Where Do We Put the ACA?

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October 25, 2005

Abstract

We provide several possible locations for the ACA. One of them, W1, is significantly flatter than the other locations.

Where should we put the ACA? There are several design criteria:

- We would like it to be very close to the ALMA compact configuration so that we can have common weather conditions during some mosaicing observations, and also so we might cross-correlate the ACA antennas with the ALMA antennas.

- Its got to fit between the ALMA 12m antennas. This is a bit of an unknown. We have a good design for the ACA 12 x 7m configuration, but the location of the 4 x 12m total power antennas has not been defined. Presumably, the location of the 4 x 12m total power antennas is set by a) the desire to use these antennas' WVR systems to fit a phase plane over the ACA, and b) the need to form good correlations between the 4 x 12m dishes and the 12 x 7m dishes for calibration purposes. The footprint of the 12 x 7 m array alone, in the N-S elongated configuration, fits within a rectangle of 52m N-S and 36m E-W. As the winds aloft are generally from W to E, it makes sense to position the 12m antennas on the W and E sides of the ACA, so the 52m N-S extent is not stretched. In that case, the footprint may very well fit within a rectangle of about 52m N-S and 60m E-W. On our graph, we show the center locations of the ALMA pads, so we really need to add another $\simeq$10m on all sides of the ACA footprint to include the non-point-like nature of the ALMA antennas, so we are looking at something like 80m x 80m for the ACA. One more bit of information which I do not have, but which must be considered, is the shadowing of the ACA antennas by the ALMA antennas; if the ALMA antennas are taller than the ACA antennas, we should provide extra room, especially in the N-S direction, to accommodate low elevation (extreme declination) observations.

- We would like to remove a minimal amount of earth when flattening the ground for the ACA.

In Figure 1, we show the inner part of the mask image produced by John Conway in the spring of 2005. Plotted as red points are the centers of antenna pad positions. Plotted as green

Name	UTM-X	UTM-Y	Elevation	Earth Moved
	- 600000	-7400000		
	[m]	[m]	[m]	m^3
Mstr0	27829	53791		
AOS	27800	53710		
W1	27669	53072	5033.8	932.8
W2	27632	53121	5034.7	2311.0
W3	27529	53117	5035.5	3457.1
N1	27774	53223	5030.7	1258.7
N2	27932	53406	5029.7	1673.4
S1	27830	52860	5037.7	1987.3
S2	27873	52725	5036.0	1720.8

Table 1: Specific location coordinates, mean elevation, and the total earth that needs to be moved to make a flat region 60m x 60m

squares are positions which might support the ACA. They have enough space between red dots to accommodate the 80m x 80m footprint of the ACA including the four total power antennas. AIPS++ wouldn't help me with writing the actual labels, but the seven green dots closest to the central ALMA array are named N1, N2 (to the north; N1 is closer to the array center); S1, S2 to the south, and W1, W2, and W3 to the west. Note that the most significant digits in the coordinates have been removed to provide for more accuracy, so the UTM coordinates are actually UTMX - 600000 and UTMY - 7400000.

Also included are the estimated central point of the AOS's circular mask, and just to the NE of that is the point Master0. These are included because they do not agree with the document "Proposed AOS Technical Building Location", the map, or the numbers in that document. It is unclear where the error(s) lie, but it is clear that the numbers and the map in the "Proposed AOS Technical Building Location" are not consistent with each other. Clarifying this issue is very important.

We have calculated the amount of earth that needs to be moved from each of the ACA sites, and these are listed in Table 1. Note that W1 has the least amount of earth that needs to be moved. However, it is also the tightest fit for the ACA. However, W1 has more room N-S than E-W, so there is some flexibility.

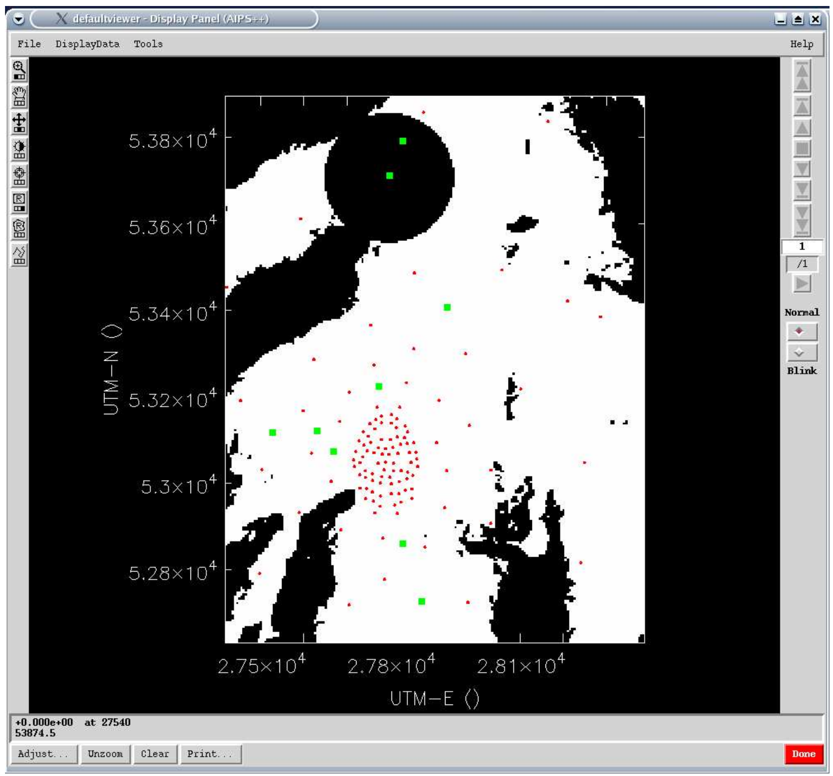

Figure 1: The inner portion of John Conway's mask image is shown with John's antenna pad locations in red dots, along with larger green squares indicating the locations of S1, S2 (places we could put the ACA that are south of ALMA's compact configuration), N1, N2 (north of the compact configuration), and W1, W2, and W3 (west of the compact configuration). At the top are two more green squares, one indicating the approximate central position of the AOS's circular footprint on the mask, and the other being the location of Master 0.