TIME VARIABILITY OF THE ORION A, R LEO AND o CETI SiO (v=1, J=2-1) MASERS

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We here report on observations of 86 GHz SiO (v=1, J=2-1) maser emission from the Mira variables R Leo and o Ceti and from Orion A, made between December 1977 and June 1979 with the new Onsala 20 m millimeter wave telescope equipped with a room temperature mixer. The SiO fluxes from R Leo and o Ceti appear to be correlated with their near infrared intensities, and to have a distinct phase lag with respect to the visual light curve. An irregular behaviour of the R Leo maser, at a time when the star approached an unusually bright maximum, is very probably a manifestation of the extreme sensitivity of the maser process to any disturbances. Definite intensity variations on a time scale of a day have been observed. The total integrated flux of the Orion A SiO maser is relatively stable but there are considerable relative intensity variations between the two main components, and weak emission appears to be present in the entire interval between the two strong features. Pumping considerations indicate that a very efficient, probably radiative pump is needed.

In figure 1 we present integrated SiO (v=1, J=2-1) and peak 2.7μm flux densities and visual magnitudes as functions of time for (a) R Leo and (b) o Ceti; (c) Integrated SiO (v=1, J=2-1) flux densities, their ratio and the peak flux ratio for the low- and high-velocity features in the Orion A maser. The errors in the integrated SiO fluxes are conservatively estimated to be smaller than ± 20%.

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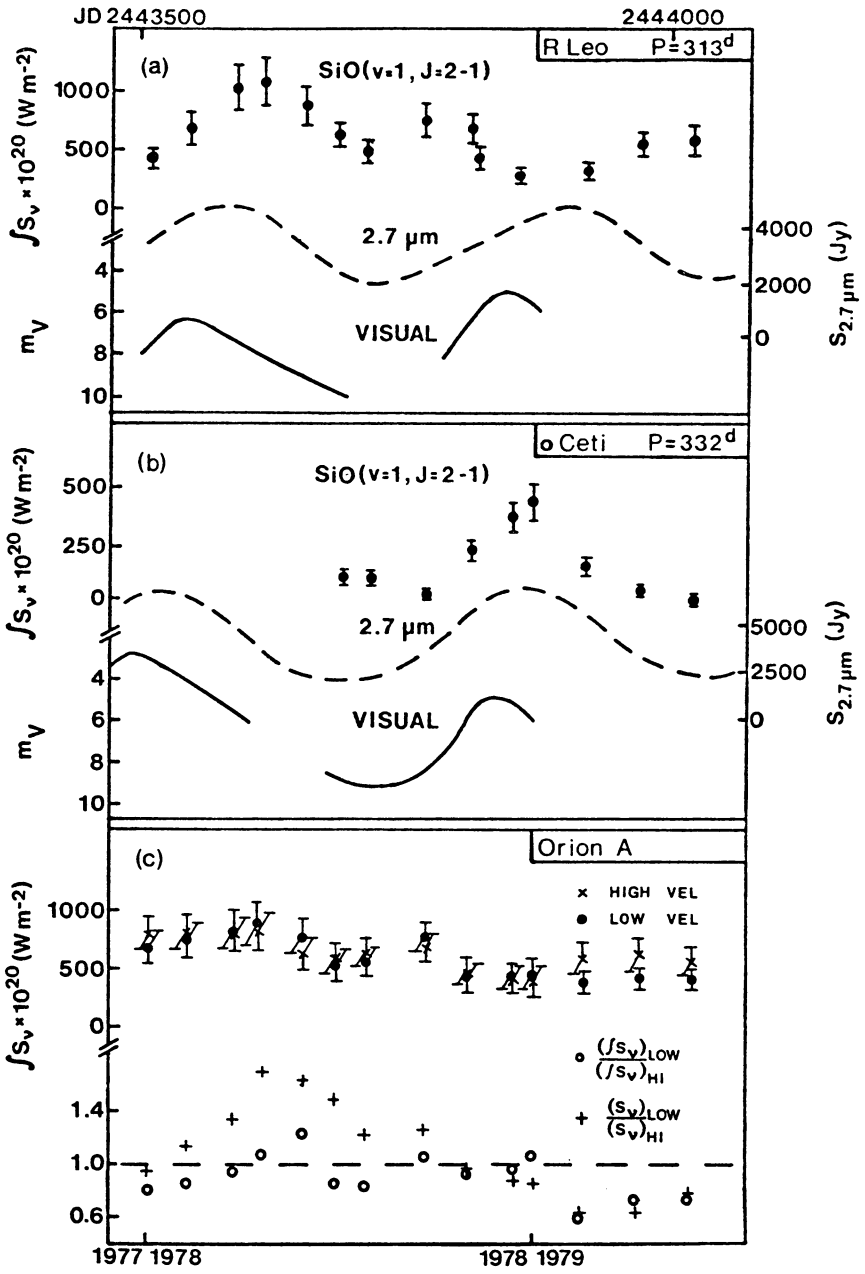

Fig. 1

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