VLBA TEST MEMO NO. 37

VLBA Antenna Horizons

A.J. Beasley & D. Medcalf,
National Radio Astronomy Observatory

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Measurements & Results

We report the results of 6 cm total-power raster scans of the horizons at 9 VLBA antennae (BR/FD/HN/KP/LA/NL/OV/PT/SC). The raster measurements were done in 72×5° azimuth steps for a 2-15°elevation range (2-20°at KP/OV/SC). One-second integrations of total and switched power were made at each raster point, and conversion to system temperature was done using the T_{cal} values listed in Table 1. Two raster patterns were performed at each site.

The data are available in three forms; tabulations of the raw data, tabulations of 75 and 150 K system temperature elevation limits, and graphically. In Tables 2, 3, and 4 the elevation where T_{sys} is 75 and 150 K ($\sim$ 1.5 & 3 times the typical zenith T_{sys}) as a function of azimuth at each site are given. These elevations are the mean values from the two raster scans at each site. These data are available in an ASCII-readable format (see below), and have not been corrected for the effects of air mass, which may be appreciable at low elevations.

In Figures 1-9, AIPS contour plots of the data are presented; indicated upon the AIPS plots are the hour-angle tracks of sources at various declinations. An AIPS task HORIZ has been written to read horizon raster scans into AIPS for further processing, and the source tracks were created using a modified version of the STARS task; both tasks are available upon request from the authors. The horizons at HN and NL are appear to be strongly affected by the presence of nearby trees; a similar effect may also be seen at

low elevations at other sites.

Data Availability

To enable VLBA users access to the raw and processed horizon data for further reductions we have made the data available via anonymous-guest FTP under the file names **'horizons.vlba'** and **'rawhoriz.vlba'** in directory 'pub' on host 'zia.aoc.nrao.edu' [146.88.1.4]. A guide to the FTP facility is available on request. The contents of the files is as follows:

horizons.vlba (6k) : Contains Tables 2 and 3 from this document.
rawhoriz.vlba (123k) : Contains T_{cal} values and raster raw data (two raster scans/site @ 9 sites).

MK to be added ~Dec 92.

STATION	T_{cal} /K (RCP)
BR	1.9
FD	3.3
HN	1.4
KP	2.6
LA	3.4
NL	3.5
OV	1.1
PT	2.9
SC	2.3

Table 1: Assumed Noise Cal. temperatures for T_{sys} conversions.

Azimuth	BR	FD	HN	KP	LA	NL	OV	PT	SC
5	4	5	10	6	8	8	6	3	7
10	4	5	9	7	7	7	6	4	7
15	5	6	10	7	9	7	7	4	7
20	5	4	10	6	6	7	10	4	7
25	5	4	10	8	8	7	11	4	9
30	5	4	9	9	9	7	12	4	8
35	5	4	8	9	9	7	14	5	9
40	6	4	8	9	8	7	13	4	8
45	6	4	8	10	8	6	14	3	9
50	5	4	8	10	8	7	15	5	9
55	6	4	9	10	9	7	15	4	9
60	6	5	10	10	9	9	15	4	10
65	5	7	9	10	9	7	13	5	10
70	6	6	10	10	8	7	12	5	10
75	6	5	10	9	10	8	11	5	11
80	6	5	10	10	9	10	10	5	11
85	6	6	11	8	8	12	9	5	10
90	6	6	10	8	9	13	8	4	12
95	6	6	10	7	10	13	8	4	13
100	6	6	9	6	8	11	6	4	13
105	5	5	10	6	9	12	6	5	13
110	6	5	11	6	8	13	5	4	14
115	5	4	12	7	8	14	4	4	15
120	6	4	11	7	9	12	4	4	18
125	6	4	12	7	9	12	4	4	17
130	6	4	13	6	9	12	4	4	16
135	5	4	14	6	9	13	4	4	16
140	5	4	14	6	8	14	5	4	17
145	5	4	14	7	10	15	4	4	14
150	5	4	14	7	10	15	5	4	14
155	5	4	14	6	8	15	4	5	13
160	4	4	13	7	9	15	2	5	13
165	5	4	13	6	9	13	3	5	11
170	4	3	12	7	10	11	3	5	11
175	5	3	11	7	8	9	4	5	13
180	5	3	11	7	8	9	3	6	13
185	5	3	11	8	8	11	4	6	14
190	5	3	11	8	8	12	4	6	17
195	6	3	12	9	9	13	5	6	15
200	6	3	12	9	8	13	5	6	15
205	5	3	12	9	10	11	7	6	16
210	5	3	11	10	9	9	7	6	14
215	5	3	10	11	8	8	7	7	13
220	5	3	12	10	7	8	8	6	11
225	5	4	12	11	8	8	7	6	13
230	5	3	11	11	9	8	7	6	13
235	6	3	9	12	9	7	7	7	11
240	6	4	9	12	9	6	8	6	10
245	7	4	9	11	8	7	8	6	11
250	6	4	7	11	9	7	9	6	11
255	6	5	8	11	9	7	9	5	11
260	7	6	10	11	10	8	9	6	9
265	6	5	10	10	10	7	8	6	8
270	6	5	10	9	10	8	7	6	8
275	6	5	9	10	9	7	7	5	10
280	7	4	9	8	9	7	7	5	8
285	7	4	8	8	9	7	6	4	9
290	7	4	9	8	10	8	5	4	9
295	7	4	9	6	8	7	4	4	9
300	6	4	10	7	10	7	4	4	8
305	6	4	11	6	9	7	4	4	7
310	6	5	9	6	9	7	4	4	8
315	6	5	10	6	10	8	3	3	7
320	6	5	9	6	8	7	3	4	7
325	6	5	10	6	9	7	3	4	6
330	5	6	9	6	8	7	4	5	7
335	6	6	9	5	9	7	2	4	8
340	7	7	10	6	9	6	4	4	9
345	6	6	11	6	9	7	3	4	8
350	5	6	11	7	10	7	4	5	9
355	5	5	9	6	7	7	4	4	10
360	5	5	9	6	9	7	4	4	9

Table 2: T_{sys} = 75 K elevation limits. Elevations are mean of two raster estimates (second raster at SC not used). All values in degrees. Azimuth measured East of North.

Azimuth	BR	FD	HN	KP	LA	NL	OV	PT	SC
5	2	4	6	2	2	2	5	2	2
10	3	5	6	2	2	2	5	2	3
15	2	5	6	2	2	2	7	2	3
20	2	3	6	2	2	2	9	2	3
25	2	3	6	2	2	2	10	2	2
30	3	3	6	2	2	2	12	2	2
35	3	2	4	2	2	2	13	2	2
40	3	3	5	2	2	2	13	2	2
45	4	2	4	2	2	2	14	2	3
50	4	2	4	5	2	2	15	2	3
55	4	3	4	6	2	2	15	2	4
60	4	4	4	7	2	2	15	2	6
65	4	7	4	7	2	2	13	3	6
70	4	5	5	8	2	2	12	3	8
75	5	4	5	8	2	2	11	2	9
80	5	4	5	9	3	3	10	3	9
85	5	5	4	6	2	6	9	2	8
90	5	6	5	3	2	6	8	2	8
95	5	6	4	2	2	6	7	2	8
100	5	5	4	2	2	6	6	2	9
105	5	4	5	2	2	8	6	2	10
110	5	3	3	3	2	7	5	2	12
115	5	2	4	3	2	7	4	2	14
120	5	2	4	2	2	6	3	2	16
125	4	2	5	2	2	7	3	2	16
130	4	2	4	2	2	7	4	2	15
135	3	2	6	2	3	6	4	2	13
140	3	2	5	2	3	6	4	2	13
145	3	2	7	2	3	7	4	2	12
150	3	2	7	2	2	7	3	2	11
155	3	3	5	3	2	6	2	2	11
160	2	2	3	3	2	5	2	2	10
165	2	2	5	3	2	4	2	2	9
170	2	2	4	2	2	3	2	3	9
175	2	2	4	2	2	3	2	3	9
180	2	2	4	2	2	3	3	3	11
185	2	2	4	3	2	3	3	4	13
190	3	2	4	3	2	3	4	4	14
195	4	2	2	3	2	2	5	3	14
200	4	2	5	3	2	3	5	4	14
205	4	2	5	3	2	3	6	4	15
210	4	2	6	3	2	3	7	4	13
215	4	2	6	3	2	3	7	4	12
220	4	2	6	4	2	3	7	4	10
225	3	4	5	4	2	2	7	4	10
230	3	2	6	5	2	2	7	4	10
235	3	2	4	5	2	2	6	4	9
240	4	2	5	4	2	2	7	4	8
245	4	3	5	4	2	2	6	3	8
250	5	3	4	4	2	2	9	4	7
255	6	4	5	4	3	2	9	3	7
260	6	5	5	3	3	2	9	3	7
265	6	5	5	3	3	2	8	3	6
270	5	4	5	2	3	2	7	4	4
275	6	4	4	2	3	2	7	3	3
280	6	3	4	2	3	2	7	3	2
285	6	3	4	2	3	2	5	2	2
290	6	2	4	2	3	2	4	2	2
295	6	2	5	2	3	2	4	2	2
300	6	3	5	2	3	2	3	2	2
305	5	4	5	2	4	2	3	2	2
310	6	5	5	2	4	2	2	2	2
315	5	4	5	2	4	2	2	2	2
320	5	4	6	2	3	2	2	2	2
325	5	4	5	2	3	2	2	2	2
330	5	5	5	2	3	2	2	2	2
335	4	6	6	2	3	2	2	2	2
340	4	6	6	2	3	2	2	2	2
345	3	5	6	2	2	2	2	2	2
350	2	5	5	2	2	2	2	2	2
355	2	5	5	2	2	2	3	2	2
360	2	5	6	2	2	2	3	2	2

Table 3: T_{sys} = 150 K elevation limits. Elevations are mean of two raster estimates (second raster at SC not used). All values in degrees. Azimuth measured East of North.

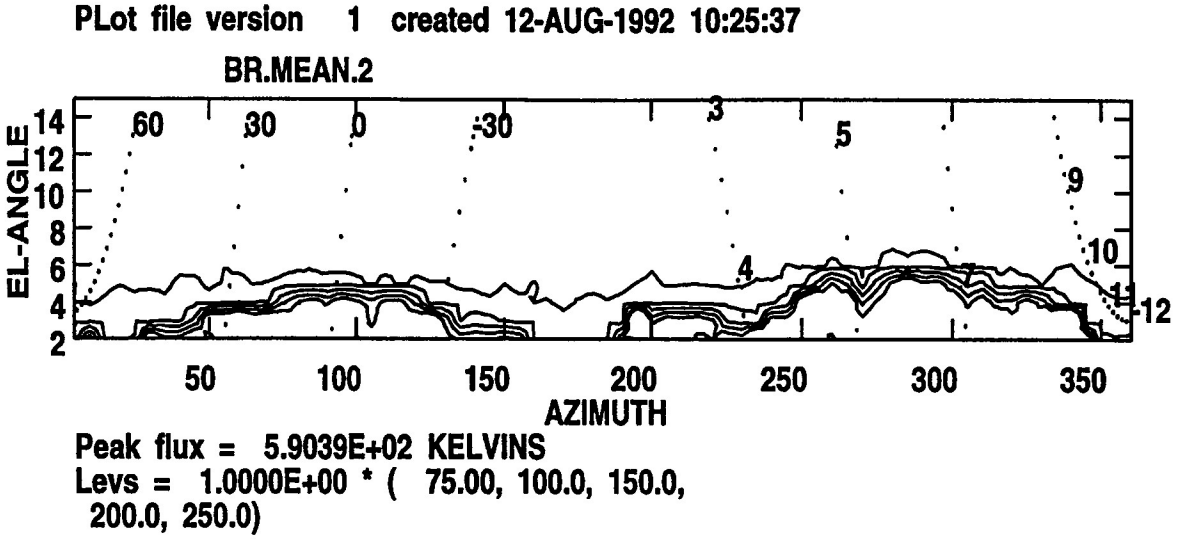

Figure 1: Brewster horizon data; contours at T_{sys} = 75,100,150,200,250 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles.

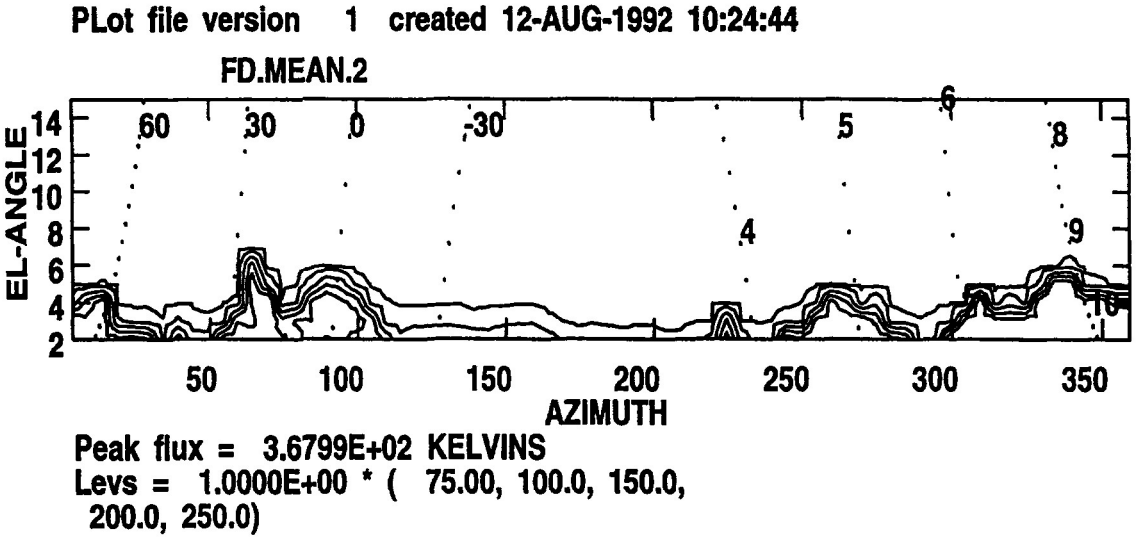

Figure 2: Fort Davis horizon data; contours at T_{sys} = 75,100,150,200,250 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles.

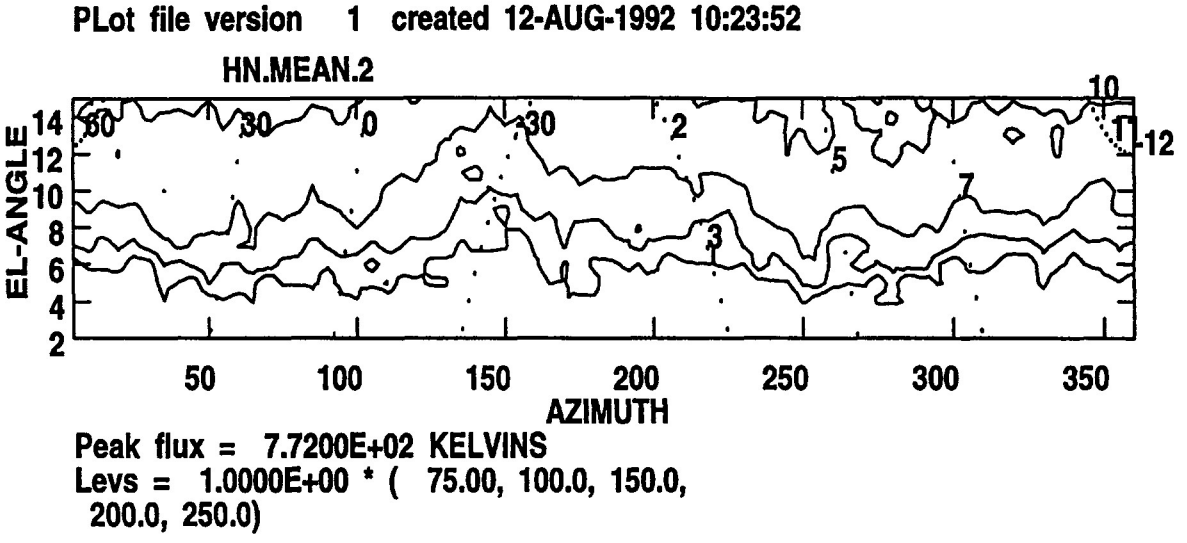

Figure 3: Hancock horizon data; contours at T_{sys} = 75,100,150,200,250 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles. The bottom contour on the diagram is the 250 K isothermal. This horizon probably strongly affected by nearby trees.

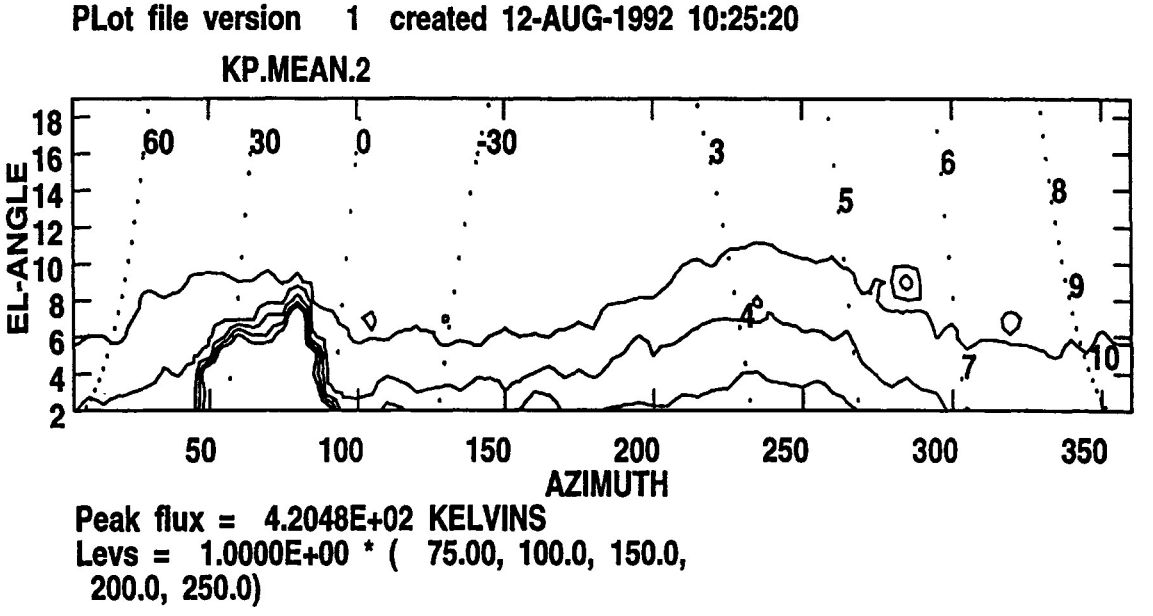

Figure 4: Kitt Peak horizon data; contours at T_{sys} = 75,100,150,200,250 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles.

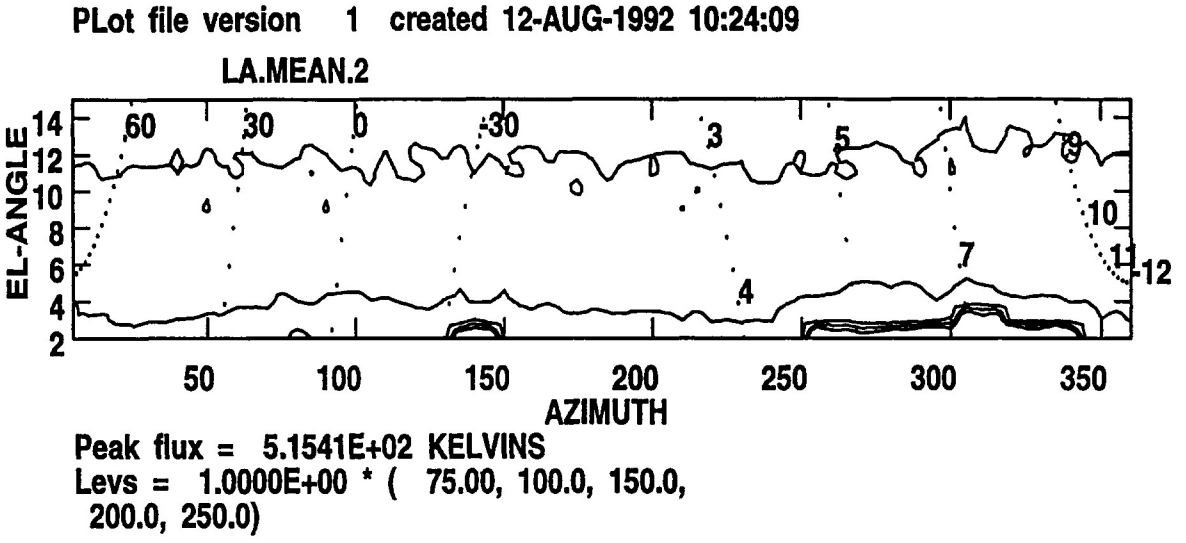

Figure 5: Los Alamos horizon data; contours at T_{sys} = 75,100,150,200,250 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles.

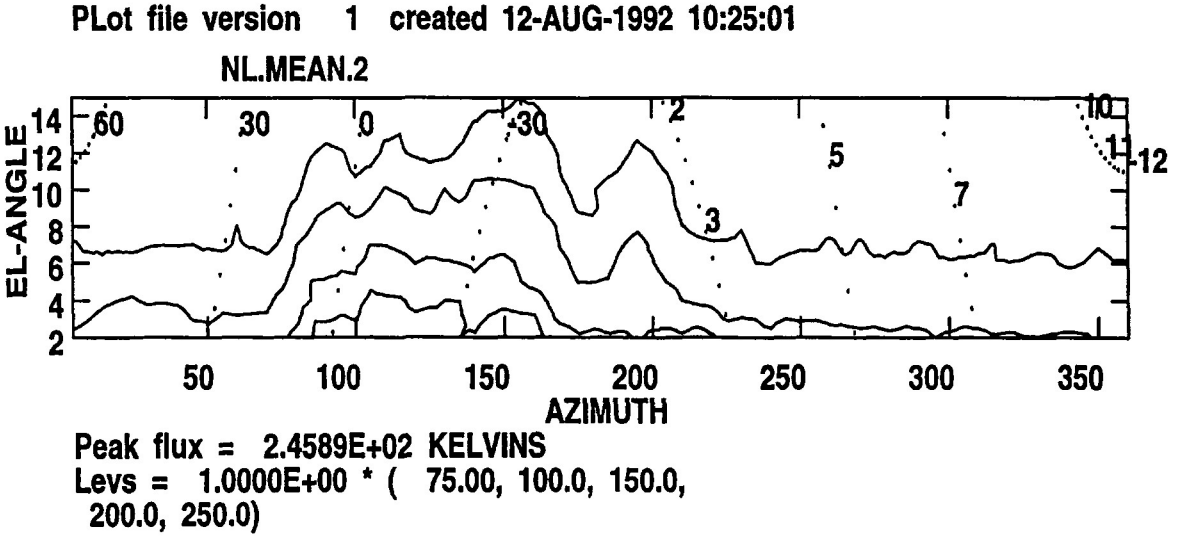

Figure 6: North Liberty data; contours at T_{sys} = 75,100,150,200 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles.

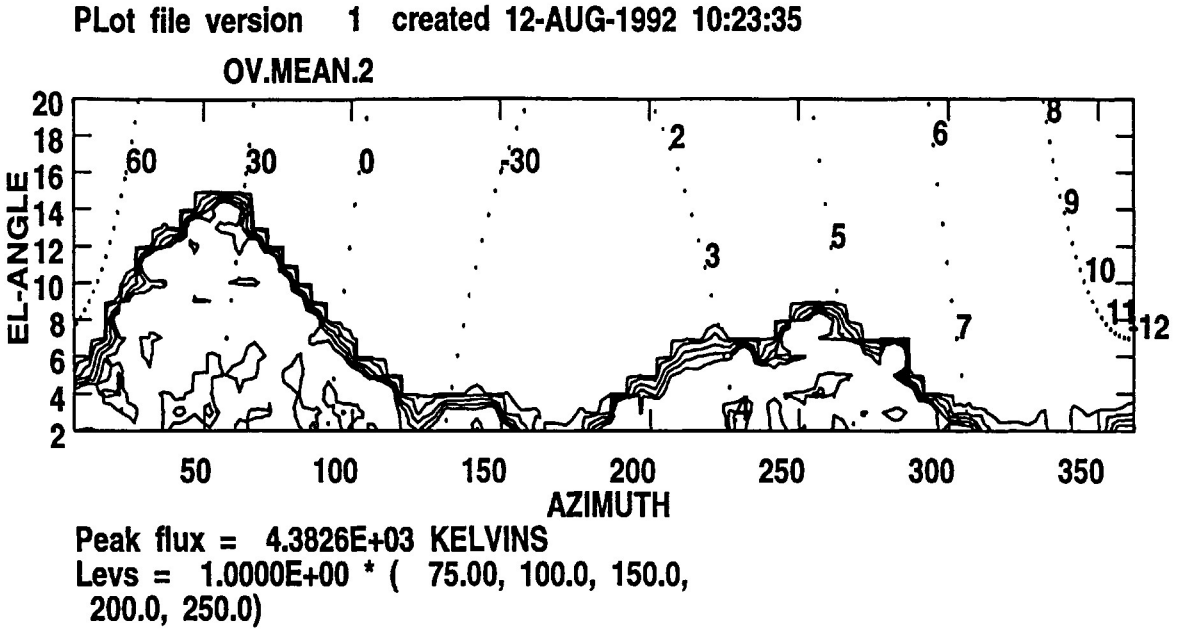

Figure 7: Owens Valley data; contours at T_{sys} = 75,100,150,200,250 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles.

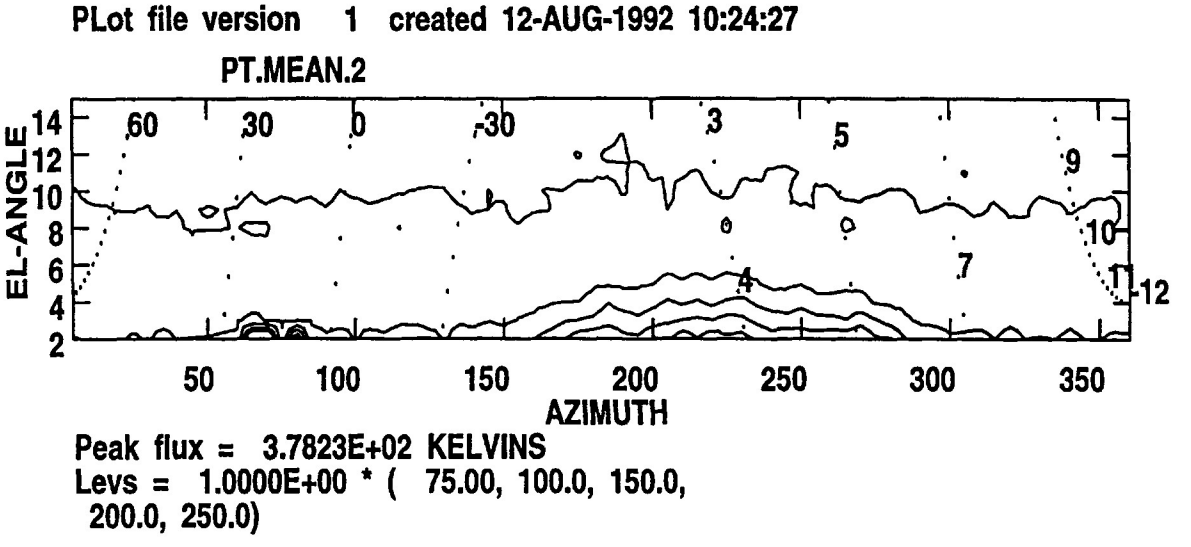

Figure 8: Pie Town horizon data; contours at T_{sys} = 75,100,150,200,250 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles.

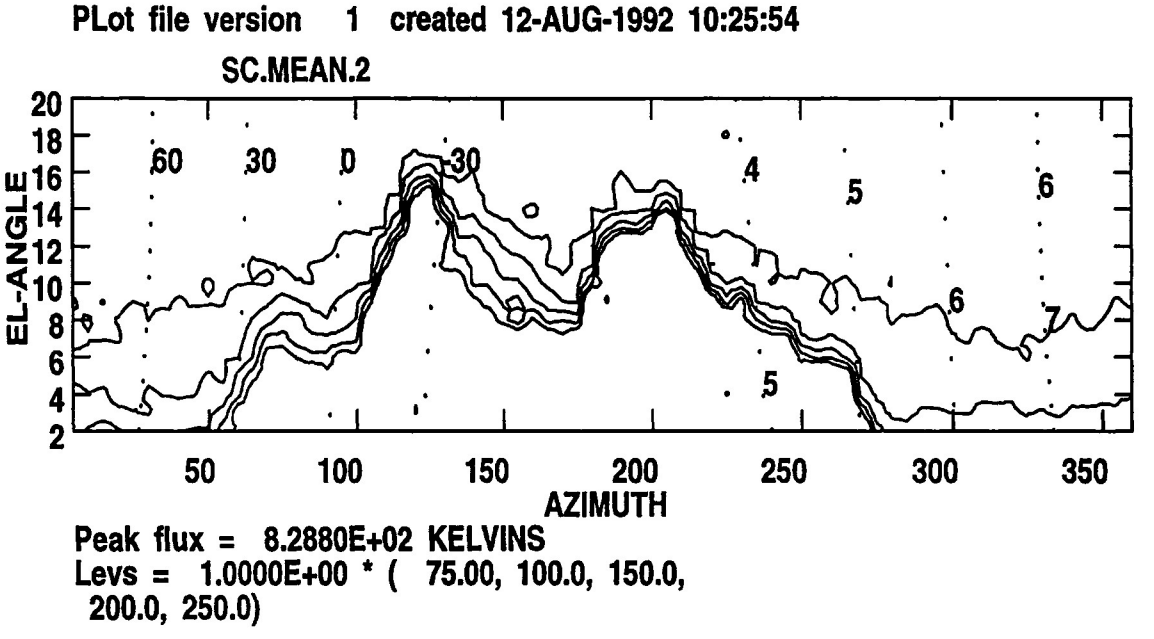

Figure 9: St. Croix horizon data; contours at T_{sys} = 75,100,150,200,250 K. Sidereal tracks for various delinations are indicated; the numbers on the left indicate the declination, the numbers on the right hour angles. These data are from only the first SC raster; the second raster had data problems and was not used.