

### **Changes in Heliophysical parameter on Global Environment and Health.**

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**It has been well documented that climatic change has the potential to influence the Environment of the Earth in Space and time. Influence of Heliophysical parameters and Galactic Cosmic Rays on the Environment and Health of the living beings of the Earth are being studied. The outbreak of Pandemic COVID 19 and the future threat of various health hazards for the living organisms of the Earth need to be studied in detail by the variables of Sunspots, Star spots and Cosmic Ray data.**

Shift of the Earth's magnetic pole towards Siberia is a phenomenon of change in the earth's interior as well triggered by the changes beyond the Earth. The manifestation of polar wandering is climate change due to the solar and galactic changes. Polar wandering, terrestrial Climate Change and COVID 19 pandemic outbreak are linked with each other<sup>1</sup>. It is a series of events initiated in outer space in the form of changes in the galactic plane. Impact of the galactic plane has changed the Sun-Earth-Cosmic equilibrium. More galactic cosmic rays and less ultraviolet rays from the Sun due to improved ozone layer have changed the mutation probability of Viruses. Furthermore the persistent solar minimum of 2019 -2020 which is near replica of 2009-2010 solar minimum.<sup>2</sup> This extra terrestrial change in may affect terrestrial environment and health of the living beings of the Earth by evolution of new species of Virus. The mechanisms of Virus mutations are not very clear till date. However, the sudden outbreak of pandemics like Swine flu of 2009 and COVID 19 of 2019-2020 has compelled to see the triggering of this catastrophe beyond the Earth. A possible correlation can be initiated based on the solar minimum induced climate change and its implications on triggering of viral mutations<sup>3</sup>. Variations in Star spots can control Sunspots and its associated heliophysical parameters<sup>5</sup>.

The wandering of Earth's north magnetic pole, the location where the magnetic field points vertically downwards, has long been a topic of scientific fascination. Since the first in situ measurements in 1831 of its location in the Canadian arctic, the pole has drifted inexorably towards Siberia, accelerating between 1990 and 2005 from its historic speed of 0–15 km yr<sup>-1</sup> to its present speed of 50–60 km yr<sup>-1</sup>. In late October 2017 the north magnetic pole crossed the International Date Line, passing within 390 km of the geographic pole, and is now moving southwards. Here we show that over the last two decades the position of the north magnetic pole has been largely determined by two large-scale lobes of negative magnetic flux on the core–mantle boundary under Canada and Siberia. Localized modeling shows that elongation of the Canadian lobe, probably caused by an alteration in the pattern of core flow between 1970 and 1999, and substantially weakened its signature on Earth's surface, causing the pole to accelerate towards Siberia. A range of simple models that capture this process indicate that over the next decade the north magnetic pole will continue on its current trajectory, travelling a further 390–660 km towards Siberia.

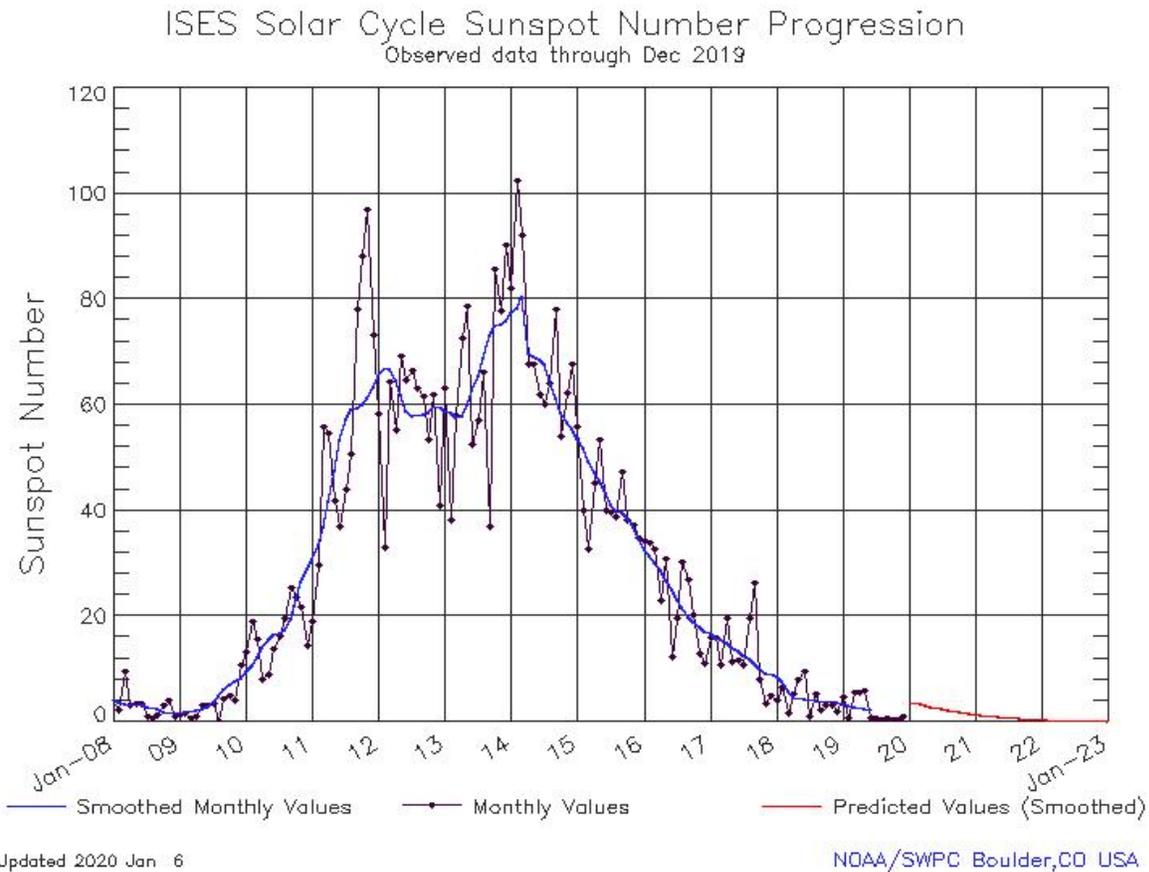


Figure.1. Sunspot number variation correlated with higher galactic cosmic rays in 2009 -2010 and 2019-2020. Outbreak of COVID 19 in 2019 and Swine flu in 2009 shows similar extra terrestrial changes. (Source: NOAA/SWPC Boulder, CO USA)

Reduction in green house gases by anthropogenic activities coupled with the low electron flux from the Sun has been responsible for reduction in Ultraviolet rays from the Sun. A correlation is being attempted to establish in between triggering of COVID-19 pandemics with an unprecedented solar minimum. During this solar minimum continuous low electron flux, low proton flux and low planetary indices has been observed from the Sun. These heliophysical variables, coupled with the high galactic cosmic rays have been observed<sup>1</sup>. Further the polar wandering has some bearing with the intensity of galactic cosmic ray change<sup>4</sup>. Similar phenomena happened during past epidemics across the world in 1918 <https://www.telegraph.co.uk/science/2018/01/05/hole-ozone-layer-has-shrunk-thanks-ban-cfcs-nasa-confirms/>. Rise in galactic cosmic rays has been observed in China in November 2019

Climate change has been influencing the global change which impacts the health of the living species of the Earth (<https://www.nature.com/scitable/knowledge/library/global-change-an-overview-13255365/>). Sudden changes in the Star and Sun has changed the terrestrial environment ([https://cdn.egu.eu/static/0efea7f/newsletter/eggs/eggs\\_14.pdf](https://cdn.egu.eu/static/0efea7f/newsletter/eggs/eggs_14.pdf)). Global warming, Global cooling, sudden snowfall or catastrophic rainfall may be due to the changes in the heliophysical parameters and cosmic

ray fluctuations (<https://www.natureasia.com/en/nindia/article/10.1038/nindia.2014.98>). Recent publication of Langenbrunner B. in Nature Climate change suggests the anomalous melting of Arctic glaciers (Langenbrunner, B. Ocean driven Arctic warming. *Nat. Clim. Chang.* **10**, 184(2020). <https://doi.org/10.1038/s41558-020-0730-3>).

It is essential to extend the research focus on the global change as well as changes within the galactic stars as well as its influence on heliophysical parameters and changes in the Environment of the Earth. It appears that the emergence and extinction of species are linked with the heliophysical and galactic changes.

## References

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