

NEW PECULIARITY OF SOLAR ACTIVITY INFLUENCE UPON THE BRIGHTNESS VARIATIONS OF COMETS. V. S. Filonenko¹, K. I. Churyumov² and L. S. Chubko³, ¹Astronomical Institute of V. N. Karazin Kharkov National University (Sumskaja str., 35, Kharkov-22, Ukraine, filonenko@astron.kharkov.ua), ²Astronomical Observatory of T. G. Shevchenko Kiev National University (Observatornaja str., 3, Kiev, Ukraine, klim.churyumov@observ.univ.kiev.ua), ³Kiev Aircraft National University (Cosmonaut Komarov avenue, 1, Kiev, Ukraine, larisa_ch@inbox.ru).

Introduction: In our previous contributions [1, 2] we found an influence of the 90-year solar activity cycle upon the secular variations of absolute magnitude for short-period comets.

We are studying the influence of solar activity upon the light curves of six new bright comets here.

Light Curves of Comets: On the basis of more than 10.5 thousand estimations of visual brightness [3] the light curves of six new comets (C/1999 S4 (LINEAR), C/2001 Q4 (NEAT), C/2002 T7 (LINEAR), C/2002 V1 (NEAT), C/2004 Q2 (Machholz) and 153P/2002 C1 (Ikeya-Zhang)) had been constructed and their peculiarities had been studied [4].

Table 1. Correlation coefficients

Comet	Observational period	Correlation coefficient
C/1999 S4	2.11.1999 - 16.12.1999	0.84 ± 0.10 (for maxima brightness)
	11.07.2000 - 1.08.2000	0.80 ± 0.13 (for maxima brightness)
	13.09.2003 - 17.11.2003	1 (for minima brightness)
C/2001 Q4	21.03.2004 - 10.06.2004	0.62 ± 0.15 (for maxima brightness)
	20.10.2004 - 1.12.2004	1 (for maxima brightness)
	1.11.2003 - 19.12.2003	0.8 ± 0.1 (for maxima brightness)
C/2002 T7	6.05.2004 - 1.06.2004	1 (for minima brightness)
	29.11.2002 - 25.12.2002	0.67 ± 0.25 (for maxima brightness)
C/2002 V1	25.08.2004 - 6.06.2005	0.75 ± 0.07 (for maxima brightness)
C/2004 Q2	18.03.2002 - 5.08.2002	0.84 ± 0.06 (for minima brightness)

Comets Brightness Variation Comparison with Solar Activity: For such comparison the temporal shift, induced by difference between heliocentric longitudes of comet and Earth, must be no more than 3-4 days. Under this condition the observational periods had been determined for each comet (Tab. 1).

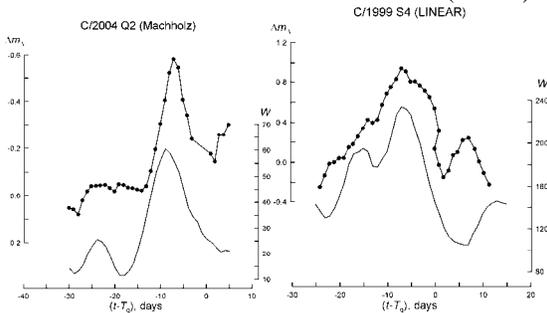


Fig. 1. Comparison variations of brightness of comets C/2004 Q2 and C/1999 S4 with variation of Wolf numbers.

For all comets the brightness variations well correspond to the variations of solar activity level (Fig.1, for example). But the comets are divided into

two groups: 1) for comets C/2001 Q4 (NEAT), C/2002 V1 (NEAT) and C/2004 Q2 (Machholz) the maxima of Wolf numbers correspond to the *maxima* (outbursts) of brightness, and 2) for comets C/1999 S4 (LINEAR), C/2002 T7 (LINEAR) and 153P/2002 C1 (Ikeya-Zhang) the maxima of Wolf numbers correspond to the *minima* of brightness. The correlation coefficients, calculated by Dobrovol'sky method [5], are presented at the last column of Tab. 1. As can see, the correlation is significant for all comets.

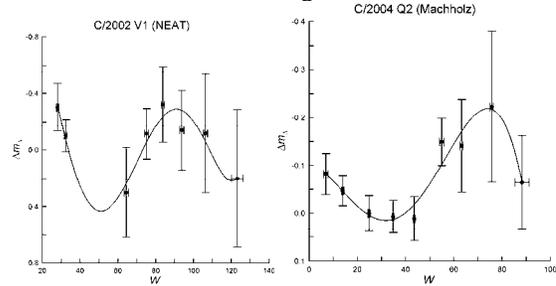


Fig. 2. Averaged values of brightness for comets C/2002 V1 and C/2004 Q2 vs Wolf numbers

In Fig. 2 the averaged values of cometary brightness vs Wolf numbers are presented for comets C/2002 V1 (NEAT) and C/2004 Q2 (Machholz). For other comets these dependences are the same.

So we found a new peculiarity of solar activity influence upon the cometary brightness: the cometary brightness is decreasing when the Wolf numbers are increasing from 0 to 40-50; when the Wolf numbers are increasing further, the cometary brightness is increasing and have maximum when the Wolf number is 80 ÷ 120; when the Wolf numbers are increasing further, the cometary brightness is decreasing again.

References:

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- [5] Dobrovol'sky O. V. (1966) *Comets*. Moscow: Nauka.