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STUDIES AT HIGH FREQUENCIES OF THE 30 DORADUS AND RCW57 REGIONS

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RESUMEN. Se presentan mapas de la región 30 DOR en 22 GHz y de la región RCW57 en 43 GHz. Los datos se comparan con mapas a menor frecuencia y de resoluciones similares. En la región 30 DOR se detectaron tres remanentes de supernova de tipo pleriónico: N1578, MC78 y MC89.

ABSTRACT. We present maps of the 30 DOR region at 22 GHz and of the RCW57 region at 43 GHz. The data is compared with maps at lower frequencies and similar resolutions. In the 30 DOR region 3 supernova remnants of plerionic type were detected: N1578, MC78 and MC89.

Key words: RADIO SOURCES-GENERAL

I. INTRODUCTION

The purpose of this work is to study the 30 Dor region, in the large Magellanic Cloud, and the galactic source RCW57, in the direction of the Carina arm, at high frequencies. We are presenting preliminary data and some results obtained from maps at 22 and 43 GHz with 4'.6 and 2'.2 angular resolution, respectively.

II. OBSERVATIONS

The observations were made at the Itapetinga Radio Observatory, in Atibaia, SP, Brazil. The 13.7 m radiotelescope is enclosed in a radome with a transmission coefficient of 0.77 in 22 GHz and 0.66 in 43 GHz. The receiver was a K-band mixer with 1 GHz d.s.b. at both frequencies, and with system temperatures of about 650 K and 1000 K at 22 and 43 GHz respectively. It was operated in the total power mode.

The maps were obtained from scans in right ascention, separated by 2' in declination at 22 GHz and 1' at 43 GHz. The duration of each scan was 20 sec. The final maps were the result of an average of at least 12 ten-minute observations for each declination.

The relation between flux density and antenna temperature for a point source was obtained from observations of Virgo A, which has a flux density of 21.3 Jy at 22 GHz and 11.5 Jy at 43 GHz (Janssen et al. 1974). This source was also used to measure the antenna beam and for pointing.

III. RESULTS

The names of the sources detected in the maps (Figs.1 and 2) and their physical parameters are listed in Table 1 for the 30 Dor region and in Table 2 for RCW57.

Column 1 gives the name of the sources. The nomenclature used for 30 Dor was given by Mc Gee et al. (1972) and Milne et al. (1980). Columns 2 and 3 give right ascention and declination, respectively, for 1950.0. The peak temperature is given in column 4 and the peak flux density in column 5. The observed size of the sources, calculated from a gaussian model, and the integrated flux density are given in columns 6 and 7, respectively. In column 8 is presented the emission mechanism: thermal (T) or non-thermal (NT). In column 9 is given the name in ohter catalogues.

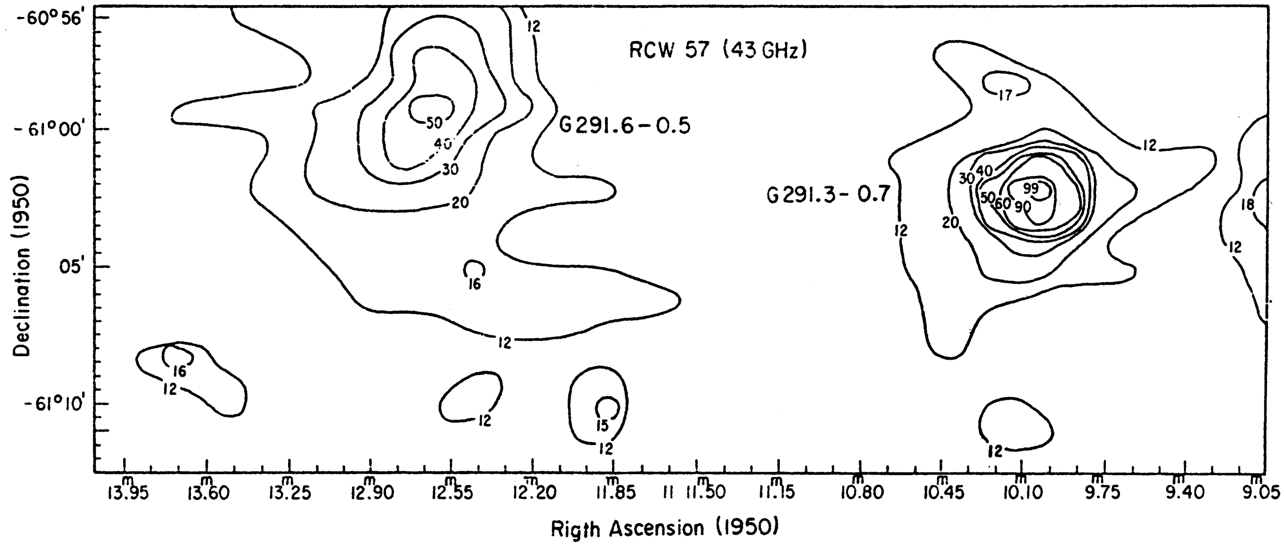

Fig. 1: Radio continuum map at 22 GHz of the 30 Dor Region. The resolution is 4'.6. The numbers associated with contours are related to temperature and flux density by the relations: T = ((2.2E-03)Nº - 0.035) K, S = (62.65T) Jy

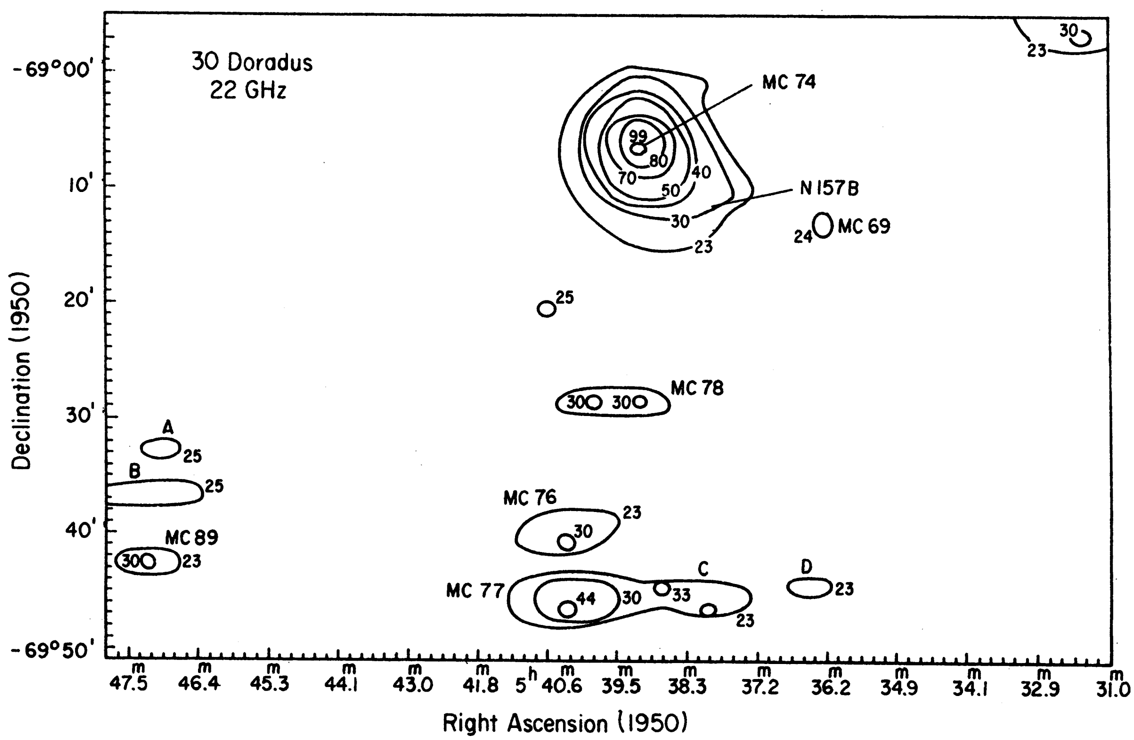

Fig. 2: Radio continuum map of RCW57 at 43 GHz. The resolution is 2'.2. The numbers associated with contours are related to temperature and flux density by the relations: T = ((6.08E-3)Nº - 0.06) K, S = (115T) Jy

TABLE 1 30 DOR REGION (22 GHz)

NAME	AR h m s	DEC ° ' "	PEAK TEMP K	PEAK FLUX Jy	OBS.SIZE '	IN FLUX Jy	E MEC.	CATALOG
MC69	5 36 13.7	-69 13 30	0.019	1.19	PTO	1.2	T	30 DOR CB
N157B	5 38 07	-69 11 20*	0.035	2.19	---	---	NT	30 DOR B
MC74	5 39 06.7	-69 06 30	0.187	11.71	5.2	27.2	T	30 DOR A N 157 A
MC75	5 40 0.67	-69 29 00	0.030	1.88	4.8	4.0	T	N 158 C
MC78	5 40 39.4	-69 21 00	0.017	1.06	PTO	1.1	NT	A 19 N 158 A
MC76	5 40 15.6	-69 41 00	0.029	1.81	4.4	3.7	T	N 160 AD
MC77	5 40 20.8	-69 41 00	0.064	4.01	---	---	T	N 159
MC89	5 47 27.9	-69 43 00	0.029	1.82	2.8	0.7**	NT	

* This position is given by Mc Gee et al. 1972.
** The spectral index calculated between 0.408 MHz and 22 GHz is -0.23, characteristic of plerionic SNR.

TABLE 2 RCW57 REGION (43 GHz)

NAME	AR h m s	DEC ° ' "	PEAK TEMP	PEAK FLUX	OBS.SIZE	IN FLUX	E MEC.	CATALOG
RCW57 I	11 10 01	-61 02 30	0.542	62.3	3.2	133.9	T	G291.3-0.7
RCW57 II	11 12 9.6	-61 00 30	0.247	28.4	---	---	T	G291.6-0.5

IV. CONCLUSIONS

In the 30 Dor region, the non-thermal sources 30 Dor B, MC78, and MC89, reported as plerionic supernova remnants (SNR), were detected at 22 GHz. The thermal component of N158C (MC75) is resolved at this frequency. This source was reported by Mills and Turtle at 0.843 MHz (1984), but it was not resolved at 0.408 GHz and 5.00 GHz (Mc Gee et al. 1972).

The flux density of G291.3-0.7 at 43 GHz is higher than the value expected from the 5 GHz (Goss and Shaver 1970) and 22 GHz (Sabalisck 1988) data, assuming an optically thin thermal source. A carefull analysis of the atmospheric attenuation and radome absorption at this frequency should be made to check the validity of this result.

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