P19b OH and H_2O Maser distribution in Orion-KL. II

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Because of its proximity, 480pc, Orion-KL is one of the most studied high-mass star forming regions in the Galaxy. One of the most interesting and important areas of study is the question of the source of its high luminosity ($L > 10^5 L_\odot$). Since astrophysical masers are good probes of the kinematical conditions around star forming regions, we have used the VLA to study the OH and H_2O maser emission towards Orion-KL. In this paper we shall discuss our observations of this region and compare their spatial distribution and velocity structure with that of the SiO masers near the strong infrared source IRc2 and the continuum source "I".

The OH masers has been monitored with multi-epochs since 1980 with the VLA. In spite of its multi-stream structure, OH maser spot tends to be located at the edge of the "hot core" illustrated by ammonia and deuterium line observations. This suggests that OH masers are pumped with shock induced collisions from the outflow. From the observation of both left and right hand polarization, we identified several Zeeman pairs and estimated a strength of several milli-gauss for the magnetic field. On the other hand the low velocity H_2O masers seem to be located, from north-east to south-west, at the peak of the hot core near IRc2. This distribution is roughly perpendicular to the OH maser distribution and to the high velocity molecular outflow. One can argue the possibility that the water vapor is released with deuterium by sublimation of dust as the molecular mantle is heated with strong radiation by the central star. We identified also, near IRc2, an inner clump of maser spots surrounding the SiO maser disc and continuum source "I", which has been suggested to be the true source powering this region.

In addition to the present results, the importance of future VLBI maser polarimetry shall be stressed in order to account for the relation between the slowly expanding rotating disc and the fast outflow. Polarimetry studies of the Orion-KL region is one of the Key Science Programmes for VSOP.