CO (J=2-1) OBSERVATIONS OF THE CARINA NEBULA AND G 333.6-0.2 AND A SEARCH FOR CO IN LMC AND SMC

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We used the ESO 3.6 m telescope at La Silla (Chile) in conjunction with the Estec heterodyne receiver to observe CO (J=2-1) emission from southern sources. The telescope HPBW was 2.2 arcmin, the beam efficiency 43 per cent. The receiver used backward-wave oscillators and Schottky barrier diode mixers. It had a single-sideband noise temperature of 4000 K at 230 GHz. The backend was a 256 channel filterbank of 1 MHz (1.3 km s^{-1}) bandwidth per channel. Calibration was done in the usual way.

We mapped the central region of the Carina nebula, and a chain of sources around longitude 333°, and searched for emission from the Magellanic Clouds. The CO map of the Carina nebula (Fig. 1) shows two distinct sources. The northern source consists of a compact component, not related to any other feature, and an extended, ridgelike component that follows the ionization front in the optical nebula Car I. The southern source consists of two components in a common envelope. It coincides with the dark bay southeast of Car II.

From a comparison with OH observations (Dickel and Wall, 1974), radio continuum observations (Huchtmeier, 1975) and far-IR observations (Harvey et al., 1979) we deduce that the optical nebulae Car I and Car II are enveloped by a molecular cloud. The southern CO source is located in front of the nebula, the southwestern part of the northern source is situated to the side of Car I, and the remaining part of the northern source is behind Car I. The far-IR source in Car II is an isolated object, but the far-IR source in Car I is situated just at the interface of the ionized region and the molecular cloud.

Around longitude 333° three CO clouds were found to be associated with seven HII regions (Fig. 2). The appearance of the CO clouds is that

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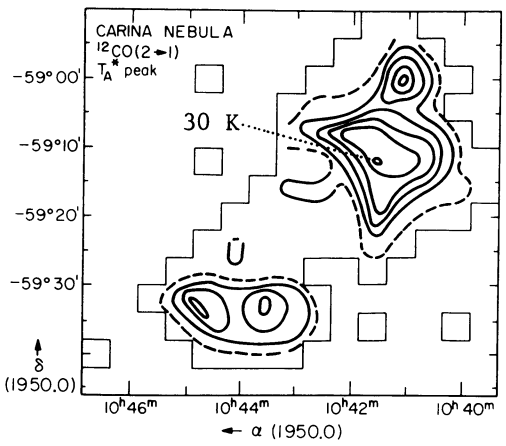

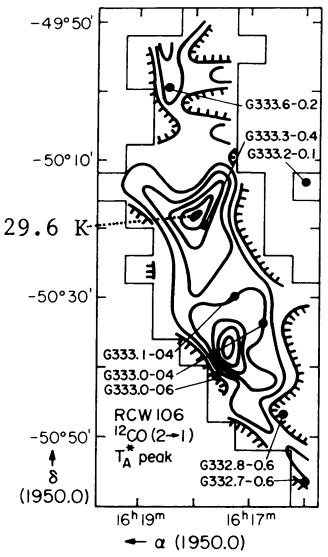

Contour intervals are 2.3 K

Figure 1. CO map of Carina Nebula

Figure 2. CO map of Southern Milky Way around $\ell = 333°$

of a chain of CO maxima in a large, very elongated cloud complex. In this respect, the G 333 CO complex resembles CO cloud complexes observed from the northern hemisphere, such as Orion and M17.

We observed five positions in the Small Magellanic Cloud and seven in the Large Magellanic Cloud, but failed to detect a signal stronger than $T_A^* = 6$ K (three times r.m.s. noise). However, a weak signal may be present at the positions of N90 (SMC), 30 Dor (LMC) and N159 (LMC).

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