

CSIRO - DIVISION OF RADIOPHYSICSAST ASTRONOMICAL PROGRAMSFIELD SIZE DISTRIBUTION

Decisions regarding antenna diameters and array configurations require as basic input an estimate of the distribution of sizes and objects to be mapped (fully or partially). This report presents such an estimate based on the "Summary of Possible AST Programs" given in ASTDOC19.

The distribution of number of days of observation versus object diameter is given in Table 1 and Figure 1. For each class of object the total observation time in days from Table 1 of ASTDOC19 was distributed in proportion to the distribution of object size obtained from a representative survey of that class of object. Surveys used were as follows:

HII Regions - Goss & Shaver (1970), $\delta < -20^\circ$.

SNR - Milne (1978), $\delta < -20^\circ$.

Magellanic Clouds - McGee et al (1972).

Nearby Galaxies - Sersic (1968).

Radio Galaxies - Cameron (1971), Christiansen et al (1977),
 $\delta < -20^\circ$.

For the Magellanic Clouds the survey used (McGee et al 1972) is of 5 GHz continuum radiation and hence the distribution is that of continuum sources. It is likely that an HI survey would include a higher proportion of wider fields. The atlas of nearby galaxies includes objects brighter than 11th magnitude and south of $\delta = -25^\circ$. For continuum observations the apparent size of the optical object was taken, whereas for HI observations, twice this size was assumed. Most other classes of object are less than 10' across, the main exception being survey fields which are of course unlimited in size.

The principal objects for which the beam of a 25-m antenna is small, i.e. HI objects whose size is greater than 36' and continuum objects whose size is greater than 10', are as follows:

Sun

HII regions - RCW38, Carina Nels., MSH11-61, RCW57, 74, 95, 107 and 108, NGC6334, W22 and W29.

SNR - Puppis A, PKS 0902-38, Vela SNR, MSH11-61A, RCW86, 9326.3 - 1.8, SN1006 and others.

Magellanic Clouds - 30 Doradus, HI fields.

Nearby Galaxies (HI) - NGC55, 253, 300, 5128, 5236, 6744.

Radio Galaxies - Cen A (inner lobes), Fornax A, NCC1399, 1343 - 60.2, 1602 - 63, 1610 - 60.8.

Survey fields.

The main conclusions are as follows:

- (a) More than half of the observing time of the AST would be spent on objects where the region of interest was $\leq 10'$.
- (b) A number of important objects are larger than the field of a 25m. antenna. However, many of these are much larger (some unlimited) and hence could not be covered by any antenna of reasonable size. Also, it is in principle possible to cover large objects with series of overlapped observations.
- (c) These results suggest that sensitivity is more important than field size and that the antennas should be as large as possible compatible with a reasonable mapping speed for the array.

References

- Cameron (1971), MNRAS, 152, 439.
 Christiansen et al. (1977), MNRAS, 181, 183.
 Goss and Shaver (1970), Aust.J.Phys.Suppl. 14, 1.
 McGee et al. (1972), Aust.J.Phys., 25, 581.
 Milne (1978), Aust.J.Phys. 32, 83.
 Sersic (1968), Atlas de Galaxias Australes.

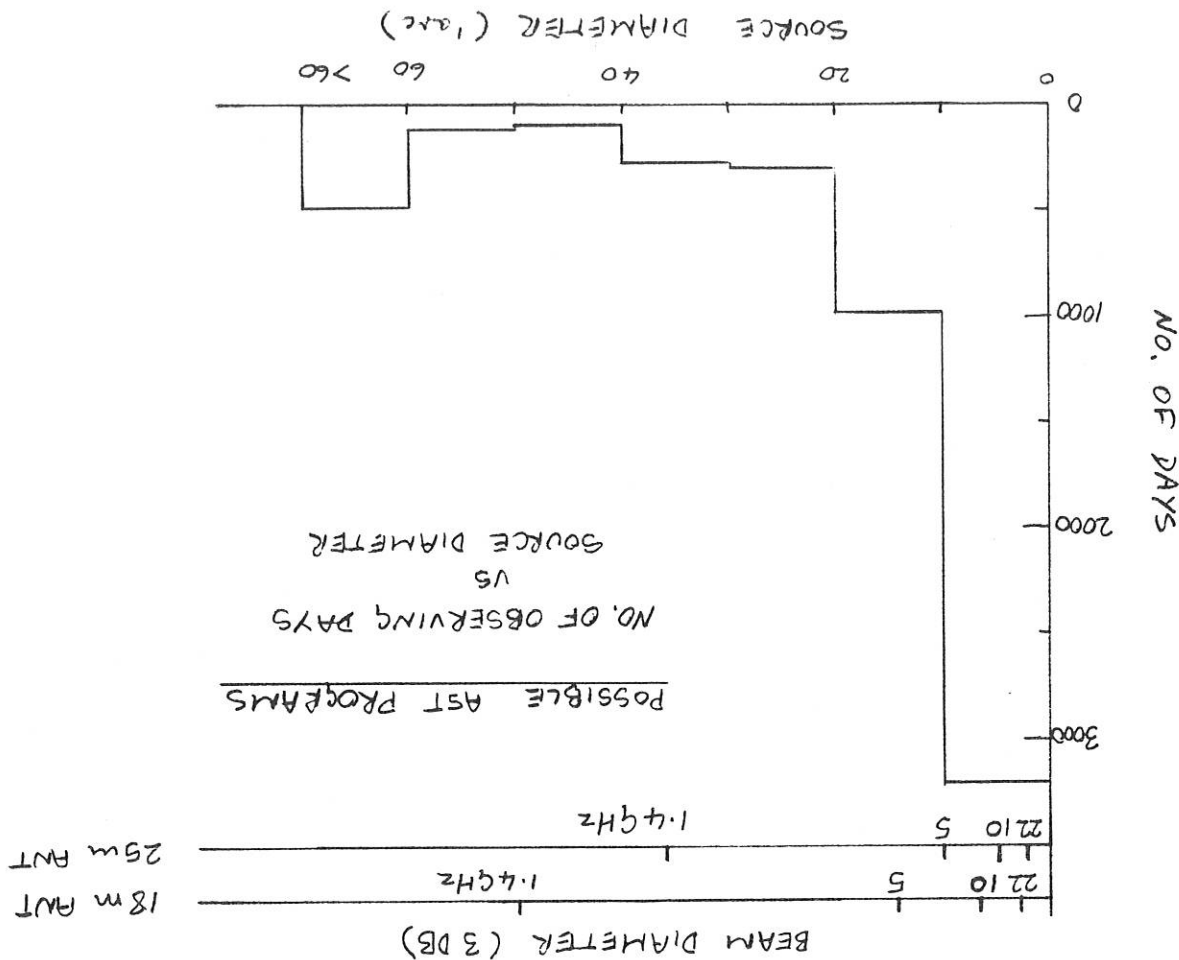


TABLE 1 : AST DAYS OF OBSERVATION VERSUS FIELD SIZE

OBJECT	0-10'	10'-20'	20'-30'	30'-40'	40'-50'	50'-60'	>60'
1. Planets	120						
2. Sun				100			
3. Stellar radio sources	100						
4. X-ray, γ -ray sources	200						
5. Pulsars	50						
6. HII Regions	200	250	150	120	50	90	70
7. Planetary Nels.	150						
8. SNR	150	100	20	15	15	0	15
9. Gal. HI	25						40
10. IS Mols.	120	165	35				
11. Mag. Clouds	1500	70	50	40			
12. Nearby Gal.	375	110	45	15	5	5	5
13. Nucleii Gal.	65						
14. Radio Gal.	150	200					50
15. QSO's	40						
16. Ex. Gal.	85						
17. Surveys							300
18. Astrometry	50						
Total	3380	995	300	290	70	95	480