430 linefeed pointing after extension

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1.0 Summary

The 430 Mhz line feed was extended by 13 inches during the month of june 1999. The pointing was checked after the extension using total power cross scans on 6 sources. The results are:

1. The pointing error was measured to be.88 arcminutes (figure 1,2).
2. Compensating for the latitude change lowers the error to .8 arcminutes (figure 1,2). This was implemented on 29jun99.
3. It looks like a 3az term should be added to the model (figure 3).
4. The za error jumps above 18 degree za by about .5 arcminutes (figure 4).
5. The model should probably be redone.

2.0 Setup.

The sources used are shown in table 2:

TABLE 1. pointing sources.

Source	430 Flux Jy	date
J1540+147	2.67	27jun99
J1859+129	8.56	27jun99
J2251+188	5.90	27jun99
J1831+291	5.42	28jun99
J2148+069	3.58	28jun99
J0020+156	8.27	28jun99

Cross scans (great circle) were done in azimuth and zenith angle on 27,28 jun 99. They were 30 arcminutes on 27jun99 and 40 arcminutes on 28jun99. The signal was detected with a .2 second time constant and then sampled at 10 hz. The baseline was subtracted and then a gaussian was fit to the interference free portion of the strip. The pointing error was computed as the measured peak position - the expected position for the center of the gaussian.

3.0 Pointing errors.

3.1 The pointing model and the measured error.

The carriage house pointing model uses an offset, sin(az), cos(az), and sin(za) term for azimuth and zenith angle. There is no za encoder table. The current model was made in nov 1997. The rms error measured using this model was .88 arcminutes. Table 2 row 1 shows the components of the error. Figure 1 and figure 2 show the distribution versus azimuth.

3.2 The latitude change.

The latitude used for the observatory was changed 18dec99 by 38 arc seconds (from the geodetic position 18 20 36.6 back to the old astronomical position 18 21 14.2). The gregorian model was remade but the carriage house model was never updated. Table 2 row 2 shows the error after removing a 38” cos(az), sin(az) term from the measured errors. It reduces the error to .8 arcminutes. Figure 1,2 show these terms.The model was updated 29jun99 to include the latitude change.

3.3 The 3az term.

After removing the latitude change a strong 3az term was seen in the azimuth residuals with an amplitude of .48 arcminutes and a phase of 22 degrees. The 3az term in the za errors was not as strong. Table 2 row 3 shows the error after removing the 3az term from the data. Figure 3 shows the az errors vs az with the 3az term overplotted.

3.4 Za linear term.

A linear term in za was fit to the za errors. Table 2 row 4 shows the results. Figure 4 shows the data with the 3az term removed and the linear fit. You can see that something strange is happening above 18 degrees. This linear term would probably be absorbed by the sin(za) term in the model.

TABLE 2. pointing error arcminutes.

measurement	az offset	za offset	az rmsErr	za ms Err	total rmsErr	fig
before lat fix	.02	-.15	.64	.60	.88 before 29jun99	1,2
after lat fix	.02	-.04	.51	.62	.80 after 27jun99	1,2
with 3az term	0	0	.39	.58	.70 not installed	3
and za linfit	0	0	.39	.40	.56 not installed	4

4.0 What we’re left with.

The latitude change was implemented but the 3az and linear term were not included because there were not enough sources covering north/south to do it reliably.

FIGURE 1. az error vs az with latitude correction overplotted

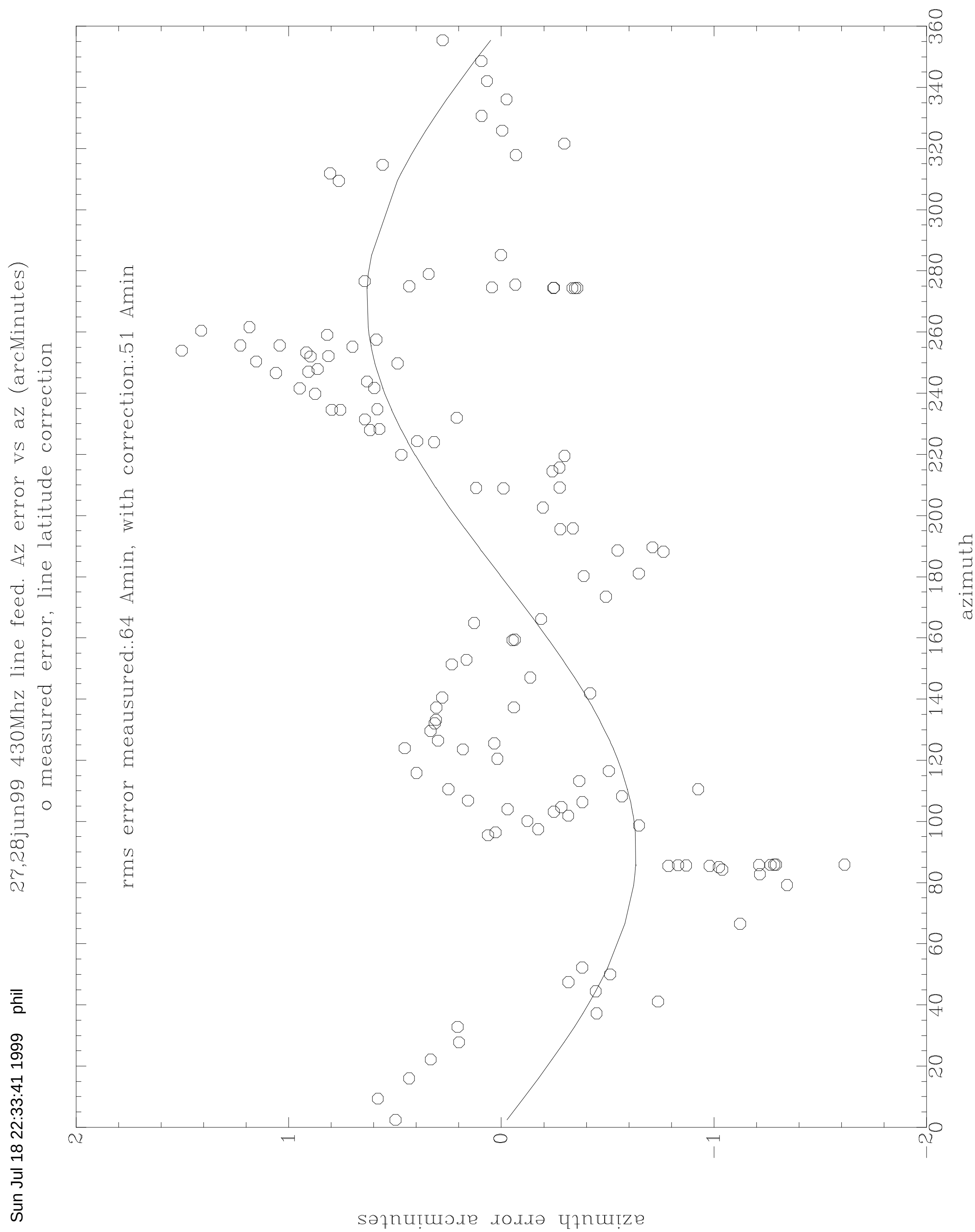

FIGURE 2: za error vs az with latitude correction overplotted.

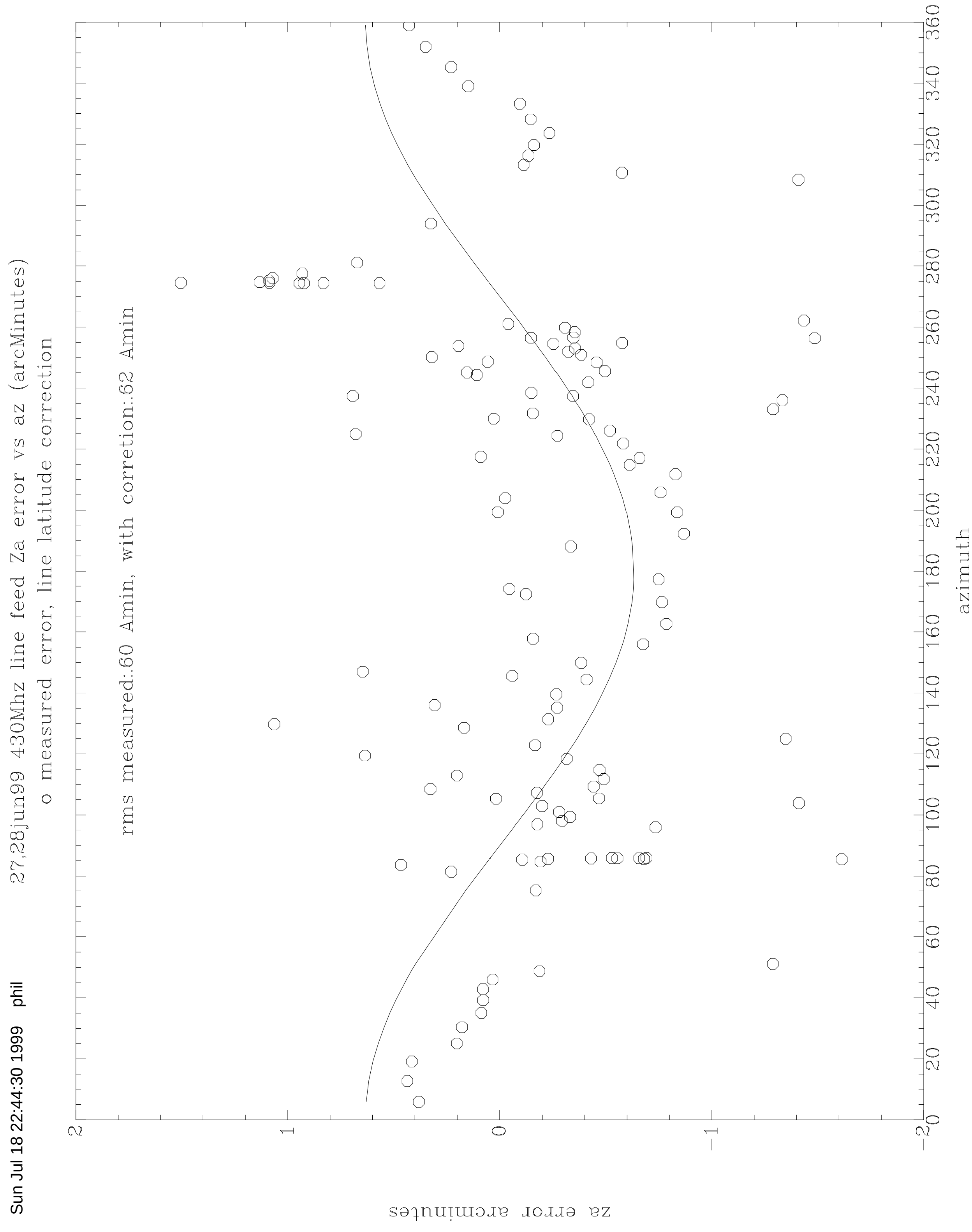

FIGURE 3: az error after latitude change and 3az fit.

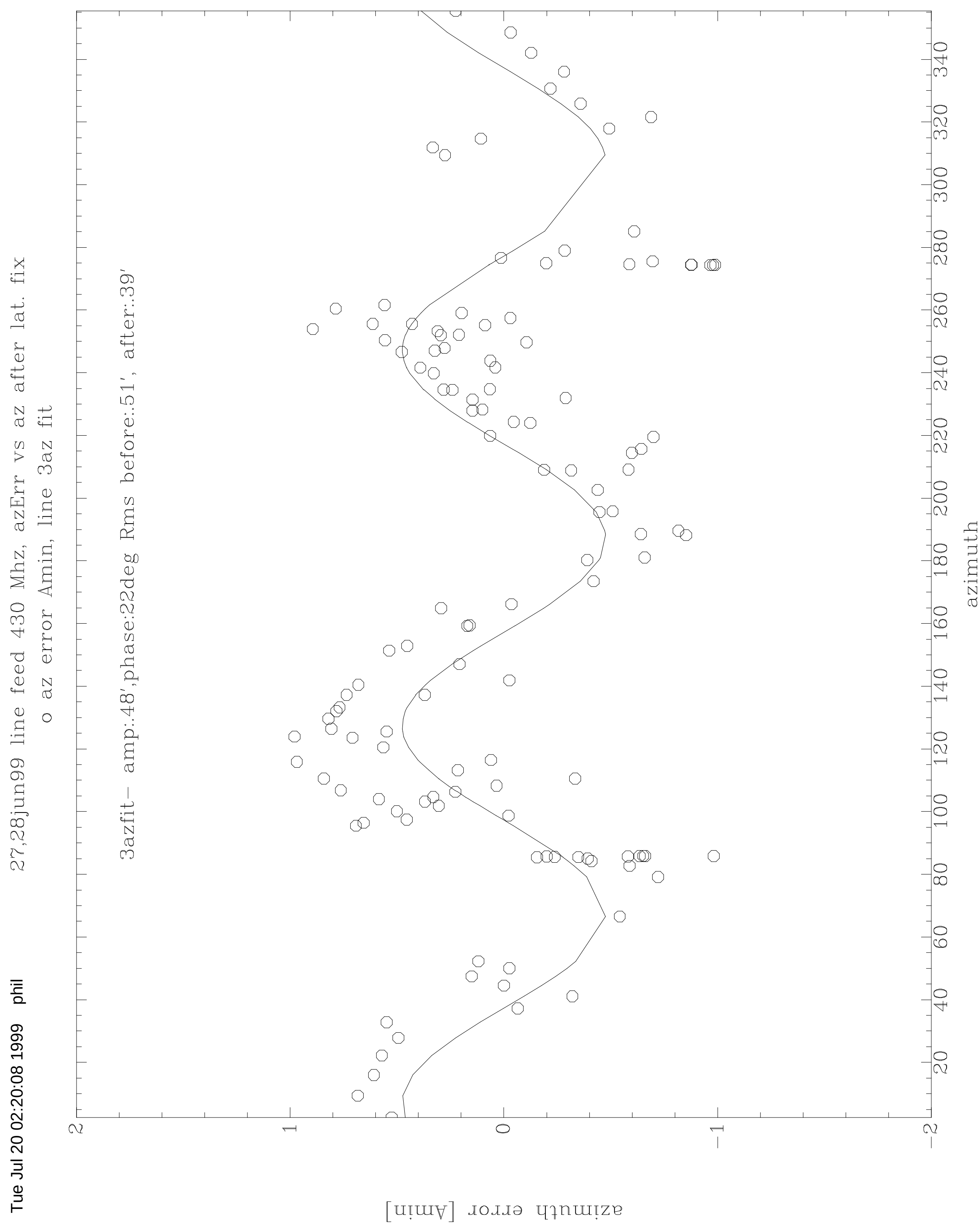

FIGURE 4:za errors after latitude and 3az term with linear fit to za overplotted.