SPECTROPHOTOMETRY OF COMET LEVY (1990c)

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Abstract. Two spectrophotometric scans of comet Levy (1990c) have been analysed to estimate Haser model column densities and production rates of CN and C_2 molecules.

1. Introduction

Comet Levy (1990c) was discovered on May 29, 1990 with the help of a 0.4 m reflector. At the time of discovery its magnitude was 9.6 with 2′ tail in south-west direction. Since then visual magnitude estimates, spectroscopy, photometry, photometry with IUE, microwave spectrum, orbital elements have beeen obtained. CN emission on a strong continuum was detected by Kwitter and Kagan (1990) on June 2 and 3. Production rates of OH, CN, C_2, C_3, NH and dust were estimated by Schleicher *et al.* (1990) based on photometry obtained on June 3, 4 and 5. Water production rate, CO production rate and increase in CS, OH and ultraviolet continuum flux were reported by Fieldman (1990) based on photometry using the IUE Fine Error Sensor. HCN was detected at 266 GHz by Schloerb and Ge (1990). Narrowband photometry on 10 consecutive nights beginning August 18 by Schleicher *et al.* (1990a) has revealed quasi-periodic variations in the comets level of activity. Colom *et al.* (1990) observed microwave spectrum and detected HCN, H_2CO, CH_3OH and H_2S molecules. An estimate of production rate of these molecules have also been made. Klinglesmith (1990) reported the detection of a tail disconnection event on September 19.

2. Observations and Reduction

We observed this comet spectrophotometrically on August 30 and 31 and identified emission bands due to CN and C_2 molecules. The instrument for these observations and the method of reduction were the same as described in our earlier paper by

TABLE I

Basic data for comet Levy (1990c)

Date 1990 (UT)	Geocentric distance Δ (AU)	Heliocentric distance r (AU)	Radius of the circular region in the sky at distance Δ $\times 10^4$ (km)
August 30,73	0.455	1.329	0.74
August 31,63	0.465	1.319	0.76

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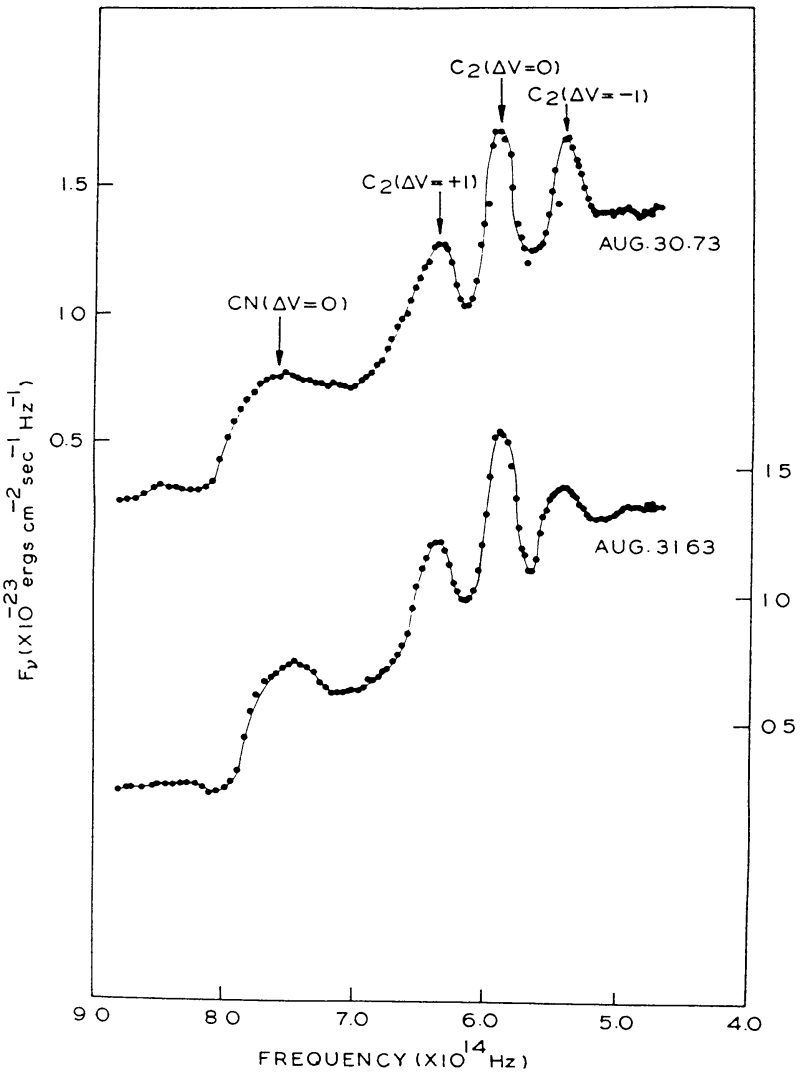

Fig. 1. Absolute flux distribution of the head of comet Levy (1990c).

TABLE II

Emission band fluxes relative to C_2 ($\Delta V = 0$)

Date 1990 (UT)	Apparent F (C_2 $\Delta V = 0$) (ergs cm^{-2} sec^{-1}) $\times 10^{-10}$	F/F ($C\Delta V = 0$) CN ($\Delta V = 0$)	C_2 ($\Delta V = +1$)	C_2 ($\Delta V = 0$)	C_2 ($\Delta V = -1$)
Aug. 30, 73	1.382	1.188	0.864	1.000	0.625
Aug. 31, 63	1.400	1.138	0.764	1.000	0.486

Rautela and Sanwal (1988). The standard star α Lyr was observed to check the wavelength calibration of the scanner and to standardize the observations of the comet.

The basic parameters of the comet for the days of observations are given in Table I and the absolute flux distribution is shown in Figure 1. The absolute values of fluxes correspond to Taylor's (1984) calibration of α Lyr.

TABLE III

Column densities (M) and production rates (Q)

Date 1990 (UT)	log (M) CN ($\Delta V = 0$)	C_2 ($\Delta V = +1$)	C_2 ($\Delta V = 0$)	log (Q) C_2 ($\Delta V = -1$)	*CN*	C_2
August 30.73	29.54	29.71	29.51	29.63	25.70	26.01
August 31.63	29.54	29.67	29.53	29.54	25.68	25.95

3. Results

The prominent emission features, as can be seen in Figure 1 are CN ($\Delta V = 0$) at 388.3 nm $C_2(\Delta V = +1, 0, -1)$ at 469.5, 516.5 and 553.8 nm, respectively. The area under the emission bands was measured after making a guess of the continuum and converted into total flux. These fluxes relative to C_2 ($\Delta V = 0$) are listed in Table II. Haser model column densities and production rates have been estimated adopting the procedure reported earlier by Rautela and Sanwal (1988). Fluorescence efficiency for C_2 was adopted from Sivaraman *et al.* (1987) and for CN it was obtained from the figure of Tatum and Gillespie (1979), for which orbital elements were used from BAA CirNo. 700. Column densities and production rates estimated are listed in Table III. These production rates of C_2 and CN are less than the mean production rates during August 1990 as reported by Schleicher *et al.* (1990). Poor resolution of the scanner used by us may result in the underestimation of the total flux inside the emission bands and hence production rates.

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