Research Article

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2024.57.008994

Solar Alpha Particle Radiation Affects Human Psyche and Behavior – Examples of Mental and Behavioral Disorders Mortality in the European Union

Nikolay Takuchev*

Associate professor, Trakia University, Stara Zagora, Bulgaria

***Corresponding author:** Nikolay Takuchev, Associate professor, Trakia University, Stara Zagora, Bulgaria

ARTICLE INFO

Received: June 27, 2024

Published: July 05, 2024

Citation: Nikolay Takuchev. Solar Alpha Particle Radiation Affects Human Psyche and Behavior – Examples of Mental and Behavioral Disorders Mortality in the European Union. Biomed J Sci & Tech Res 57(3)-2024. BJSTR. MS.ID.008994.

ABSTRACT

A dangerous phenomenon for humanity is described. In the joint analysis of data from satellites in orbit around the Earth and from the health statistics source EUROSTAT, it became clear that, by some mechanism, flows of positively charged particles with high energy entering the Earth's orbit increase mortality on the planet's surface. The increase in mortality is in a zone of maximum risk in the Northern Hemisphere, parallel to the equator and bounded by the parallels of 30° and 60° north latitude. Examples are given for the European Union mortality from several mental and behavioral causes of death, confirming the described phenomenon. A hypothetical mechanism based on observational evidence has been proposed, according to which this dangerous phenomenon is due to solar alpha particles of high energy sufficient to overcome the atmosphere's resistance and reach the Earth's surface in a limited area of maximum death impact.

Keywords: Mortality; Mental and Behavioral Mortality; Satellites GOES; Cosmic Alpha Radiation; EUROSTAT

Introduction

Human history is accompanied by acts of violence – political and criminal assassinations, revolutions, and wars. These social phenomena are so common that they have become basic markers of history. The reasons for their occurrence excite a wide range of researchers – historians, sociologists, psychologists, but also representatives of the exact sciences. Psychologist Persinger defined the aggressiveness that underlies violence as intrinsic to human beings. He describes human beings as „extremely aggressive animals" [1]. Many researchers are looking for a possible external cause for changes in human behavior and a broader sense – in addition to changing aggressiveness towards the outside world, aggressiveness towards oneself expressed in self-injury, changes in attention leading to car accidents and industrial accidents, brief losses of consciousness leading to falls, drowning, poisoning, etc. The first Russian astronomer Alexander Chizhevsky in the 20s of the 20th centuries directed public attention with examples of time coincidences between the manifestations of aggressive behavior – wars, revolutions, assassinations, with the maxima in solar activity, and the manifestations of economic and cultural growth with the minima in solar activity [2]. The periods with maximum solar activity are defined as connected to „uprisings and rebellions mostly ended up in collectivist, totalitarian systems, that appealed to group hysteria, violent mob rule, and imperialism" (Sacha Dobler, [3]). (Persinger, et al. [1,2]) reasoned about a possible connection between solar activity and wars.

(Partonen, et al.) speculated on a possible relationship between suicides in Finland, seasons, and solar activity, and found marked seasonality (maximum in spring) and some influence of solar activity [4]. Alania et al. studied the influence of some external factors on car accidents in Poland during the period 1990 – 1999 [5]. They find a connection with some geomagnetic parameters but no connection with solar activity. Chibrikin et al. tracked daily changes in criminal acts in Moscow, Russia for 14 years [6]. They found a correlation with geomagnetic activity. In the present work, a hitherto unexplored factor affecting the human psyche and behavior is proposed – flows of solar corpuscular radiation with a positive charge and high ener-

Copyright@ : Nikolay Takuchev | Biomed J Sci & Tech Res | BJSTR.MS.ID.008994.

gy, sufficient to penetrate to the earth's surface, where it affects the biosphere, in particular, humans. A series of publications [7-26] discussed the presence of a high correlation between the flows of positively charged particles with high kinetic energy recorded from satellites in the Earth orbit and mortality on the Earth's surface from many diseases. The main focus of the mentioned publications was on the effect of solar alpha radiation on mortality from diseases, killer number one of mankind – those of the circulatory system. The harmful effects of positive solar corpuscular radiation are also observed on many other organs and systems in the human organism, turning this invisible effect into one of the main causes of death for humanity. The mentioned dangerous phenomenon of cosmic origin is unevenly spread on the planet's surface.

Europe and the Mediterranean are among the most affected. However, in [7-26] are described many examples, where this phenomenon is also observable in several countries from the Northern Hemisphere – Asia, America, and even Africa. This phenomenon would be expected to influence mortality in countries south of the Equator, but mortality statistics for them are scarce, unreliable, or absent, preventing reliable inferences about such an influence in the Southern Hemisphere. The described phenomenon is not observed in the statistical data of large countries such as the USA, Russia, and China. This (at least for the USA [16]) is due to masking of the phenomenon in the general statistics for the large country if the cause acts on a limited area smaller than the country and for a limited time – lasting much less than data averaging periods for statistical purposes. The European Union has a tradition of maintaining reliable mortality statistics, in which the discussed multifaceted influence of solar positive corpuscular radiation on mortality stands out clearly. Below, based on data from mortality statistics in the European Union, the unexpected association between solar alpha radiation and mortality from many mental and behavioral causes of the social phenomena listed above is shown. The mortality statistic of the European Union is suitable for the study because it is based on statistical regions, smaller than a country, but still big enough, to include a statistically sufficient number of inhabitants.

The emission frequency of said radiation depends on the phase of the 11-year cycle of solar activity, which is why the processes that this radiation causes are also influenced by the phase of solar activity.

Material and Methods

Mortality Data

The analysis below is based on an authoritative source of health data – EUROSTAT [27]. In the study, the parameter annual mortality rate – number of deaths per 100,000 inhabitants was used as a characteristic of mortality. EUROSTAT offers free access to data on mortality rates from causes in the countries of the European Union, the European Economic Area, and the candidate countries for membership in the union. Geographically, these countries occupy Europe and the Mediterranean. Data are grouped by NUTS (Nomenclature Des Unités Territoriales Statistiques in French, the nomenclature of territorial units for statistics). In the study, mortality data from the EUROSTAT shortlist in which mortality rates are grouped by causes of death into 92 groups, mostly diseases, were used. The groups are related to the classes in the International Disease Classifier ICD-10, (10th revision). The shortlist contains mortality data for EU countries (NUTS-1) and EU regions (NUTS-2, smaller areas of the larger NUTS-1 countries). Currently (2023) the shortlist includes mortality rate data for the interval 2011 – 2020. Annual mortality rate data were extracted for 396 European regions (NUTS-2) separately from each of the EUROSTAT shortlist groups for the interval 2011 – 2019 (the last pre-pandemic year).

Satellite Data

Satellite data on positive charged corpuscular radiation – protons and alpha particles recorded by the satellites of the series GOES (Geostationary Operational Environmental Satellites) were obtained from a NOAA site [28].

The satellites of the GOES series fly in geostationary orbit (above the Earth's equator), at an altitude of 36,000 kilometers above the Earth's surface, make one lap in 24 hours, that is, they „hang" over a certain point on the Earth's surface and are not shade by the Earth at their circumference around it. Data on alpha-particle and proton fluxes (unit: (number of particles).$cm^{-2}.s^{-1}.sr^{-1}.MeV^{-1}$) with energies of the range 3.8 – 21.3 MeV were used. The fluxes were recorded by the satellite high-energy particle detectors: 1. Energetic Particles Sensor (EPS), and 2. Energetic Proton, Electron, and Alpha Detector (EPEAD). The data are available averaged over a 5-minute interval, during which there are up to 25 reports of the instrument.

Data Processing

The correlation coefficients [29] between the annual averaged alpha radiation flux and the annual mortality rate were calculated. Maps were created showing (with black isolines) the distributions of the annual mortality for 14 EUROSTAT shortlist death causes, discussed below. Maps included data from 396 NUTS-2 European regions for 2012, the year with the highest solar activity in the studied time interval 2011 – 2019. With red isolines, the maps show the distribution across the territory of Europe and the Mediterranean of the correlation coefficient between the annual mortality rate from separate causes of mortality with the annually averaged alpha particle flux for the period 2011 - 2019. Data on the coordinates, latitude, and longitude [Google Earth] of the centroids of the NUTS-2 regions included in the study were used in the map. Mapping was performed with Golden Software Surfer10. The kriging interpolation procedure was selected. In mathematical statistics, the level of statistical significance [29] is a parameter, indicating the degree of reliability of the calculated correlation coefficient. The smaller the number of this parameter, the more reliably the correlation coefficient is established, i.e. the more reliably a cause-and-effect relationship has been established, in the case between the annual flux of solar alpha radiation and mortality rate from a given cause. The correlation coefficient and

the level of statistical significance are related. For the 9 years included in the study, a minimum correlation coefficient of 0.668 corresponds to a statistical significance level of 0.05 [29].

In scientific studies, a level of statistical significance no greater than 0.05 is accepted as a criterion for the acceptable reliability of the correlation coefficient. The red isolines on the correlation coefficient distribution in the maps enclose the regions with statistically significant values of the correlation coefficients around and up to a significance level of 0.05. Correlation coefficients with a significant level above the acceptable one (less than 0.05) are of high reliability (the higher the number, the lower the significance level) i.e. the existence of a causal relationship between cosmic alpha radiation and mortality rate from a given cause can be considered reliably established in the mentioned map areas enclosed by red isolines on the correlation coefficient. If there is a coincidence for some of the maxima for mortality rate and correlation coefficients, then in the region of these maxima, the impact of alpha radiation contributes noticeably to the mortality from the given cause. Three levels of statistical significance were used to classify the impact of solar corpuscular radiation on each of the EUROSTAT shortlist causes of death:

1. A causal relationship between radiation and the cause of death is most reliably established if the correlation coefficient has a significance level of 0.001,

2. An intermediate reliability of the relationship is present at a significance level of 0.01,

3. An acceptable reliability of the relationship is present at a significant level of 0.05.

The strength of the influence of radiation on a particular cause of death was characterized by a weighted sum between three components:

- The product of the number of regions with significant correlation coefficients with a significance level of 0.001, with a weighting factor of 3. For example, the cause of death under number 88 in the EUROSTAT shortlist "Intentional self-harm" has one region with a correlation coefficient with a significance level of 0.001 which contributes to the mentioned amount by 1 * 3 = 3.

- The product of the number of regions with significant correlation coefficients at a significance level of 0.01, with a weighting factor of 2. For the same cause of death, there are 10 regions with correlation coefficients at a significance level of 0.01, i.e. their contribution to the said amount is 2*10=20.

- The product of the number of regions with significant correlation coefficients at a significance level of 0.05, with a weighting factor of 1. For the same cause of death, there are 32 regions with correlation coefficients at a significance level of 0.05, i.e. their contribution to the said amount is 1*32=32.

The total sum (strength of the impact index) of the three components is 3+20+32=55, and the power of solar corpuscular radiation on suicide mortality is 55. For all causes of death in the EUROSTAT shortlist, the corresponding impact strength was calculated and the list of causes of death was ordered in descending order by the strength of radiation influence on the causes of death. To the extent that the hypothetical mechanism proposed below explaining the observed phenomenon assumes that charged particles of high energy pass through the atmosphere and reach the Earth's surface, the energy required for this was calculated from databases and calculators PSTAR and ASTAR [30,31]. Geomagnetic field data were obtained from the INTERMAGNET site [32].

Results

The described dangerous phenomenon is observed in the form of dependence between the annual average flux of radiation from positively charged particles with high kinetic energy, recorded by satellites in orbit around the Earth, and the annual mortality rate in the statistics of several countries from all continents in the Northern Hemisphere. The countries in whose mortality statistics the phenomenon is observed are in a zone parallel to the equator with approximate boundaries along the parallels of 30° and 60° north latitudes. It is observed in the annual mortality statistics of small countries. It is not noticeable in the statistics of large countries in the same zone. It can be inferred that the impact on the Earth's surface is short-lived and over a limited area the size of a small country but is masked in large country statistics because it does not affect the entire area of the large country at the same time. This conclusion is confirmed for the USA, for which there is data on mortality in individual states [16]. For particle energies of the order of 3.8 – 21.3 MeV, the year-averaged fluxes of protons and alpha particles are highly correlated, i.e. the studied phenomenon of lethality is noticeable in both the mean proton flux and the mean alpha particle flux data. In the examples below an averaged stream of high-energy alpha particles is included as the incident radiation.

The figures below are arranged in descending order of the effects of radiation on the causes of death in the EUROSTAT shortlist. First on the list (not presented here) are diseases of the circulatory system and some malignant neoplasms. "Intentional self-harm" is one of the most strongly influenced by positive solar corpuscular radiation causes of death (8th in the arranged by solar radiation influence EUROSTAT shortlist with 92 causes of death). Apparently, the impact is through effects on the human psyche. Figure 1 shows for the Europe and Mediterranean the distribution for 2012 of the mortality rate for EUROSTAT shortlist 88 deaths cause „Intentional self-harm (black isolines) and the distribution of the statistically significant correlation coefficient between solar alpha particle fluxes and the mortality rate for „Intentional self-harm"(red isolines). A pronounced effect – a statistically significant coincidence between areas with increased annual intentional self-harm mortality and its correlation with annual alpha radiation flux is observed in Central and Eastern Europe – Bulgaria, Baltic countries, Central and Southern Italy, the Czech Republic, Hungary, and Poland.

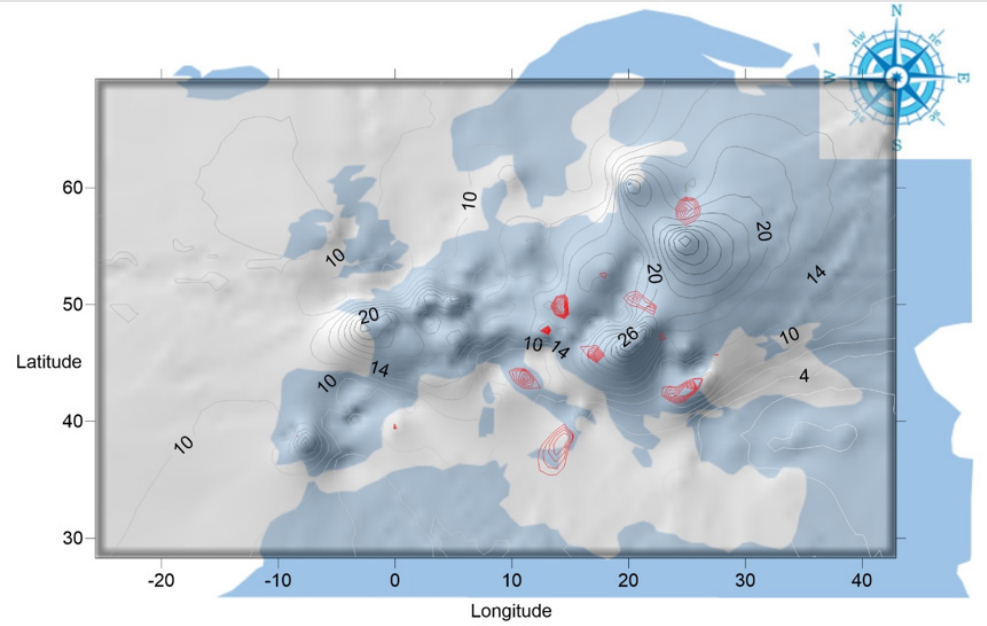

Figure 1: Europe and the Mediterranean, the Eurostat shortlist number 88 „Intentional self-harm" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 55, 8th in the ranking of the influence of radiation on the causes of death in the EUROSTAT shortlist.

Maybe Jan Palach, Jan Zaits, and Evzhen Plotsek, who committed suicide in 1969 in a protest against the occupation of Czechoslovakia by armies of socialist countries were victims of solar radiation too? Figure 2 and all graphs below show the time dependence in the interval 2011 – 2019 of two numerical sequences:

1. Of the recorded annual fluxes of alpha particles from satellites of the GOES series – 13, 14, and 15, and,

2. Of the several examples of EUROSTAT shortlist annual mortality rate for some of the NUTS-2 regions of the European Union. Figure 2 shows an example of correlated changes in alpha radiation flux with the "Intentional self-harm" mortality rate for Praha, Czech Republic. EUROSTAT shortlist number 90 „Assault" mortality rate is the next external cause of death significantly affected by solar corpuscular radiation, 29th in the arranged Eurostat shortlist – in the first one-third of the arranged shortlist. Apparently, again through an impact on the human psyche, positive solar corpuscular radiation unleashes aggression. Central Europe and the British Isles are mainly affected, (Figures 3 & 4). EUROSTAT shortlist number 84 „Transport accidents (V01-V99, Y85)" mortality rate is the next external cause of death affected by solar corpuscular radiation, 40th in the arranged Eurostat shortlist – in the middle of the arranged shortlist. Apparently, the impact is through impaired attention and delayed reactions. Belarus, Lithuania, and the British Isles are mainly affected (Figures 5 & 6). EUROSTAT shortlist number 85 „Other accidents (W20-W64, W75-X39, X50-X59, Y86)" mortality rate is the next external cause of death affected by solar corpuscular radiation, 44th in the arranged EUROSTAT shortlist – in the middle of the arranged shortlist. Apparently, the impact is through impaired attention and delayed reactions. The mountain countries Bulgaria and Switzerland are mainly affected, (Figures 7 & 8).

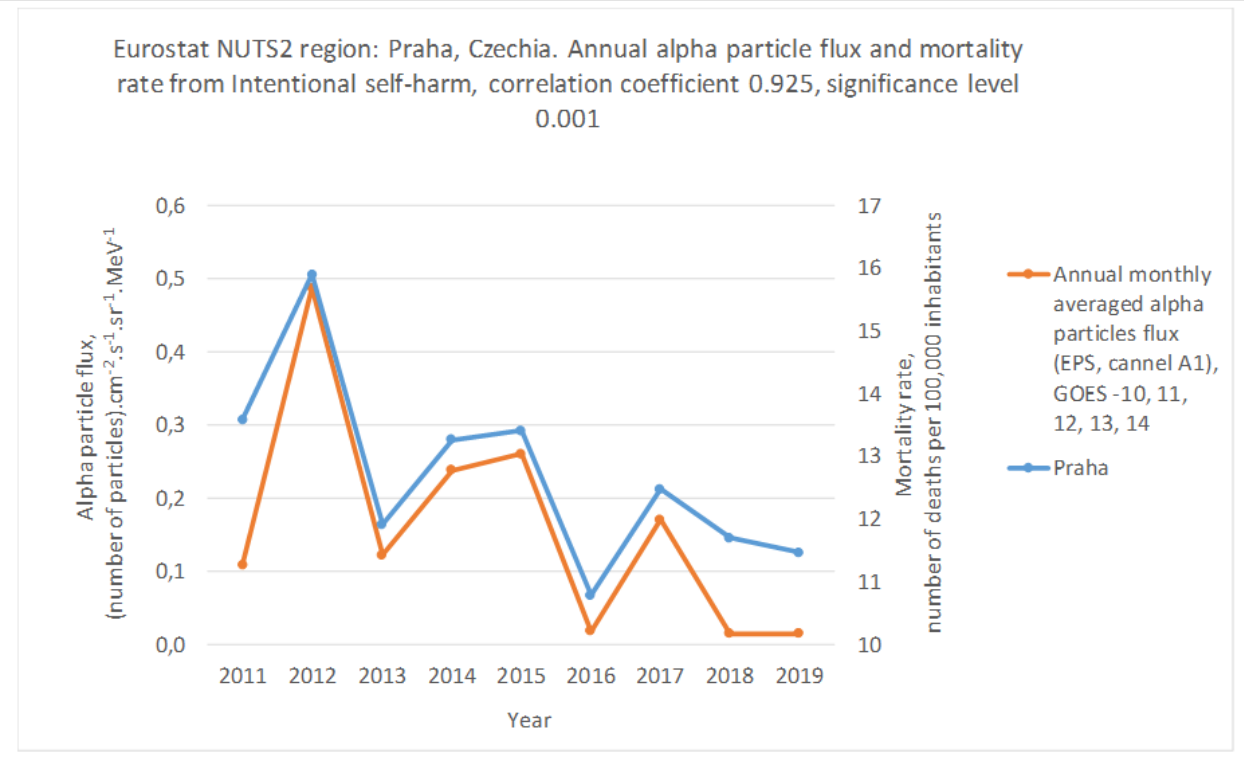

Figure 2: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 88 „Intentional self-harm" mortality rate for the EUROSTAT NUTS-2 region Praha, Czechia, indicates the presence of a causal relationship between the two phenomena.

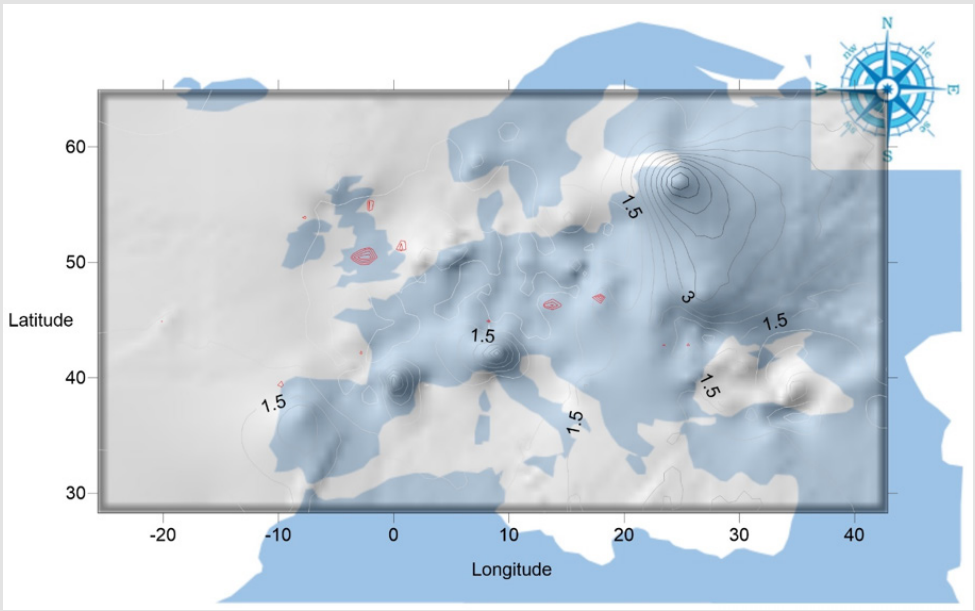

Figure 3: Europe and the Mediterranean, the Eurostat shortlist number 90 „Assault" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 39, 29th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

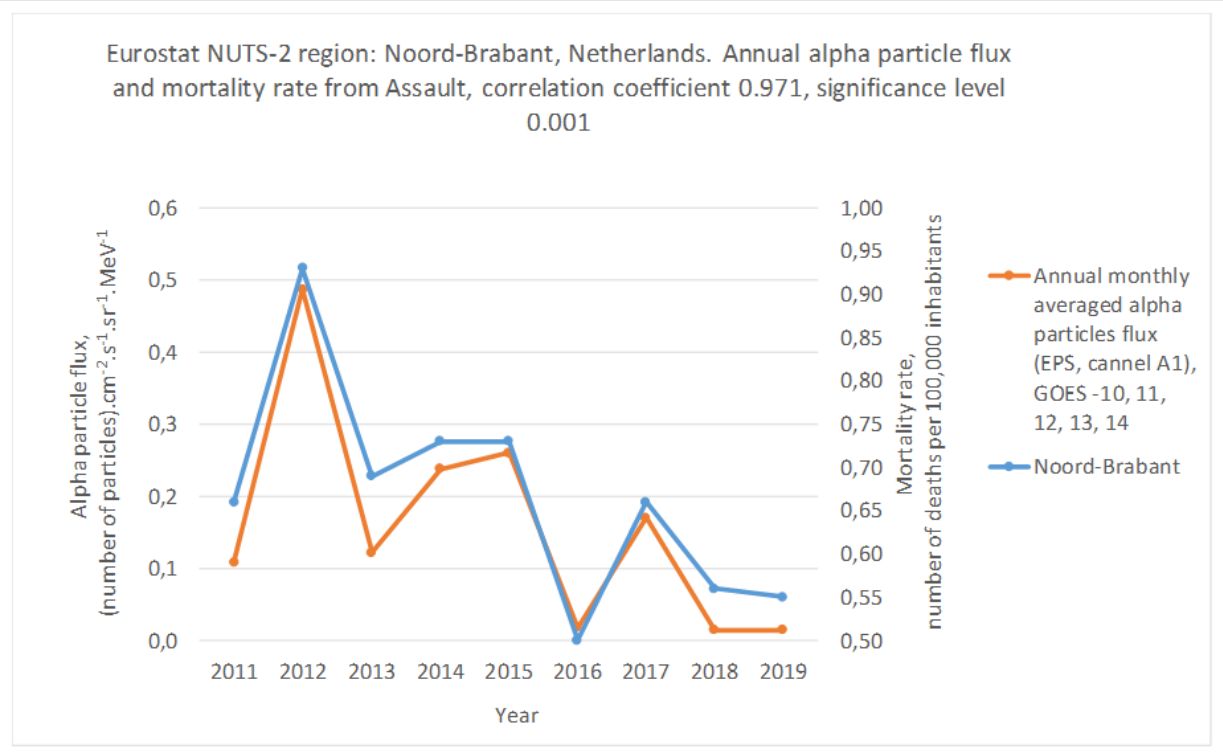

Figure 4: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 90 „Assault" mortality rate for the EUROSTAT NUTS-2 region Noord-Brabant, Netherlands, indicates the presence of a causal relationship between the two phenomena.

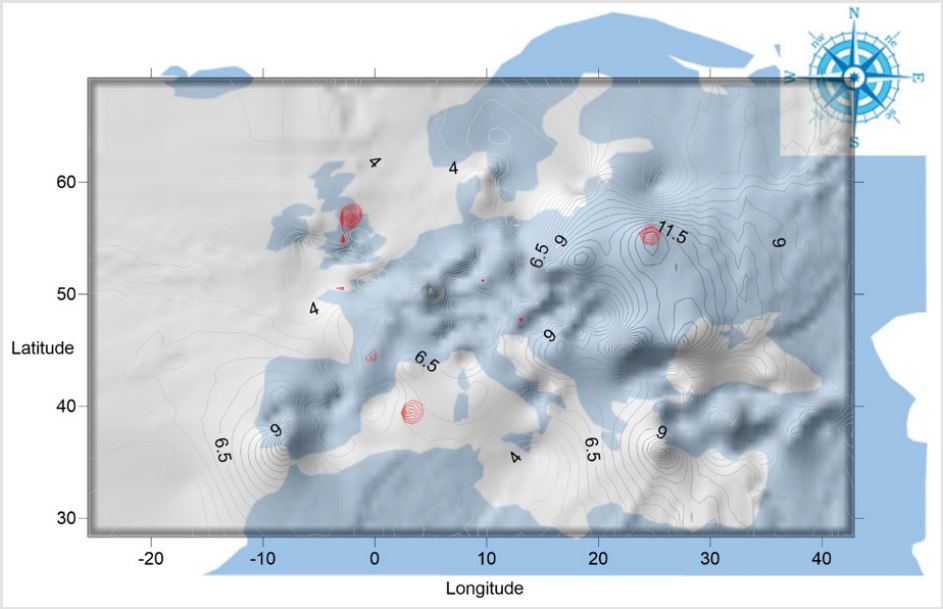

Figure 5: Europe and the Mediterranean, the Eurostat shortlist number 84 „Transport accidents (V01-V99, Y85)" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 34, 40th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

 DOI: 10.26717/BJSTR.2024.57.008994

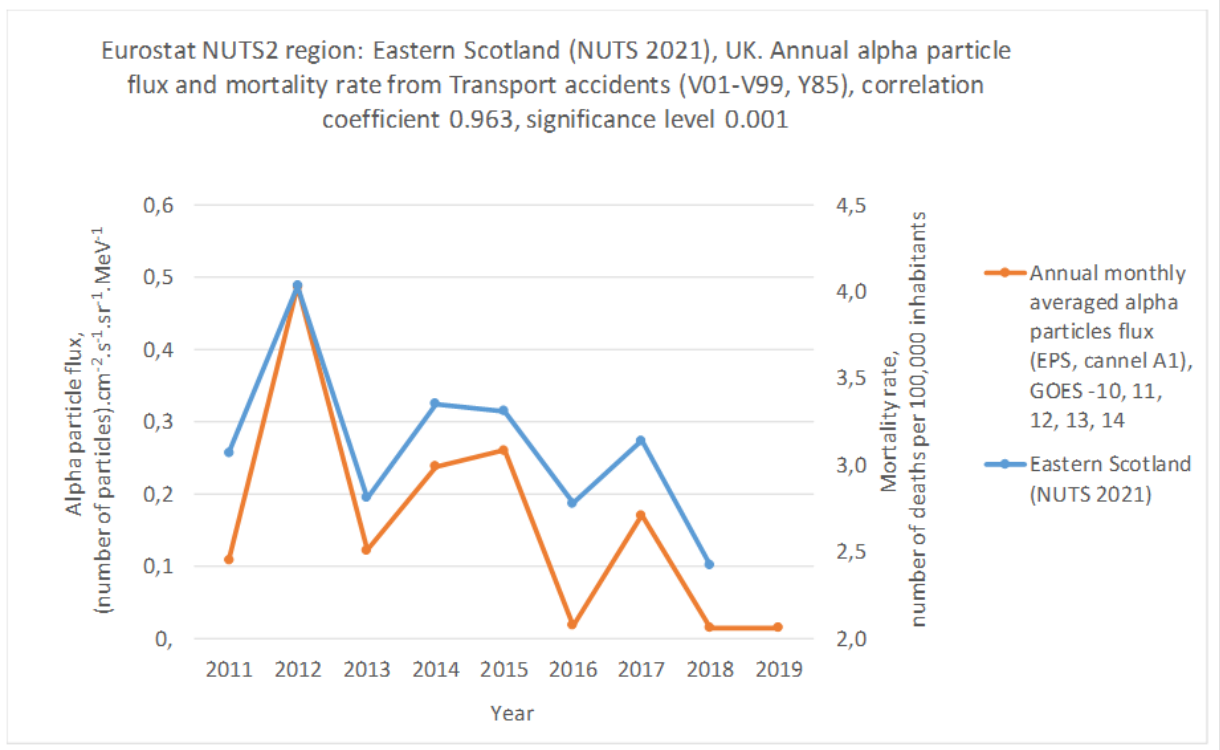

Figure 6: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 84 „Transport accidents (V01-V99, Y85)" mortality rate for the EUROSTAT NUTS-2 region Eastern-Scotland (NUTS 2021), United Kingdom, indicates the presence of a causal relationship between the two phenomena.

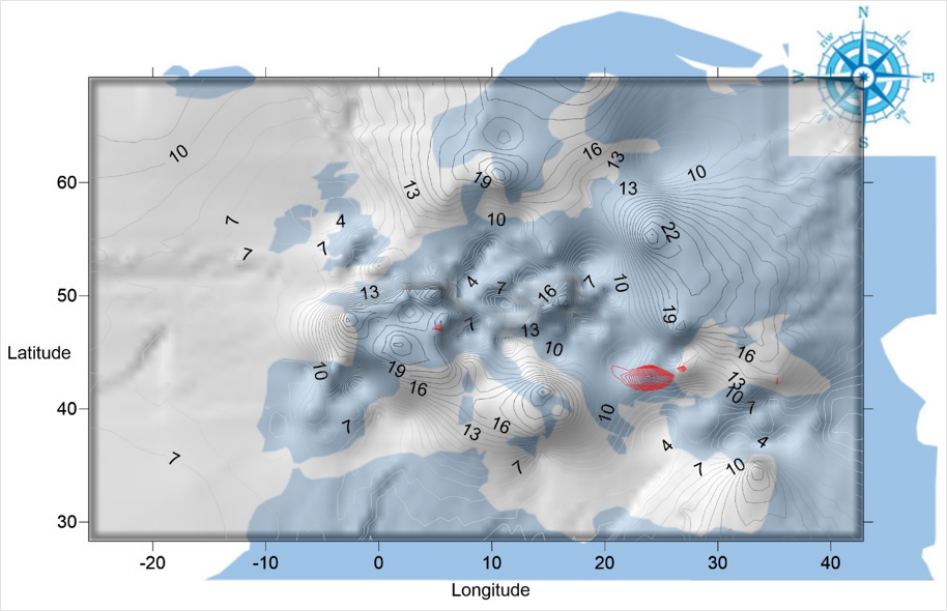

Figure 7: Europe and the Mediterranean, the Eurostat shortlist number 85 „Other accidents (W20-W64, W75-X39, X50-X59, Y86)" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 32, 44th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

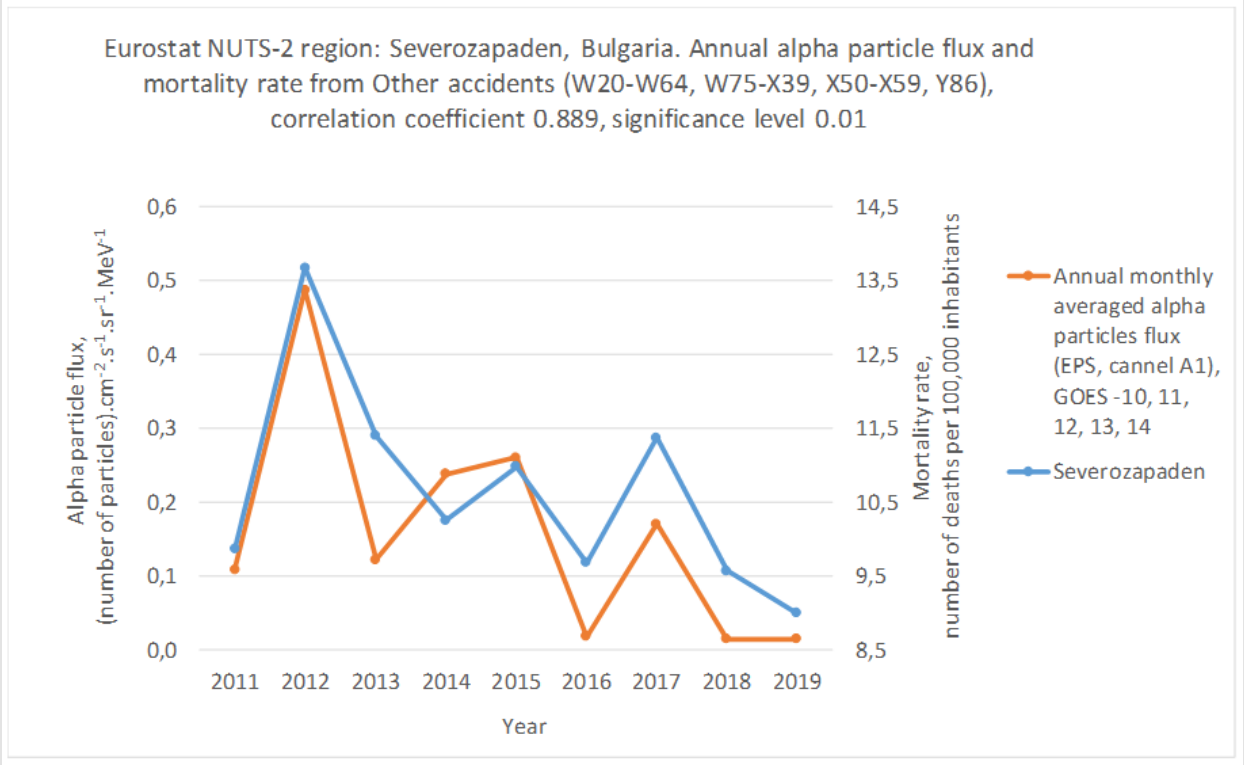

Figure 8: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 85 „Other accidents (W20-W64, W75-X39, X50-X59, Y86)" mortality rate for the EUROSTAT NUTS-2 region Severozapaden, Bulgaria, indicates the presence of a causal relationship between the two phenomena.

EUROSTAT shortlist number 82 „External causes of morbidity and mortality (V01-Y89)" mortality rate is the next external cause of death affected by solar corpuscular radiation, 54th in the arranged EUROSTAT shortlist – in the middle of the arranged shortlist. The impact is apparently through mental influence, impaired attention, and delayed reactions. Bulgaria and Latvia are mainly affected (Figures 9 & 10). EUROSTAT shortlist number 83 „Accidents (V01-X59, Y85, Y86)" mortality rate is the next external cause of death affected by solar corpuscular radiation, 55th in the arranged EUROSTAT shortlist – in the middle of the arranged shortlist. The impact is apparently through mental influence, impaired attention, and delayed reactions. Bulgaria, Latvia, and France are mainly affected, (Figures 11 & 12). EUROSTAT shortlist number 87 „Accidental drowning and submersion" mortality rate is the next external cause of death affected by solar corpuscular radiation, 56th in the arranged EUROSTAT shortlist – in the middle of the arranged shortlist. The impact is apparently through mental influence, impaired attention, delayed reactions, and momentary loss of consciousness. The South Balkans, South Italy, and the West Mediterranean are mainly affected (Figures 13 & 14). EUROSTAT shortlist number 86 „Falls" mortality rate is the next external cause of death affected by solar corpuscular radiation, 60th in the arranged EUROSTAT shortlist – in the middle of the arranged shortlist. The impact is apparently through mental influence, impaired attention, delayed reactions, and momentary loss of consciousness.

 DOI: 10.26717/BJSTR.2024.57.008994

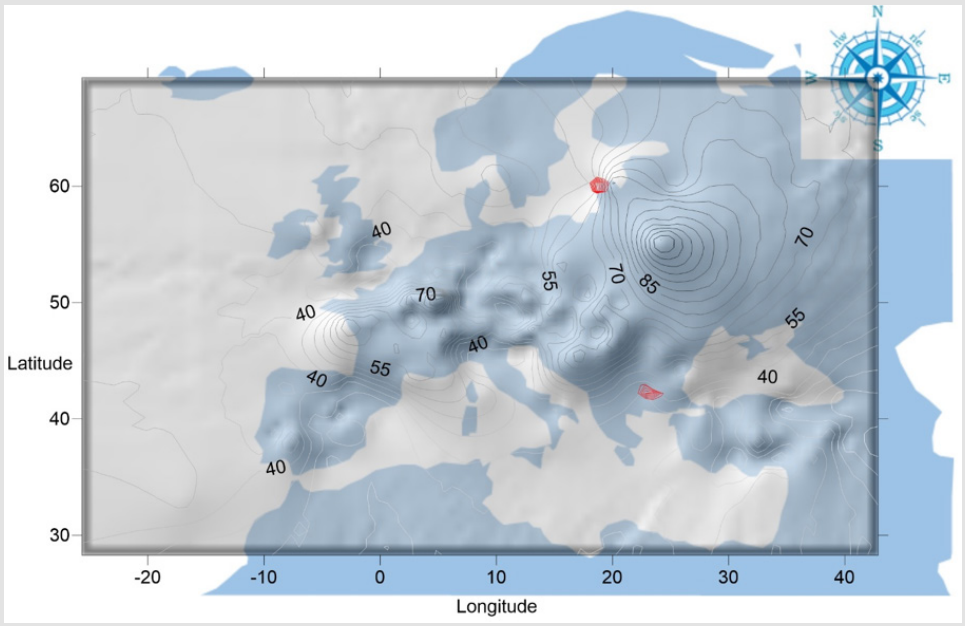

Figure 9: Europe and the Mediterranean, the Eurostat shortlist number 82 „External causes of morbidity and mortality (V01-Y89)" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 26, 54th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

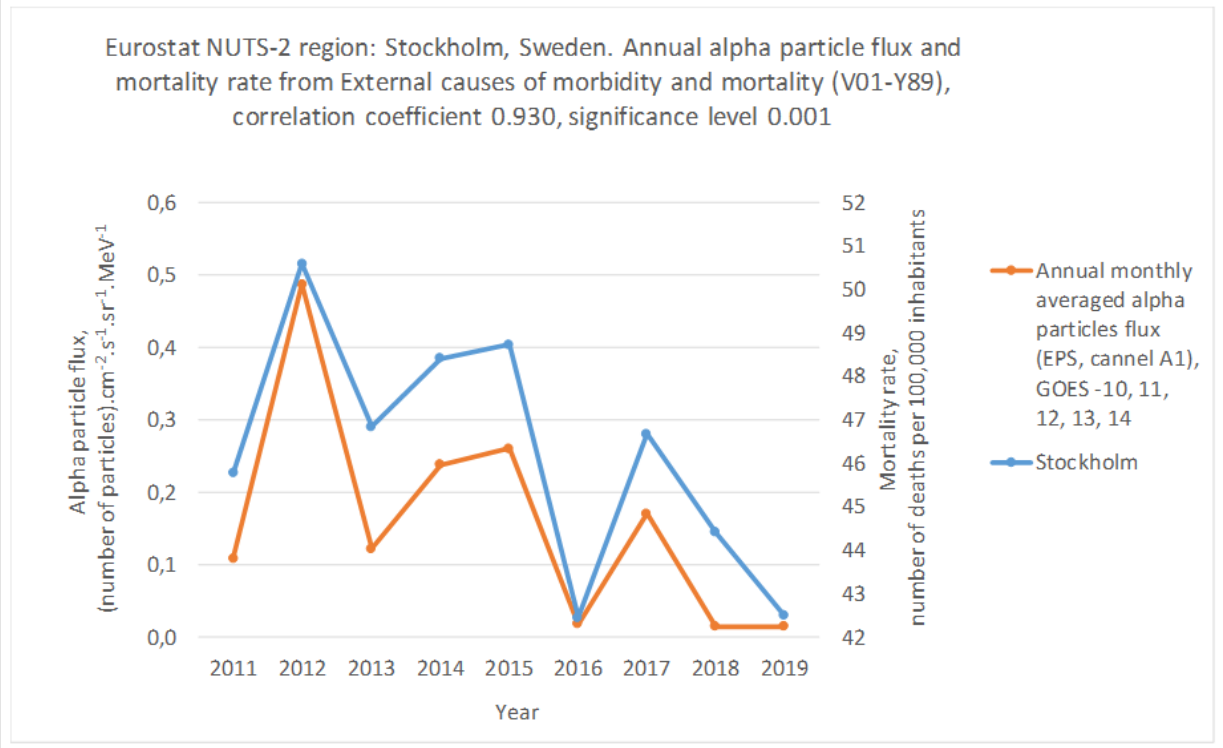

Figure 10: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 82 „External causes of morbidity and mortality (V01-Y89)" mortality rate for the EUROSTAT NUTS-2 region Stockholm, Sweden, indicates the presence of a causal relationship between the two phenomena.

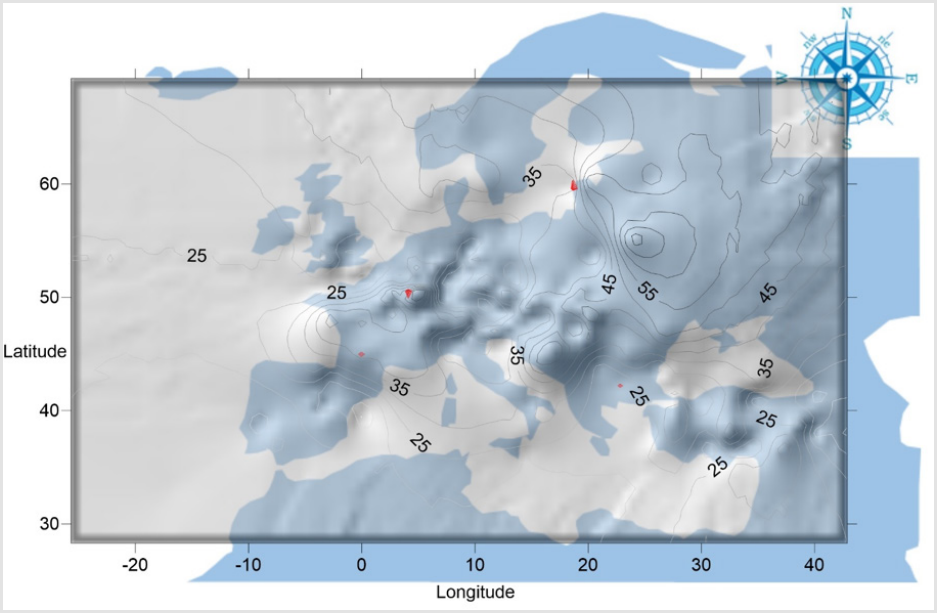

Figure 11: Europe and the Mediterranean, the Eurostat shortlist number 83 „Accidents (V01-X59, Y85, Y86)" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 26, 55th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

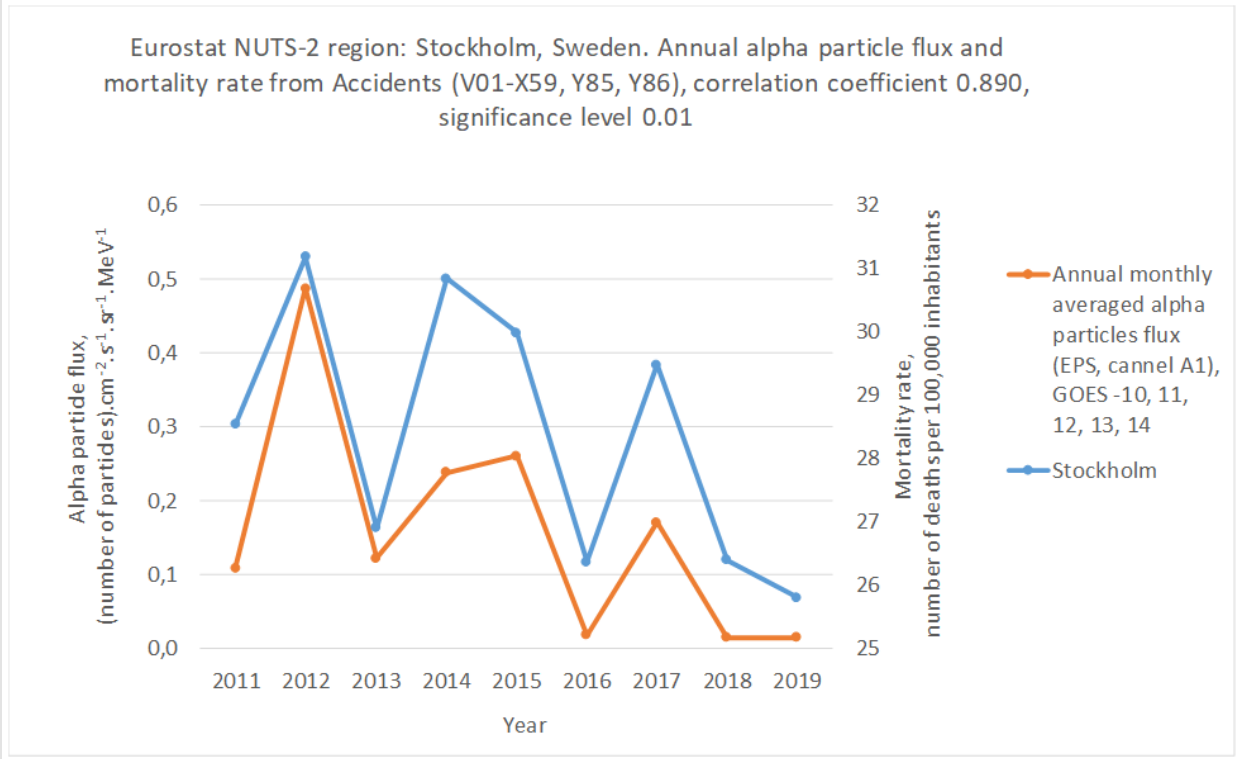

Figure 12: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 83 „Accidents (V01-X59, Y85, Y86)" mortality rate for the EUROSTAT NUTS-2 region Stockholm, Sweden, indicates the presence of a causal relationship between the two phenomena.

 DOI: 10.26717/BJSTR.2024.57.008994

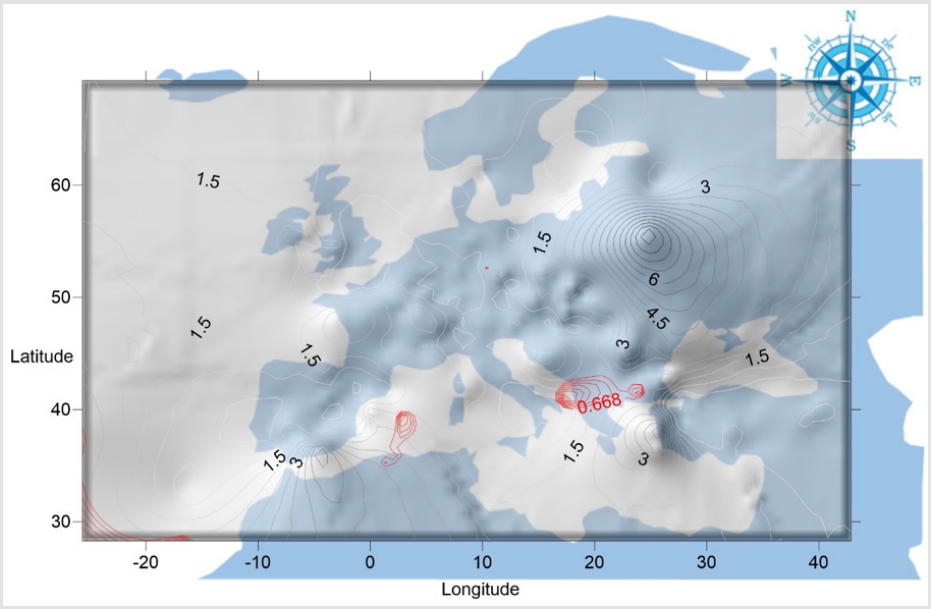

Figure 13: Europe and the Mediterranean, the Eurostat shortlist number 87 „Accidental drowning and submersion" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 25, 56th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

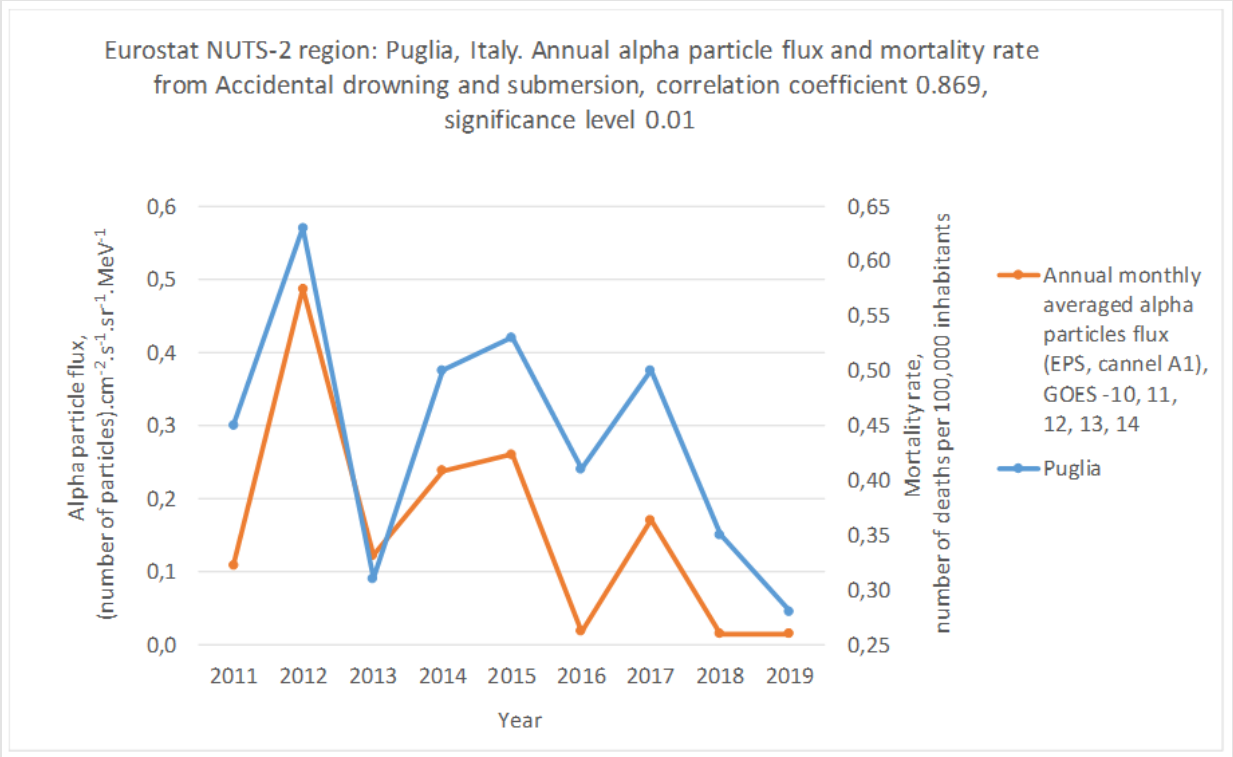

Figure 14: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 87 „Accidental drowning and submersion" mortality rate for the EUROSTAT NUTS-2 region Puglia, Italy, indicates the presence of a causal relationship between the two phenomena.

South Italy and Latvia are mainly affected (Figures 15 & 16). EUROSTAT shortlist number 89 „Accidental poisoning by and exposure to noxious substances" mortality rate is the next external cause of death affected by solar corpuscular radiation, 64th in the arranged EUROSTAT shortlist – in the middle of the arranged shortlist. The impact is apparently through mental influence, impaired attention, delayed reactions, and momentary loss of consciousness. Lithuania, Switzerland, Central Italy, and Western France are mainly affected (Figures 17 & 18). EUROSTAT shortlist number 41 „Other mental and behavioral disorders (remainder of F00-F99)" mortality rate is the next external cause of death affected by solar corpuscular radiation, 65th in the arranged EUROSTAT shortlist – in the last third of the arranged shortlist. The impact is apparently through mental influence. An example is shown for Istanbul, Turkiye (Figure 19). EUROSTAT shortlist number 39 „Mental and behavioral disorders due to use of alcohol" mortality rate is the next external cause of death affected by solar corpuscular radiation, 69th in the arranged EUROSTAT shortlist – in the last third of the arranged shortlist. The impact is apparently through mental influence. An example is shown for Belgium (Figure 20). EUROSTAT shortlist number 40 „Drug dependence, toxicomania (F11-F16, F18-F19)" mortality rate is the next external cause of death affected by solar corpuscular radiation, 83rd in the arranged EUROSTAT shortlist – in the last third of the arranged shortlist. The impact is apparently through mental influence. Affected are many countries in a wide zone – from the Mediterranean to Scandinavia, from Turkiye and Ukraine to British islands (Figures 21 & 22).

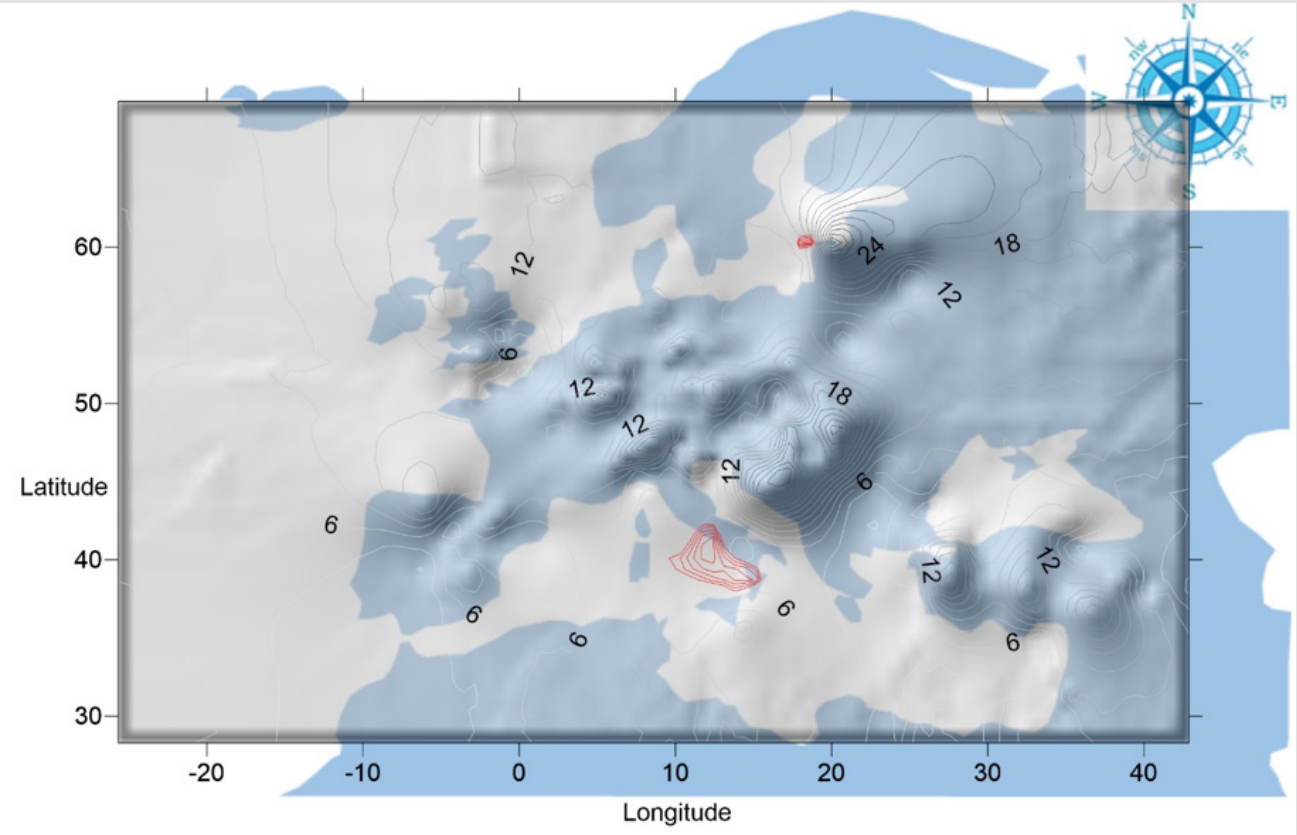

Figure 15: Europe and the Mediterranean, the Eurostat shortlist number 86 „Falls" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 24, 60th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

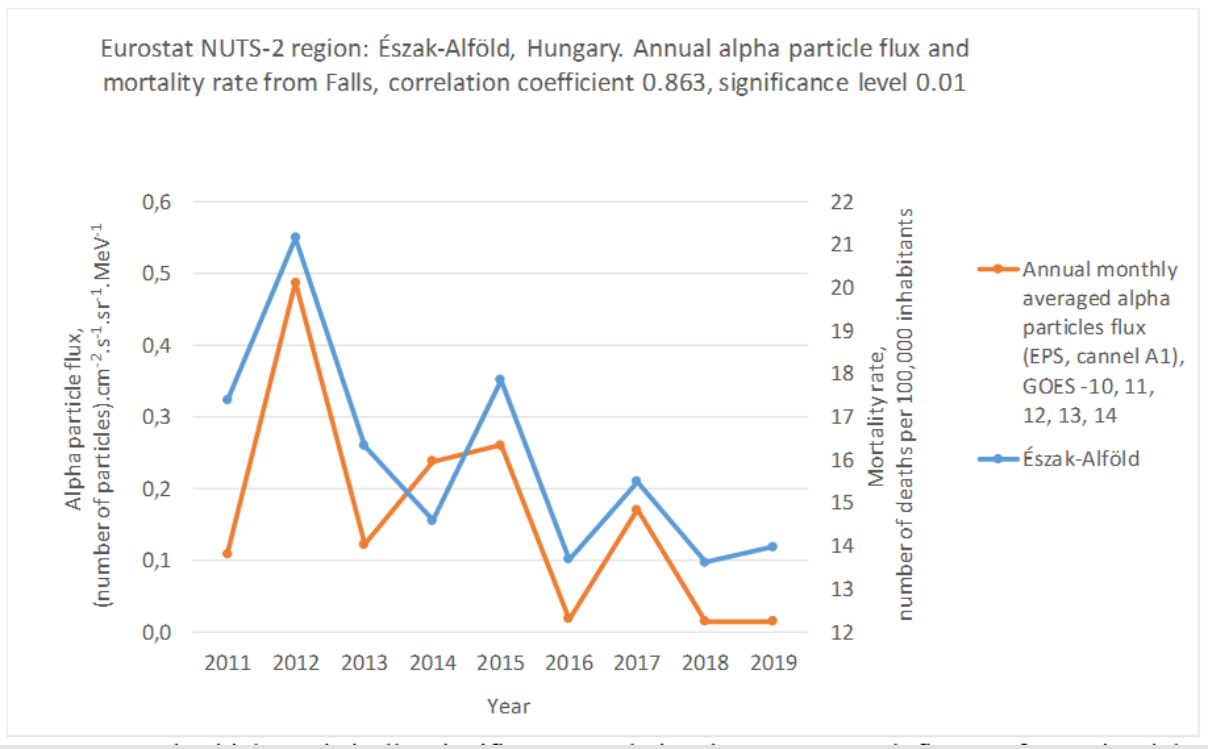

Figure 16: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 86 „Falls" mortality rate for the EUROSTAT NUTS-2 region Észak-Alföld, Hungary, indicates the presence of a causal relationship between the two phenomena.

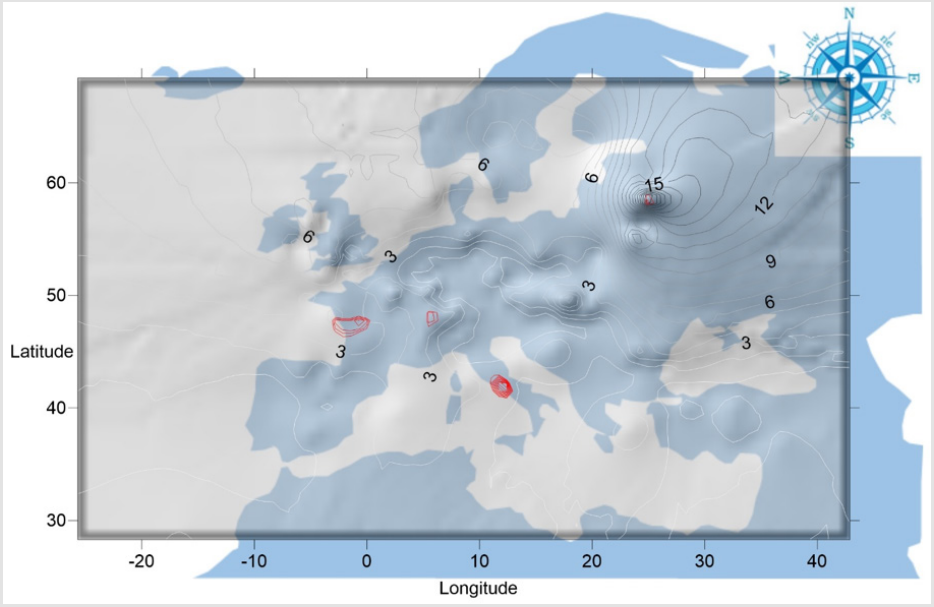

Figure 17: Europe and the Mediterranean, the Eurostat shortlist number 89 „Accidental poisoning by and exposure to noxious substances" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 22, 64th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

 DOI: 10.26717/BJSTR.2024.57.008994

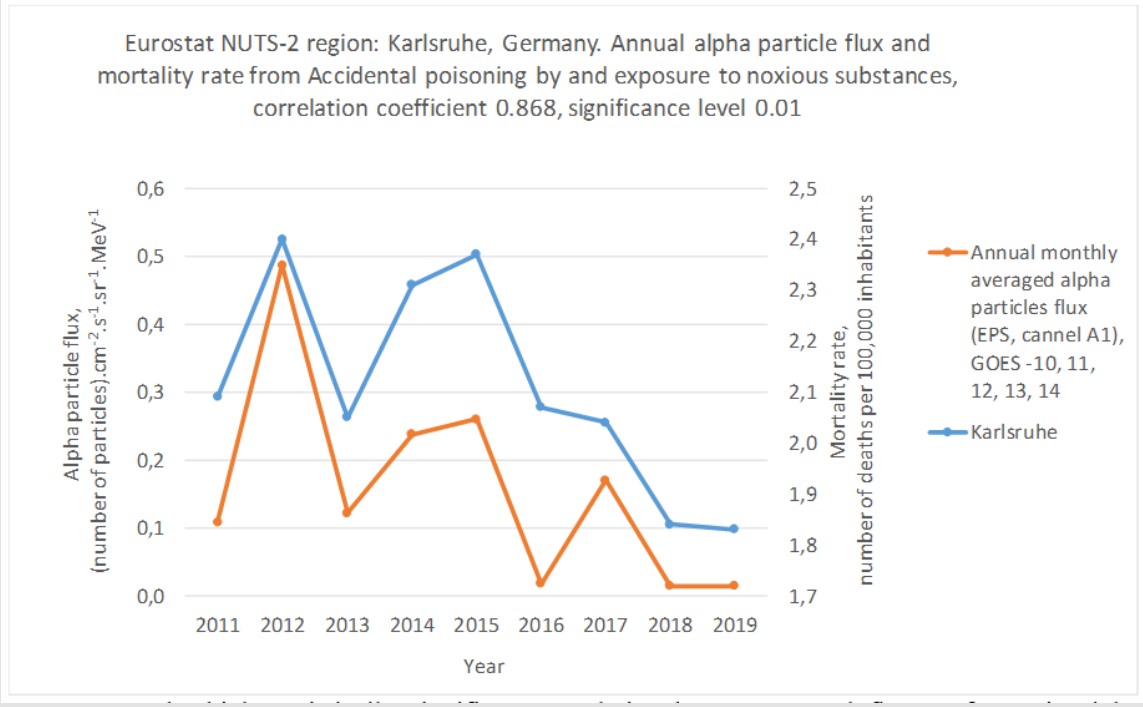

Figure 18: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 89 „Accidental poisoning by and exposure to noxious substances" mortality rate for the EUROSTAT NUTS-2 region Karlsruhe, Germany, indicates the presence of a causal relationship between the two phenomena.

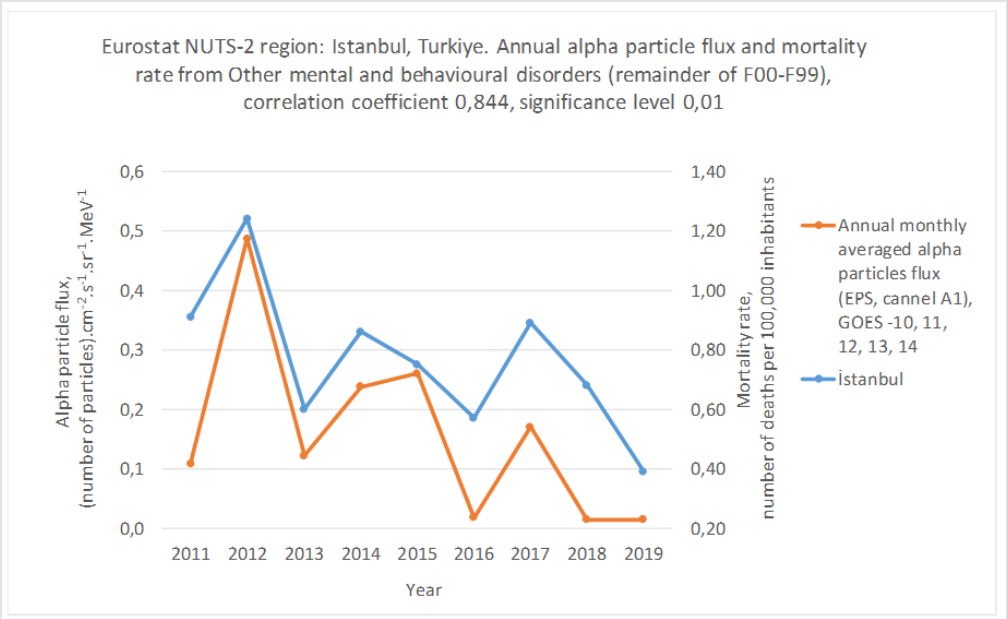

Figure 19: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 41 „Other mental and behavioral disorders (remainder of F00-F99)" mortality rate for the EUROSTAT NUTS-2 region Istanbul, Turkiye, indicates the presence of a causal relationship between the two phenomena. Impact index 21, 65th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

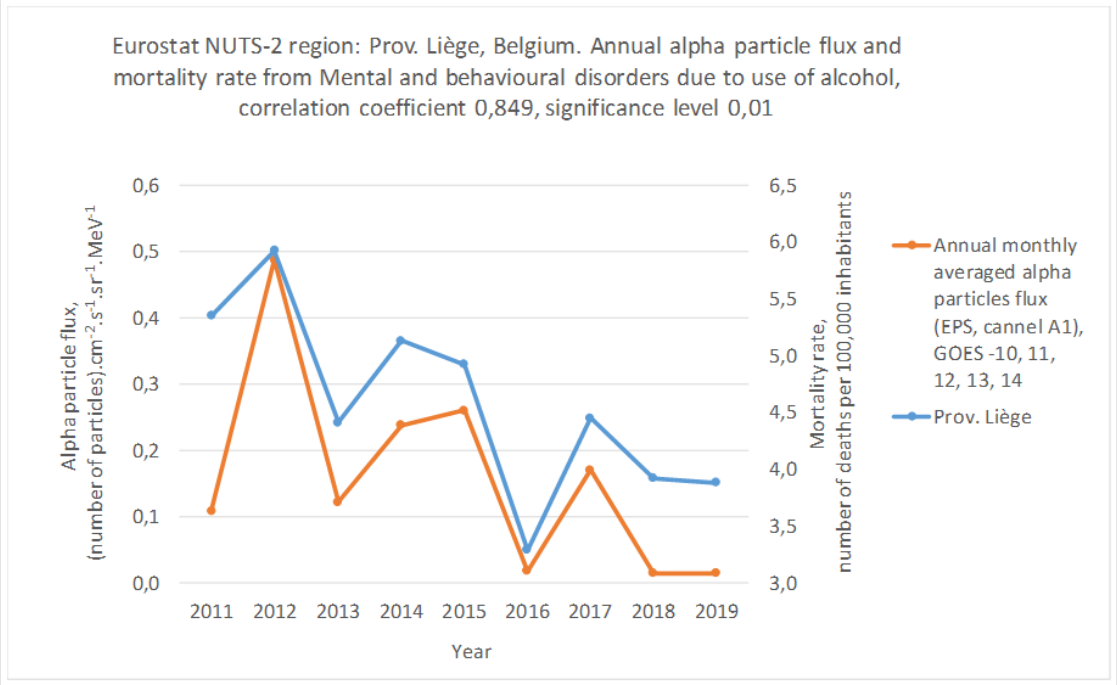

Figure 20: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 39 „Mental and behavioral disorders due to use of alcohol" mortality rate for the EUROSTAT NUTS-2 region Prov. Liège, Belgium, indicates the presence of a causal relationship between the two phenomena. Impact index 19, 69th in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

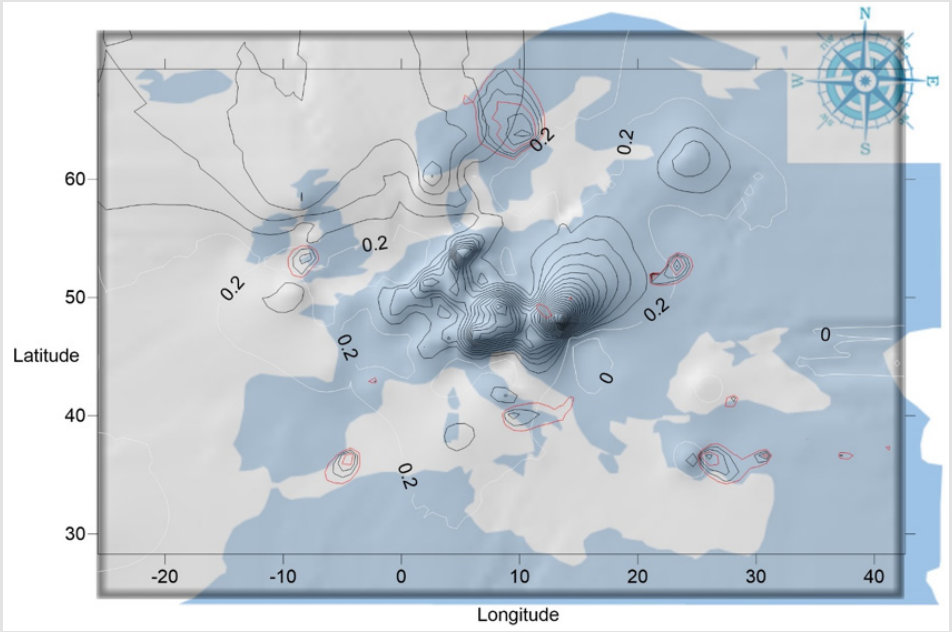

Figure 21: Europe and the Mediterranean, the Eurostat shortlist number 40 „Drug dependence, toxicomania (F11-F16, F18-F19)" mortality rate for 2012 (black isolines), and its statistically significant correlation with annual alpha particle flux (red isolines) for the studied interval 2011 – 2019. Impact index 9, 83rd in the ranking of the strength of the influence of radiation on the causes of death in the EUROSTAT shortlist.

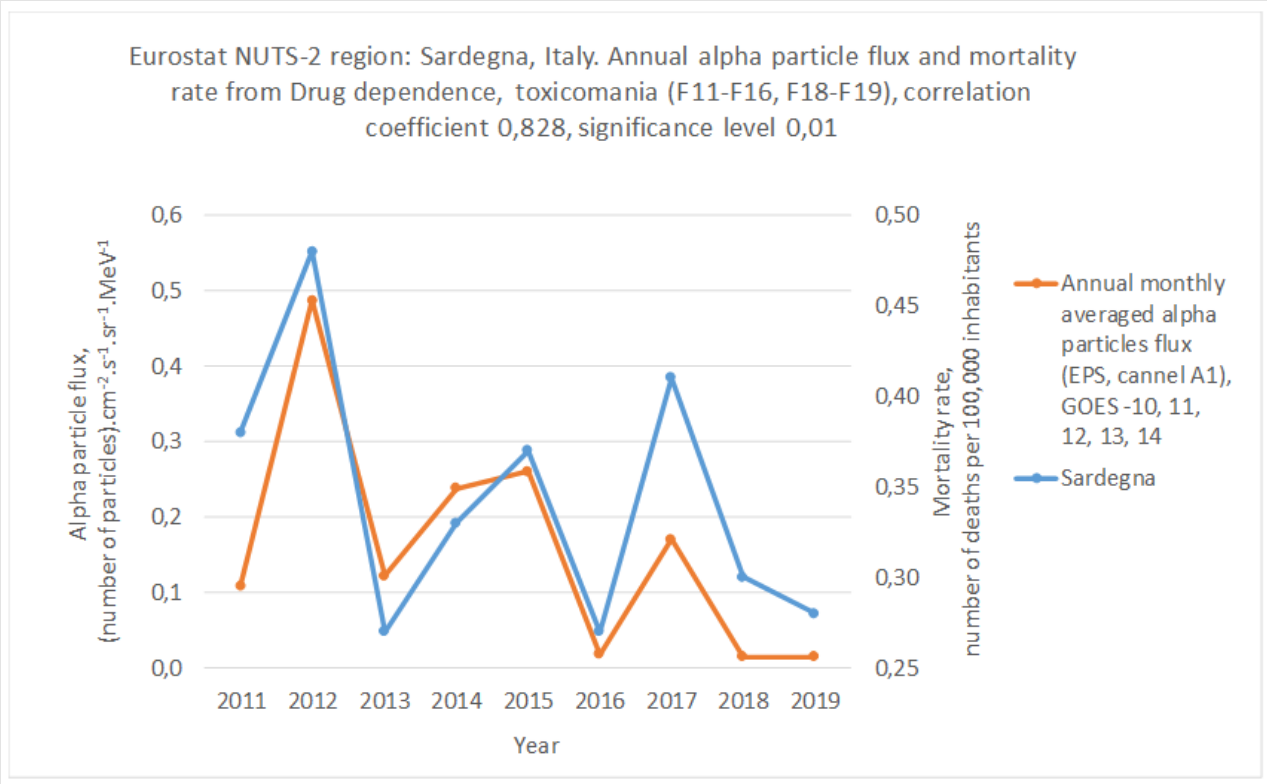

Figure 22: The high statistically significant correlation between annual fluxes of cosmic alpha radiation and the Eurostat shortlist number 40 „Drug dependence, toxicomania (F11-F16, F18-F19)" mortality rate for the EUROSTAT NUTS-2 region Sardegna, Italy, indicates the presence of a causal relationship between the two phenomena.

Discussion

The given examples convincingly prove the existence of an influence of positive solar corpuscular radiation flux on several causes of death, maybe by impact on the human central nervous system. The problem of the mechanism of the described influence remains unclear. A hypothesized mechanism of this influence is outlined below, answering many of the questions that arise.

1. An observed phenomenon – the mortality rate from many diseases in the statistics of many European countries located mainly in the 30°N – 60°N band, is strongly correlated with fluxes of positively charged particles with energy of the order of 4 – 21 MeV, recorded by the GOES series satellites in Earth orbit.

2. The recorded alpha particle flows are mostly pulses with a duration from minutes to hours.

3. Proposed hypothesis – positively charged particles with high energy penetrate through the Earth's atmosphere to the Earth's surface and damage human health, causing death. Unlike the geomagnetic field, which does not ionize matter, positively charged particles with high energy ionize both the air through which they pass, reaching the earth's surface, and the living matter in which they fall, causing damage that adversely affects the vital activity of the organism.

4. As the average altitude of the affected countries increases, the particle flux-correlated mortality shows an increasing trend [10,16]. It is probably due to the more intense radiation flux penetrating the thinner atmosphere over the mountainous region of Earth's surface – an argument favoring the hypothesis.

5. The source of the flows of positively charged particles is the Sun – mortality increases with observable processes on the Sun – from Solar Mass Ejections directed to Earth (a phenomenon on the solar surface that could be observed with other astronomical means) [10,14]. The Alpha Magnetic Spectrometer (AMS-02) on the International Space Station measures cosmic rays, excluding those of solar origin (when shielded from the Sun by the station's solar panels). In particular, it measures the flow of 3He and 4He (alpha particles) in cosmic rays. The measurements show [33] increasing annual flux of alpha particles in cosmic rays for the interval of years from 2011 to 2017 (last available data), while the flux of GOES registered (solar?) alpha particles for the same interval of years is decreasing (graphs from Figure 2 and the next). Indirect

evidence for the Sun as a source of high-energy alpha particles is that this assumption convincingly explains the downstream processes that ultimately lead to death.

6. Positively charged solar particles capable of penetrating through the Earth's atmosphere to the Earth's surface are high-energy alpha particles. Calculators (PSTAR, [30]) and (ASTAR, [31]) calculate the penetration parameters of protons, respectively alpha particles in different substances, in particular in air. Calculations with data for a homogeneous atmosphere – an atmospheric model with constant density, temperature, and pressure decreasing with height [10] show that only particles whose energy is above 2.4 GeV for protons and over 6.2 GeV for alpha particles can penetrate the Earth's atmosphere to the surface. There are no registered by GOES satellites protons above 0.7 GeV, but there are registered alpha particles with energy above 3.4 GeV, hypothetically also those with energy above 6.2 GeV [10,16,18], i.e. the particles that penetrate to the Earth's surface are probably high-energy alpha particles. Only registered by the satellites flows of alpha particles with a magnitude of at least (hundreds of particles).$cm^{-2}.s^{-1}.sr^{-1}.MeV^{-1}$ is correlated with the mortality of the Earth's surface.

7. It is assumed that the alpha particles registered by the satellites were emitted simultaneously with the hypothetical fast alpha particles in a common explosive process (flares?) on the solar surface. It can be calculated that particles with an energy of 7 GeV need 8.87 min to reach the Earth's surface from the Sun's surface and registered by satellites particles with energies of 5 – 10 MeV travel about 2 hours. The registered alpha particles do not have enough energy to penetrate the atmosphere, unlike the hypothetical fast alpha particles that reach the surface of the Earth in minutes from the center of the solar disk. However, the registered alpha particles are an indicator that two hours earlier there was an irradiation of the Earth's surface with fast (unregistered) alpha particles.

8. Although alpha particle streams irradiate the entire illuminated part of the atmosphere, penetration of fast alpha particles to the surface occurs only in a limited area of the surface (death spot), for which two conditions favoring penetration are combined:

a. The Sun is culminating for the center of the death spot. During the year, the apparent position of the Sun relative to the point of observation shifts, so that the maximum angle of elevation of the Sun's disk above the horizon (solar culmination) changes depending on the date. The latitude and longitude of a point on the Earth's surface where the solar disk is at its culmination at that moment of registration of the incoming alpha particle flow – the point of registration, can be determined from the date (latitude), and the time (hours and minutes) of registration (longitude). The center of the dead spot can be calculated – it is approximately 30° east of the registration point [16]. The Earth's angular velocity is 15° per hour.

b. For the center of the death spot, a coincidence is in effect – the direction of the geomagnetic vector coincides with the direction of the alpha particle intrusion – in such a case the alpha particle movement is not affected by the deflecting magnetic force. Such a coincidence occurs twice a year for latitudes in the band from 28°N to 48°N [10]. For latitudes outside this band, such a coincidence is impossible, the geomagnetic pole deflects the fast alpha particles and they do not reach the Earth's surface, or their flux on the surface decreases fast with their moving away from the band. The moment of occurrence of a flow of fast alpha particles cannot be predicted, but the dates of increased risk for a given point on the Earth's surface between 30°N – 60°N can be calculated by the latitude of the location [16]. For example, for EUROSTAT NUTS-2 region Sardegna, Italy, (See Figure 22), with latitude 40°N, the dates with maximum risk are around April 4th and September 8th. On these dates, the inclination (55.5°) of the geomagnetic vector for Sardegna is close in magnitude to or coincides with the culmination of the Sun (the Earth's atmosphere is thinnest at the moment of the Sun's culmination, and there is no deflecting magnetic force for alpha particles if they intrude at this time from the Sun). The increased risk of health incidents outdoors around local noon is a further argument for the healthfulness of the indoor midday break ('siesta') practiced in Mediterranean countries. The fluxes of solar alpha radiation become more frequent during the „rise" phase and the maximum of the 11-year cycle of solar activity, i.e., the impact of alpha radiation on mental and behavioral processes is expected to reach its maximum.

The Sun is currently at the maximum of its 25th cycle (the numbering is based on the last 250 years of astronomical observations) and the societal uncertainty we are witnessing is likely due to the effects on the human psyche and behavior of the increased flux of solar alpha radiation.

References

1. Persinger MA (1999) Wars and increased solar-geomagnetic activity: aggression or change in intraspecies dominance? Percept Mot Skills 88(3 Pt 2): 1351-1355.
2. Miroslav Mikulecký (2007) Solar activity, revolutions and cultural prime in the history of mankind. Neuro Endocrinol Lett 28(6): 749-756.
3. Sacha Dobler (2018) Solar History: The Connection of Solar Activity, War, Peace and the Human Mind in the 2nd Millennium. Independently Published, pp. 339.
4. Timo Partonen, Jari Haukka, Heikki Nevanlinna, Jouko Lönnqvist (2004) Analysis of the seasonal pattern in suicide. J Affect Disord 81(2): 133-139.
5. MV Alania, A Gil, R Wieliczuk (2001) Statistical analyses of influence of solar and geomagnetic activities on car accident events Adv Space Res 28(4): 673-678.

6. VM Chibrikin, EG Samovichev, IV Kashinskaia, NV Udaltsova (1995) Dynamics of social processes and geomagnetic activity. 1. Periodic components of variations in the number of recorded crimes in Moscow. Biofizika 40(5): 1050-1053.
7. Nikolay Takuchev (2019) Solar corpuscular radiation and mortality from various forms of ischemic heart disease in Bulgaria for the interval 2005 – 2015. AIP Conference Proceedings 2075(1): 130005.
8. Takuchev N (2020) Ischemic Heart Diseases Mortality for Bulgaria Partly Depends on Solar Corpuscular Radiation? ES Journal of Cardiology 1(2): 1010.
9. Nikolay Takuchev (2021) How Ischemic Heart Diseases Mortality Depends on Solar Corpuscular Radiation: A Case from Bulgaria. Chapter in: Challenges in Disease and Health Research Book Publisher International 8: 44-55.
10. Nikolay Takuchev (2021) Does the Angel of Death Sometimes Use Solar Alpha Particles to Take Our Souls? Book Publisher International (1st Edn.).,.
11. Nikolay Takuchev (2021) Solar Corpuscular Fluxes of Alpha Particles and Mortality from Ischemic Heart Disease in Bulgaria. In: Proceedings of a scientific conference, "RADIATION SAFETY IN THE MODERN WORLD", p. 17-18.
12. Nikolay Takuchev (2022) The Solar Alpha Particles Invading Earth and Ischemic Heart Diseases – the Worldwide Killer Number One, Connected? London Journal of Research in Science: Natural and Formal London Journals Press 22(5): 43-51.
13. Nikolay Takuchev (2023) The High-Energy Positive Solar Particles Invading the Earth with Contribution to the Mortality from Ischemic Heart Diseases? SCIREA Journal of Physics 8(2): 54-65.
14. Nikolay Takuchev (2023) Alpha particle fluxes and ischemic heart disease mortality study for Bulgaria and Los Angeles, California, USA. J Mod Appl Phy 6(2): 1-10.
15. Nikolay Takuchev (2023) Solar Alpha Particles and Death from Ischemic Heart Disease. Journal of Current Medical Research and Opinion CMRO 6(6): 1615-1625.
16. Takuchev N (2023) Space threat to the USA – increase in mortality from ischemic heart disease due to high-energy alpha particles entering Earth's orbit. J Mod Appl Phys 6(3): 1-13.
17. Nikolay Takuchev (2023) Solar Alpha Particles and Death from Ischemic Heart Disease. Int J Complement Alt Med. (International Journal of Complementary & Alternative Medicine) 16(4): 228-232.
18. Takuchev N (2023) Humanity is subject to a deadly cosmic impact – is non-human intelligent intervention also possible? J Mod Appl Phys 6(3): 1-11.
19. Takuchev N (2023) High Energy Solar Alpha Particles are Dangerous for the People on the Earth's Surface. J Phys Astron11(8): 368.
20. Nikolay Takuchev (2023) Mortality from Diseases of the Circulatory System in Europe and the Mediterranean Connected with Space Energetic Alpha Particles. Journal of Cardiology Research Reviews & Reports 4: 187.
21. Takuchev N (2023) Human Mortality Depends on Streams of Cosmic Alpha Particles, some of which have Signs of Artificial Origin J Space Explor 12(11): 305.
22. Takuchev N (2024) Space Alpha Particle Fluxes towards the Earth's Surface Increase Human Mortality – Examples from the Balkans and Greece. Open J of Astro 2(1): 000105.
23. Takuchev NP (2024) Streams of High-Energy Solar Alpha Particles - The Cause of Both Rising Global Temperature (Global Warming) and Partly Human Mortality? Phys Sci & Biophys J 8(1): 1-15.
24. Nikolay Takuchev (2024) Solar Alpha Particle Radiation Increases Human Mortality – An Example from the Malignant Melanoma Mortality in the Europe and Mediterranean. Biomed J Sci & Tech Res 56(5): 48429-48438.
25. Takuchev N (2024) Solar Alpha Particle Radiation Increases Human Mortality – An Example from the Tuberculosis Mortality in the European Union. Recent Adv Clin Trials 4(2): 1-9.
26. Nikolay Takuchev (2024) Solar Alpha Particle Radiation Increases Human Mortality – an example from the HIV disease mortality in the European Union. International Journal of Medical Science and Clinical Invention 11(4): 7096-7105.
27. (2023) EUROSTAT European short list of deaths by cause, death rate by NUTS 2 region of residence Statistics.
28. Data from GOES satellites. Available: https://www.ncei.noaa.gov/data/goes-space-environment-monitor/access/avg/
29. Lakin GF (1990) Biometrics. Moscow Higher School Publishing House 208-214 (In Russian).
30. PSTAR.
31. ASTAR. Available: https://physics.nist.gov/PhysRefData/Star/Text/ASTAR.html.
32. Data on the geomagnetic field. Available: http://www.intermagnet.org/data-donnee/dataplot-eng.php?type=xyz last visited on 14.8.2018.
33. Cosmic Ray Data Base (CRDB). charged cosmic rays.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2024.57.008994

Nikolay Takuchev. Biomed J Sci & Tech Res

This work is licensed under Creative *Commons* Attribution 4.0 License

Submission Link: https://biomedres.us/submit-manuscript.php

Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles

https://biomedres.us/