EVLA Phase II

NMA and E-array Progress

Frazer Owen

EVLA Advisory Committee Meeting
June 11, 2002

People

- Aaron Cohen
- Steve Durand
- Leonia Kogan
- Bob Tacker
- Cam Wade
- Craig Walker

NMA Puzzle

Combine UV Coverage,
Land Availability,
Power Availability and
Fiber Optics Network
into a practical Array Design

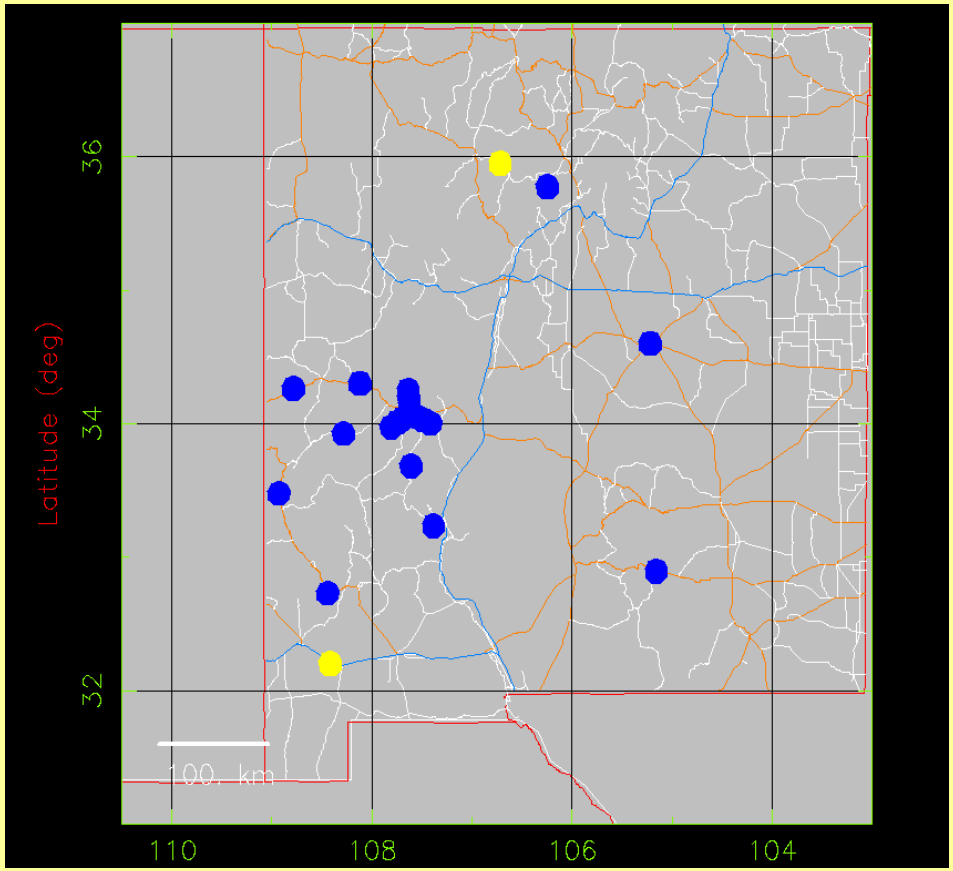
Criteria for now

- Fiber --- Find Sites Near Existing, Available Fibers.
- Power --- Find Sites with minimum distance from 3-phase power.
- Land --- Find sites with multiple acceptable land options.

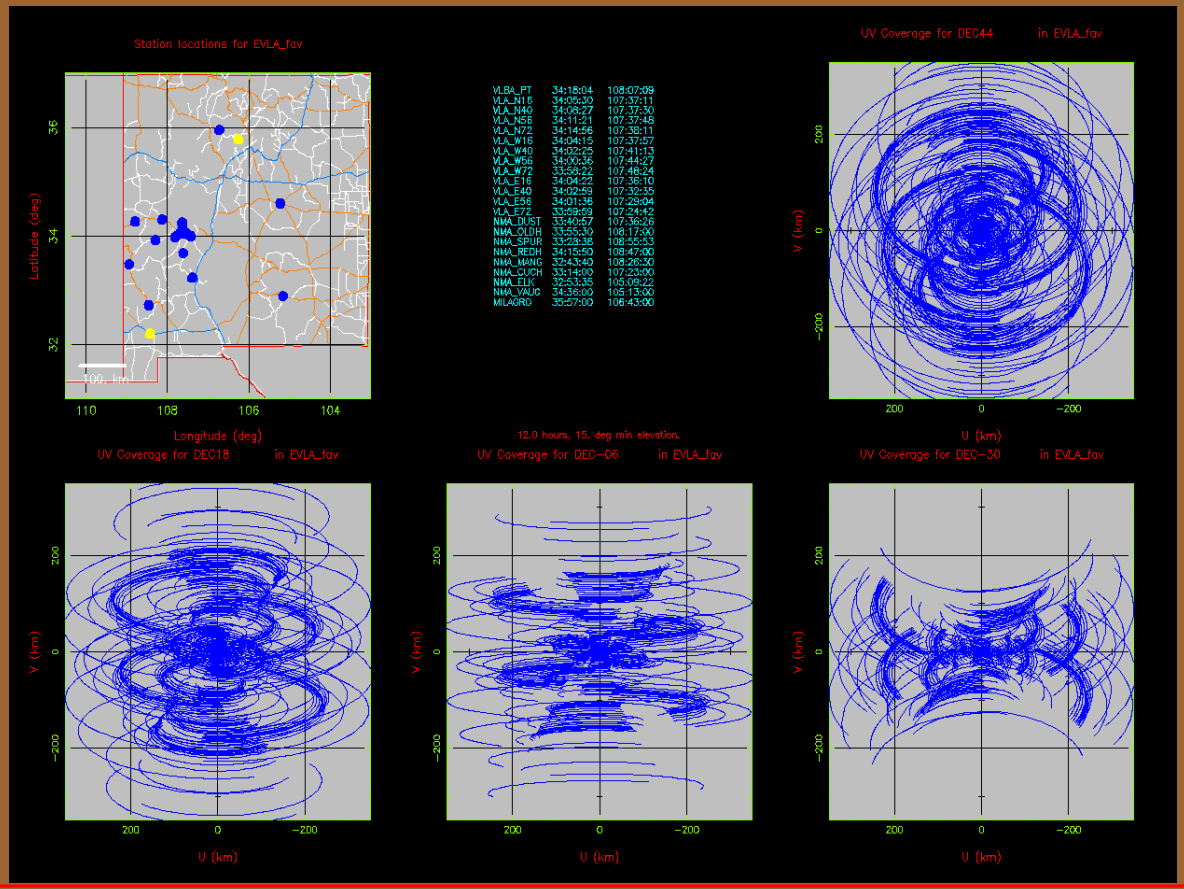
Criteria for now

- Stay away from sensitive environmental areas, population concentrations, potential interference, etc
- In some cases add, somewhat longer runs of fiber or power to fill out uv coverage.
- Current array is likely to be modified later.

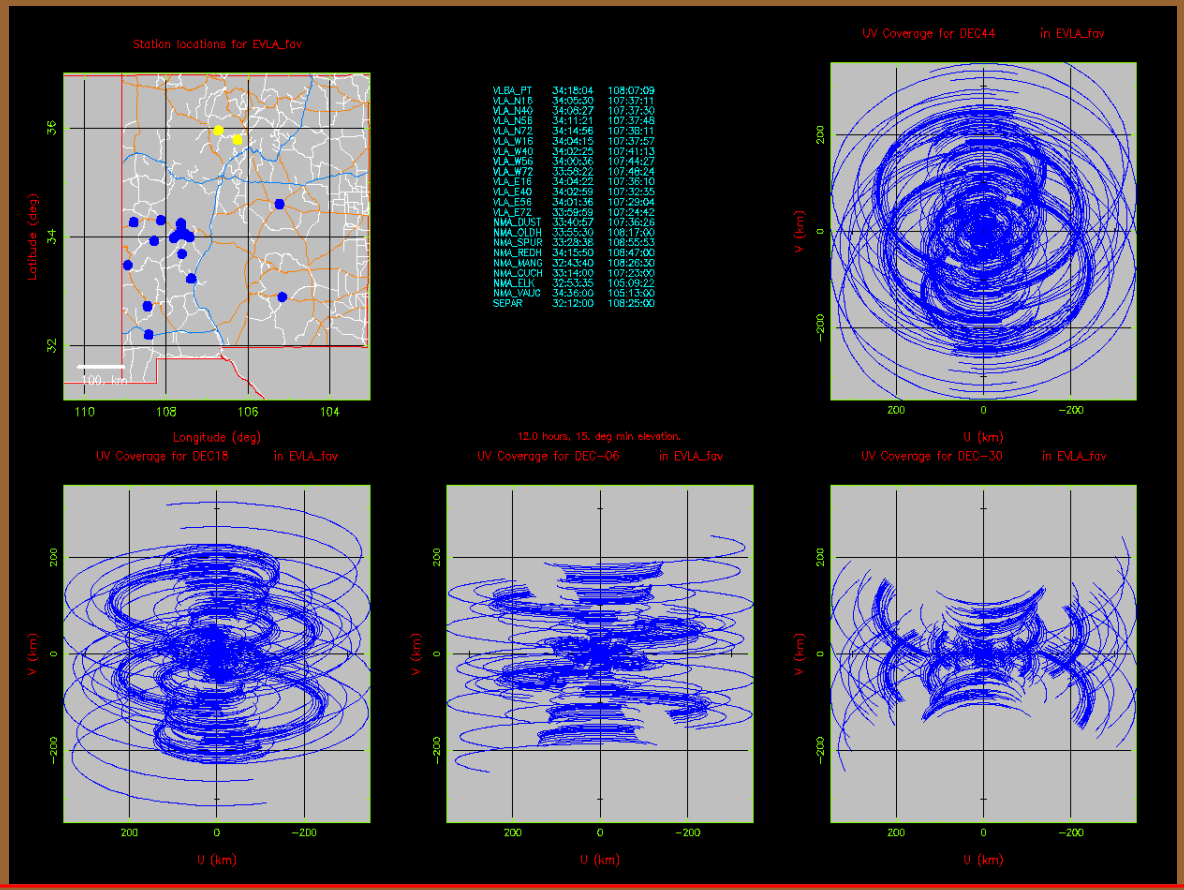
NMA Sites



NMA - Milagro


Station locations for EVLA_fav
Latitude (deg)
Longitude (deg)
VLBA_PT 34:18:04 108:07:09
VLA_N18 34:05:30 107:37:11
VLA_N40 34:08:27 107:37:30
VLA_N56 34:11:21 107:37:46
VLA_N72 34:14:56 107:38:11
VLA_W16 34:04:15 107:37:57
VLA_W40 34:03:25 107:41:13
VLA_W56 34:00:36 107:44:27
VLA_W72 33:58:22 107:48:24
VLA_E16 34:04:22 107:36:10
VLA_E40 34:02:59 107:32:55
VLA_E56 34:01:36 107:29:04
VLA_E72 33:59:59 107:24:42
NMA_DUST 33:40:57 107:36:26
NMA_OLDH 33:55:30 108:17:00
NMA_SPUR 33:29:38 108:55:53
NMA_REDH 34:15:50 108:47:00
NMA_MAMG 32:43:40 108:26:20
NMA_CUCH 33:14:00 107:23:00
NMA_ELK 32:53:35 105:09:22
NMA_VAJC 34:36:00 105:13:00
MILAGRO 35:57:00 106:43:00
UV Coverage for DEC44 in EVLA_fav
V (km)
U (km)
12.0 hours, 15. deg min elevation.
UV Coverage for DEC18 in EVLA_fav
UV Coverage for DEC-06 in EVLA_fav
UV Coverage for DEC-30 in EVLA_fav

NMA - Separ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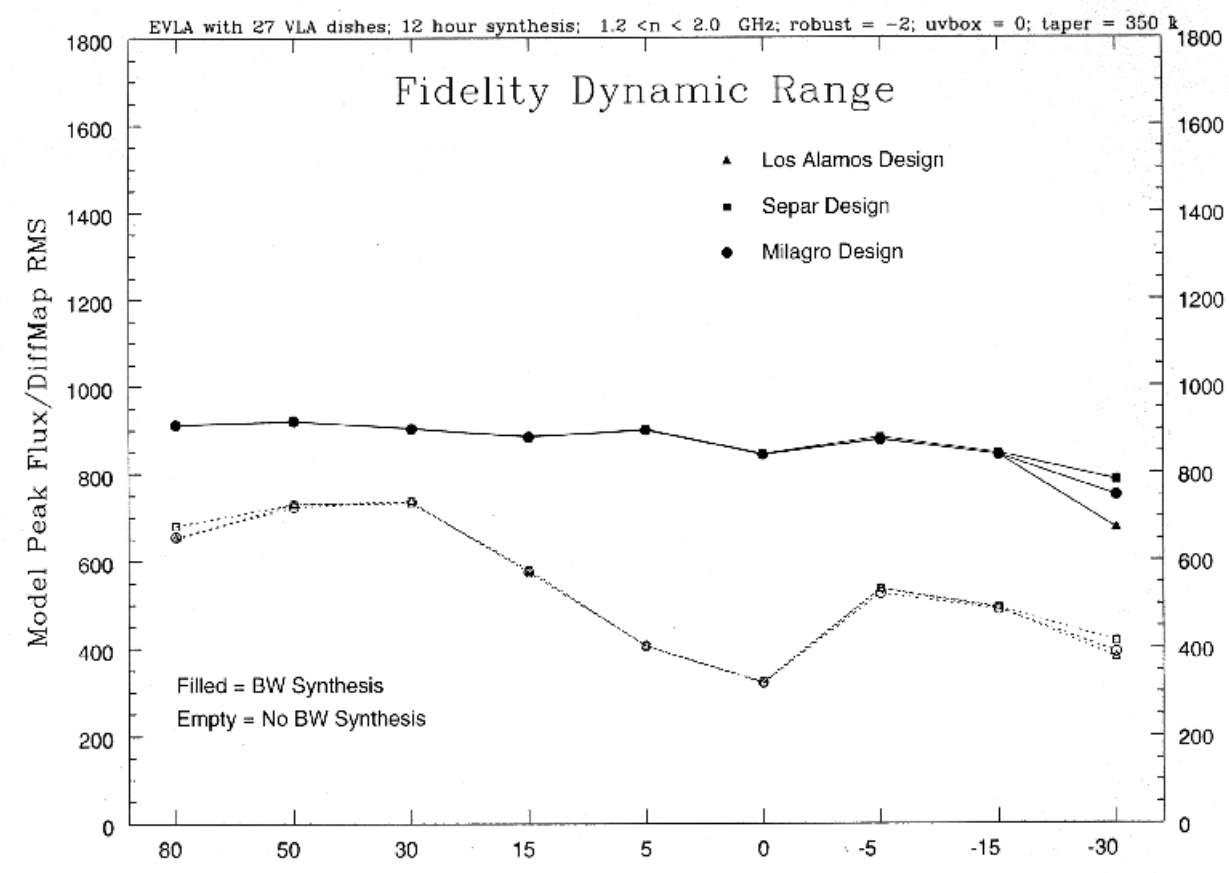
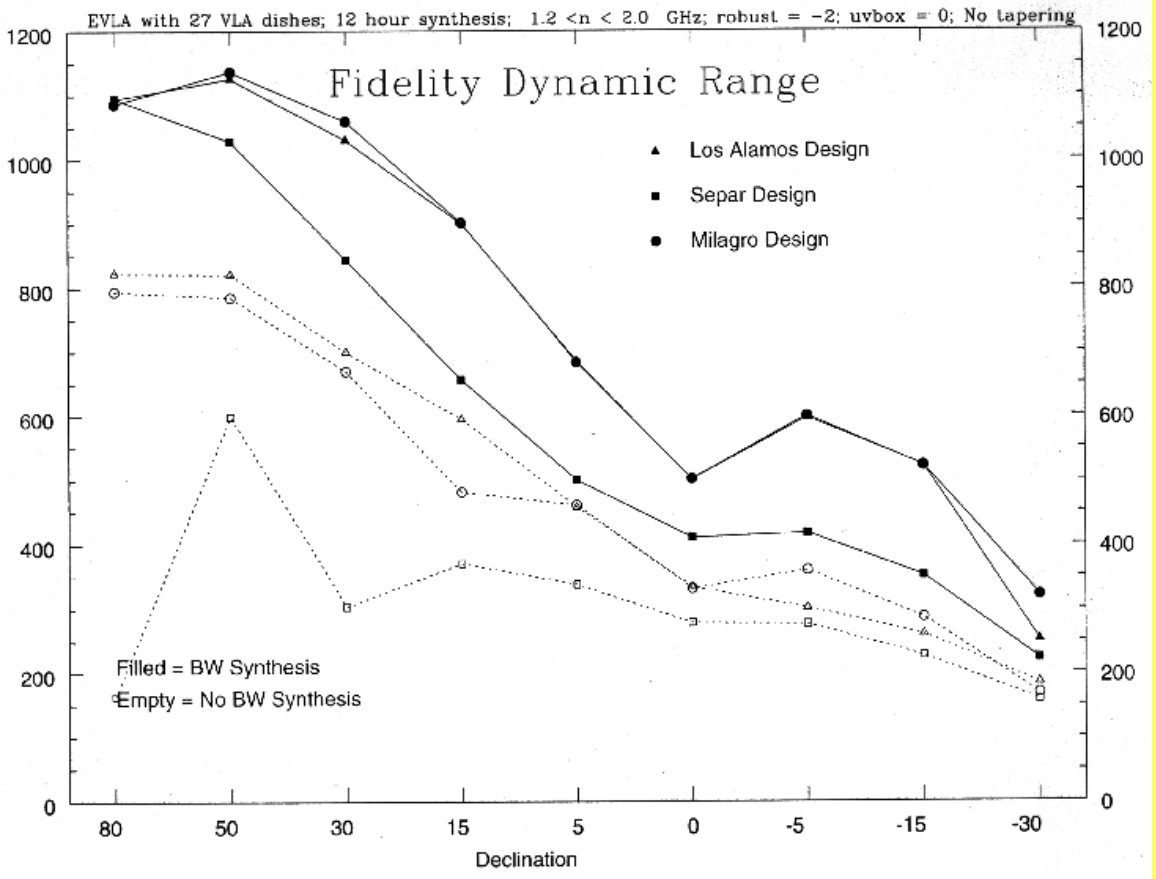
NMA_CUCH 33:14:00 107:53:00
NMA_ELK 32:53:35 105:09:22
NMA_VAUC 34:36:00 105:13:00
SEPAR 32:12:00 108:25:00
UV Coverage for DEC44 in EVLA_fav
V (km)
U (km)
12.0 hours, 15. deg min elevation.
UV Coverage for DEC18 in EVLA_fav
UV Coverage for DEC-06 in EVLA_fav
UV Coverage for DEC-30 in EVLA_fav

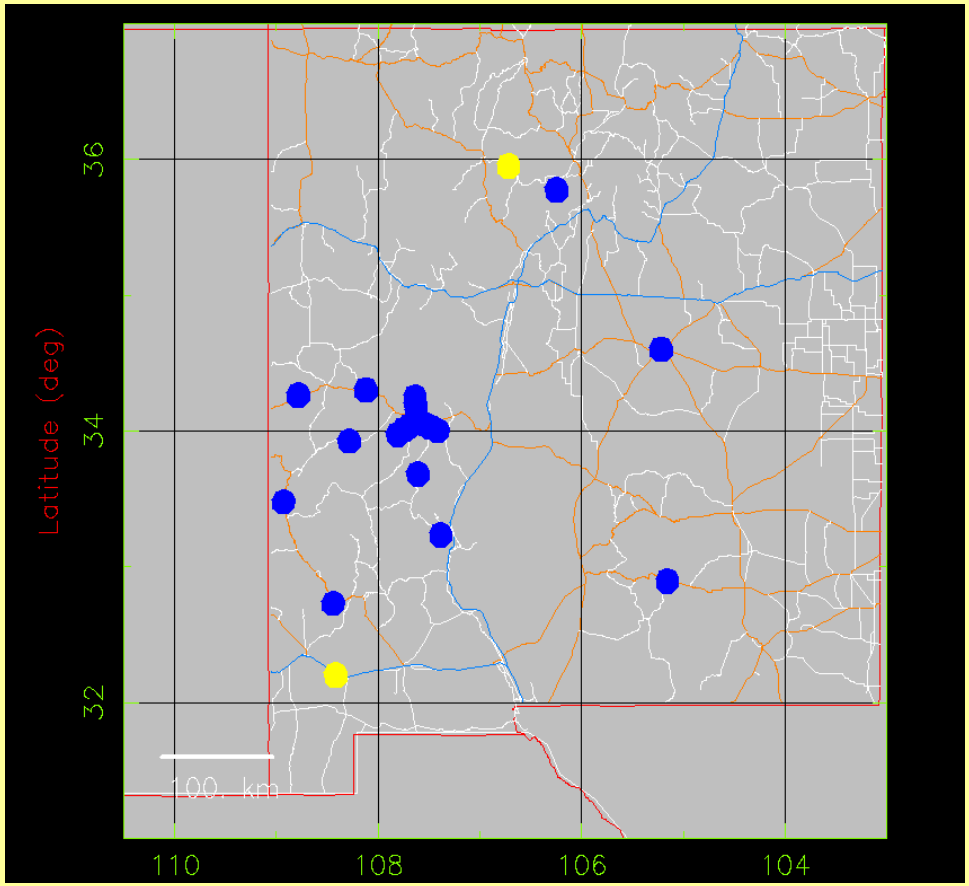
Fidelity "100km"



Fidelity
Full Resolution



NMA Sites



NMA Issues

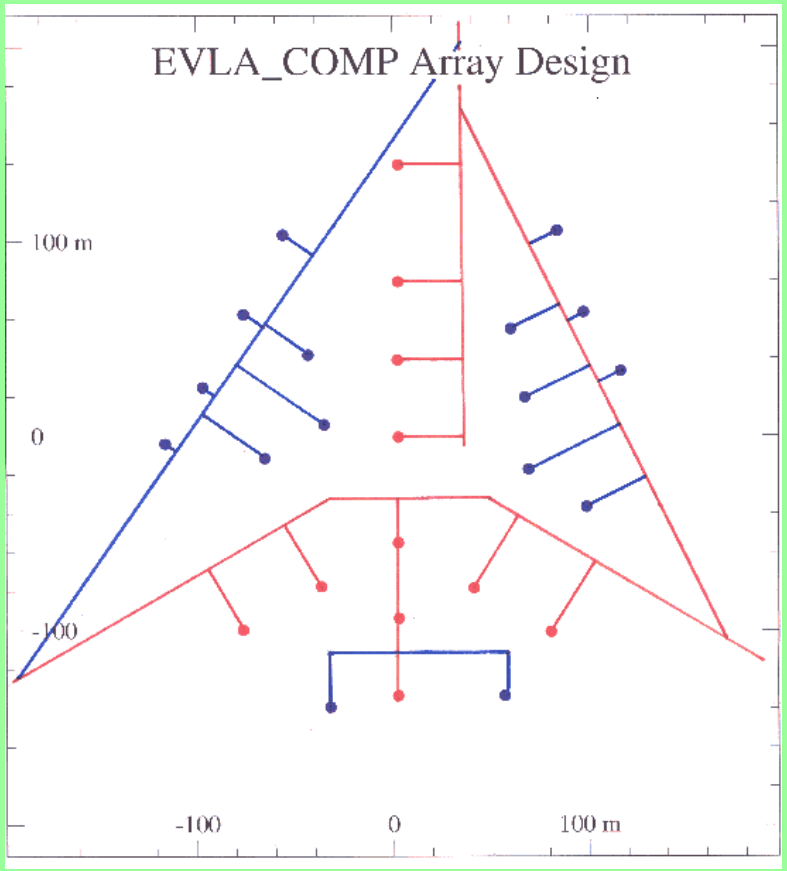
- What is An Acceptable Configuration ?

- What should happen in 2003 ?
  Should we continue full speed ahead
  (at some expense to phase I)
  or should we "mothball" NMA until
  we get real funding ?

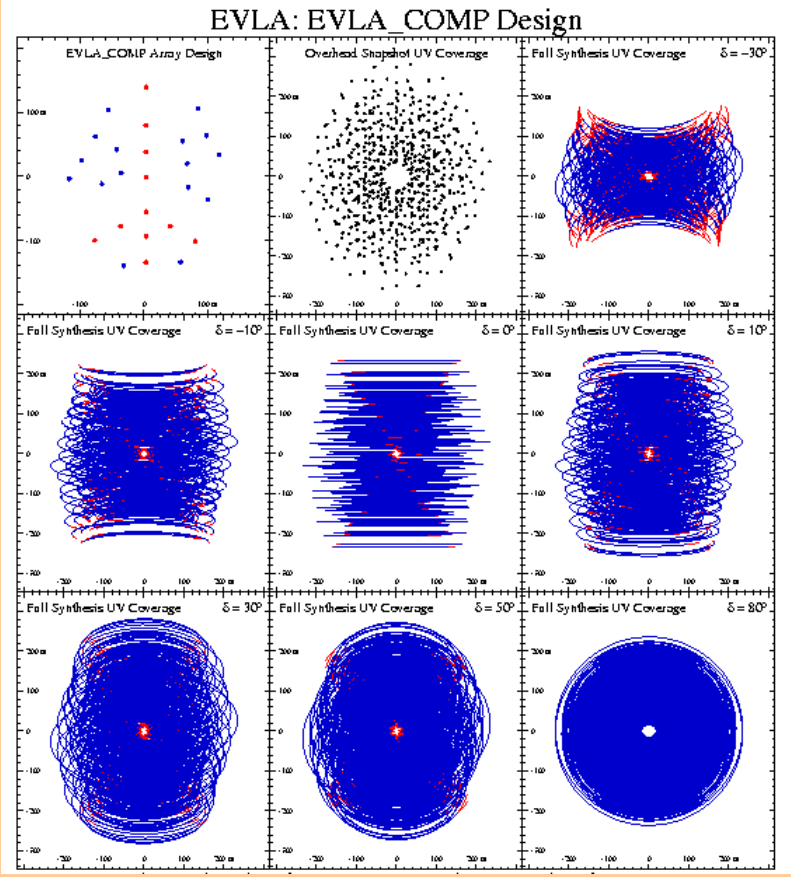
E-array

Goal:

Better Fidelity and
Surface Brightness
Sensitivity at minimum
Cost.



E UV-coverage

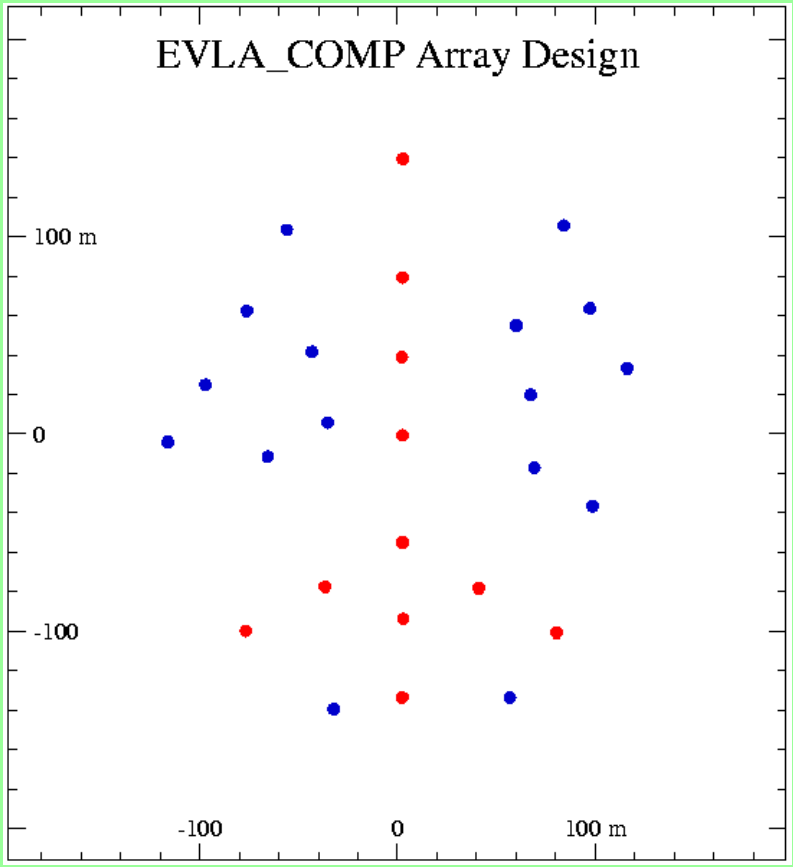


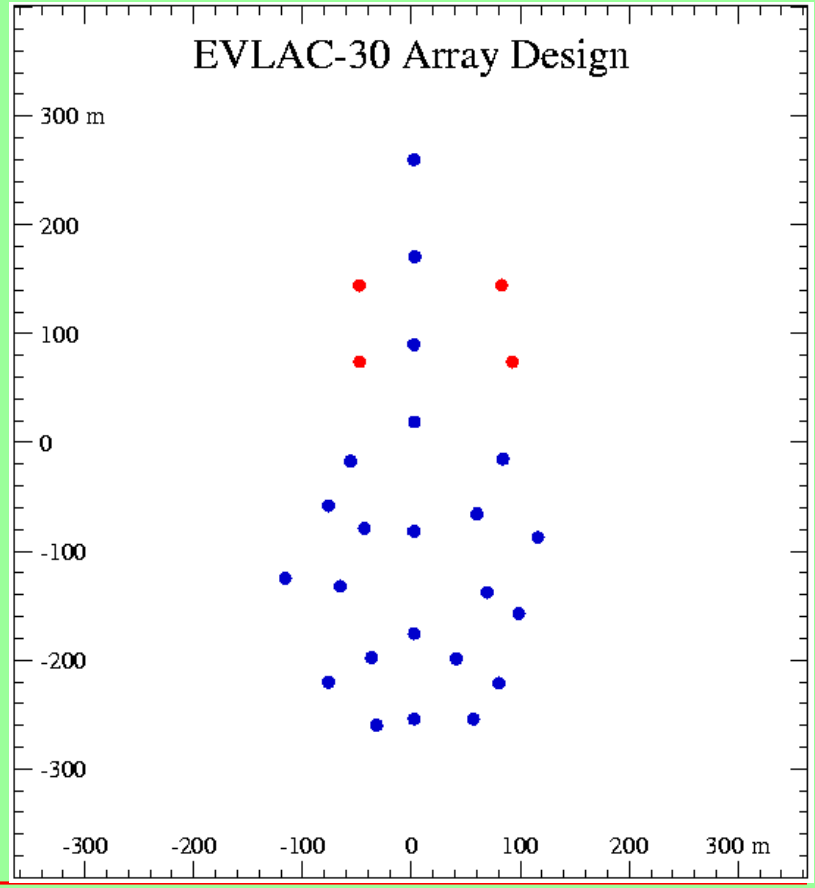
E-array

- However, E array beam-shape, shadowing become a problem in the south (e.g. –30d)

- To image well in the south we need a stretched E-array.

E + E-30


EVLA_COMP Array Design
100 m
0
-100
-100
0
100 m


EVLAC-30 Array Design
300 m
200
100
0
-100
-200
-300
-300
-200
-100
0
100
200
300 m

Shadowing

Regular E Array

Table 1: Sensitivity considering shadowing. The compact configuration optimised taking into account the primary beam

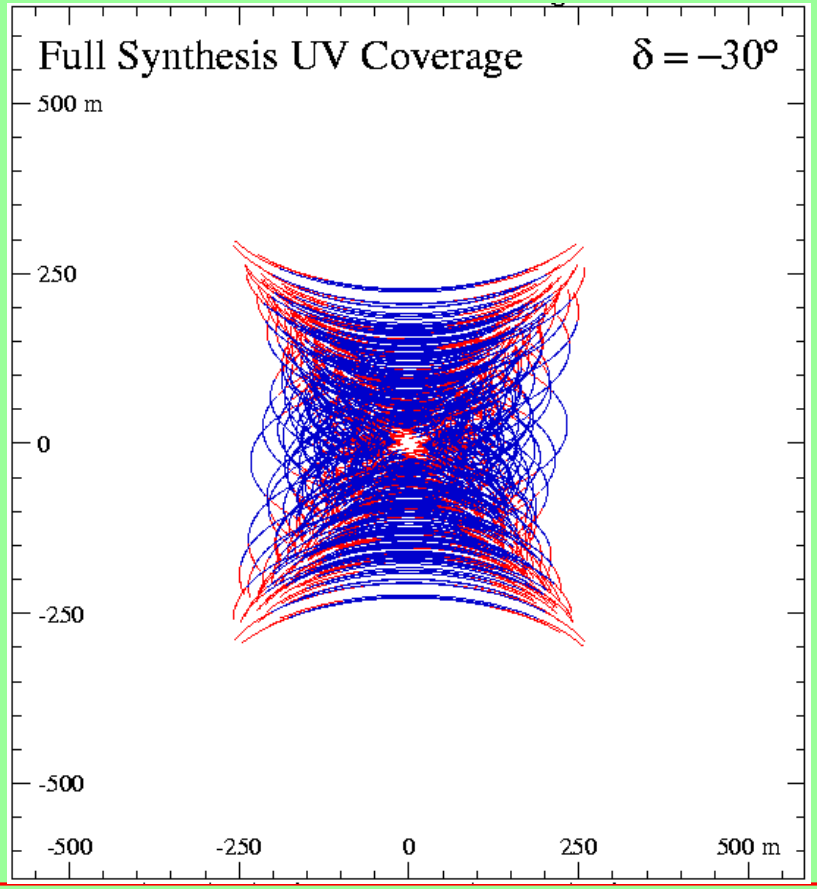
Decl., deg	Hour Angle, hours								
	-4.	-3.	-2.	-1.	0.	1.	2.	3.	4.
60.	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
50.	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40.	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
30.	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92
20.	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89
10.	0.71	0.96	1.00	1.00	1.00	1.00	1.00	0.92	0.77
0.	0.62	0.92	1.00	1.00	1.00	1.00	1.00	0.85	0.62
-10.	0.36	0.70	0.92	0.96	1.00	1.00	0.92	0.66	0.36
-20.	0.32	0.55	0.70	0.70	0.71	0.71	0.81	0.47	0.21
-30.	0.21	0.32	0.51	0.62	0.58	0.55	0.40	0.24	0.17

E-30 Array

Table 1: Sensitivity Considering Shadowing. The Configuration for Declination -30

Decl., deg	Hour Angle, hours								
	-4.	-3.	-2.	-1.	0.	1.	2.	3.	4.
70.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
40.	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
30.	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
20.	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
10.	0.85	0.96	1.00	1.00	1.00	1.00	1.00	0.96	0.93
0.	0.70	0.93	1.00	1.00	1.00	1.00	1.00	0.96	0.81
-10.	0.67	0.85	0.96	1.00	1.00	1.00	0.96	0.85	0.63
-20.	0.48	0.81	0.93	1.00	1.00	1.00	0.93	0.78	0.33
-30.	******	0.59	0.85	0.96	1.00	0.89	0.78	0.56	******
-40.	******	******	0.59	0.63	0.59	0.56	0.52	******	******

E-30 UV-coverage



Simulations

Plan for the phase II completion document is for full mosaic simulations (including GBT) to test E and E-30 performance using AIPS++.

E-array Issues

- How much simulation for E should we do ?
- Do we want E-30 ?