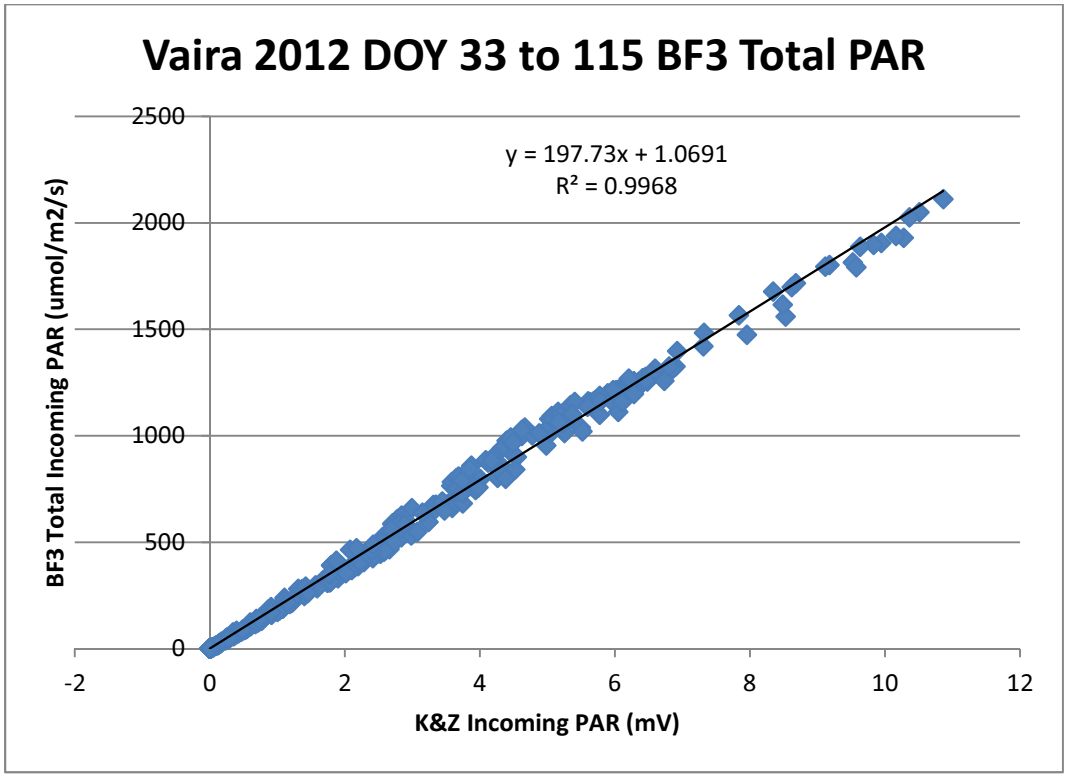

Fig 4. BF3 Total PAR regression