ISO Spectroscopic Observations of the Carina Region

T. Onaka[1], M. Mizutani[1], and H. Shibai[2]

[1] Department of Astronomy, University of Tokyo, Bunkyo-ku, Tokyo 113, Japan
[2] Department of Physics, Nagoya University, Chikusa-ku, Nagoya 464-01, Japan

Abstract

The Carina region ($l \sim 287°$ and $b \sim -0.6°$) on the Galactic Plane of about $20' \times 40'$ has been observed with LWS01, SWS02, and PHT-S with an interval of $3'$. Several emission lines, such as [OI]63, 146μm, [OIII]52 and 88 μm, [NIII]57μm, [NII]122μm, and [CII]158 μm have been detected in the LWS spectra of most positions observed, while the PHT-S observations have shown the unidentified emission bands (UEBs; 6.2, 7.7, 8.6, and 11.2 μm) as well as ionic lines, such as [ArIII]8.99μm and [SIV]10.5μm. The SWS observations detected [SiII]35μm at most positions and H_2 of 9.66μm (J=5-3) at several positions.

The emission lines from the ionized gas are peaked in the east part of the Carina region, but they also show an extended spatial distribution over the entire observed area. The observed ratio of the [OIII]52μm to 88μm is relatively low (in the range of 0.5 -1.0) and fairly uniform. The ratio of [NIII]57μm to [OIII]52μm also stays in a narrow range (0.3-0.5). These results indicate the presence of extended ionized gas of low electron density of $200 - 300$ cm^{-3} around the Carina region.

The far infrared continuum in the LWS spectra can be fitted fairly well with blackbodies with constant emissivity. From this fit we have derived the dust optical depth at 100 μm, the dust temperature, and the total far-infrared intensity. The lines of [OI]63μm and [CII]158μm, and the UEBs are peaked around the peak of the far-infrared intensity, which coincides with the photodissociation region, the interface between the ionized region (east) and the molecular region (west). In addition to this peak, [CII]158μm and the UEBs show a very extended spatial distribution, indicating that they originate also from various stages of the interstellar medium (Onaka et al. 1996, Shibai et al. 1996).

References

Onaka, T., Yamamura, I., Tanabé, Roellig, T. L., and Yuen, L. 1996, PASJ, 48, L59
Shibai, H., Okuda, H., Nakagawa, T., Makiuti, S., Matsuhara, H., Hiromoto, N., and Okumura, K. 1996, PASJ, 48, L127