On the Problem of External Influence on Solar Activity: Scientific and Theological Aspects

V.G. Lozitsky
Astronomical Observatory of Taras Shevchenko National University of Kyiv,
3, Observatorna Str., Kyiv, 04053, Ukraine
lozitsky_v@ukr.net

Abstract. Solar activity is magnetic in nature, and, as is commonly believed, should not depend on non-magnetic processes in the solar system. Nevertheless, there are peaks of 11.89 and 9.97 years in the solar spectrum which are close to Jupiter's period of revolution around the Sun (11.86 years) and the period of repetition of orbital quadratures in the system "Jupiter-Saturn" (9.90 years). These and other data indicate a possible external influence on solar activity. Even more surprising is that there are indications of a correlation between the processes on the Earth and the Sun, to be exact, between the most powerful manifestations of *solar activity* and extremely intensive *technological and social phenomena* on the Earth. In particular, the maximum area of a sunspot group (up to 5000-6000 m.s.h.) over the past 140 years occurred in 1946-1947, i.e. a relatively short time after the atomic bombardments of Hiroshima and Nagasaki. Also, some other great events on the Sun occurred after important events on the Earth. It is noteworthy that the likelihood of accidental coincidence of these events is sometimes less than 1%. If these correlations are not really accidental, their explanation is possible only outside of science, namely, that it is God's Providence – perhaps, a warning to humanity about its big mistakes.

Keywords: Sun; solar activity; solar-terrestrial correlations; God's Providence; warning to humanity; big mistakes.

Introduction

In the *Bible*, we find evidences that the Sun was unusual sometimes – not as we know it from everyday observations or from scientific data. So, the book of Joshua (10:12–10:14) reads:

10:12 "Then spake Joshua to the LORD in the day when the LORD delivered up the Amorites before the children of Israel, and he said in the sight of Israel, Sun, stand thou still upon Gibeon; and thou, Moon, in the valley of Ajalon.

10:13 And the sun stood still, and the moon stayed, until the people had avenged themselves upon their enemies. *Is* not this written in the book of Jasher? So the sun stood still in the midst of heaven, and hasted not to go down about a whole day.

10:14 And there was no day like that before it or after it, that the LORD hearkened unto the voice of a man: for the LORD fought for Israel".

From a scientific point of view, the stopping of the Sun in the sky could have only the sole natural cause – the stopping of the Earth rotation on its axis. However, insofar as the planet Earth has tremendous inertia, this is physically possible only with a fantastically powerful external influence on it, with the energy level of $\sim 10^{29}$ J. This influence, in principle, could be the Earth collision with a large space body, an asteroid, with a diameter of about 500-1000 km, which could slow the axial rotation of the Earth. But, first, such collision should be accompanied by a global environmental catastrophe, the clouding of the Earth's atmosphere and a sharp decrease in the surface temperatures to the level of the Ice Age or even below (tens of degrees). Nothing like this can be found in the Bible. Second, to restore the speed of the rotation of the Earth at the

same level, another similar powerful external shock of the same nature is needed. In other words, there should be another catastrophic fall of a similar asteroid, with the second global environmental disaster and even a greater cooling on the Earth. Nothing of the kind is mentioned in the Bible. Modern science also excludes such a scenario. Indeed, on the Earth one can not find relatively young impact craters (astroblems) with a diameter of several thousand kilometers in size, which would show the imprint of the Earth's recent collision with very large asteroids.

The Gospel of Matthew (27:45) says that during the crucifixion of Jesus Christ "Now from the sixth hour there was darkness over all the land unto the ninth hour". We find similar lines in the Gospels of Luke (23: 44-23: 45) and Mark (15:33) too. Obviously, this could not be an astronomical eclipse. The total solar eclipse (as an astronomical phenomenon), closest in time, was in Palestine on 24 November, 29 BC, i.e., 4 years before the events referred to in the Gospels.

Thus, the two above events are not explained within the framework of modern science. The only explanation would remain but it is outside of science - that these were miracles, the God's Providence. After all, since God created the world, He, of course, has plenty of power to change something in a small part of the Universe – on the Earth or on the nearest star named the Sun.

The purpose of this work is to draw attention to some scientific data that also indicate a possible external influence on the Sun. We will try to analyze these data from scientific and theological perspectives.

About the Sun as a Star

The Sun is the nearest and, at the same time, unique star. This is a star with an optimal mass equal to 2×10^{33} g. Due to this mass and the corresponding chemical composition, it will shine like now for a long time – for about 5 billion years. The Sun shines and warms the solar system because a thermonuclear reaction of fusion of hydrogen into helium takes place in its nucleus, though very slowly, via the tunnel effect. The Sun is a stable and reliable star, it will continue to shine without any tremendous explosions like a nova or supernova which could destroy biosphere. It should be noted that supernovae are the final stages of the evolution of massive stars only - at least 3 times more massive than the Sun. These are, for example, Polaris, Betelgeuse, Deneb and some others. But they are far enough away from us (more than 600 light years) and do not threaten us.

Another benefit for us is that the Sun is a lonely star. In the case of double, triple or multiple stars, the planet orbit should be very complicated, with periodic approximations to star satellites. This would create permanent and significant temperature fluctuations on the planet that are intolerable for life in its present form. In fact, the Sun has no proximate stars, the Earth's orbit is almost circular and this gives almost the same heating for our planet during its rotation around the Sun.

Changes in energy flows from the Sun (its luminosity) are very insignificant in the Modern Age - within 0.1%. These changes can cause variations of effective temperature on Earth of just 0.1°C, which is very small compared with the effects of global warming.

The Earth and the Sun are two cosmic bodies which are critical to our existence. Without the Earth with its unique flora, fauna, hydrosphere and atmosphere, our existence would be impossible. But also without the Sun our life on Earth is physically impossible, too. Indeed, we receive energy from the Sun about three orders more than from below, from the heated bowels of the planet. Therefore, the absence or attenuation of the Sun in our sky, from the point of view of science, clearly means only one thing - the termination of life on Earth.

Solar Activity

Solar activity is a complex phenomenon in the solar atmosphere which is caused by the lifting on its surface of strongly concentrated magnetic fields. Where these fields come to the surface, sunspots occur. They may have different magnetic polarities and magnetic field strengths within the range 2-6 kG, and perhaps even 8 kG (Solanki, 2003; Lozitsky, 2016). This is a field that is about 10,000 times stronger than the magnetic field of the Earth at its surface. Solar flares are explosive processes in the solar atmosphere with the lifetime from a few minutes to several hours and with the energies within the range 10^{27}-10^{32} erg; these prosesses are most often produced by those groups of sunspots where strong magnetic fields have an entangled structure with a close contact of opposite magnetic polarities. Solar flares are associated with a sudden conversion of magnetic energy into other forms – plasma heating, electromagnetic radiation, accelerated particles, shock waves and coronal mass ejection. If the coronal mass ejection flies towards the Earth, it can reach our magnetosphere within 1-2 days. As a result, the geomagnetic field begins to change slightly. This is the so-called magnetic storm. Most people do not feel these storms, but obviously not all of them. This question is poorly understood today as yet.

A characteristic feature of solar activity is its 11-year cycle. However, this is only the most obvious and intense solar activity cycle, a kind of its "pulse". A more detailed analysis shows that the spectrum of fluctuations in solar activity has about 20 less intensive but reliable cycles, including the cycles with the duration of 11.89 and 9.97 years (Tsirulnik et al., 1997). These cycles are close to the period of Jupiter's revolution around the Sun (11.86 years) and repetition of orbital quadratures for the system "Jupiter- Saturn" (9.90 years), see Fig. 1.

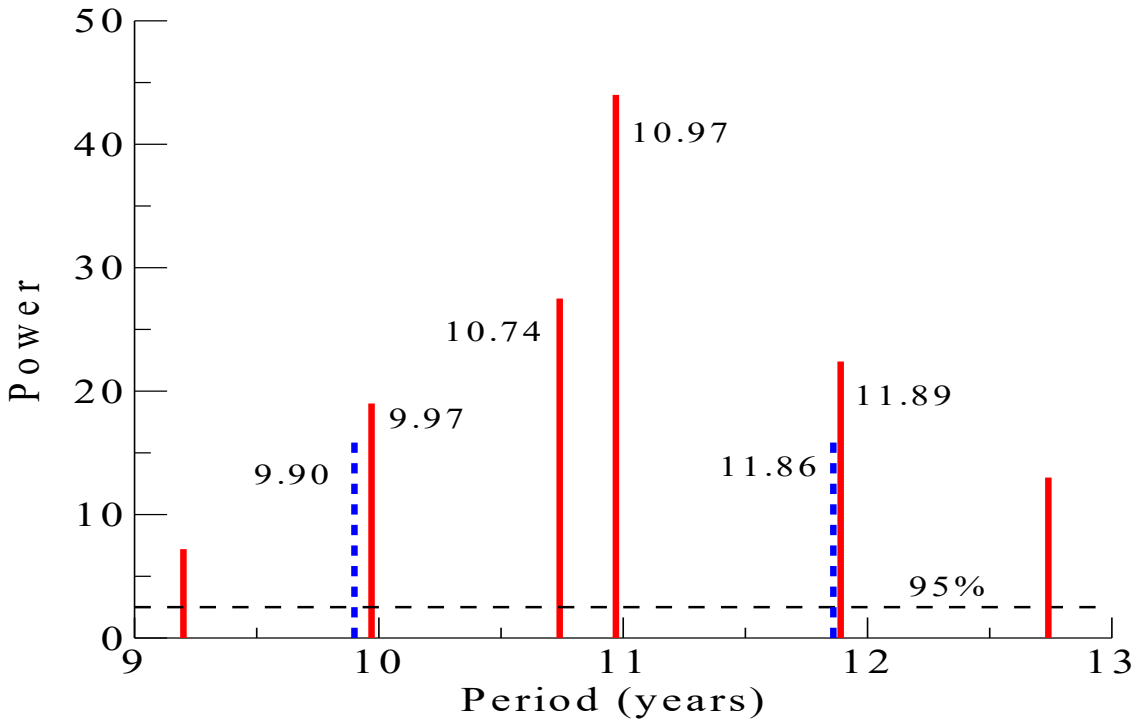

Figure 1. Comparison of the most powerful peaks in the spectrum of solar activity oscillations (the solid lines) according to Tsirulnik et al. (1997) with some planetary periods (the dashed lines).

A Possible Influence of Planets on Solar Activity

The fact that the spectrum of fluctuations of solar activity has the "planetary" periods about 12 and 10 years suggests a possible influence of the planets on solar activity. This hypothesis was analyzed by many scientists (see, e.g. Romanchuk, 1981). It is interesting to note that the "planetary" periods exist not only in the number of sunspots, but also in the number of solar flares. In particular, Akimov et al (2005), studying X-ray and optical flares by Fourier analysis, found that the power spectra of these phenomena have the reliable periods of 36.5, 73, 88 and 116 days. The first period almost exactly coincides with the average period of axial rotation of the Sun visible from Mercury, and the second one, with its twofold value. The period of 88 days is a sidereal period (relative to fixed stars) of Mercury's rotation around the Sun, and 116 days is a synodic period (visible from the Earth) of rotation the planet's around the Sun. It was also found that solar flares occur more often when Mercury is farthest from the Sun.

Despite this coincidence of solar and planetary periods, the hypothesis about the influence of planets on solar activity is considered highly controversial at present. Indeed, solar activity is a purely magnetic phenomenon in the surface layers of the Sun (in its atmosphere) that has enormous power as compared with other sporadic processes in the solar system.

The magnetic energy of one active region on the Sun can be estimated at level of 10^{31}-10^{34} erg, while solar flares (see. above), at that of 10^{27}-10^{32} erg. Powerful solar flares last an hour, hence the energy output of such flares is about 10^{28} erg / s, i.e. 10^{21} watts (W). For comparison, the energy capacity of terrestrial earthquakes is about 10^{11} W, and that of tidal friction (which slows the Earth's rotation) is 10^{12} W. The explosion energy of one megaton bomb is around ~10^{23} erg, which is less than the energy of solar flares in 10^{4}-10^{9} times.

According to current scientific data, the processes in magnetic fields (including the Sun) can reflect the influence of any other electromagnetic fields caused, for example, by some currents with their induced magnetic fields. The gravitational fields of the planets can not impact directly solar magnetic fields. To be more exact, even if such effects exist, modern science can not describe them. Possible changes of solar magnetic fields can be accounted for primarily by internal, solar causes, and only then, by external one, but, necessarily, of electromagnetic nature.

However, giant planets (e.g., Jupiter) have large magnetospheres, but these magnetospheres do not extend to the Sun – on the contrary, they are deformed by the solar wind, they are literally compressed by it. At least in qualitative terms, it is not correct to speak about the interaction between the magnetospheres of the Sun and planets. In fact, it is reasonable to speak here about the unilateral pressure of the magnetized solar wind on the magnetospheres of planets.

Thus, on the one hand, the situation is such that solar activity (as a magnetic phenomenon) can not reflect any impact from the magnetic fields of planets. On the other hand, gravitational fields can have no influence because of the different physical natures of magnetic and gravitational fields. Therefore, we should not expect any spatial and temporal effects of solar activity associated with outside bodies relative to the Sun – planets, comets, etc. Moreover, from a scientific point of view, we should not expect any impact on solar activity from even the most powerful physical or social processes on the Earth itself.

Solar-Terrestrial Correlations for the Most Powerful Phenomena

If one compares the most powerful manifestations of *solar activity* and extremely intense *technological and social phenomena on Earth*, important correlations may be revealed:

(a) the maximum number of sunspots for the past 400 years was in the 19th cycle (1954–1964) - at a time of the maximum total energy of global nuclear weapon testing. And what is

more, solar activity in this cycle, perhaps, was at its maximum during the last 5000 years (Nagovitsyn, 2008);

(b) the maximum of a sunspot group area (up to 5000-6000 m.s.h.) over the past 140 years occurred in 1946-1947 (Babij et al. 2011), and the first extremely large sunspot group appeared on 31 January 1946 – *about half a year after* the atomic bombardments of Hiroshima and Nagasaki (6 and 9 August 1945, respectively), see Fig. 2;

(c) the most powerful X ray flare on the Sun over the past 40 years, according to GOES data (http://www.swpc.noaa.gov), had X28 class and was on 4 November 2003 - *about 7.5 months* after the beginning of the large-scale war in Iraq (it began on March 20, 2003), Fig. 3;

(d) the most spectacular eruptive prominence (which reached the height of 1.7 million km) was observed on June, 4 1946 (Pettit, 1946) – *about ten months after* the atomic bombardment of Hiroshima and Nagasaki. Interestingly, previous exclusively powerful prominences were on September, 17 1937 (height till 1 million km) and March, 20 1938 (height till 1.55 million km).

It should be noted that the graph presented here in Figure 2 is different from that published earlier by Babij et al. (2011). This is a result of discussions with my colleagues who have extensive experience working with databases of various observatories. In particular, Lozitska (2015) found a few dozen errors in the database of Pulkovo's observatory. She concludes that the Greenwich database is not only the largest but also the most reliable one. That is why the data for Fig. 2 were derived from Greenwich only. The peak values of $S_{p,max}$ on Fig. 2 are as follows: 5202 (February 7, 1946), 6132 (April 8, 1947) and 4865 (May 19, 1951).

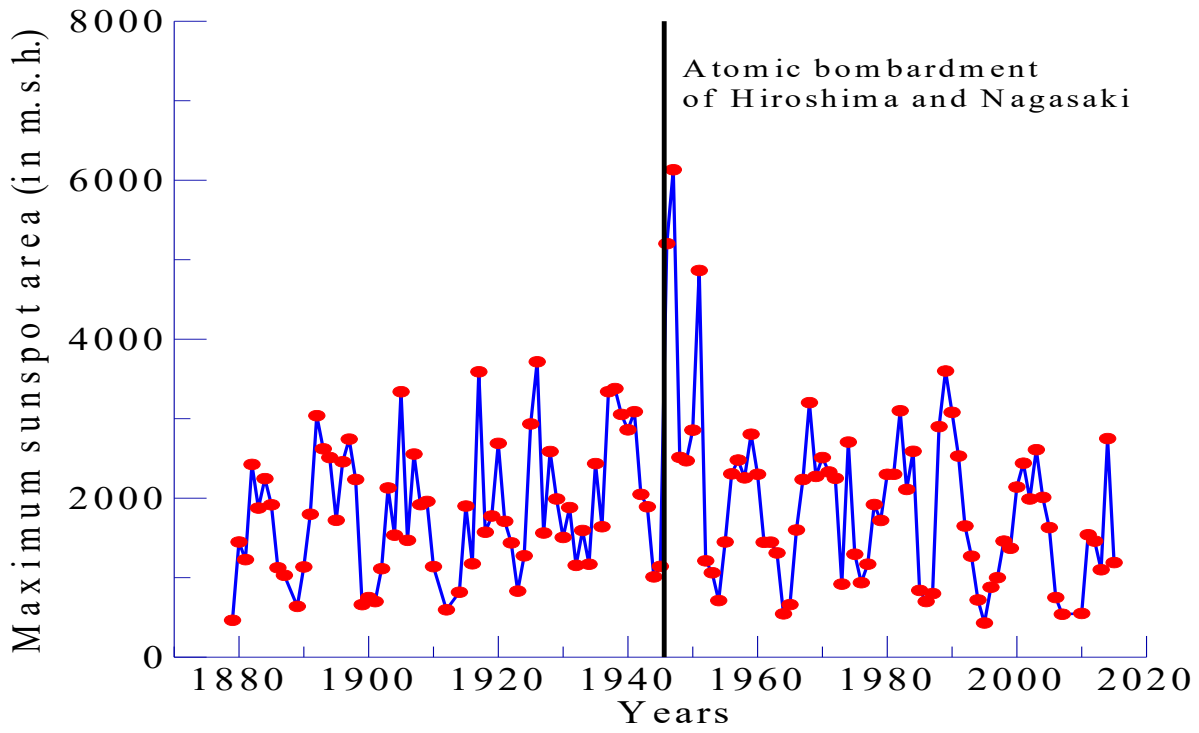

Figure 2. Comparison of maximum areas of a sunspot group (per each year), $S_{p,max}$, over the past 140 years according to Greenwich data (http://solar.science.msfc.nasa.gov/greenwich/). On the vertical axis are the corrected whole spot areas in millionths of solar hemisphere (1 m.s.h. = 3.04×10^6 km^2). One can see that immediately after 1945 there was a high and relatively short jump of $S_{p,max}$ parameter.

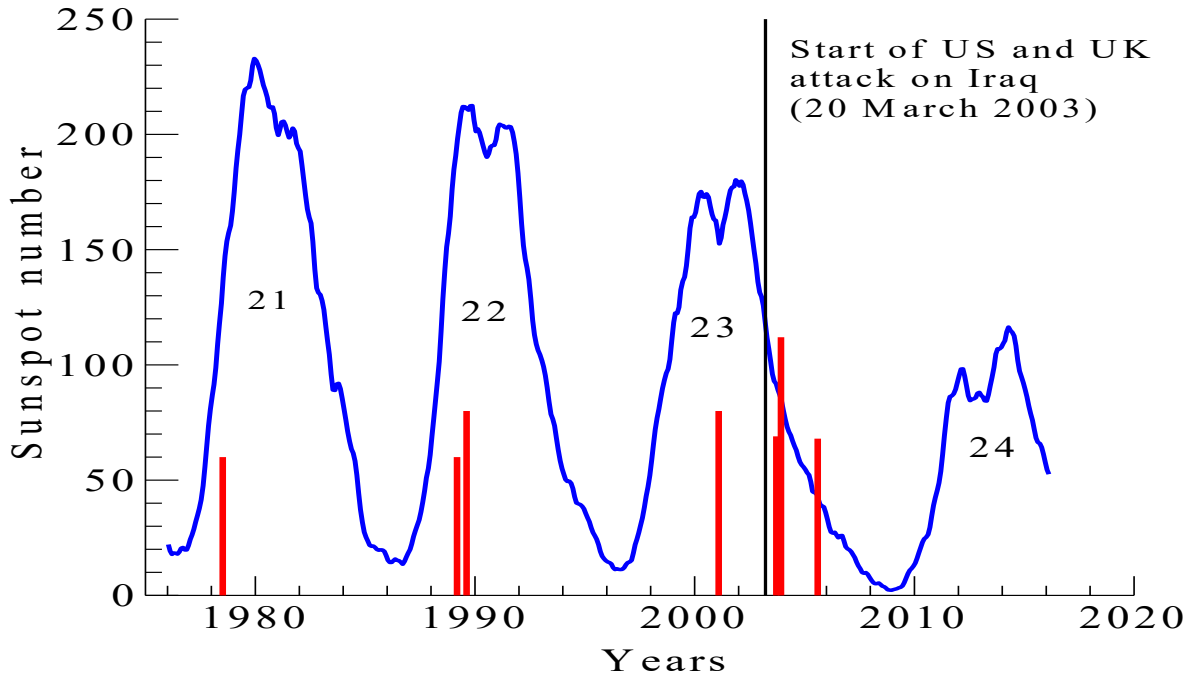

Figure 3. Comparison of changes in sunspot numbers (solid curve) with the most powerful X flares of X ≥ 15 class during the last four 11-years solar cycles (see the red vertical intervals; their lengths correspond to the class of a flare). One can see that a short time after the start of US and UK attack on Iraq in 2003 (see the black vertical line), the most powerful flare of X28 class appeared on the Sun.

Obviously, the above correlations from (a) to (d) can be purely random. The probability of random coincidences can be estimated as follows. Let us have the time interval of 400 years, and we are interested in a relatively narrow period of time, such as the 19th cycle (1954-1964) with a duration of about 10 years. What is a chance to get accidentally in this short period of time? Obviously, this probability is equal to the length ratios for specified temporal intervals, i.e., the ratio 10/400. Let us write this value via p_a, i.e. $p_a \approx 10/400 = 0.025 = 2.5\%$;

Similarly, we can estimate the probability of random coincidence for other solar-terrestrial correlations listed above.

$p_b \approx 0.5/140 = 0.0036 = 0.36\ \%$;
$p_c \approx 0.63/40 = 0.0158 = 1.58\ \%$;
$p_d \approx 0.83/50 = 0.0166 = 1.66\ \%$;

We can see that the probability of random coincidence in some cases is quite low, about 1–2% or less. But that is not all. We can ask the following question: what is the probability that all correlations occur together, that is, in full the set from (a) to (d)? According to probability theory, this is possible with a frequency equal to the result of multiplying all probabilities, that is

$$P_{a+b+c+d} = p_a\, p_b\, p_c\, p_d \approx 2.4\times10^{-8}.$$

So, we have a very small, almost zero probability. In other words, the coincidence of the above processes on the Earth and the Sun with great certainty, almost 100%, can not be considered accidental.

But then, what may be their nature?

Discussion

It is important to note that the above-named events on the Sun from (b) to (d) took place after the events on Earth. The direct impact of the Earth on the Sun seems incredible, since, for example, solar flare energies are by 4-9 orders of magnitude greater than the energy of a one megaton atomic bomb.

One can assume that this effect is the result of the presence of some unknown X factor that has the appropriate level of energy. This may be either a highly developed extraterrestrial civilization, or God.

Let us analyze these two options.

We know nothing about extraterrestrial civilizations. We do not know whether they exist. We can only assume that if they are, they have a very high level of development and energy security, and they conduct themselves here, on Earth, very carefully, trying not to interfere much with our lives. It is unlikely that they are interested in our moral, ethical and spiritual values. Rather, they are interested in the very planet Earth, with its natural resources and unique climatic conditions which are necessary for the existence of a highly developed life. They may be interested only in the fact that these conditions should not be destroyed and the planet should not turn into a trash-strewn and radioactive desert.

In contrast, from the Holy Scriptures we know that God is interested above all in a human being – the only creature on Earth which He created according to His likeness. He gave us the Scriptures in order to explain clearly and specifically how a person should live on Earth in order to be a true God's creature. God inclines us towards understanding that there are particularly valuable, sacred things present in our lives which we must protect, not destroy.

From the Bible we know that one unquestionably holy place on Earth is Palestine, where now there is the state of Israel. Another place is probably somewhere on the territory of modern Iraq where Paradise was. In the Bible there is a specific geographic linking of this place (Genesis, 2: 8–2:14):

2:8 “And the LORD God planted a garden eastward in Eden; and there he put the man whom he had formed.

2:9 And out of the ground made the LORD God to grow every tree that is pleasant to the sight, and good for food; the tree of life also in the midst of the garden, and the tree of knowledge of good and evil.

2:10 And a river went out of Eden to water the garden; and from thence it was parted, and became into four heads.

2:11 The name of the first *is* Pison: that *is* it which compasseth the whole land of Havilah, where *there is* gold;

2:12 And the gold of that land *is* good: there *is* bdellium and the onyx stone.

2:13 And the name of the second river *is* Gihon: the same *is* it that compasseth the whole land of Ethiopia.

2:14 And the name of the third river *is* Hiddekel: that *is* it which goeth toward the east of Assyria. And the fourth river *is* Euphrates.”

Thus, the place of Paradise on Earth is somewhere near the well-known rivers Tigris and Euphrates. Now it is Mesopotamia, the territory of modern Iraq. While we can not specify exactly where Paradise was in Mesopotamia, one thing is clear – the whole of this territory deserves great reverence as the Holy Place, which was given to us by God.

Specifically, this place should not have been bombed during the war in Iraq.

It is from this perspective that the nature of the correlation (c) becomes clear. God gave commands to the Sun to behave abnormally – in the form of extremely powerful flares. It is likely that those anomalies were signals for us about our big mistakes. Obviously, the creation, testing and use of nuclear weapons were other big mistake of humanity (see. the above effects

(a), (b) and (d)). Such weapons are capable, figuratively speaking, to ignite on the Earth "a little sun" with the temperature of tens of millions of degrees.

These man-made "small suns" inflict irreparable wounds on our planet – by their scorching flames and radioactive pollution they destroy a wonderful world on the Earth that, as compared to other planets, is a true paradise. People have lost the first Paradise because of the original sin, and now the threat arises of losing the second paradise...

Thus, answering the above question "Is this is an extraterrestrial civilization or God?" we have every reason to believe that this is God. That is, the abnormal phenomena of solar activity listed above were cosmic manifestations of God's Providence. His goal - to make people pay heed to the fact that something unusual and threatening is happening to Nature, and on this basis – to make them stop, think again and change their minds and behavior. To facilitate our understanding, the Sun's phenomena occurred almost immediately after great mistakes made on the Earth.

Conclusions

Thus, with a high degree of confidence it can be argued that the above-mentioned correlations point to the fact that for the last 75 years humankind has made several big blunders that significantly impair the quality of life on our Earth. Not only does God really exist, but He really cares lest we should annihilate ourselves. God's Providence exists at present, too, and, moreover, It is manifested on a cosmic scale. This Providence clearly demonstrates God's Love for us and His Desire to warn us against mistakes that can be fatal to our existence on Earth. Obviously, we need to completely change the paradigm of our activity: priority should be given to the study of all harmful effects of science and technology development, rather than the progress as the aim in itself and the guarantee our welfare. We must recognize that science has no exclusive right to the truth. Some essential part of the objective reality is reflected adequately by religion.

Hence, here out are made the following conclusions.

1. Atomic (nuclear) bombs are a great evil for our Earth and the great sin before God. Each explosion of a nuclear bomb is a small man-made sun on Earth which inflicts bleeding wounds on our planet. The Sun and other stars must shine high in the sky, but not flare up on the Earth, and they should always be there to preserve the harmony of our wonderful World.
2. As long as there are in the world atomic and hydrogen bombs, we should avoid committing another mistake that may overtax God’s patience and really lead to the end of the world. ***Never either an atomic or hydrogen bomb should explode in Iraq or in Israel, for they are the Holy Places for us given from God.***
3. In 1994, by refusing from nuclear weapons inherited from the former Soviet Union, Ukraine made an unprecedented and definitely right step. Other nations should not seek to develop and perfect nuclear weapons, but rather take all efforts to destroy them. Nations of the world should win and deserve God's Mercy and Grace rather than strive to have nuclear or other super-weapons. But we can do this only when we strictly obey God's commandments, and when we set our hearts on listening to our conscience - this quiet voice of God in each of us.

Acknowledgments. I am grateful to Prof. Ivan Klymyshyn for his useful and critical notes, and also to Dr. Volodymyr Efimenko for his help with processing databases. The author is also thankful to Prof. Viacheslav Karaban for revising the text.

References

1. Akimov, L. O., Belkina, I. L., and Bushueva, T. P. (2005). “Solar Activity during the Cycles 21–23 from X-ray and Optical Observations”, *Kinematika i Fizika Nebesnykh Tel*, Vol. 21, No. 4. 267-277.
2. Babij V.P., Efimenko V.M., and Lozitsky V.G. (2011). “Statistical Characteristics of Large Sunspots in Solar Activity Cycles 17–23”, *Kinematics and Physics of Celestial Bodies*, Vol. 27, No 4. 191–196.
3. *King James Bible online* (2016), hppt:// www.kingjamesbibleonline.org .
4. Lozitska, N.I. (2015). “The Problem of Mistakes in Databases, Processing and Interpretation of Observations of the Sun”, *Odessa Astronomical Publications,* Vol. 28, No. 2. 236–237.
5. Lozitsky V.G. (2016). “Indications of 8-Kilogauss Magnetic Field Existence in the Sunspot Umbra”, *Advances in Space Research,* Vol. 57, Iss. 1. 398–407.
6. Nagovtsyn Yu.A. (2008). Global Solar Activity on Lon-Time Scales // *Astrophysical Bull*., Vol. 63, Iss. 1. 43–55.
7. Pettit E. (1946). An eruptive prominence of record height, June 4, 1946 // *Publications of the Astronomical Society of the Pacific.* Vol. 58. 310–314.
8. Romanchuk P.R. (1981). “The Nature of Solar Cyclicity. I”, *Soviet Astronomy*, Vol. 25, No.1. 87–92.
9. Solanki S. (2003). “Sunspots: An overview”, *The Astronomy and Astrophysics Review*, Vol. 11, Iss. 2-3. 153–286.
10. Tsirulnik L.B., Kuznetsova T.V., and Oraevsky V.N. (1997). “Forecasting the 23rd and 24th Solar Cycles on the Basis of MGM Spectrum”, *Advances in Space Research*, Vol. 20, Iss. 12. 2369–2372.