

National Radio Astronomy Observatory 535
Socorro, New Mexico

VLB ARRAY MEMO No. ~~35~~

17 Feb. 1986

(860305)

To: NRAO Council
From: Craig Walker
Subject: More on a VLBA Antenna in Green Bank

Since my last memo to the Council, the location of the Caribbean station of the VLBA has been changed to St. Croix from Puerto Rico (the coordinates of Arecibo were used in the u-v studies). I expected that this move would be sufficiently small that, for an outer antenna of the array, it would make no difference to the u-v coverage. Indeed, this is true if a New England location (eg. Haystack or FCRAO) is used for the Northeast site. Unfortunately, the move does about as much damage as it possibly could to the overall coverage when Green Bank is used instead of New England. Moving the Northeast site from New England to Green Bank opens some holes in the u-v coverage. The move from Arecibo to St. Croix increases the size of those holes.

The attached figures show the differences in coverage when Green Bank is used instead of Massachusetts. The figures are:

Figure 1: The coverage of the VLBA with the currently official sites. The coordinates were obtained from Cam Wade. The Northeast antenna is at FCRAO.

Figure 2: The coverage of the VLBA with Green Bank using the station coordinates in use at the time of the earlier discussion. Specifically, the Caribbean station was at Arecibo.

Figure 3: The coverage of the VLBA with the current official coordinates but with Green Bank substituted for Massachusetts. The point of this memo is that the hole at about 3000 km north and south at declinations between 18 and 44 degrees is larger. The effect of this hole is more dramatic when the coverage of the VLBA plus some European stations is displayed as in the next two figures.

Figure 4: The coverage of the VLBA with FCRAO plus several telescopes of the European VLBI Network (EVN). Note that, at high declinations, this is rather impressive coverage and should allow maps of extremely complex sources to be made. The biggest problems for such observations are likely to be missing short spacings -- but that is another topic.

Figure 5: The coverage of the VLBA with Green Bank plus the same EVN stations as in Figure 4. Now the holes mentioned above are very clear. The EVN stations are unable to fill

them and they are now very large on the scale of the overall quality of the coverage. Also the relatively poor quality of the coverage at the equatorial declinations is now apparent, especially along a stripe from the lower left to upper right of the plots passing within about 2000 km of the center.

There are a few ways in which the holes can be filled. For some experiments, the existing Haystack telescope will be available, at least for a few years. If the Canadians build antennas in Calgary and Yellowknife, the holes are filled. However we cannot count on either the availability of Haystack over the long run or any new construction in Canada.

I suspect that the Northeast antenna is still the best to move to Green Bank if one must be moved, especially since Haystack will probably be kept alive by the Air Force. However the argument against the move is now somewhat stronger than it was before.

VLBA_PT	34.30	108.12
VLBA_KT	31.96	111.61
VLBA_LA	35.78	106.25
VLBA_WA	48.13	119.68
VLBA_FD	30.63	103.95
VLBA_UI	17.75	64.60
VLBA_IA	41.77	91.55
VLBA_OU	37.23	118.28
VLBA_HI	19.54	155.58
VLBA_MA	42.40	72.35

Scale in km
(kilometers $\times 10^3$)

VLBA

8000 km

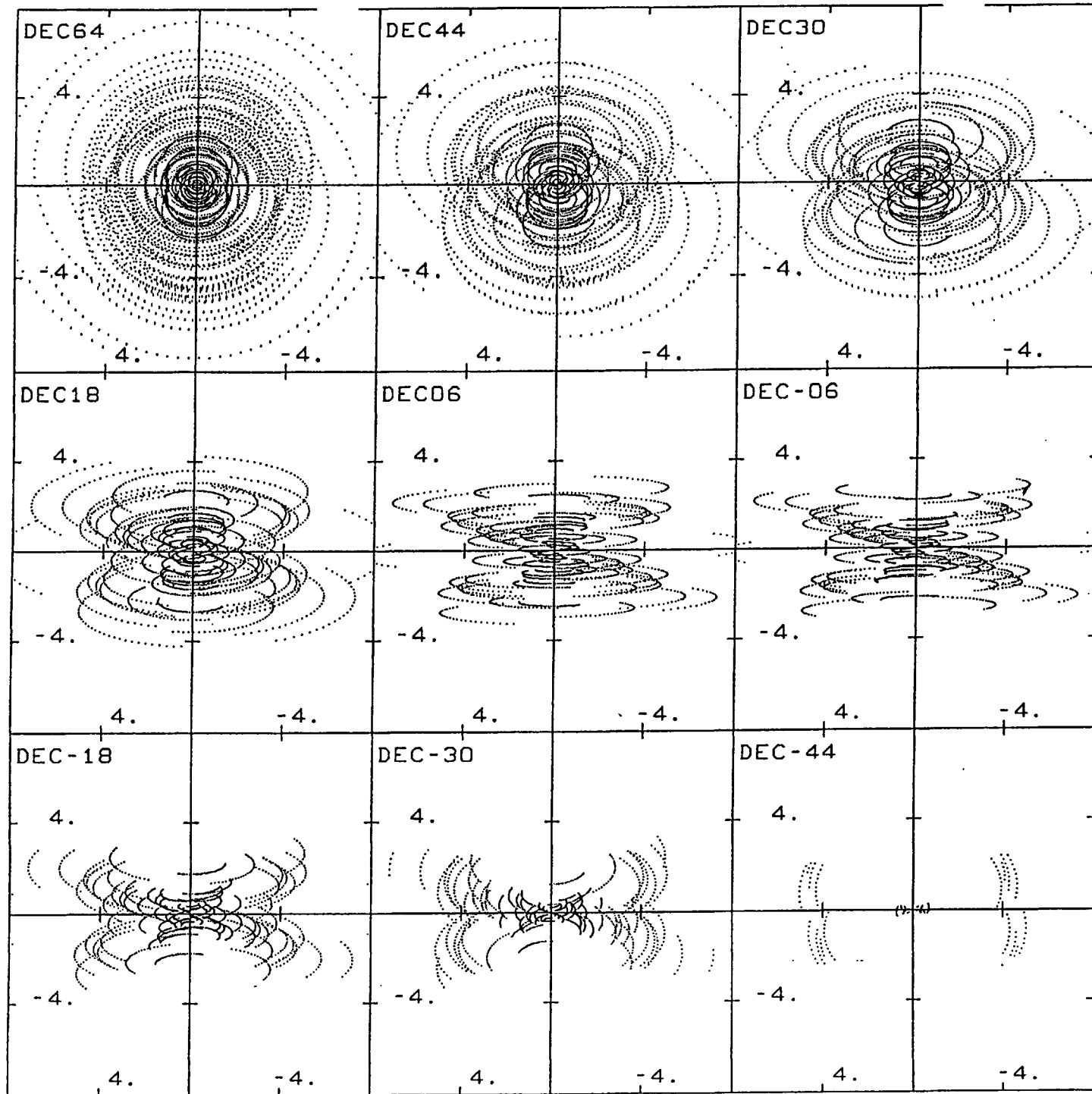
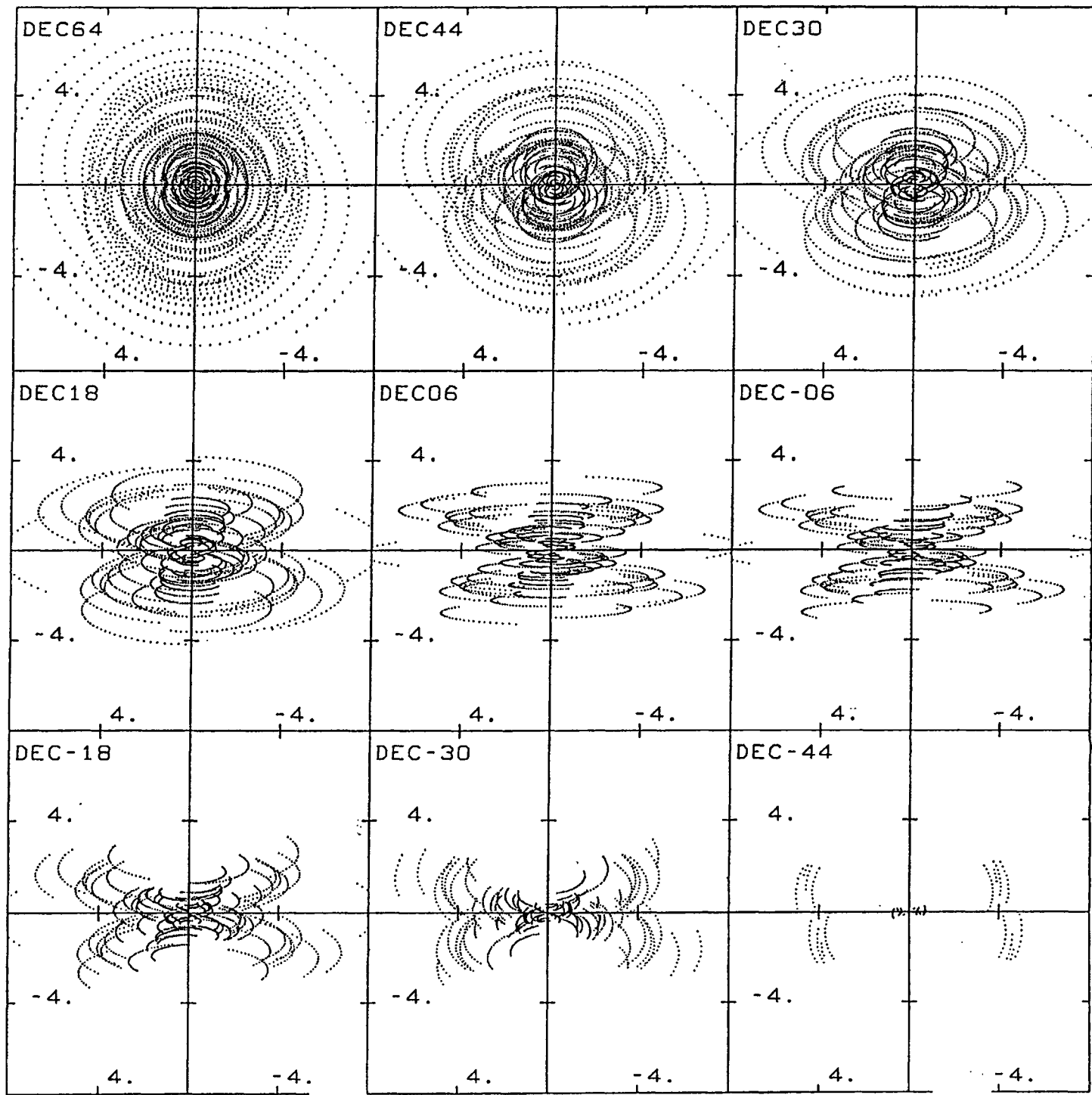


Fig 1

PIETOWN	34.33	108.14
KITT	31.96	111.60
LASL2	35.81	106.27
OROVILE	48.90	119.75
FDSUSNEW	30.47	103.95
AREC80	18.34	66.75
IOWA	41.58	91.57
OURO	37.05	118.28
HAWAII	19.80	155.50
NRAONEW	38.25	79.84

Scale in km
(kilometers x 10³)

VLBA
with Green Bank
Old Coordinates
(eg Arecibo instead)
of St. Croix



VLBA_PT	34.30	108.12
VLBA_KT	31.96	111.61
VLBA_LA	35.78	106.25
VLBA_WA	48.13	119.68
VLBA_FD	30.63	103.95
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Scale in km
(kilometers x 10³)

VLBA
WITH
Green Bank

8000 km

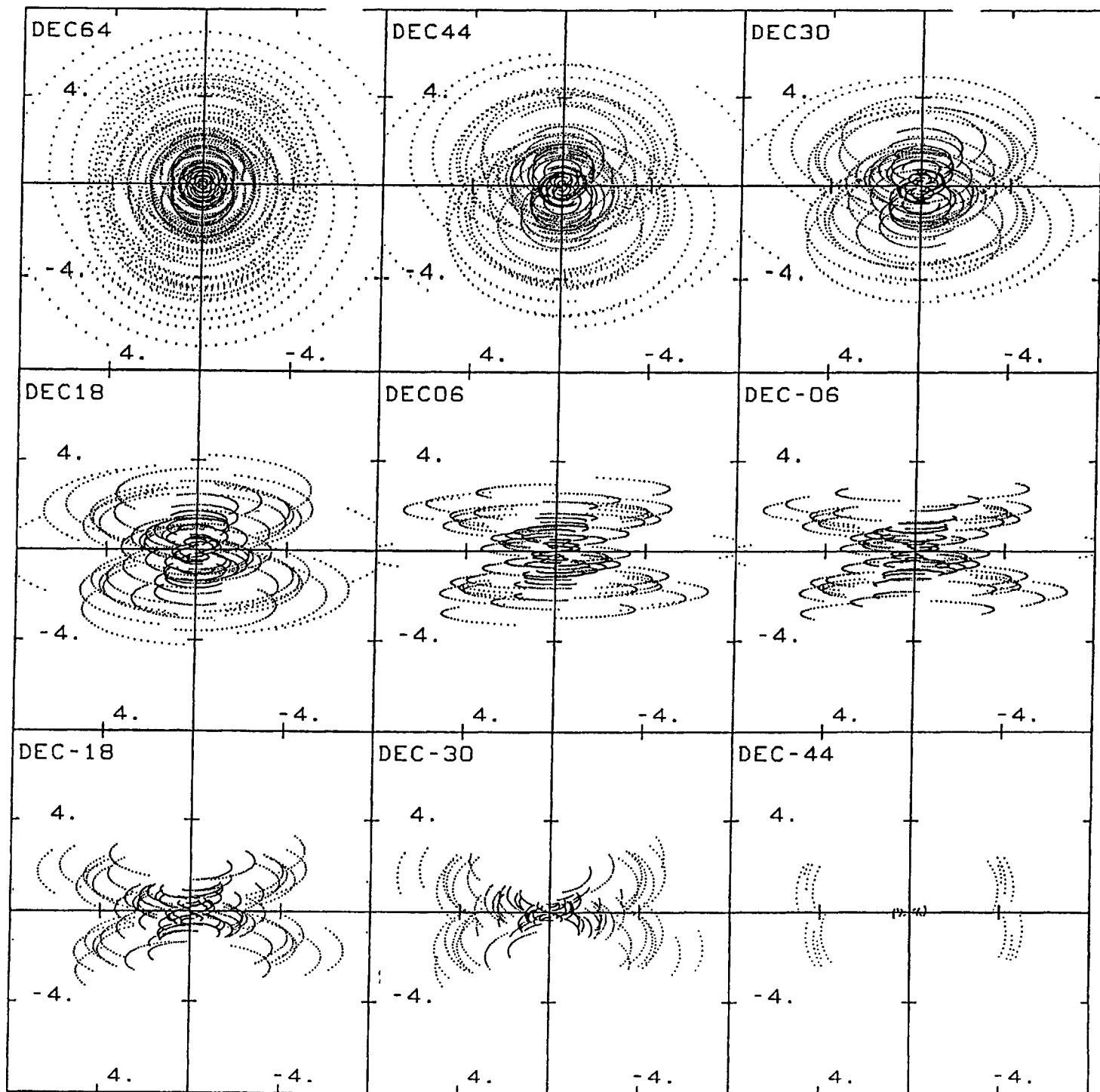


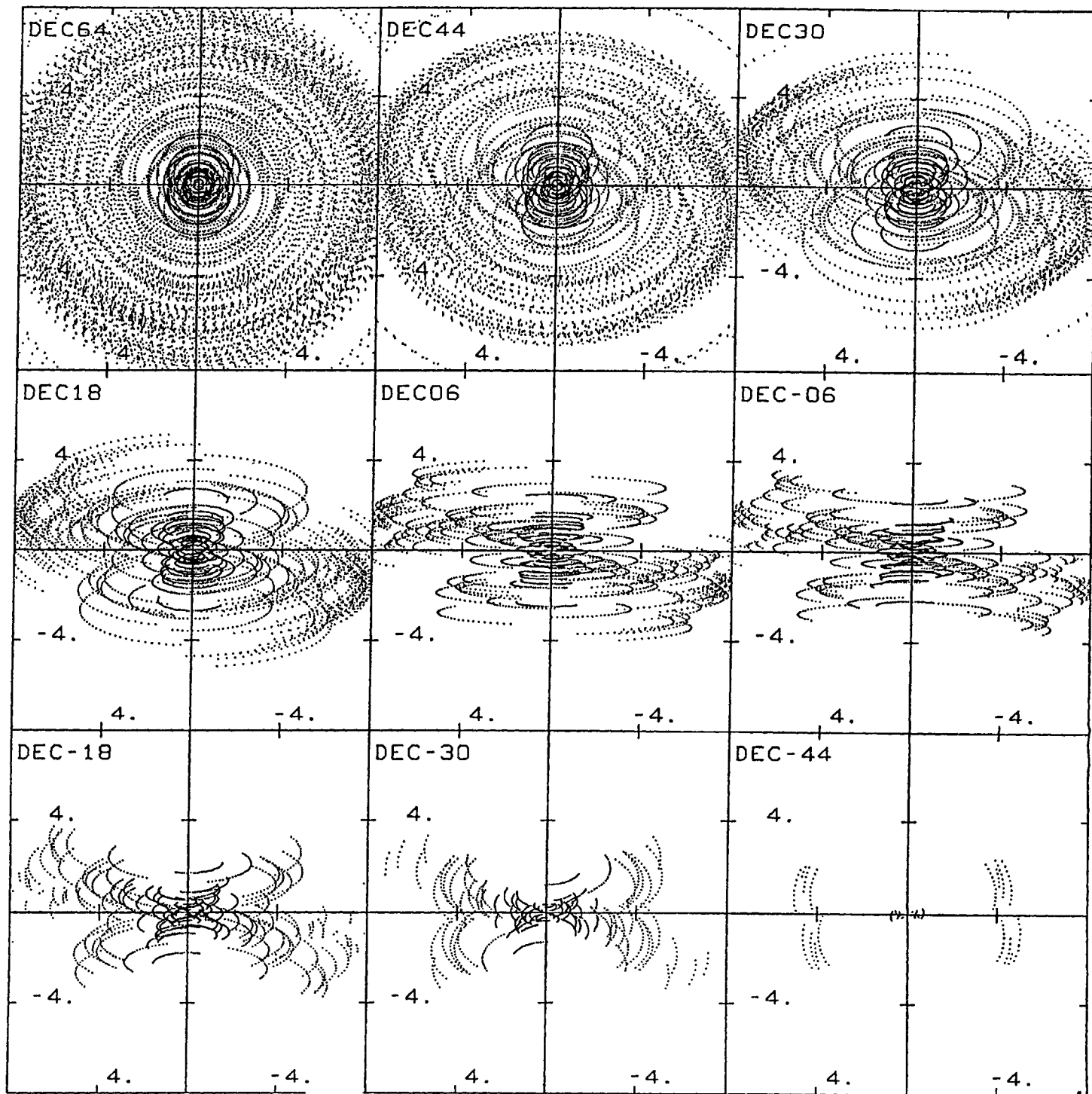
Fig 3

VLBA_PT	34.30	108.12
VLBA_KT	31.96	111.61
VLBA_LA	35.78	106.25
VLBA_FD	30.63	103.95
VLBA_WA	48.13	119.68
VLBA_VI	17.75	64.60
VLBA_IA	41.77	91.55
VLBA_OV	37.23	118.28
VLBA_HI	19.54	155.58
VLBA_MA	42.40	72.35
WSRT	52.92	-6.61
BONN	50.34	-6.88
ONSALA	57.22	-11.92
BGNA	44.50	-11.30
JODRELL	53.05	2.31

Scale in km
(kilometers x 10³)

VLBA
+
EVN
8000km

4



BONN	50.34	-6.88
ONSLA	57.22	-11.92
BGNA	44.50	-11.30
WSRT	52.92	-6.61
JODRELL	53.05	2.31
NRAONEW	38.25	79.84
VLBA_HI	19.54	155.58
VLBA_PT	34.30	108.12
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VLBA_IA	41.77	91.55
VLBA_VI	17.75	64.60

Scale in km
(kilometers x 10³)

VLBA
with Green Bank
+ EVN
8000 km

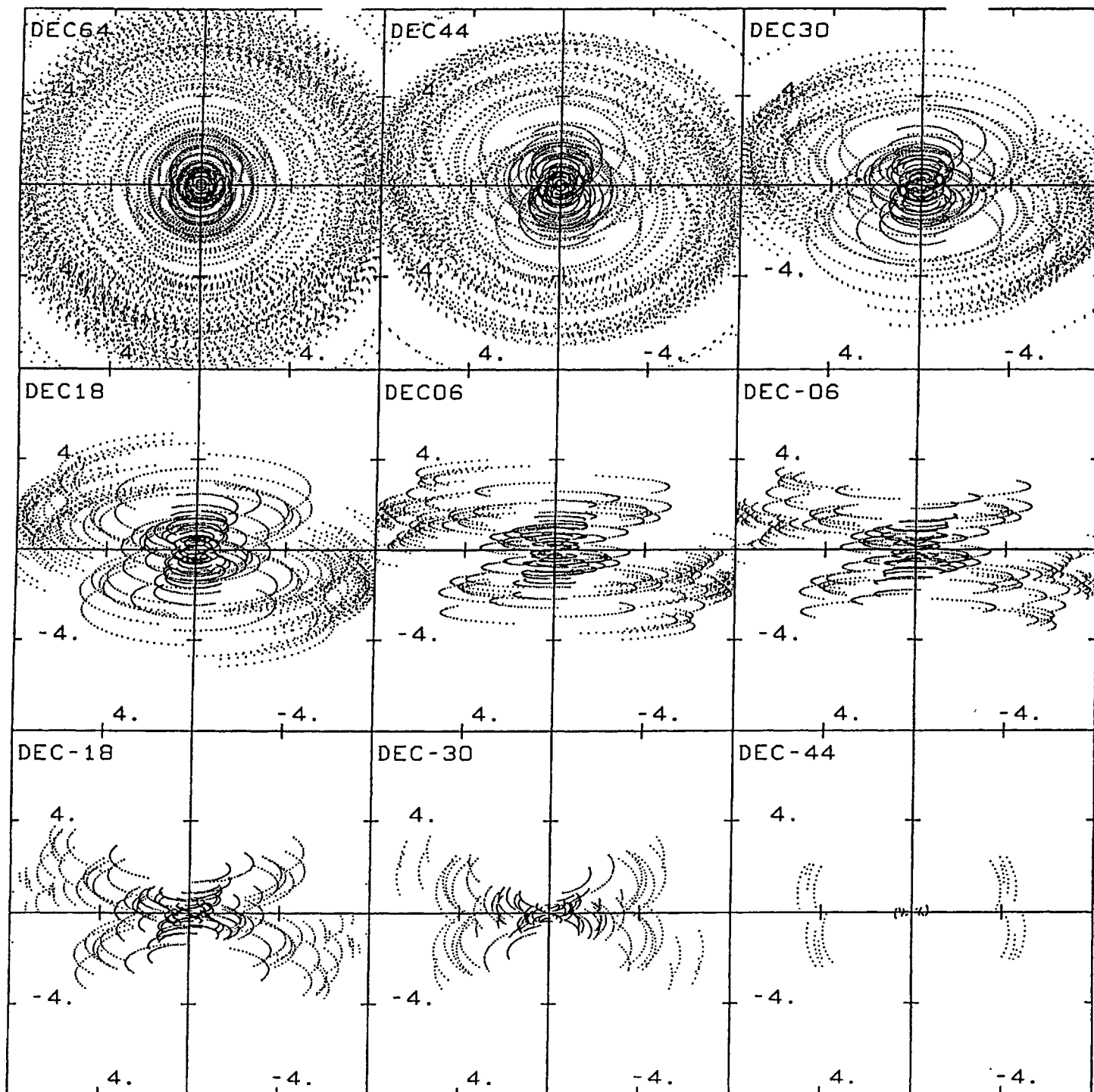


Fig 5