Changes in the Shape of Histograms Constructed from the Results of ^{239}Pu Alpha-Activity Measurements Correlate with the Deviations of the Moon from the Keplerian Orbit

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We have found that the shape of the histograms, constructed on the basis of the results of radioactivity measurements, changes in correlation with the distortions of the lunar Keplerian orbit (due to the gravitational influence of the Sun). Taking into account that the phenomenon of "macroscopic fluctuations" (regular changes in the fine structure of histograms constructed from the results of measurements of natural processes) does not depend on the nature of the process under study, one can consider the correlation of the histogram shape with the Moon's deviations from the Keplerian orbit to be independent from the nature of the process the histograms were obtained on.

1 Introduction

In the last decades, the studies of solar-terrestrial relations, which were initiated by A. L. Chizhevsky [1, 2], rest upon the concept that these relations have an electromagnetic origin [3–9]. A supposition that the solar-terrestrial relations could be of gravitational nature — when the matter at issue are *physico-chemical*, *chemical* and *biochemical* processes — would raise objections, as the energy change upon gravitational disturbances is much less than that observed in the processes mentioned. As for correlations of *physiological* processes with tidal forces (see, for example, [10–12]), they can be explained on the basis of complex indirect mechanisms.

Nevertheless, there were reports [13–21] on a strong correlation between variation of some physical and biochemical processes and deviations of the Moon from the Keplerian orbit (evection, variation and annual inequality; see [30]). The conclusion was that gravitational disturbances should play an essential role in these phenomena. The processes that correlations were revealed for were very different in their nature: there were fluctuations of "computer time", ^{239}Pu α-activity, the rate of a model chemical redox reaction, the content of haemoglobin in erythrocytes, and urea secretion.

There is no trivial explanation to the fact that physical and biochemical processes, which are little affected by tidal forces, correlate with changes of the lunar orbit.

As shown for the processes of diverse nature, the spectrum of their amplitude fluctuations (i.e., the shape of the corresponding histograms) correlates with a number of cosmophysical factors [22–28]. The change of energy in those processes (noise in electronic circuits, α-decay, chemical reactions) varies by tens orders of magnitude, yet the correlations are the same. Evidently, we deal with correlations of a non-energy nature. So we can suggest that the correlations of various processes with the distortions of the lunar orbit reported in [13–21] have a non-energy nature as well.

Thereby we have checked if changes in the shape of histograms constructed from the results of ^{239}Pu α-activity measurements correlate with the deviations of the Moon from the Keplerian orbit. The measurements were carried out at Novo-Lazarevskaya station (Antarctida) and in Pushchino in 2003–2008. Analysing regularities in the change of the histogram shape, we found periods corresponding to the periodical deviations of the Moon from the Keplerian orbit: variation (14.8 days) and evection (31.8 days). The correlations are analogous to those reported earlier [13–21], which suggests a common and very general nature of all these phenomena.

2 Materials and methods

The measurements of ^{239}Pu α-activity were performed at Novo-Lazarevskaya station (Antarctida) and in Pushchino in 2003–2008. α-Activity was monitored continuously, with a second interval, using devices constructed by one of the authors (I. A. Rubinstein). The analysis of data consists in pairwise comparing of histograms constructed from the results of measurements. Histograms were constructed either for 60-point segments of one-second measurements (1-min histograms) or for 60-point segments of one-minute measurements (1-h histograms). All the operations of histogram construction and analysis, as well as calculation of intervals between similar histograms and plotting the corresponding dis-

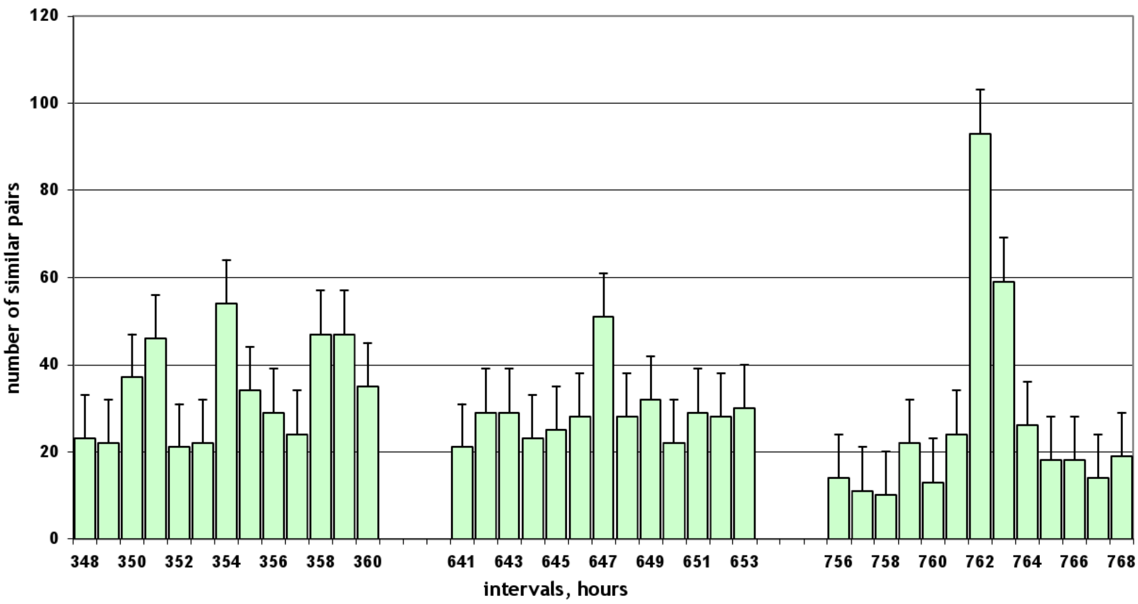

Fig. 1: Comparing 1-h histograms reveals periods equal to 350–354 h (in the region of variation, 14.8 days), 647 h (in the region of the 27-day period) and 762 h (in the region of evection, 31.8 days). In the figure, the number of similar histogram pairs (y-axis) is plotted versus the interval between similar histograms (x-axis, h).

tributions, were conducted with the aid of a computer program written by E. V. Pozharsky [22]. The decision of two histograms to be or not to be similar was made by an expert upon visual evaluation. A detailed description of all the procedures (measurements, histogram construction and analysis) can be found in [22].

3 Results

3.1 The shape of histograms changes with the periods of evection and variation

Figs. 1 and 2 show the results of our search for periodical changes in the shape of histograms constructed from the Antarctic data (Novo-Lazarevskaya station; since May 26, 2005 till the end of the year). We compared series of both 1-min and 1-h histograms in the regions of the putative periods: 762±6 h (a 31-day period, evection), 648±6 h (a 27-day period) and 355±6 h (a 15-day period, variation).

All the expected periods can be seen in Fig. 1. However, the period that corresponds to evection is, *ceteris paribus*, much more pronounced. To be sure that the periods revealed are not artefacts, we repeated the analysis many times with different data. Fig. 2 shows the summary result of five other experiments, in which we compared 1-h histograms constructed from the data obtained on April–October, 2004.

Along with 1-h histograms, we also compared 1-min ones. Fig. 3 shows the results of this analysis, which was made in the region of evection period.

As can be seen in Fig. 3, the 60-fold increase in "resolution" does not change the character of the distribution: there is a sharp extremum, which corresponds to the evection period.

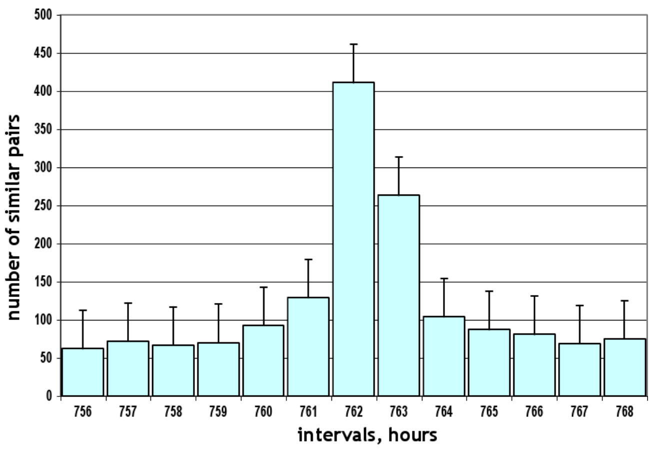

Fig. 2: Determination of the evection period by comparing 1-h histograms constructed from the results of ^{239}Pu α-activity measurements on April–October, 2004 (a summary result of five experiments). Axes are defined as in Fig. 1.

It is very surprising. Evection is a rather slow process: its period equals to 31.8 days. Naturally, one minute (out of 45779!) is by no means enough for evection to manifest itself — the distortion of the Keplerian orbit will be negligible. So we believe that the clear periodicity in the alteration of the histogram shape cannot be explained by a slow change of the "effecting force".

3.2 "Palindrome effects" in the evection periods

It seems that the apparently paradoxal narrowness of the extrema we see in the above figures has a relation to the sharp spatial anisotropy of our world [26–29]. Many observations

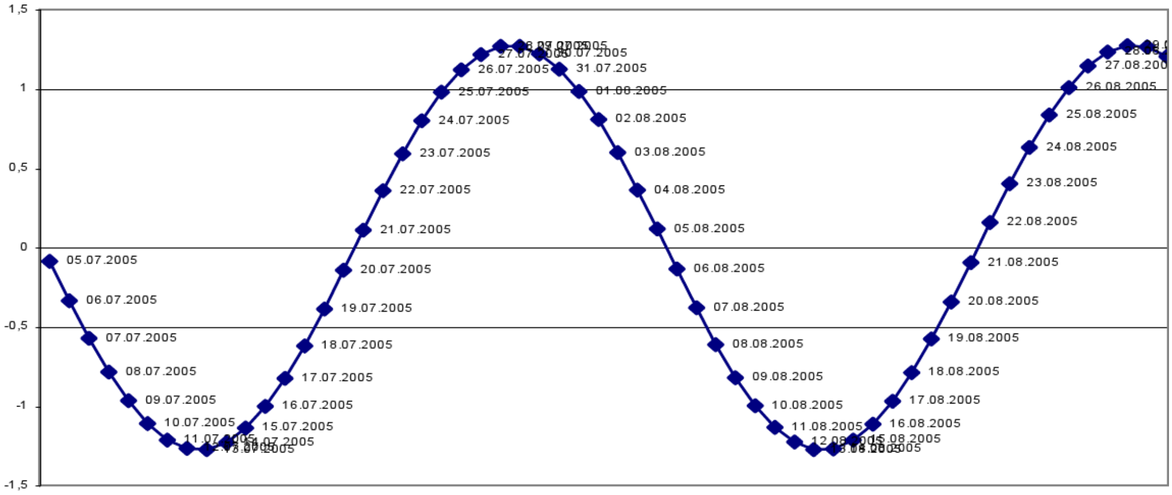

Fig. 4: Evection phenomenon (periodical change of the extent of distortion of the lunar Keplerian orbit) on July–August, 2005. Evection maxima in 2005: May 26, June 26, July 27, August 28–29, September 29–30, November 1 and December 2. Evection minima in 2005: June 10, July 11–12, August 12–13, September 13–14, October 15–16 and November 16.

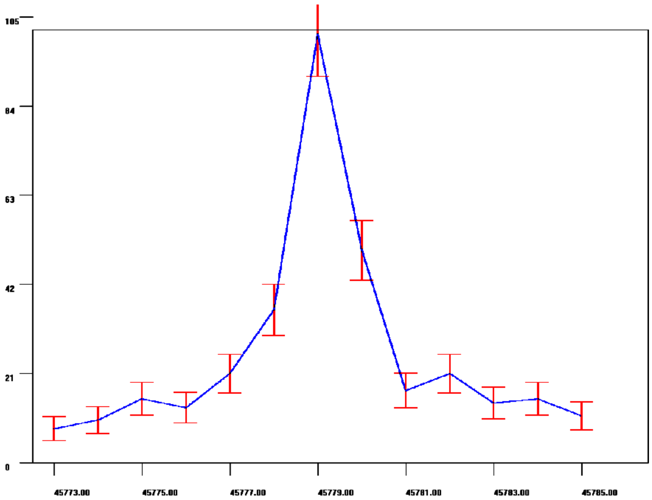

Fig. 3: Comparing 1-min histograms gave an evection period equal to 45779 min (31.79 days). Axes are defined as in Fig. 1.

confirmed this supposition — in particular, the experiments that made use of collimators, isolating narrowly directed beams of α-particles [24–25]. This anisotropy is stable, which is evidenced by the high probability of a certain histogram shape to reappear every time the laboratory has the same orientation towards the sphere of fixed stars. With the Earth rotating about its axis and moving along the circumsolar orbit, the laboratory will repeatedly pass through such points of the same star-related orientation. A manifestation of stable anisotropy of our space is the phenomenon of "palindromes", which is the high probability of a series of "daytime" histograms to be similar to the inverse series of the "nighttime" ones. In the nighttime, the rotation of the Earth is co-directed with its movement along the sircumsolar orbit, this being the opposite in the daytime. As a result, the sequence of "star-orientation points" that the laboratory passes through in the nighttime will be reversibly scanned by the laboratory in the daytime. Accordingly, series of daytime histograms were found to be opposite to the correspondent series of the nighttime ones [27, 28], with the "day-" and "nighttime" being accurately defined as the local time since 6:00 to 18:00 (daytime) and since 18:00 to 6:00 of the next day (nighttime). Figuratively speaking, the rotating Earth consecutively reads the same text first in the direct and then in the inverse order, and the result is the same — as in the phrase "step on no pets".

As it turned out, the histogram series that correspond to the "direct" and "inverse" halfs of the evection cycle are also "palindromes".

The periodical changes of the lunar Keplerian orbit in the evection cycles that correspond to the periods of our measurements are given in Fig. 4. According to this graph, we prepared series of 1-h histograms constructed from the results of ^{239}Pu α-activity measurements. The series were divided into the "odd" and "even" ones, corresponding to the descending and ascending halfs of the evection periods respectively (each half lasting 381.6 h or, more precisely, 22896 min). Then we compared the "odd" series to the "even" ones pairwise, with the even series being of two types: direct and inverse (with the direct and inverse sequence of histograms).

As shown in Fig. 5, there is a high probability of an "even" histogram to be similar to the "odd" one of the same order number when the series of "odd" histograms is inverse. Without inversion, the similarity is much less probable. This is a typical palindrome.

4 Discussion

Thus, the shape of histograms constructed from the results of radioactivity measurements changes in correlation with the distortions of the lunar Keperian orbit caused by the gravita-

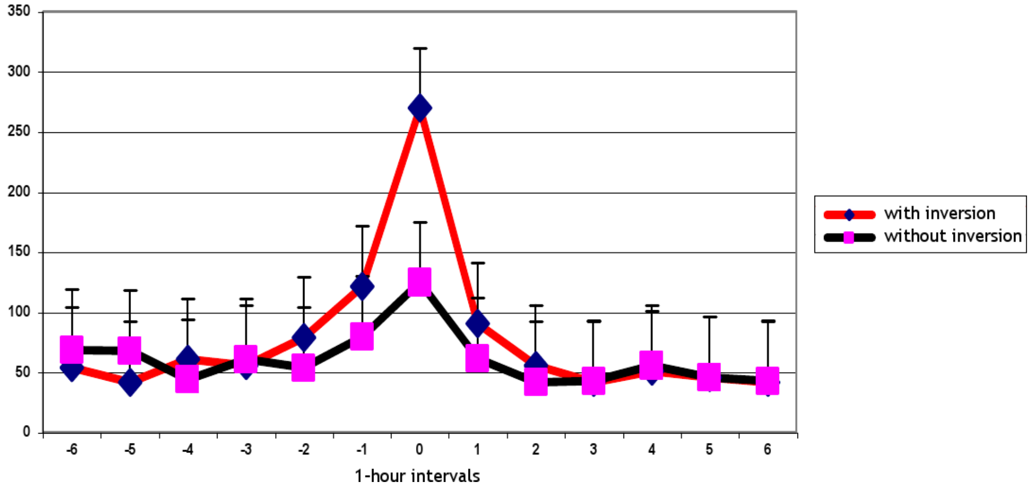

Fig. 5: The palindrome effect. When a series of consecutive 1-h histograms of the 1st (descending) half of the evection period is compared to the corresponding series of the 2nd (ascending) half, the high probability of histograms of the same order number to be similar is observed only in the case of *inversion* of the 2nd histogram series. The figure shows a summary result of analysis of four different sets of data obtained in the period since May 26 to October 1, 2005 at Novo-Lazarevskaya station.

tional influence of the Sun. It changes in the same manner as the processes reported in [13–21]. Taking into account that the phenomenon of "macroscopic fluctuations" (i.e., regular changes in the fine structure of histograms constructed from the results of measurements of natural processes) does not depend on the nature of the process studied [26, 28], one can consider the correlation of the histogram shape with the deviations of the Moon from the Keplerian orbit to be independent of the process nature as well. Since gravitational forces would have no direct impact on physico-chemical and biological processes in terms of energy, the correlations revealed can be considered as resulting from gravitation-induced disturbances in the space geometry. These disturbances, changes of space curvature — to formulate in general, changes of the spacial-temporal scale — should equally manifest themselves in the processes of any nature. The data on strong correlations revealed for the fluctuations of "computer time" [13–21] might be an illustration of such alterations of the spacial-temporal scale.

The phenomena of half-day and half-year palindromes were explained by the repetition of a certain orientation of the Earth towards the Sun [27] and the sphere of fixed stars [28] respectively. Adopting an analogous explanation to the palindrome with the period equal to that of evection (31.8 days) assumes a strong spatial anisotropy caused by the Moon.

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