THE POLARIZED WATER MASER IN ORION

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ABSTRACT. We present the results of 12 years of observations of the 8 km s^{-1} water maser in Orion. Four large flares in the flux density were observed, as well as variability in the degree and angle of polarization. The profile of the line is also variable, indicating the superposition of several sources.

OBSERVATIONS AND RESULTS

The observations obtained with the Itapetinga radiotelescope are presented in Fig. 1. The data up to 1987 were already discussed by Abraham et al. 1981, 1983 and by Vilas Boas and Abraham 1988. Since 1987 the intensity remained low but the line continues strongly polarized. Three small outbursts were observed in 1988, 1990 and 1991 as can be seen in Fig. 1. The shape of the line was not very different during the three outbursts, but the variation of the degree of polarization and polarization angle across the line changed drastically at the time of the outbursts. In April 1988 the degree of polarization decreased linearly within the line, from 53% at 7 km s^{-1} to 35% at 7.7 km s^{-1}. The polarization angle also changed linearly between these velocities, from -24^o to +5^o. Similar results were obtained in observations in 1983, 1986 and 1987 (Vilas Boas and Abraham 1988, Matveenko et al. 1988, Garay et al. 1989). In July 1990, when the second outburst occured, the degree of polarization was 65% at the center of the line and 55% at the half power width, the polarization angle remained constant across the line, at -5^o. In April 1991, at the time of the third outburst, the degree of polarization decreased across the line between 60% at 7.2 km s^{-1} and 38% at 8 km s^{-1}. The polarization angle remained constant at -3^o.

Several interpretations for the behaviour of the source were presented as new measurements became available (Abraham et al. 1986, Matveenko et al. 1988). Our results show that there is no correlation between the velocity of the components and the polarization angle, as claimed by Matveenko et al. (1986), since this relation changes at each outburst.

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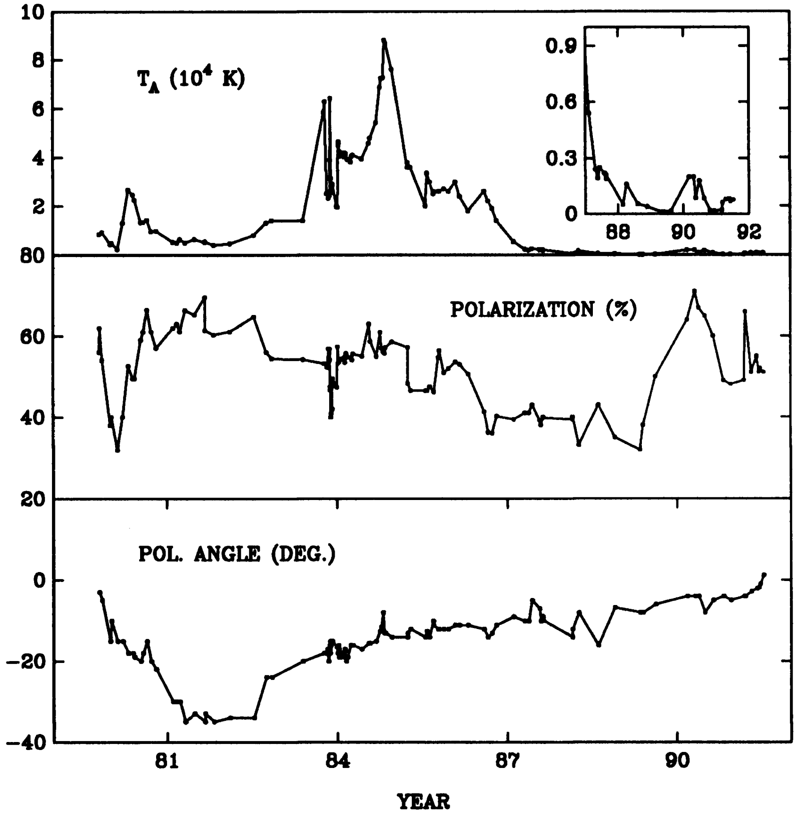

Figure 1. Antenna temperature, degree of polarization and polarization angle as a function of time for the 8 km/s water maser feature in Orion.

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