

Pyrheliometer Alignment Tests

Michael Milner
Bureau of Meteorology
Australia

Overview

- * Alignment Test Method.
- * Results – Signal Contour plots.
- * Errors display on Alignment sights.
- * Angular Error vs % Signal Loss.

Test Method –Set up



Instruments

EKO MS56

Hux DR01

Eppley NIP

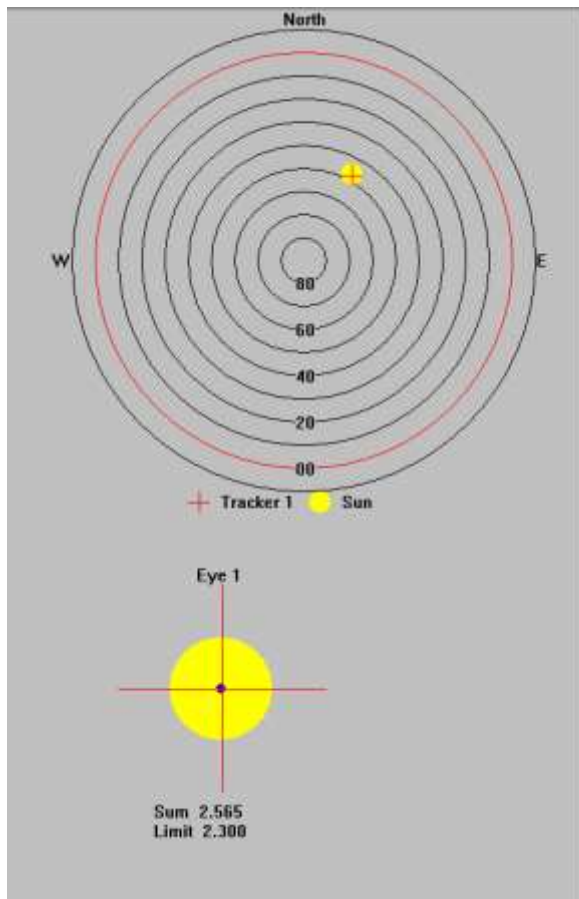
CS DN5 (x2)

K&Z CH1 (x2)

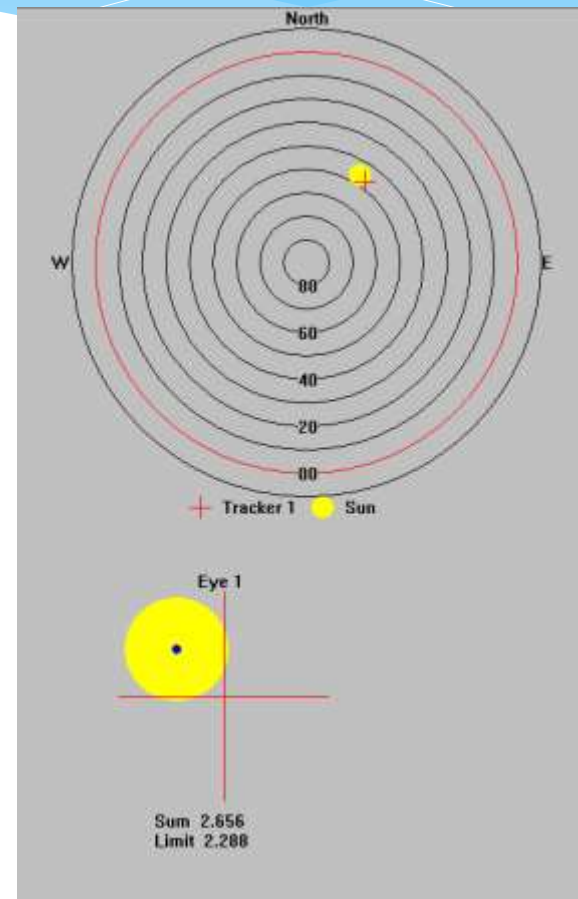
K&Z CHP1

Test Method - Tracking

Normal Tracking



Scanning mode



Test Method - Scan

Last Measurement Positions:

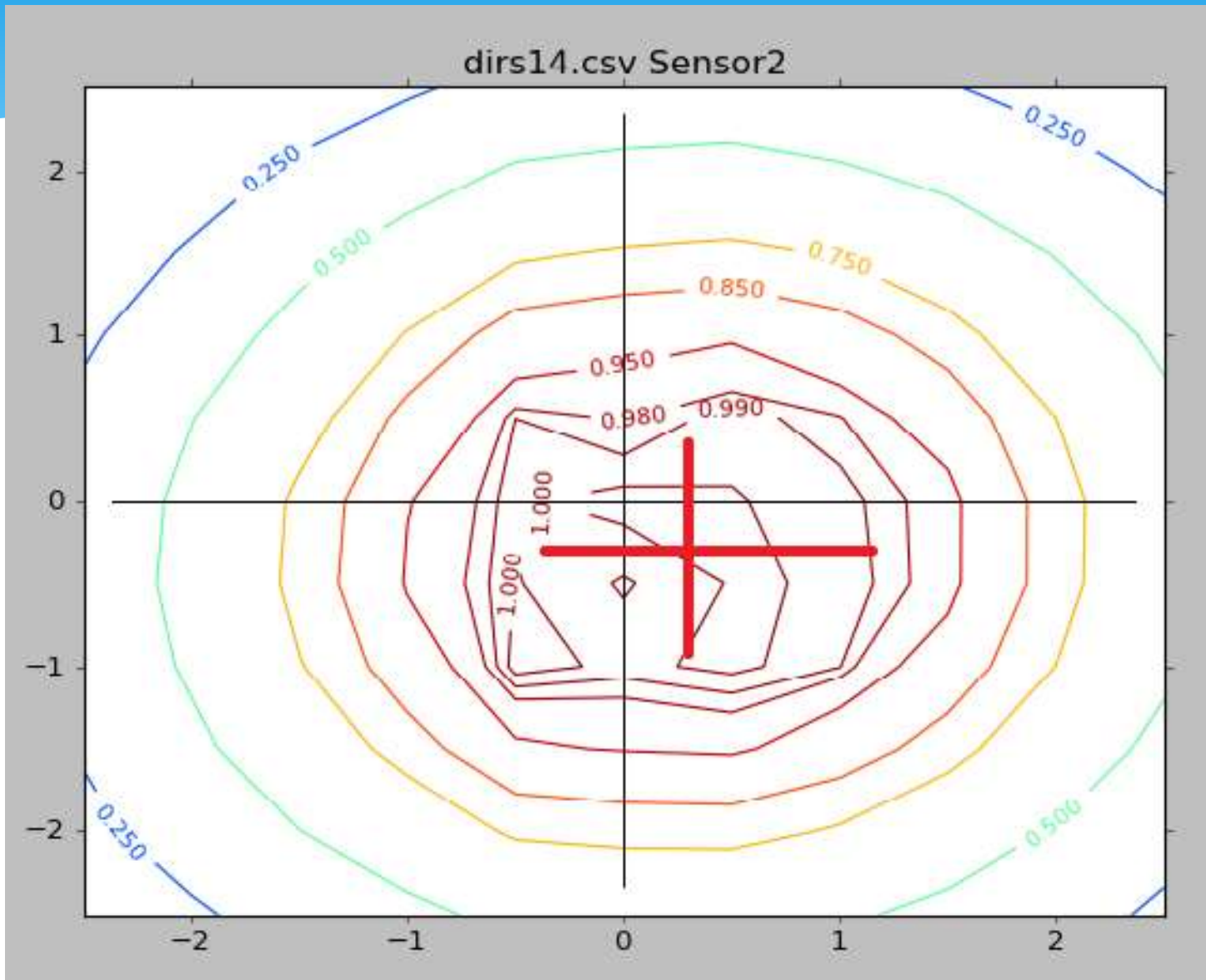
Array Position:	Column:	7	
	Row	3	
Tracker Position:	Elevation:	43.86	(1.53)
	Azimuth:	216.97	(-0.59)

Columns vs Rows Matrix = 11 x 11

	X	X	X	X	X	X
	X	X	X	X	X	X
	X	X	X	X	X	X
	X	X	X	X	X	X
	X	X	X	X	X	X
	X	X	X	X	X	X
	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X	X	X	X	X

Minutes elapsed 25 of likely 42

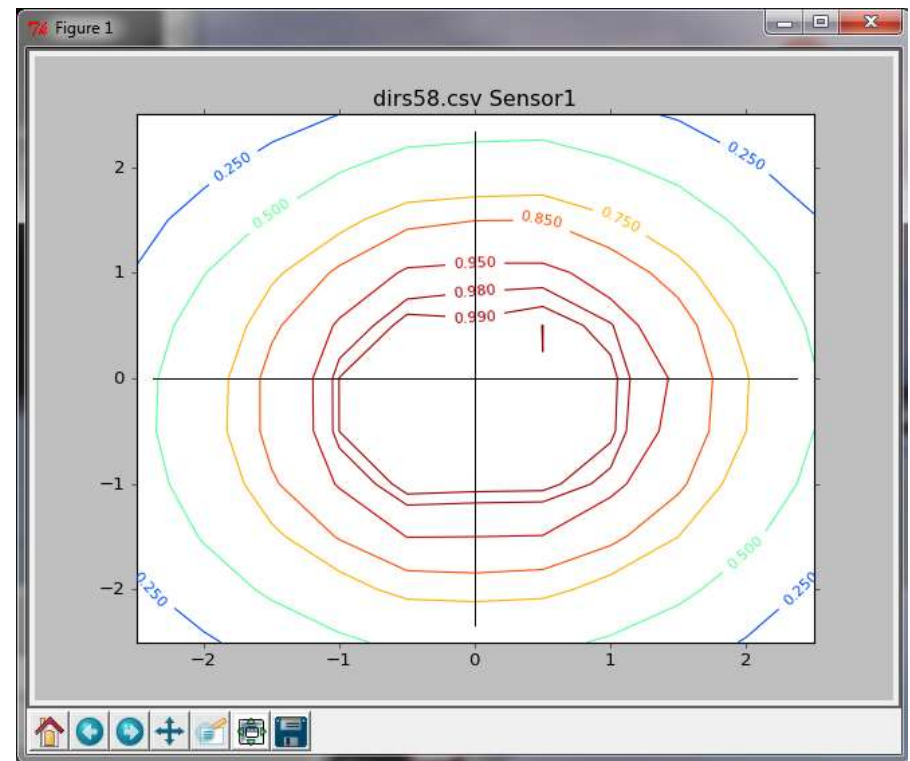
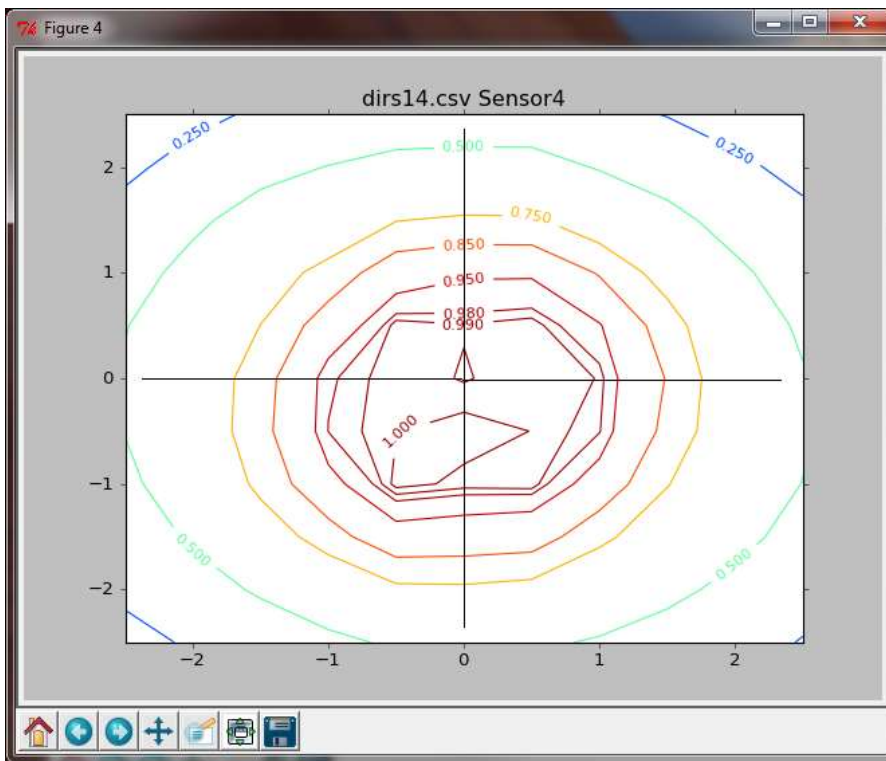
Results – BoM Transfer Standard



Results – Contour Plots

EKO MS56

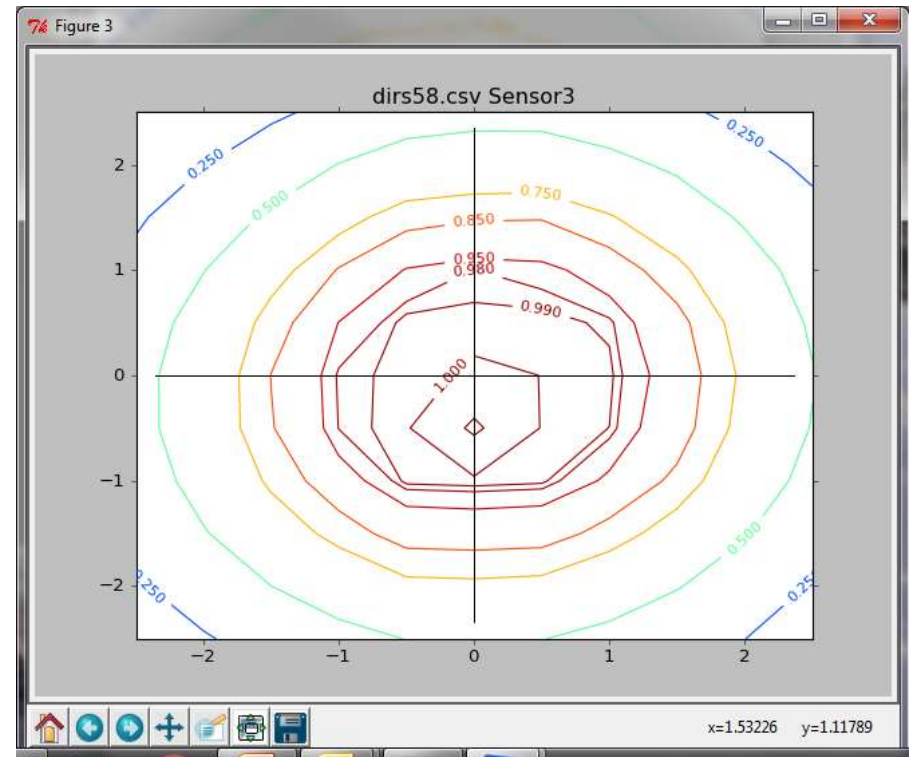
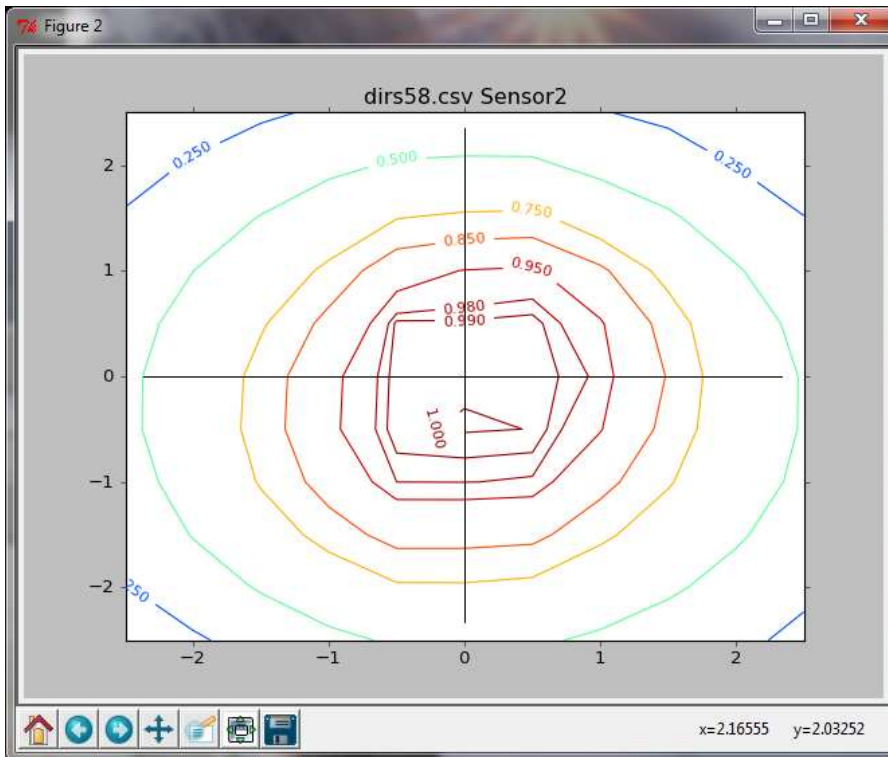
Hux DR01



Results – Contour Plots

Eppley NIP

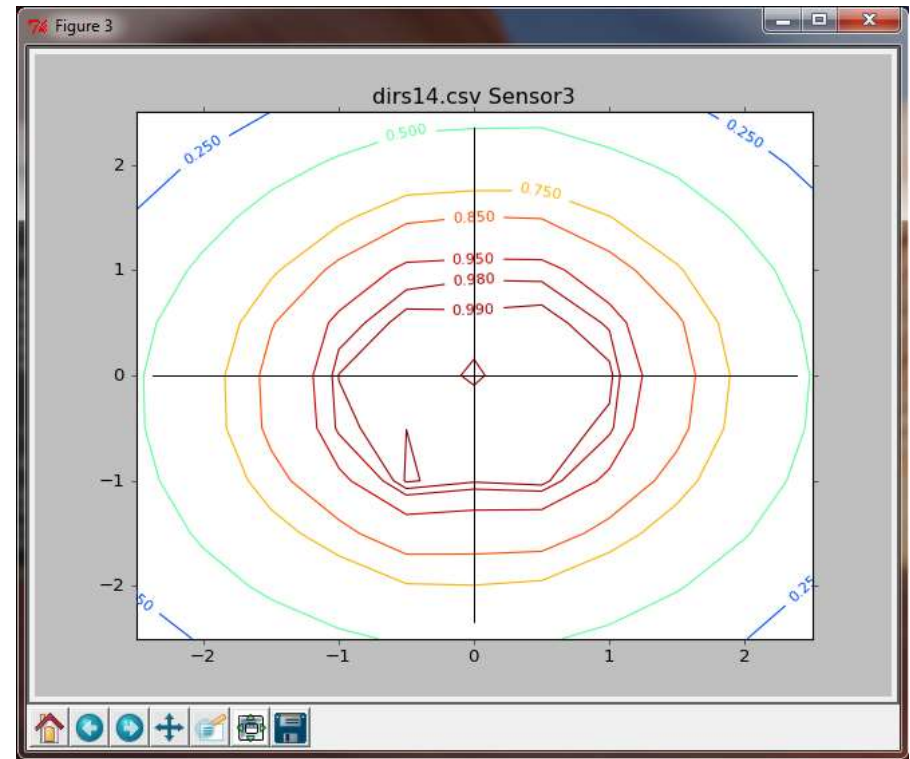
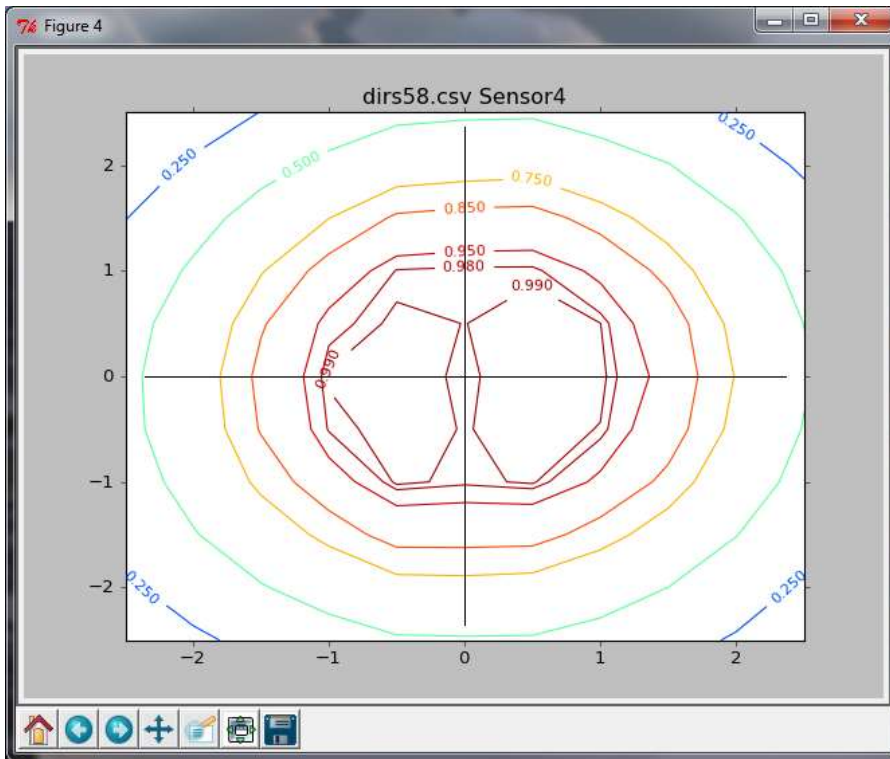
CSD DN5



Results – Contour Plots

Kipp CH1

Kipp CHP1



Errors displayed on Alignment Sights

Eppley NIP
0.5° Azimuth Error



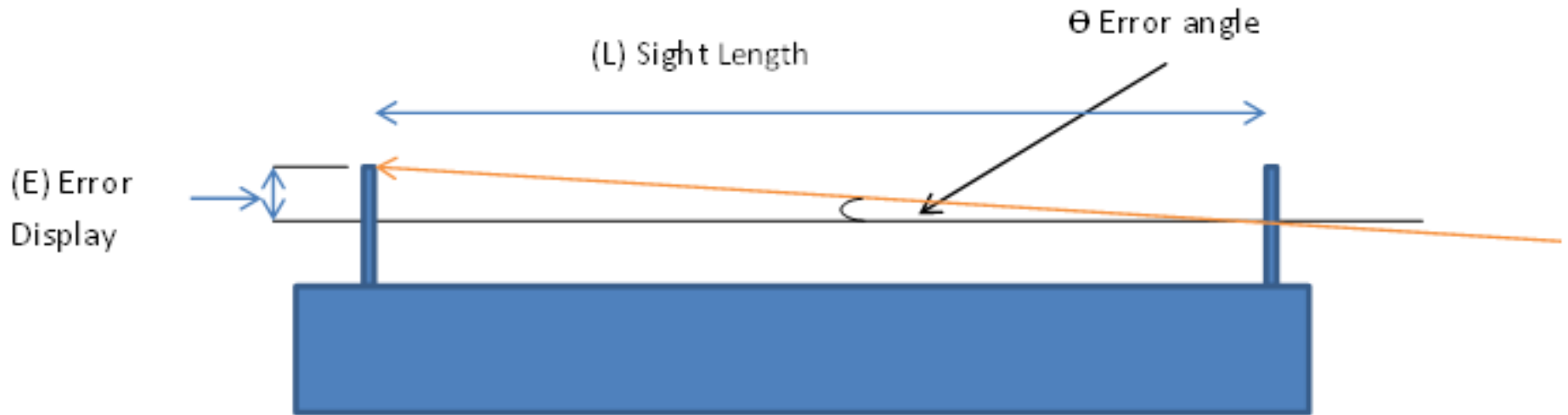
CSD DN5
1.0° Azimuth Error



Errors displayed on Alignment Sights

Alignment Sight Geometry

$$E = L \tan \theta$$



Errors displayed on Alignment Sights

EKO MS56

0.5° Azimuth Error



EKO MS56

1.0° Azimuth Error



Errors displayed on Alignment Sights

Hux DR01

0.5° Azimuth Error



Hux DR01

1.0° Azimuth Error



Errors displayed on Alignment Sights

Eppley NIP
0.5° Azimuth Error



Eppley NIP
1.0° Azimuth Error



Errors displayed on Alignment Sights

CSD DN5

0.5° Azimuth Error



CSD DN5

1.0° Azimuth Error



Errors displayed on Alignment Sights

Kipp CH1

0.5° Azimuth Error



Kipp CH1

1.0° Azimuth Error

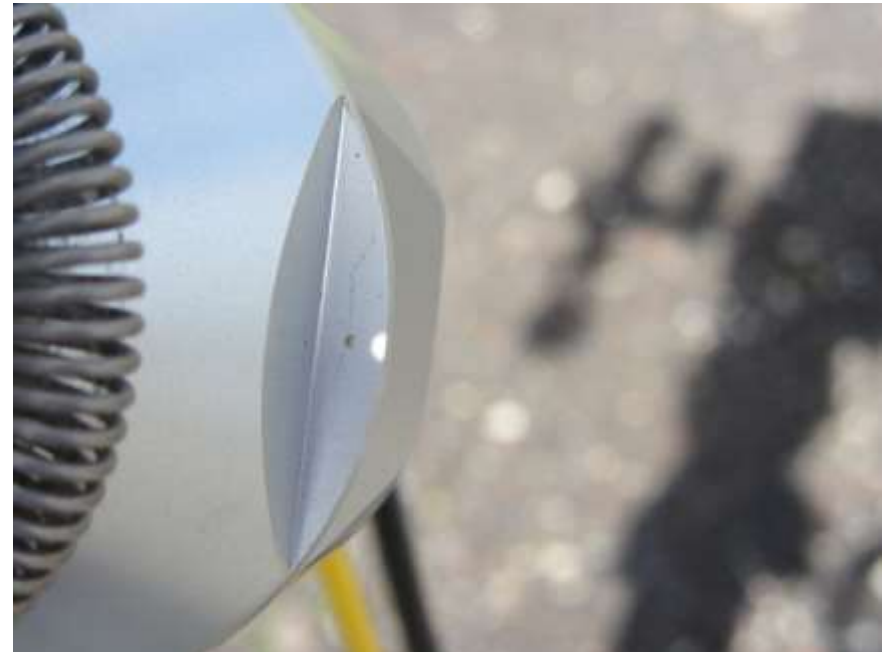


Errors displayed on Alignment Sights

Kipp CHP1
0.5° Azimuth Error



Kipp CHP1
1.0° Azimuth Error



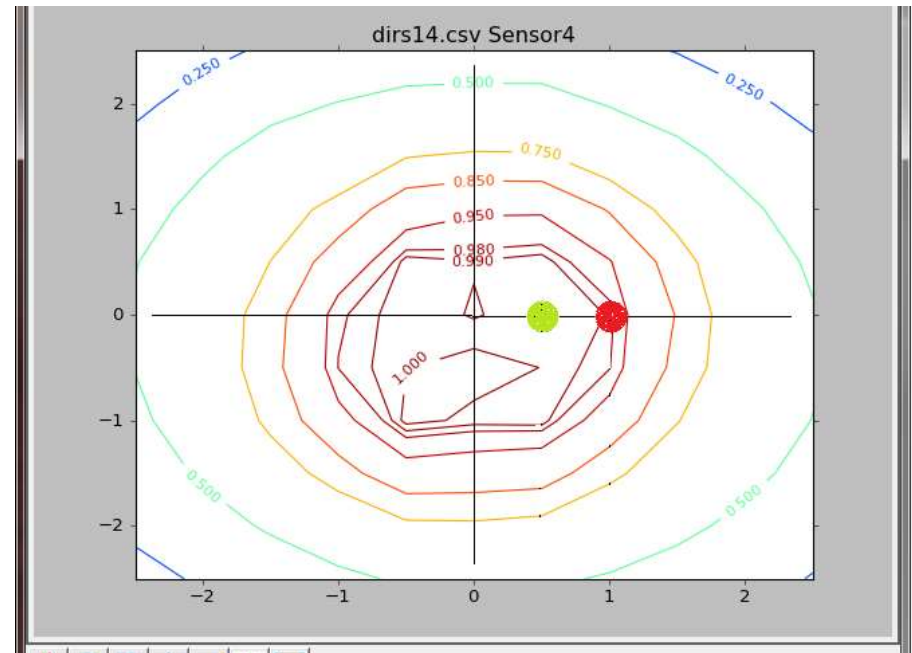
Alignment Error vs Signal Loss

EKO MS56

1.0° Alignment Error



Signal Plot



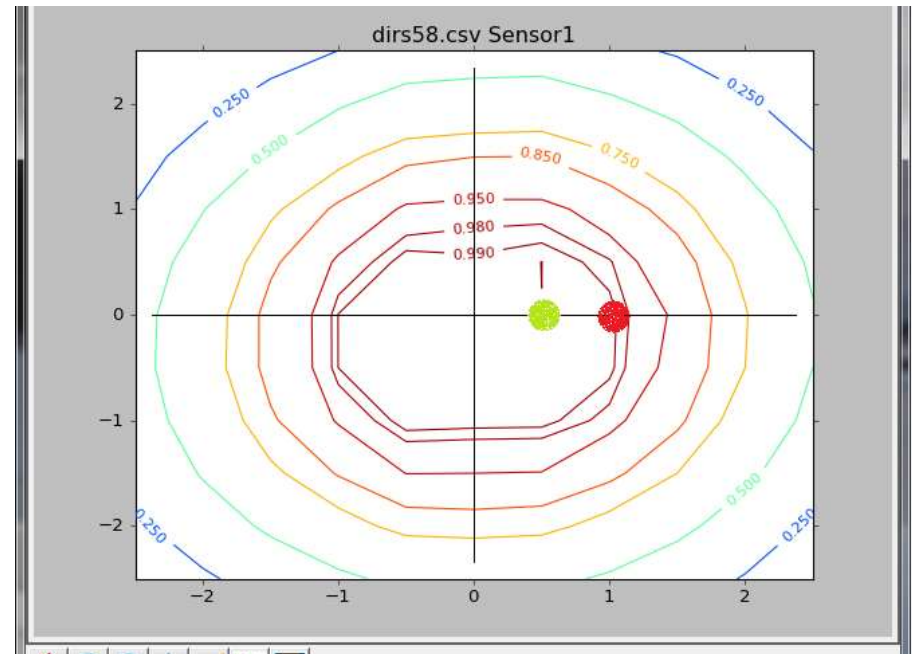
Alignment Error vs Signal Loss

Hux DRo1

0.5° Alignment Error



Signal Plot

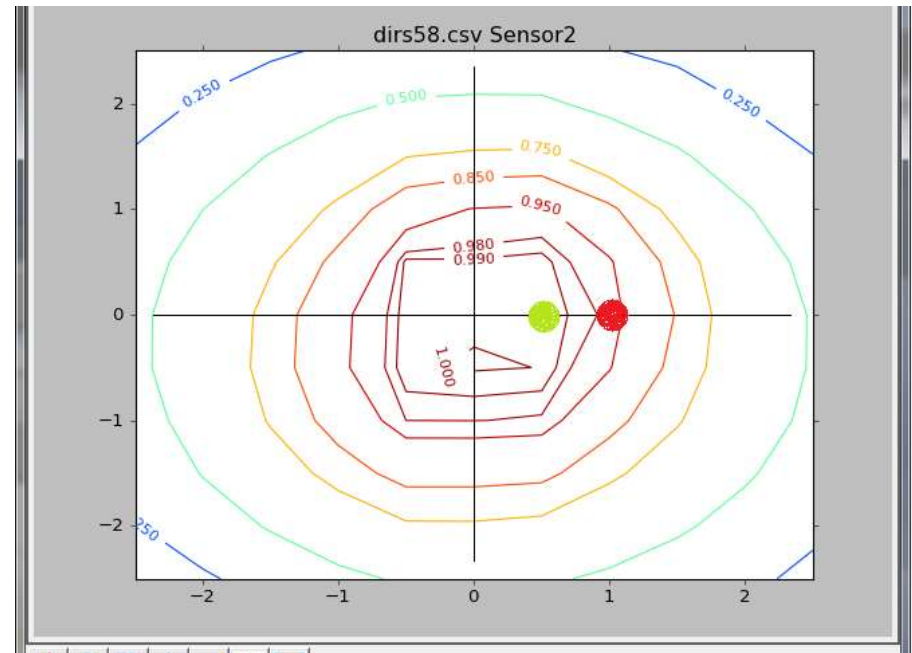


Alignment Error vs Signal Loss Eppley NIP

0.5° Alignment Error



Signal Plot



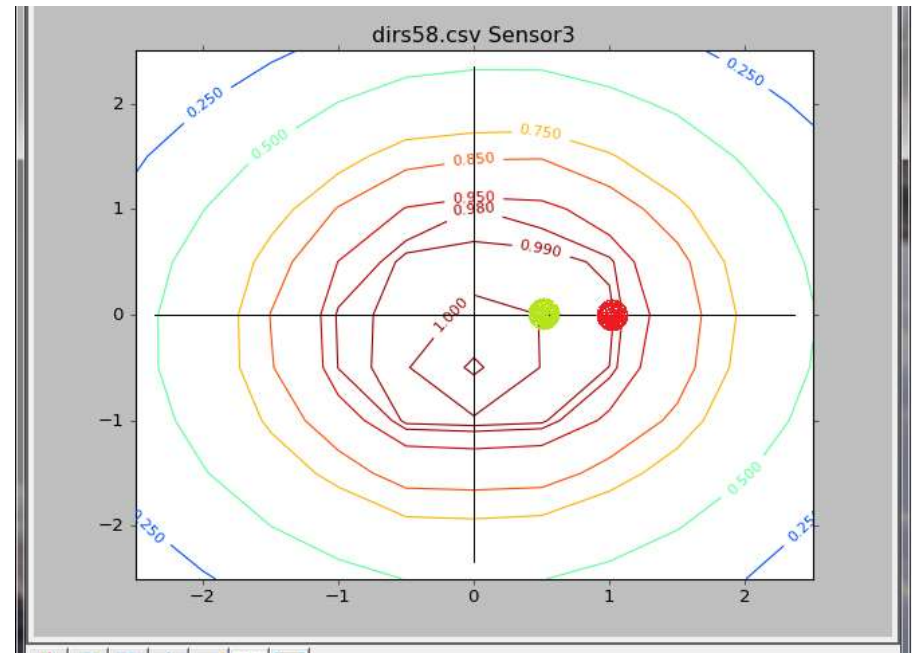
Alignment Error vs Signal Loss

CSD DN5

0.5° Alignment Error



Signal Plot



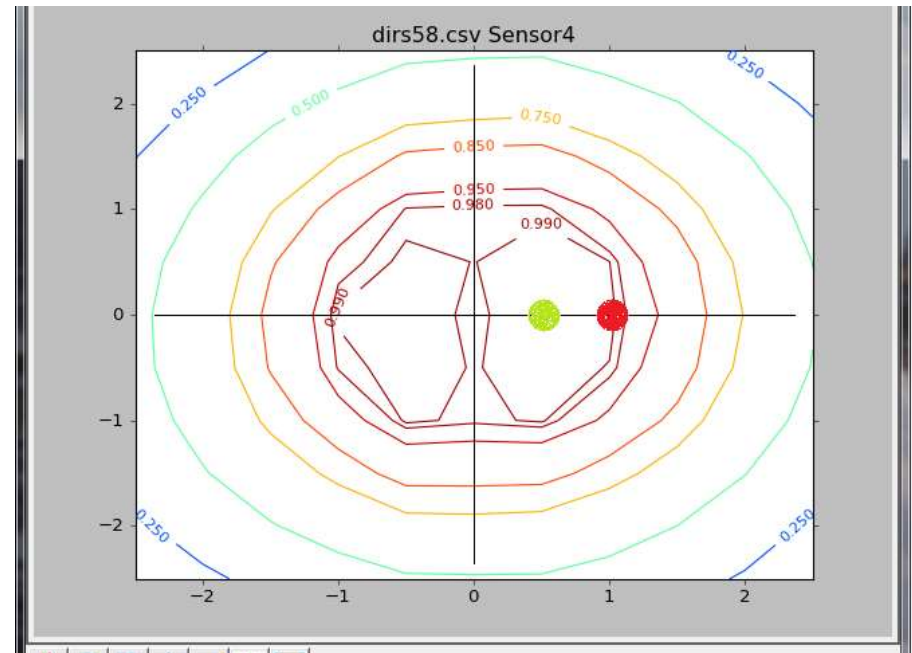
Alignment Error vs Signal Loss

Kipp CH1

1.0° Alignment Error



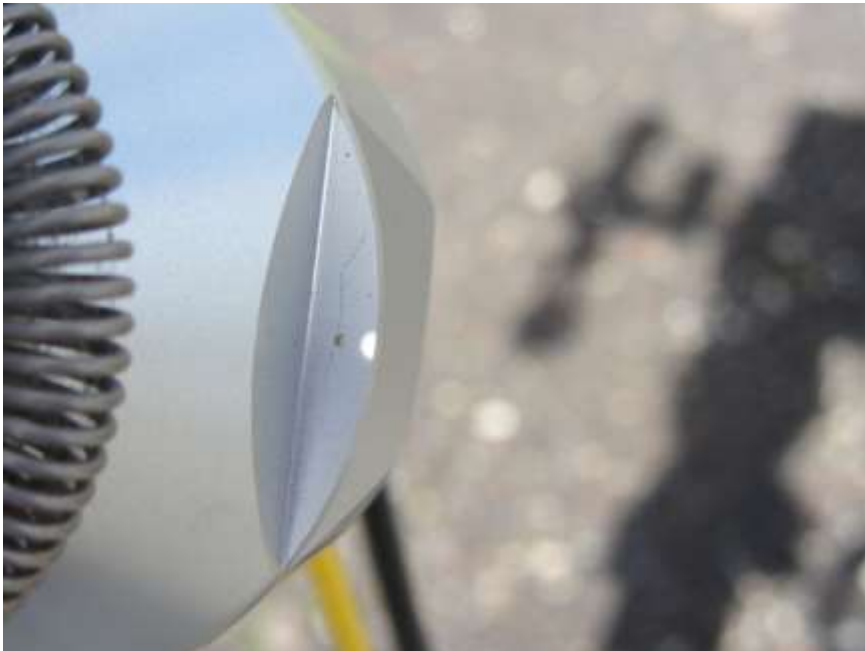
Signal Plot



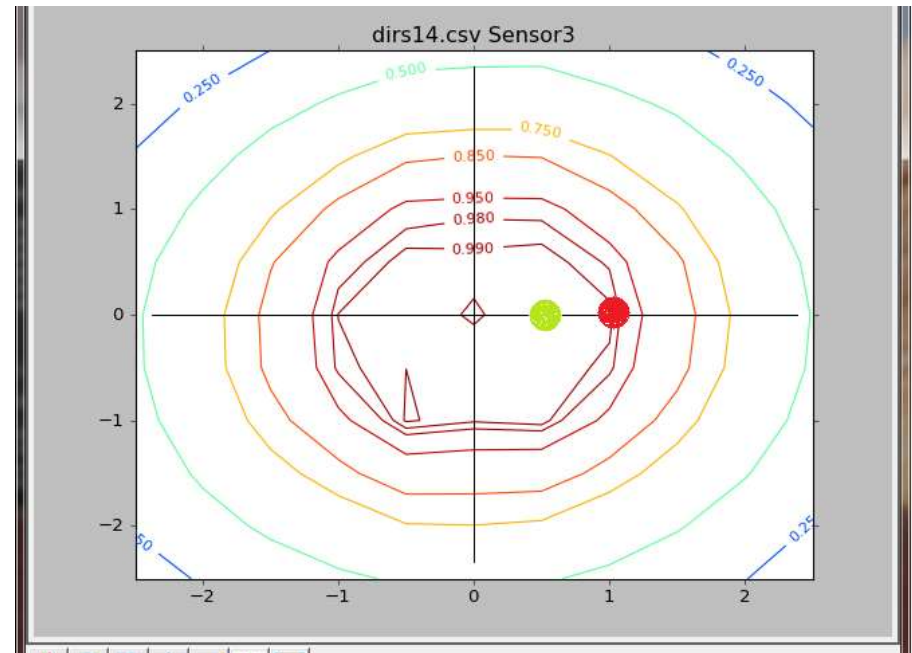
Alignment Error vs Signal Loss

Kipp CHP1

1.0° Alignment Error



Signal Plot



Conclusion

- * Our manufactures are doing a good job with alignment.
- * 0.5 degree error is not the end of the world.

End.
Thank you.