EARTH SCIENCES

MAGNETIC STORMS, MUONS AND HUMAN HEALTH

Shevchenko I.
PhD, Senior Researcher, M. P. Semenenko Institute of Geochemistry Mineralogy and Ore Formation; Kyiv, 03142 Ukraine
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Abstract
It has recently been discovered that muons produced in the Earth's atmosphere by solar radiation have a strong dynamic influence on hydrolytic processes on Earth. Muons break hydrogen bonds between water molecules, destroy water clusters and increase their hydrolytic activity. This is very important for biological processes and human health as in the absence of muons in the atmosphere water clusters become highly structured and lose their hydrolytic activity. Since muons have an electric charge, their concentration and direction of movement in the Earth's atmosphere strongly depend on the geomagnetic field, the strength and direction of which changes greatly during magnetic storms.

Keywords: hydrolysis; solar influence; muons; magnetic storms; human health

Introduction

The impact of magnetic storms on human health is well known and has been studied in the context of many medical examples. Geomagnetic disturbances during magnetic storms have a particularly strong impact on the cardiovascular system leading to heart attacks and blood pressure fluctuations. The production of melatonin in the human brain is also very sensitive to geomagnetic disturbances which causes headaches and mental disorders, such as depression, sleep disturbances, irritability, decreased concentration and performance. Magnetic storms can also aggravate chronic diseases, as well as reduce reflexes and increase the risk of thrombosis.

However, the mechanism by which magnetic storms affect human health remains unknown, since direct exposure to even a strong magnetic field does not have negative impact on people.

It was logical to assume that unlike local magnets which have a relatively small radius of influence of the magnetic field, changes in the strength and direction of the geomagnetic field on the scale of planet Earth affect living organisms through some intermediate factor that directly influences biological processes.

Discussion

Our research indicates that this intermediate factor is muons, which are constantly produced in the Earth's atmosphere under the influence of the solar radiation. Unlike the electrons and protons of the solar wind, muons have large penetrating ability. They not only reach the Earth but even penetrate some depth underground. Muons were found to break hydrogen bonds between water molecules, forming free hydroxyl groups. This disrupts water clusters and significantly increases their reactivity in hydrolytic processes. Therefore, with an increase in the formation of muons in the atmosphere under solar influence, hydrolytic reactions are greatly accelerated. This is important for biochemical processes, since in the absence of muons, water clusters are structured to maximum sizes and are deactivated, and hydrolytic reactions are significantly slowed down or stopped. For example, due to fluctuations in solar activity over the 11-year solar cycle and changes in solar influence as the Earth rotates around the Sun and around its axis, the same solution of water in acetonitrile can consist of a small number of large passive clusters, or a large number of small, very active clusters. Therefore, at different times of the year the difference in the rate of hydrolysis at a constant temperature can reach 200 times. This was confirmed by regular measurements of the rate of hydrolysis of triethyl phosphite [$(EtO)_3P$] in acetonitrile over 6 years 2015-2020, including 5 years of the second half of the 24th solar cycle 2015-2019 and the first year 2020 of the 25th cycle. (Fig.1) [1]

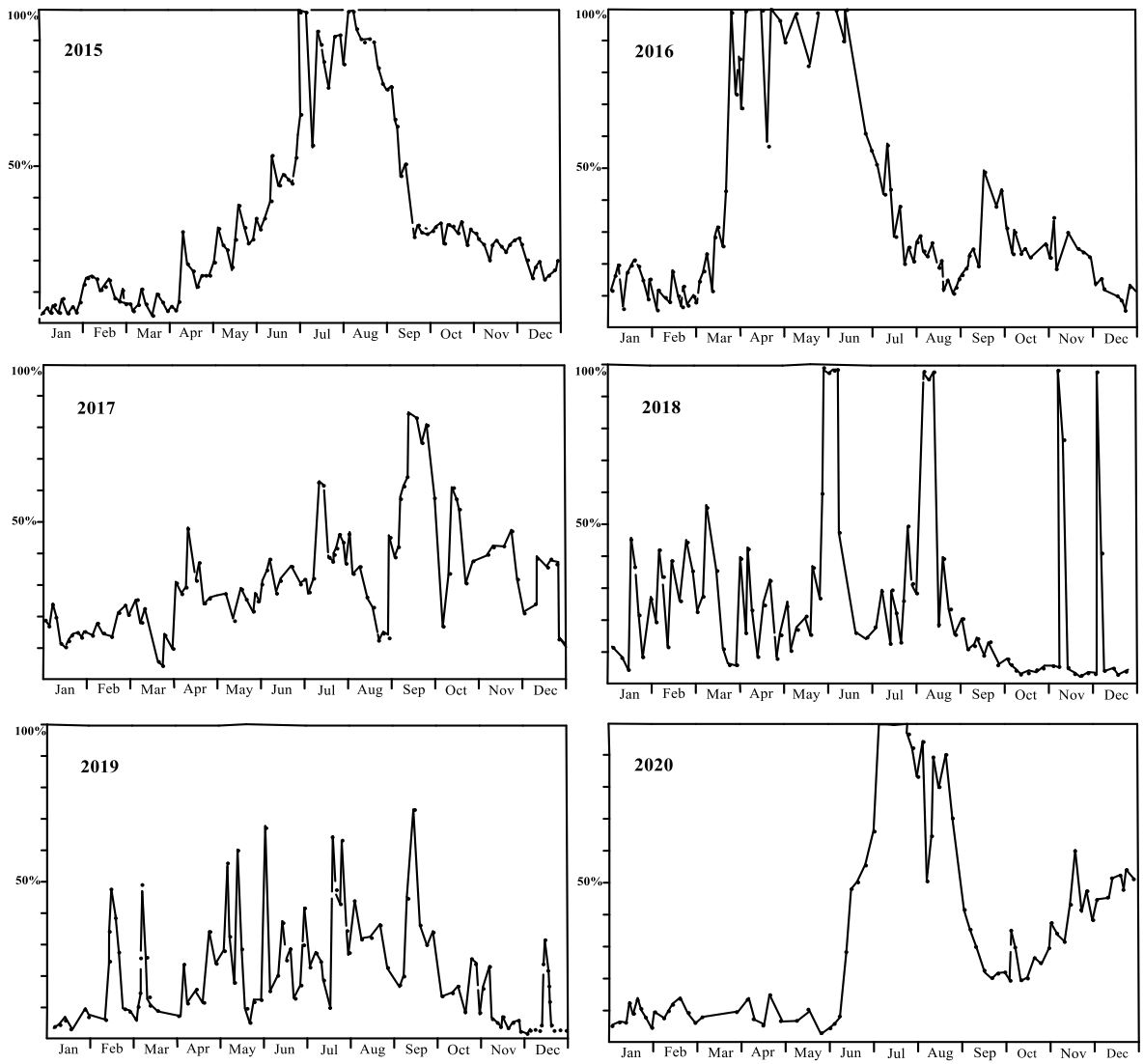

Fig. 1. Variations of the rate of hydrolysis of triethyl phosphite [$(EtO)_3P+H_2O$] in acetonitrile in 2015-2020 (conversion after 25 minutes of heating at 80°C). This period includes the second half of the 24-th solar cycle 2015-2019 and the first year 2020 of the 25-th cycle.

By conducting these regular 6-year measurements we noticed that during periods of strong magnetic storms, the rate of triethyl phosphite hydrolysis decreases. This is explained by the fact that the components of the solar wind (electrons and protons) and the muons formed under their influence in the Earth's atmosphere have an electric charge. Therefore, magnetic storms strongly influence the formation of muons, as well as the direction and intensity of their movement in space. This determines the degree of destruction of water clusters by muons, their hydrolytic activity and the rate of hydrolytic processes. This has been well confirmed experimentally. For example, if a solution of water in acetonitrile is protected from muons with a special shield, the water clusters begin to structure to very large sizes and do not react with the added triethyl phosphite. And after removing the shield, hydrolysis immediately begins under the solar influence and accelerates very quickly. [2]

Water is a common structural component of all organs of the human body, so changes in its properties caused by fluctuations in muon influence can manifest themselves in different forms in different organs. This is exactly what is observed in medical practice. The aggregation of water molecules into large passive clusters in the absence of muons in the atmosphere during geomagnetic storms explains the slowdown of biochemical processes and the increase in blood viscosity leading to thrombosis. This occurs when fluctuations in the interplanetary magnetic field significantly alter the direction of movement of muons in the Earth's magnetic field.

The cessation of muon formation in the atmosphere occurs not only during magnetic storms, but also at night, when the Sun irradiates the opposite side of the Earth. After sunset, the disruption of hydrogen bonds between water molecules stops and the size of water clusters increases again. Therefore, at night the rate of hydrolytic processes in living cells significantly slows down, which promotes the formation of blood clots. This explains why strokes typically occur in the morning, when water clusters are at their largest after a night of solar inactivity, and do not occur in the evening, when water molecules have not yet had time to combine after exposure to muons.

Conclusion

Under the influence of solar radiation, secondary particles muons are constantly formed in the upper layers of the Earth's atmosphere, which have a significant impact on hydrolytic processes on Earth. Muons destroy hydrogen bonds between water molecules in water clusters, forming free hydroxyl groups, which maintains the hydrolytic activity of the clusters at the level necessary for biochemical processes. Since muons have an electric charge, their concentration and the direction of their movement in the Earth's magnetic field are strongly dependent on fluctuations in the strength of the interplanetary magnetic field during magnetic storms. This has a significant impact on the self-organization of water molecules, hydrolytic processes and human health. Thus, geomagnetic storms indirectly prove that the constant formation of muons in the Earth's atmosphere is a necessary condition for the existence of life on the planet.

References:

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