

Mapping of CO, $J=5-4$, in Orion using the Odin satellite

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Abstract. Odin is a Swedish-led satellite project whose main purpose is to observe transitions of water and molecular oxygen in frequency ranges heavily attenuated by Earth's atmosphere (Nordh et al. 2003; Frisk et al. 2003; Olberg et al. 2003). The spectral range of the receivers, 486-581 GHz, includes the $J=5-4$ rotational transition of the four CO isotopologues; $^{12}\text{C}^{16}\text{O}$, $^{13}\text{C}^{16}\text{O}$, $^{12}\text{C}^{18}\text{O}$ and $^{12}\text{C}^{17}\text{O}$, not observable from ground. The three spectrometers of Odin have allowed simultaneous mapping of CO and ^{13}CO across a $7' \times 7'$ area around Orion KL while obtaining H_2O pointing maps of the KL outflow.

We present CO and ^{13}CO $J=5-4$ emission maps of the Orion KL region, and high signal-to-noise spectra of all four CO isotopologues at the KL position (Fig. 1). The simultaneously collected maps have been used to estimate the warm CO (and hence H_2) column density distribution across this region. We find CO column densities ranging from $4 \times 10^{17} \text{ cm}^{-2}$ at map edges to $6 \times 10^{18} \text{ cm}^{-2}$ at the molecular ridge. The results will both be used in future analysis of H_2O emission data and provide a reference for the ongoing searches for O_2 (Pagani et al. 2003). Our ultimate goal is to determine the H_2O abundance variations using H_2O , CO and ^{13}CO mapping data deconvolved to $40''$ resolution - the angular resolution of Herschel Space Observatory at these wavelengths.

References

- Frisk, U., et al. 2003, *A&A* 402, L27
Nordh, H. L., et al. 2003, *A&A* 402, L21
Olberg, M., et al. 2003, *A&A* 402, L35
Pagani, L., et al. 2003, *A&A* 402, L77

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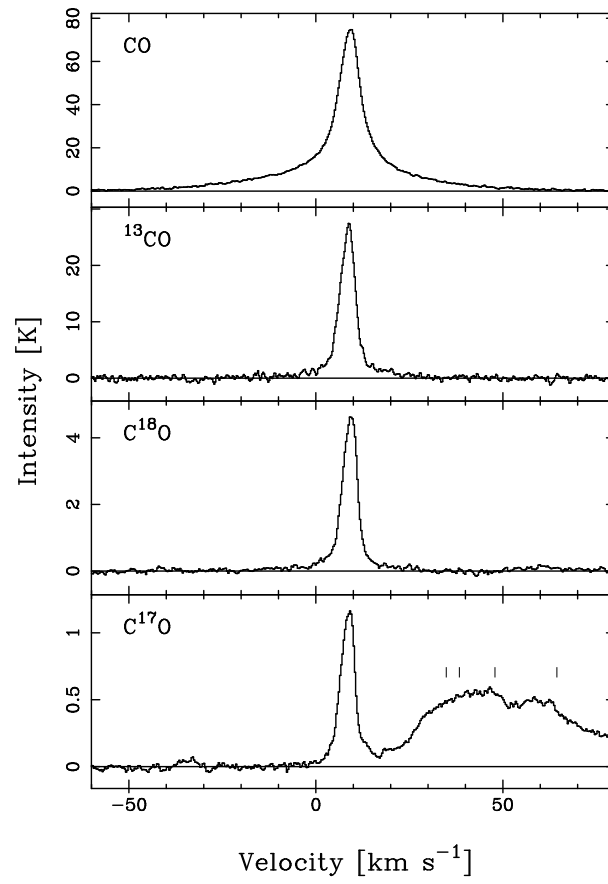


Figure 1. CO, ¹³CO, C¹⁸O and C¹⁷O $J=5-4$ towards Orion KL. Four SO₂ lines, with typical wide outflow line shapes, are marked in the C¹⁷O spectrum. Note the different vertical scales.