

## RECENT OBSERVATIONS OF THE OH 18-CM LINES IN COMETS WITH THE NANÇAY RADIO TELESCOPE

Colom, P.<sup>1</sup>, Crovisier, J.<sup>1</sup>, Biver, N.<sup>1</sup> and Bockelée-Morvan, D.<sup>1</sup>

The OH 18-cm lines have been systematically observed in comets with the Nançay radio telescope since 1973 (Crovisier et al. 2002). These observations allow us to evaluate the cometary water production rate and its evolution with time, and to study several physical processes such as the excitation mechanisms of the OH radio lines, the expansion of cometary atmospheres, their anisotropy in relation with non-gravitational forces, the Zeeman effect in relation to the cometary magnetic field. Between 1973 and 1999, 52 comets have been successfully observed at Nançay. The radio telescope has been upgraded in 2000, and observations are now made with a sensitivity increased by about a factor of two. As of mid 2008, the returns of 40 comets were observed at Nançay with the refurbished instrument (Table 1). The observations are organized in a data base; the part from 1982 to 2002 is publicly available (Crovisier et al. 2002; <http://www.lesia.obspm.fr/planeto/cometes/basecom/>). New analyses have been performed of the OH line shapes in terms of coma expansion velocity (Tseng et al. 2007) and of the correlation between visual magnitudes and OH production rates (Crovisier 2005; Jorda et al. 2008). Among the last comets observed at Nançay are 9P/Tempel 1 prior to its visit by Deep Impact (Biver et al. 2007), the two main fragments of 73P/Schwassmann-Wachmann 3 during their passage close to the Earth in 2006 (Colom et al. 2006; Biver et al. 2008a), the day-time comet C/2006 P1 (McNaught) close to the Sun (Biver et al. 2008c), 17P/Holmes just after its outburst in October 2007 (Biver et al. 2008b), and 8P/Tuttle in winter 2007-2008, also during its close approach to the Earth.

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<sup>1</sup> LESIA, Observatoire de Paris, 5 place Jues Jansse, F-92195 Meudon

**Table 1.** The comets observed at Nançay since 2000.

comet	perihelion	$q$	range of	$r_h$ range	$N$	
	[yymmdd]	[AU]	observations [yymmdd]	a) [AU]	b)	c)
C/1999 S4 (LINEAR)	000726.17	0.765	000706–000803	0.76–0.86	20	L
C/1999 T1 (McNaught-Hartley)	001213.47	1.172	001115–010130	1.17–1.40	40	L
C/2000 W1 (Utsunomiya-Jones)	001226.56	0.321	001212–010107	0.33–0.49	11	L
73P/Schwassmann-Wachmann 3	010127.71	0.937	001201–010310	0.96–1.23	31	J
45P/Honda-Mrkos-Pajdušáková	010329.89	0.528	010103–010315	0.60–1.14	27	J d)
24P/Schaumasse	010502.66	1.205	010310–010630	1.22–1.43	47	J
C/2001 A2 (LINEAR)	010524.52	0.779	010402–010712	0.96–1.22	56	L
16P/Brooks 2	010719.82	1.835	010417–010510	1.93–2.01	18	J d)
19P/Borrelly	010914.73	1.358	010719–011129	1.36–1.50	54	J
C/2000 WM <sub>1</sub> (LINEAR)	020122.67	0.555	011004–020420	0.75–2.10	104	L
153P/2002 C1 (Ikeya-Zhang)	020318.98	0.507	020227–020620	0.51–1.90	78	H
C/2002 F1 (Utsunomiya)	020422.90	0.438	020409–020620	0.46–1.37	34	L
46P/Wirtanen	020826.76	1.059	020720–020816	1.07–1.17	19	J d)
C/2002 O6 (SWAN)	020909.46	0.495	020821–020902	0.52–0.65	9	L
C/2002 X5 (Kudo-Fujikawa)	030129.00	0.190	030101–030409	0.19–1.71	64	L
C/2002 V1 (NEAT)	030218.30	0.099	021231–030426	0.10–1.37	62	L
C/2002 Y1 (Juels-Holvorcem)	030413.24	0.714	030301–030427	0.72–1.10	18	L
2P/Encke	031229.88	0.338	031018–040122	0.35–1.44	40	J
C/2004 F4 (Bradfield)	040417.09	0.168	040506–040520	0.66–1.00	13	L
C/2002 T7 (LINEAR)	040423.10	0.615	031102–040620	0.61–2.93	67	L
C/2003 T3 (Tabur)	040429.02	1.481	040204–040413	1.50–1.89	29	L
C/2001 Q4 (NEAT)	040515.97	0.962	040502–040613	0.96–1.08	42	L
C/2003 K4 LINEAR)	041013.72	1.024	040601–041113	1.03–2.28	92	L
C/2004 Q2 (Machholz)	050124.84	1.203	041001–050122	1.21–2.09	78	L
C/2003 T4 (LINEAR)	050403.65	0.850	041009–050401	0.85–2.85	120	L
9P/Tempel 1	050705.32	1.506	050304–050710	1.51–1.92	95	J
C/2006 A1 (Pojmanski)	060222.18	0.555	060216–060331	0.57–0.98	20	L
73P/Schwassmann-Wachmann 3 (B)	060607.92	0.939	060407–060721	0.94–1.28	62	J
73P/Schwassmann-Wachmann 3 (C)	060606.95	0.939	060302–060720	0.94–1.61	76	J
4P/Faye	061115.46	1.667	060915–061019	1.69–1.78	25	J
C/2006 M4 (SWAN)	060928.73	0.783	061027–061115	0.96–1.18	13	L
C/2006 P1 (McNaught)	070112.80	0.171	070110–070120	0.17–0.34	7	L
96P/Machholz 1	070404.62	0.125	070319–070604	0.19–1.48	39	H
2P/Encke	070419.30	0.339	070501–070601	0.46–1.01	25	J
17P/Holmes	070504.50	2.053	071025–071108	2.44–2.49	10	J
C/2007 F1 (LONEOS)	071028.76	0.402	071018–071111	0.40–0.54	21	L
8P/Tuttle	080127.02	1.027	071203–080128	1.03–1.31	49	H
46P/Wirtanen	080202.50	1.057	080103–080121	1.07–1.13	16	J
C/2007 W1 (Boattini)	080624.89	0.850	080401–010831	1.67–0.85	119	L
6P/d'Arrest	080814.96	1.353	080614–080806	1.36–1.53	36	J

a) lowest and highest heliocentric distance of the observations;

b) number of observations in the data base;

c) L: long-period comet; H: Halley-family comet; J: Jupiter-family comet;

d) no detection.