

# TNE EVOLUTION OF THE PHOTOMETRIC PARAMETRS OF SHORT PERIODIC COMET 2P/ENCKE AND SOLAR ACTIVITY

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The article discusses the dependences of the photometric parameters of the short-period comet 2P/Encke and the activity of the Sun. It turned out that the absolute magnitude of comets is completely independent of the Wolf number. The correlation coefficient for comet 2P/Encke is  $0.88 \pm 0.03$ . Most likely, other processes affect the activity of the comet's nucleus. Although the absolute magnitude has fallen by more than  $3^m$ , the comet is still active.

**Keywords:** comet 2P/Encke—absolute magnitude—photometric parameter—solar activity—correlation coefficient.

## 1. INTRODUCTION

The evolutionary processes in comets are determined mainly by the chemical composition, structure and properties of their nuclei and the influx of solar energy into the comet's nucleus. The comet nucleus consists mainly of water ice and refractory substances [1]. One of the most likely such variants of the evolution of the nucleus is considered to be radiation from the sun. Since basically the observation of comets comes from the surface of the Earth, the nucleus of the comet itself is very difficult to observe. The Earth observer always determines the photometric size of the nuclei. Therefore, the evolution of the photometric parameters of the comet nucleus is still relevant. It is known that there are families of short-period comets in the planets of the giants of the solar system. A study of the evolution of the photometric parameters of some short-period comets allows one to discover the inverse dependence of the velocity of fall of the absolute brightness of comets on the perihelion distance of their orbit [2]. The aim of this work is to study the evolution of the photometric parameters of the short-period comet 2P / Encke and the activity of the Sun.

## 2. THE MAIN PART

Comet 2P/Encke is considered the shortest-period comet, its period averages 3.3 years around the Sun. From the time of the discovery of the comet 2P/Encke, it has so far 71 times returned to the Sun, including in eight, no comet has been observed. The perihelion distances of the cometary orbit from the time of the first detection in 1786 to the last observation in 2017 fluctuate at 0.013579 AU. Such a change is found in some parameters of the orbits with time. The inclination of the orbit from the moment of discovery ( $13.7^\circ$ ) began to decrease until the last observation ( $11.7^\circ$ ). The eccentricity of the orbit and the period of rotation of the comet around the Sun also fluctuate.

The photometric parameters of comet 2P/Encke were studied by many scientists, including Dobrovolsky et al. [3]. In comet 2P/Encke, the nuclei several times split into several parts. In the comet's atmosphere, gas and dust jets, shells are observed and anomalous tail was observed in several appearances [4, 5].

For accurate determination of the correlation coefficient between the photometric parameter, the absolute magnitude with the activity of the Sun, there is such a relationship [5]:

and its standard is equal

where  $N_{mW}$  - is the number of intervals with maximums W and m,  $N_W$  - is the number of intervals with maximums W, but without maximum m, N is the number of intervals without maximums m,  $\bar{N}$  - is the number of intervals without maximum W, but with maximum m,  $\bar{N}_W$  - is the total number intervals with maxima,  $\bar{N}_m$  - the number of intervals without maxima W,  $\bar{N}_m$  - the number of intervals without maxima m and n - the total number of intervals

The coefficient r is a numerical measure of the relationship between events. For intermediate values of r, the connection can be considered static proven if the absolute value of r exceeds the standard  $\sigma$  more than three times. For comet 2P/Encke, the correlation coefficient is  $r = 0.88$  and its standard is  $\sigma = 0.03$ .

## 3. CONCLUSION

Comet 2P / Encke is a short-period comet of the Jupiter family. Elements of the comet's orbit change over time due to the perturbation of the planets, in particular the planet Jupiter. It turned out that in only a few cases the absolute brightness of the comet coincides with the maxima of the Wolf numbers. In other cases, there is an inverse relationship. The correlation coefficient for comet 2P/Encke is  $0.88 \pm 0.03$ . Although the absolute magnitude does not completely depend on the activity of the Sun, in comets there are often separate flashes of brightness. This may be due to the meteoroid swarm complex, which is consid-

ered to be the comet Encke by the ancestor and bombards the comet's nucleus at the time the intersection of their orbits. Since comet 2P/Encke, from 1924 to 1951, anomalous tail was observed on each appearance, and the moment of the formation of the anomalous tail always occurred before the perihelion of the comet's orbit passed.

## REFERENCES

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