THE DUST CAVITY AROUND THE EXCITING STAR OF SMALL H II REGIONS

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1. INTRODUCTION

In a series of observations (Mizuno *et al.* 1981; Mizuno 1982; Nakano *et al.* 1983), we have carried out the surface photometry of small H II regions which were selected from Sharpless catalogue (1959) by the following properties: (1) small angular size ($\leqq$ 10 arcmin), (2) round and simple appearance, and (3) a single B0 V star as the exciting star. Properties (1) and (2) are for the convenience of image processing, and property (3) is to avoid the contamination of [O III] emission in the *V*-band so as to get pure continuum intensity.

In this paper we present the surface brightness distribution of eight small H II regions, in which four are the reanalysis of our previous observations (Nakano *et al.* (1983) and four (S152, S153, S292, and S297) are based on new observations.

The model calculations by Nakano *et al.* (1983) for the subtraction of the background intensity of scattered light outside the H II regions are revised.

2. OBSERVATION AND REDUCTION

We have made the photographic observations with the 105/150/330cm Schmidt telescope at the Kiso Observatory of the Tokyo Astronomical Observatory. The plate-filter combinations are: hypersensitized 103a-E and RG645 for the Hα band, and IIaD and GG495 for the *V*-band.

We measured these photographic plates with the Joyce Loebl MDM6 machine at the Kyoto University, and we analyzed them with the image processing system developed by Mizuno (1982). The calibration of the image in the *V*-band is based on the *UBV* photometric data of the open cluster NGC 2323 for S292/S297 and of NGC 7510 for S152/S153 (Hoag *et al.* 1961). We used the calibration method of Ishida and Kawajiri (1968) for the Hα images.

3. RESULTS OF MODEL CALCULATIONS

In deriving the radial distribution of ionized gas and dust we have assumed that the cloud is: spherically symmetric, isothermal (T_e = 8000 K) and optically thin at the Hα-line. Dust grains are assumed to be composed of a graphite core plus an ice mantle (core radius 400 A and mantle radius 1750 A).

Figure 1 illustrates some results of our model calculations. The main results indicate that there are: (1) centrally enhanced distributions of the ionized gas, and (2) centrally depleted dust cavities around the exciting stars. These results reconfirm those by Nakano *et*

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al. (1983) but with somewhat different distributions. The gas-to-dust mass ratios in these H II regions are two orders of magnitude or more higher than the usual value of 100.

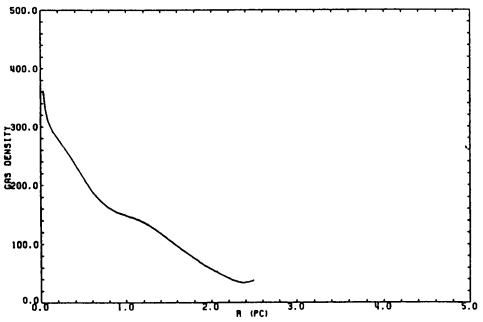

Fig. 1a. The distribution of ionized gas in S237 is plotted as a function of distance from the center. The ordinate values are in cm^{-3}.

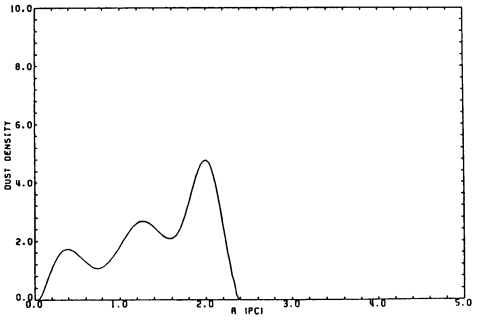

Fig. 1b. Same as Figure 1a, but for the distribution of dust grains. The ordinate values are in $10^{-10} cm^{-3}$.

REFERENCES

Hoag, A.A., Johnson, H.L., Iriarte, B., Mitchell, R.I., Hallam, K.L., Sharpless, S.: 1961, Publ. U.S. Naval Obs. 16.
Ishida, K., Kawajiri, N.: 1968, Publ. Astron. Soc. Japan 20, 95.
Mizuno, S.: 1982, Astrophys. Sp. Sci. 87, 121.
Mizuno, S., Sakka, K., Sasaki, T., Kogure, T.: 1981, Astrophys. Sp. Sci. 78, 235.
Nakano, M., Kogure, T., Mizuno, S., Sakka, K., Sasaki, T., Wiramihardja, S.D: 1983, Astrophys. Sp. Sci. 89, 407.
Sharpless, S.: 1959, Astrophys. J. Suppl. 39, 157.

A STUDY OF CONTINUUM EMISSION AT 3.5 mm FROM SELECTED H II REGIONS

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As the first part of a program to investigate the thermal emission of dust at millimeter wavelengths, we present maps of the continuum emission from radio-bright H II regions. These maps have been made with

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