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ON CORRELATION BETWEEN SUPERWEAK RADIATION READINGS AND COSMOPHYSICAL FACTORS

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The available findings on cosmobiological correlations with vital processes in living organisms raise an issue of whether cosmophysical factors (*CPF*) can influence the inner elements of devices registering various physical fields and, consequently, their readings. In order to obtain direct evidence of the influence, we used a supersensitive sensor for superweak radiation (*SSR*) in the longitudinal study during the 46th Russian Antarctic Expedition at the Antarctic station Vostok Apr 20 – Dec 21, 2001. The output variable, which is a function of internal resistance of *SSR* forming elements, was registered [1, 2]. The reason to choose the sensor was its successful application for the intervals including instants of the Moon and Sun meridian and horizon transits. These astronomic phenomena, in certain cases, provoked substantial changes in its conductivity.

In our study, the meridian-oriented sensor was placed inside a customized metal screen covered with a heating cable and foam enclosure for temperature stabilization. The thermometer was positioned so that its head was 2-3 cm away from the sensor. The *SSR* output signal was being recorded to *PC* (using DIGISCOP software) via multi-meter with a sampling period of 5 minutes. Temperature and sensor’s readings correlated at -0.7.

To completely eliminate the influence of temperature on the analyzed data, we used new information-bearing characteristics of *SSR*, which were conventionally named density (absolute deviation of current multi-meter readings from the model curve - *dDB*) and reliability (number of intersections with the curve during the day - *f*). Here the model curve was defined on the basis of the most appropriate description of the linear relationship between two parameters within each current 5-day interval: $Dbmod = A - B \times T$, where T is current temperature, $Dbmod$ – prototype curve values, A and B – coefficients. Estimate values of *dDB* and *f* averaged over 9 spots were used for studying the correlations of their fluctuations with *CPF* variations.

The obtained results bring the following facts to our attention:

The oscillatory nature of *dDB* and *f* fluctuations manifested itself clearly with the period of appr. 18-21 days (see Fig. 1). For both indices, the amplitude of oscillation is ±30-40% from the average values. The relative changes of *dDB* and *f* are opposing (r = -0.69). Changes of *f* are retarded in phase for 2 days from changes of *dDB* (r = -0.71 at the inversed juxtaposition of curves).

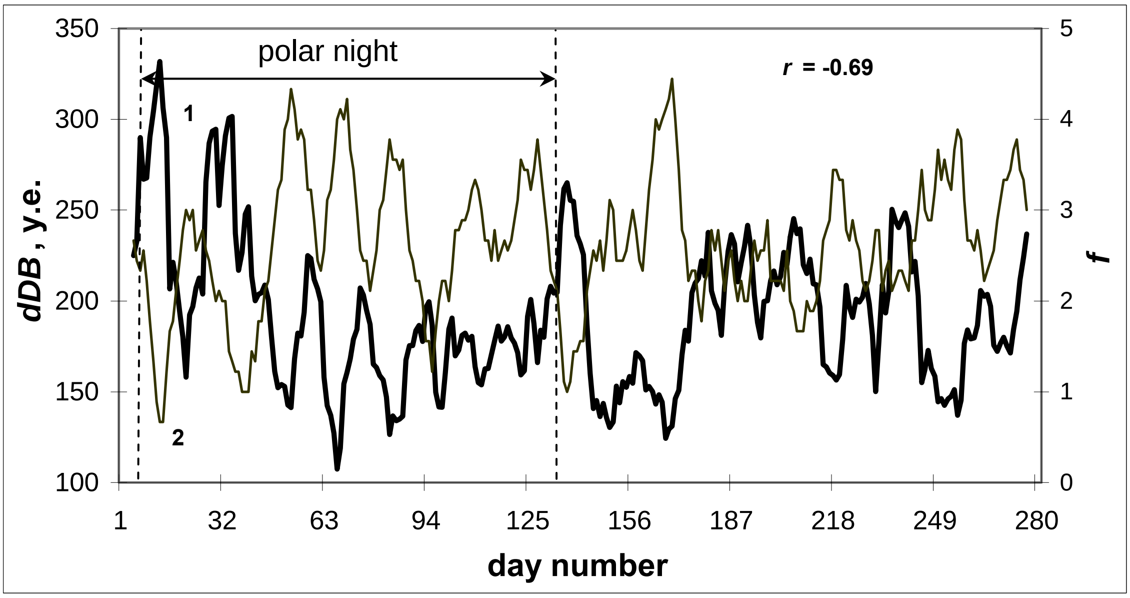

Fig. 1 Rhythmic *dDB* (curve 1) and *f* (curve 2) fluctuations, averaged over 9 spots

In addition, readings of the sensor practically do not correlate with temperature (correlation coefficients between *T* and *dDB* and *f* are 0.08 and -0.08, respectively). The changes in daily average values apparently correspond with such seasonal factors as Polar day-night alternations. Particularly, during a polar night *dDB* decreases to the minimum, while *f* rises to the maximum.

Matching polynomial trends (fifth-order polynomials) for *dDB* and *f* with the equation of time (*ET*) and the equation of equinoxes (*EE*) (see Fig.2) revealed significant correlations of *ET* and *EE* variations with *f* (direct correlation at r = 0.53, r = 0.83) and *dDB* (inverse correlation at r = -0.25, r = -0.64). The polynomial trends for readings correlated at r = -0.84. At the same time, short-period fluctuations of *dDB* and *f* corresponded with sign reversal for the sector structure of the interplanetary magnetic field (*IMF*) see Fig.3 (data averaged over 9 spots). The correlations between them are 0.52 and -0.46, respectively. Additionally, the changes of readings are indirectly (via affecting *IMF*) influenced by the Moon orbital position (phase) and its orbital velocity. Fig. 4 represents matching variations of the sign of *IMF* sector structure (curve 1), the Moon phase (curve 2) and orbital velocity of the Moon (curve 3), the analysis of which shows that the new moon and the maximum of the positive sector during the period of increasing orbital velocity of the Moon (decreasing distance between the Earth and the Moon) contribute to preserving the periodicity of *IMF*. Without these conditions, *IMF* periodicity is disturbed.

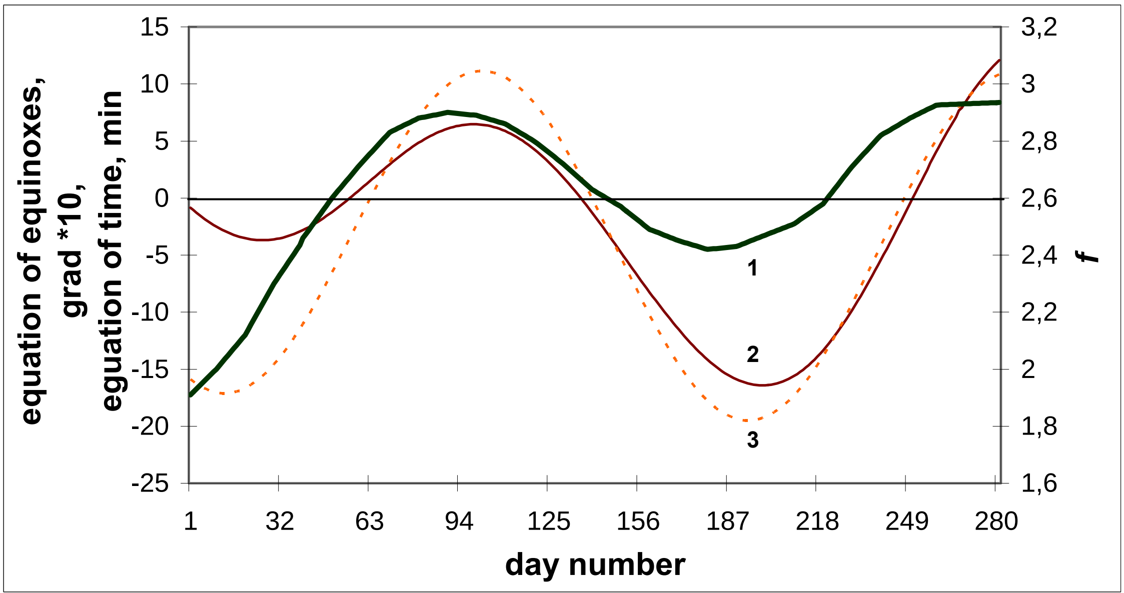

Fig. 2 Comparing long-term fluctuation (fifth-order polynomial) of *f* (curve 1) and variations of the equation of time (curve 2) and the equation of equinoxes (curve 3)

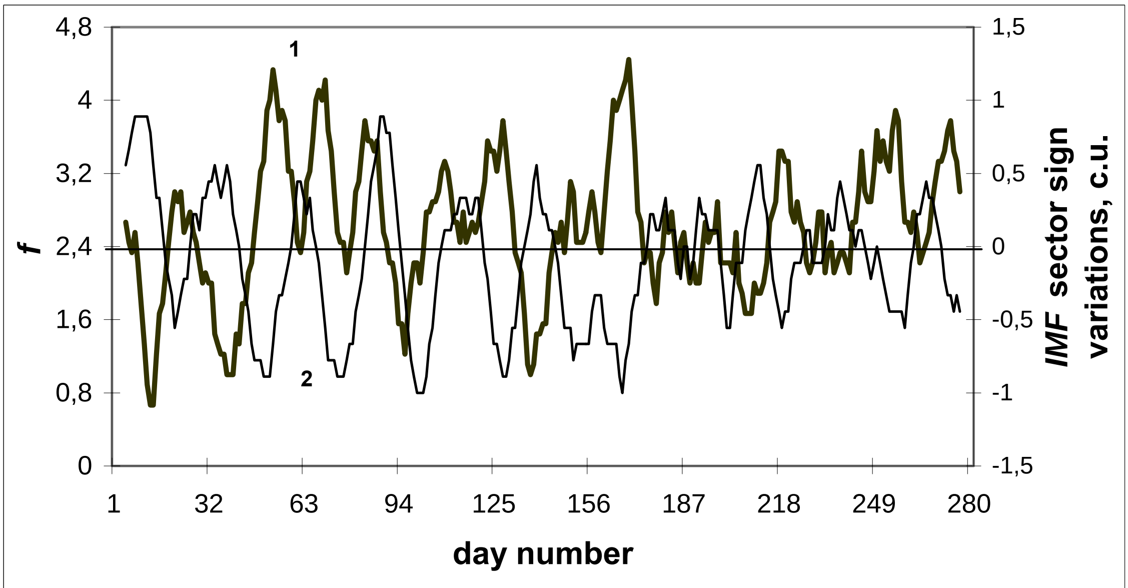

Fig. 3 Comparing fluctuations of *f* (averaged over 9 spots, curve 1) and variations of sector sign of *IMF* (curve 2)

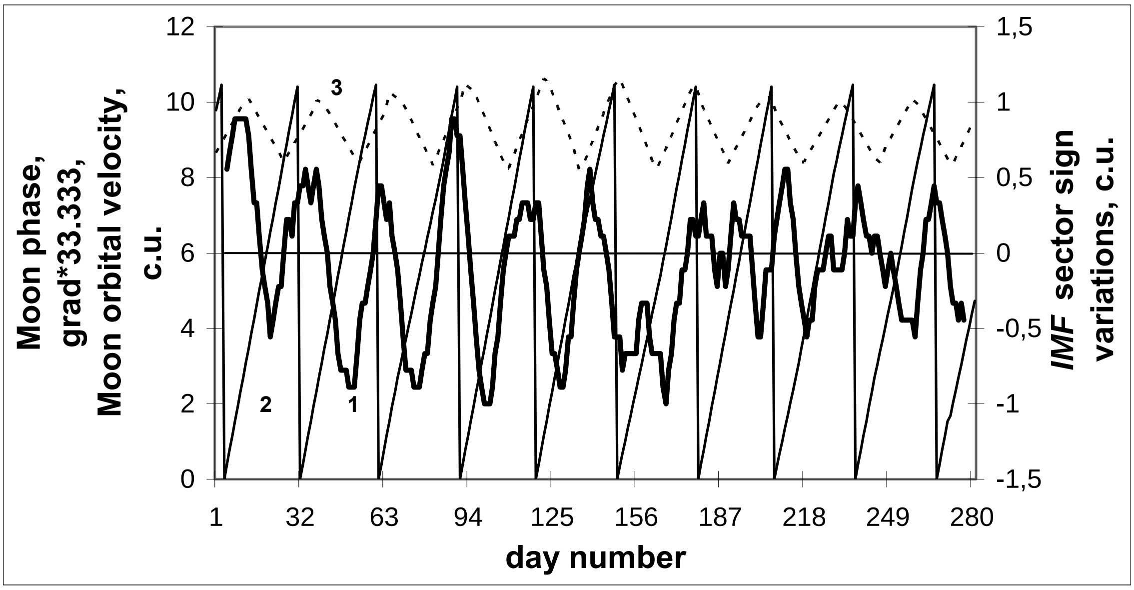

Fig. 4 Comparing variations of sector sign of *IMF* (averaged over 9 spots, curve 1), the Moon phase (0, 360 grad – the new moon, curve 2) and orbital velocity of the Moon (curve 3)

The analysis of the correlations between *SSR* readings (manifested when the sensor was screened) and the components of the terrestrial magnetic field (*TMF*) revealed relatively low levels of correlation of horizontal (*H*) and vertical (*Z*) *TMF* components with *dDB* (reverse correlation) and with *f* (direct correlation), which, when *IMF* structure is compared to *SSR* values, is inverse. Since *Z* vector (in the Antarctic conditions of registering *SSR* signals) is pointed upwards, it's changing in the same direction leads to a decrease of *SSR* density (*dDB*) and some increase of *f*. The same effect is observed when the sign of *IMF* sector is negative (solar wind toward the Sun). It is also when the sensor registers random signals more accurately. When the growth of *Z* vector is negative (pointed downwards) the density values change controversially (as in case of positive *IMF* sector). It should be mentioned that the correlation between *IMF* and *TMF* components *H* and *Z* is predictably negative (-0.2 and -0.19).

There is no sufficient evidence of solar radio intensity (*SRI*, 10.7 cm) and basic solar disturbances (λ in the equation of lunar motion) influencing *dDB* and *f*.

Spectral analysis of the variations in the sensor's density and reliability values revealed periods which are similar to the periods of *SRI* variations (51.2, 25.6, 28.44 days), λ -15.06 days and *IMF* (25.6, 28.44 and 15.06 days).

Therefore, the similarity of the above-mentioned periods and the presence of correlations between *dDB* and *f* variations and variations in gravitational indices of the Sun, the Earth, the Moon and *IMF* confirm the correspondence of the internal processes in supersensitive sensor with the influence from cosmophysical factors. Here the relatively high correlation of *SRI* value variations and *IMF* variations can be attributed to the impact of a gravity-determined *IMF*-relevant factor onto the screened sensor. In case of the positive *IMF* sector structure this factor causes increasing of the sensor's density, which contributes into measuring error. General similarity influencing variations of *SSR* readings (accuracy of signal presentation) was revealed, which relates to the adequate changes in *TMF* level and sector sign of *IMF*.

References

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