Eight element arrays on Upper Harkless Flats

Figures 1 through 5 illustrate simulated uv coverage and synthesized beams for 8 antennas using currently defined pad positions for the Upper Harkless Flats 5-arm star array.

The basic conclusions are:

- A 'Y' array using the the north arm and 2 southern arms of the current star pad positions does not have adequate *uv* coverage. This Y array has a narrow opening angle (constrained by the existing star pattern) and has inferior *uv* coverage compared to the full star pattern. Therefore, the 'Y' arrays are not explored further here.
- Reasonable D, C, and B arrays of 8 antennas (resolutions of $4''$, $2''$ and $1''$, respectively) can be designed using pads currently defined in the 5-arm star pattern.
- The B, C, and D configurations are not well optimized for low declination sources. Each configuration requires a separate equitorial configuration to get adequate *uv* coverage for low-declination sources.

Antenna positions used for each configuration defined here are listed below.

Table 1: 8-element star D array

name	E psn (m)	N psn (m)
03d	-6.0	39.5
04d	-10.7	71.0
06d	25.5	12.8
07d	45.9	23.0
09d	27.0	-27.4
12d	-19.0	-36.7
15d	-29.5	4.9
16d	-53.1	8.8

Table 2: 8-element star DE array

name	E psn (m)	N psn (m)
02c	-6.0	39.5
03c	-14.9	98.6
04d	-10.7	71.0
07d	45.9	23.0
09d	27.0	-27.4
11d	-7.6	-14.7
13d	-34.2	-66.0
15c	-73.8	12.2

Table 3: 8-element star C array

name	E psn (m)	N psn (m)
02c	-6.0	39.5
03c	-14.9	98.6
06c	63.7	31.9
07c	114.7	57.4
09c	67.5	-68.5
13d	-34.2	-66.0
14c	-29.5	4.9
16c	-132.9	22.0

Table 4: 8-element star CE array

name	E psn (m)	N psn (m)
02c	-6.0	39.5
03c	-14.9	98.6
03b	-37.3	246.6
07c	114.7	57.4
09c	67.5	-68.5
11c	-19.0	-36.7
12c	-47.5	-91.7
16c	-132.9	22.0

Table 5: 8-element star B array

name	E psn (m)	N psn (m)
02b	-14.9	98.6
04b	-67.1	443.8
06b	159.3	79.8
07b	286.7	143.6
10c	121.6	-123.3
11c	-19.0	-36.7
14b	-73.8	12.2
16b	-332.1	55.0

Table 6: 8-element star BE array

name	E psn (m)	N psn (m)
02c	-6.0	39.5
04b	-67.1	443.8
07b	286.7	143.6
08b	67.5	-68.5
09b	168.8	-171.2
12b	-118.9	-229.3
13b	-213.9	-412.8
16b	-332.1	55.0

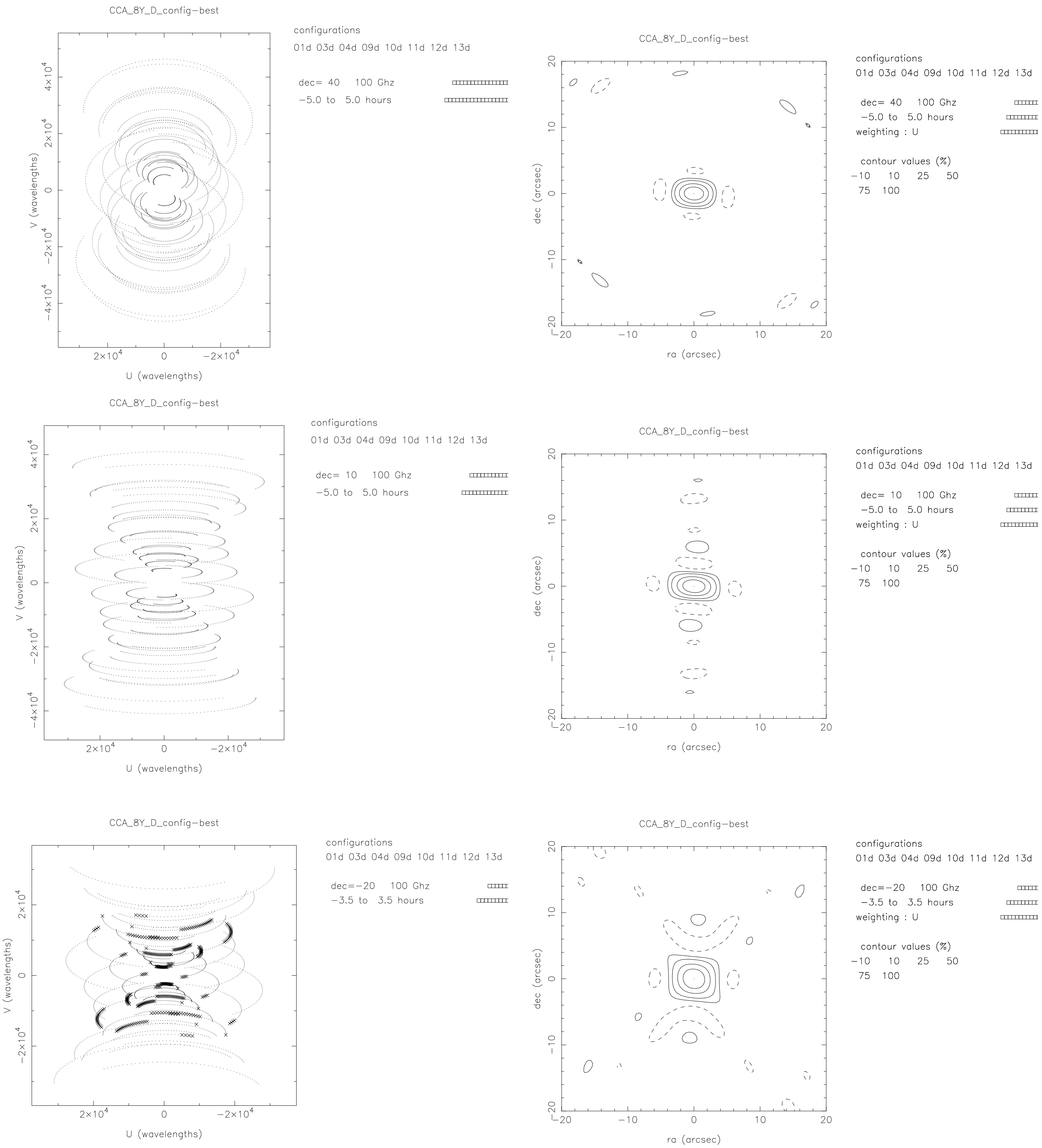

Fig. 1.— 8 element Y-array, D configuration, $\sim 4.5''$ resolution. The configuration uses currently defined Upper Harkless Pads.

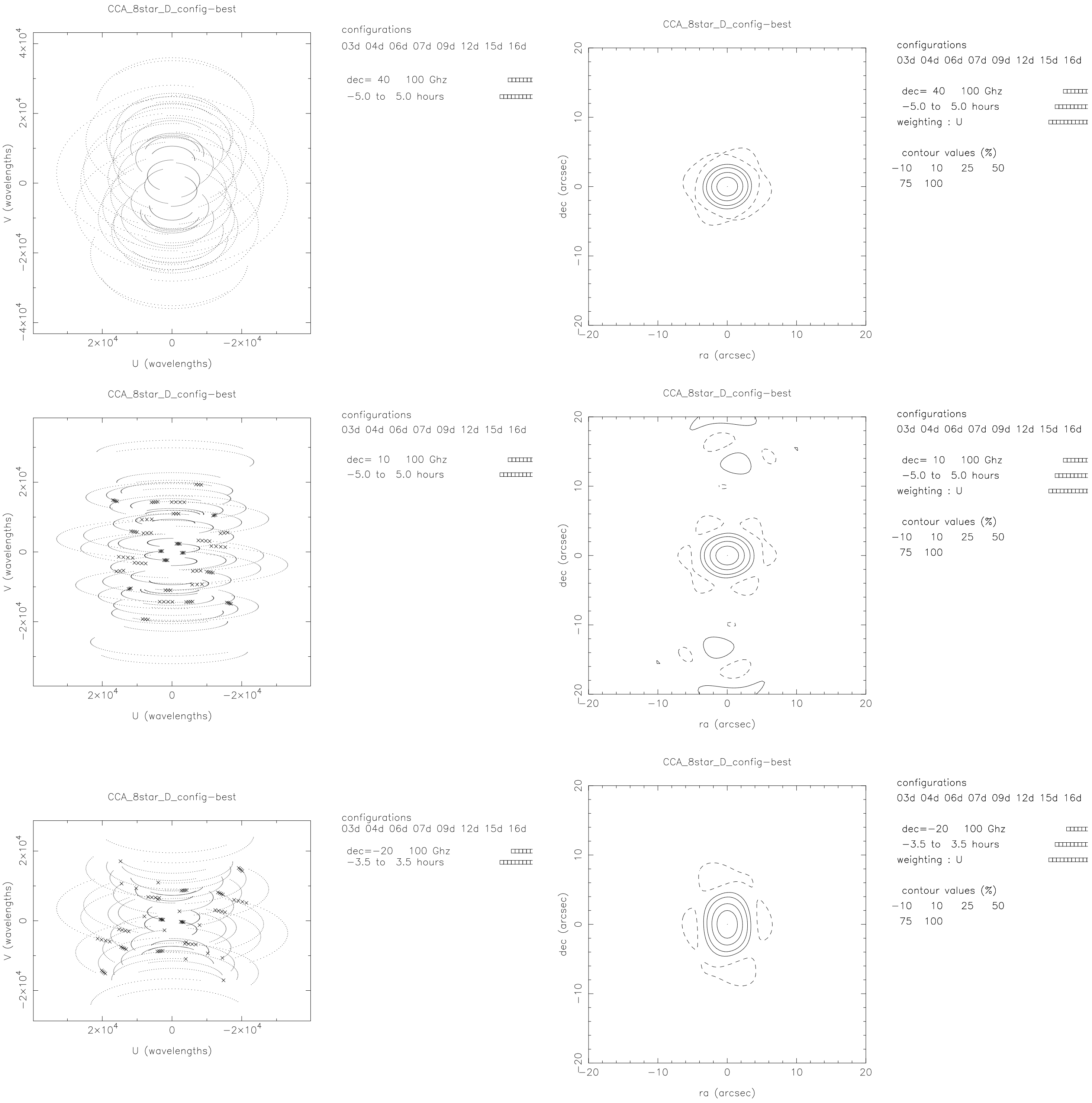

Fig. 2.— 8 element star array, D configuration, $\sim 4''$ resolution, on Upper Harkless Pads. An equitorial configuration will be required for low-declination sources.

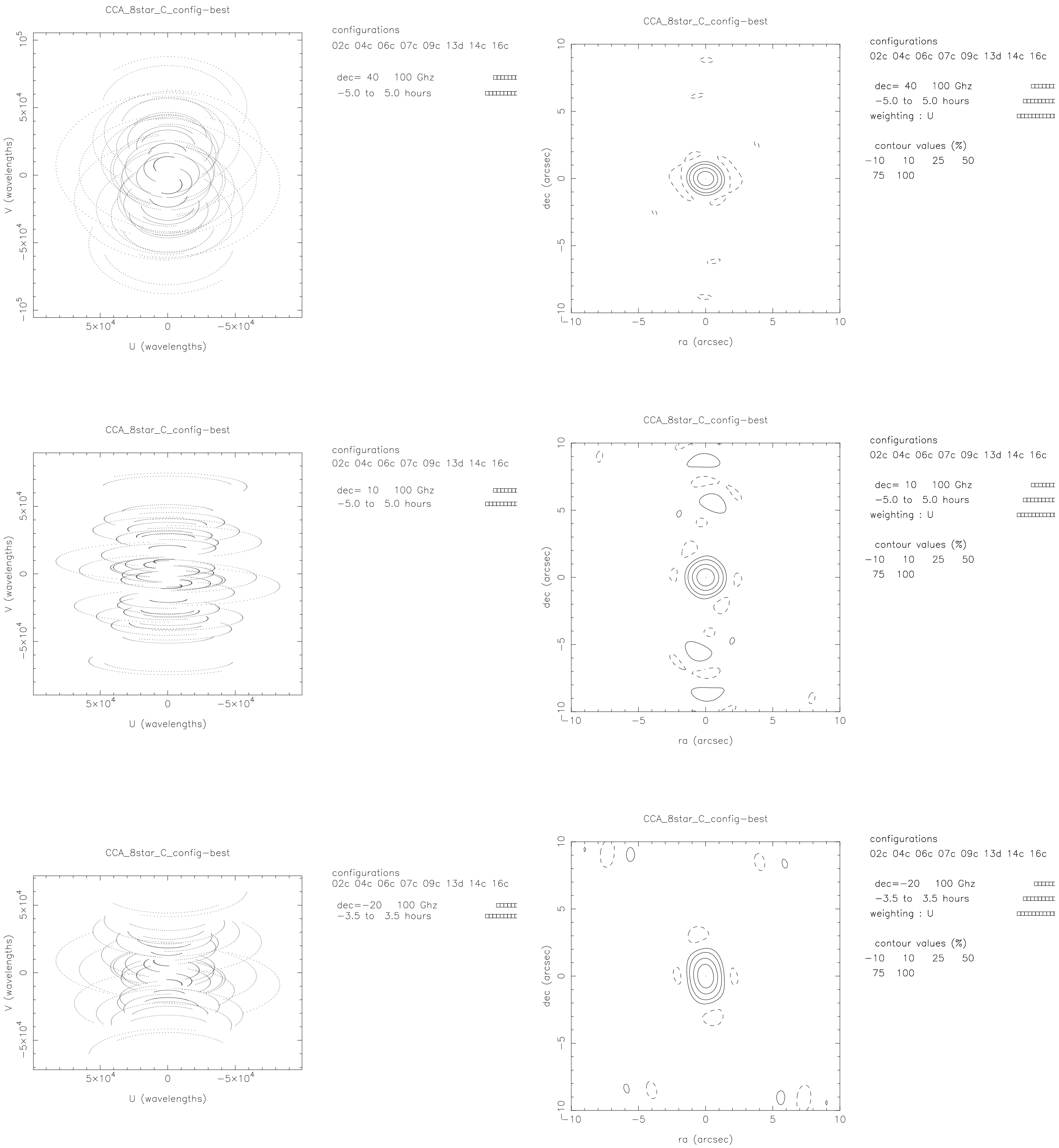

Fig. 3.— 8 element star array, C configuration, $\sim 2''$ resolution, on Upper Harkless Pads. An equitorial configuration will be required for low-declination sources.

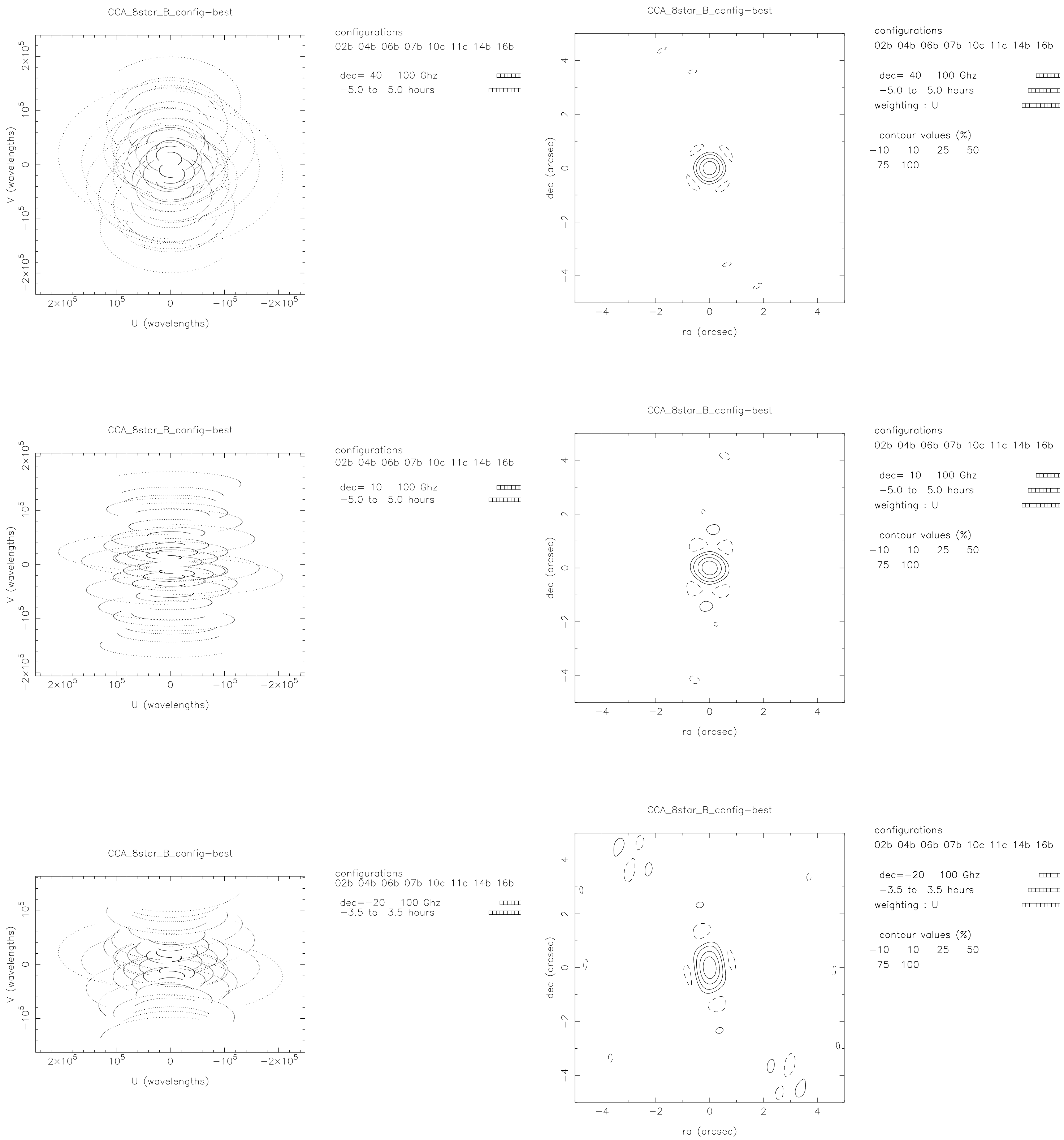

Fig. 4.— 8 element star array, B configuration, $\sim 1''$ resolution, on Upper Harkless Pads. An equitorial configuration will be required for low-declination sources.

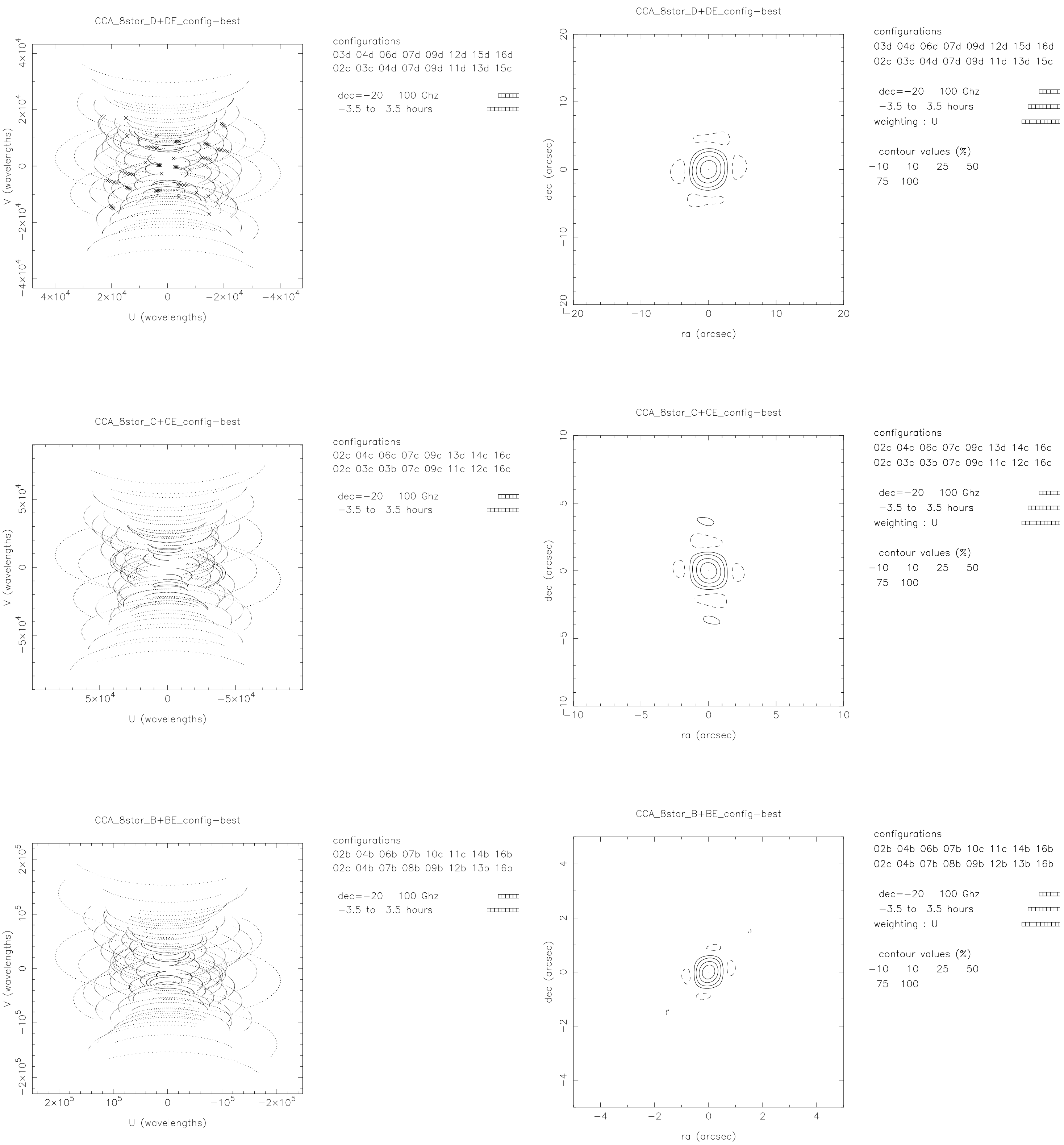

Fig. 5.— 8 element star array, standard plus taylored equitorial configurations for low declination sources ($\delta = -20$ shown here) on Upper Harkless Pads. D+DE, C+CE, and B+BE configurations, $\sim 4'', 2'',$ and$1''$ resolution, respectively. Equitorial configurations combined with the standard configurations can improve the uv coverage for low declination sources and produce a better shaped beam.