A Review work on Atmospheric Nanoparticles and Cosmic Ray activity are the cause of Climate Change and Biological Disorder of Public Health

Sarmistha Basu
Lecturer, Department of Electronics, Behala College, West Bengal, India

Abstract
For cosmic radiation emerging from cosmic rays, the high energy particles is originating outside the solar system. The flux of incoming Cosmic Rays at the upper atmosphere is dependent on the Solar Activity. The influence of Solar Variability on Earth's climate requires a solar variability, solar–terrestrial interactions and mechanisms determining the response of the Earth’s climate system, including solar irradiance variations on both decadal and centennial time scales and their relation to galactic cosmic rays. Cosmic Rays are also responsible for the continuous production of a number of unstable isotopes in Earth's atmosphere. It can be used for validating magnetospheric field models during very severe storms. Measurements of the energy and arrival directions of the ultra-high-energy primary cosmic rays by the techniques of density sampling and fast timing of extensive air showers. Nanoparticles have large surface area to volume ratios and react rapidly in the atmosphere, commonly growing into particles large enough to interact with radiation and to have serious consequences for visibility and local, regional, and global climate. They also have potentially significant health effects. Gamma ray deriving from local supernovae could have affected cancer and mutation rates, and might be linked to divisive alterations in the Earth's climate. Nucleation mode particles accounts for the greatest number of atmospheric particles and are found in high number concentrations near their sources. Atmospheric Nanoparticles are of growing interest to many investigators for two - nanoparticles in technology and in the atmosphere Nanosized particles are a subgroup of atmospheric particles. Though humans have been exposed to Nanosized particles through- out their evolutionary stages, the respective exposure has dramatically increased over the last century due to contribution from various anthropogenic sources. The Airborne particles are one of the most important pollutants of present times and their presence in the atmosphere has harmful effects both on human health and environment.

Keywords: Cosmic Radiation, Solar Variability, Global Climate, Airborne particles

Date of Submission: 11-08-2020
Date of Acceptance: 27-08-2020

I. Impact on Climate change with the increasing of Galactic Cosmic Rays:

The action of space factors on the Earth's climate is realized mostly through cosmic rays and space dust influenced on formation of clouds controlled the total energy input from the Sun into the Earth's atmosphere. The propagation and modulation of Galactic Cosmic Ray in the Heliosphere are determined by their interactions with magnetic fields frozen in solar wind and in coronal mass ejections with accompanied interplanetary shock waves(1), (2) The effects of space factors on the climate can be divided into two types: one is related to changes on time scales ranging from 10³ a to 11–22 a, producing effects which could be greater than that produced from anthropogenic factors, and another is sudden type, coming from supernova explosions and asteroid impacts. It is necessary to investigate all of the possible sudden factors, to develop methods of forecasting and also for protecting the biosphere, and the Earth's civilization from big changes in climate and environment. Cosmic Rays and Cosmic Dust through their influence on cloudiness are important factors in understanding climate. Cosmic Ray Ionization maintains the atmosphere as very dilute electrically conducting plasma, allowing a continuous electrical current to pass from the ionosphere to Earth's surface. The most Energetic Cosmic Rays are dangerous because they are Ionizing Radiation. (4)-(8), (15)-(18) The Magnetic Flux of Cosmic Ray at the upper atmosphere is dependent on the Solar Wind. On entering the heliosphere, charged cosmic rays are deflected by the inhomogeneous magnetic fields of the solar wind. The dominant effect on the motion of cosmic rays in the solar wind is the interplanetary magnetic field using random functions. Sunspots are on the Sun'sphotosphere that appear as spots darker than the surrounding areas are marked by intense magnetic activity and play host to solar flares and hot gassy ejections from the sun’s corona. They are regions of reduced surface temperature caused by concentrations of magnetic flux that inhibit convection. The total solar irradiance reaching the Earth’s atmosphere is the main driving agent for the variation in the Earth’s
climate. The effect of cosmic rays on climate could be in three ways: (a) through changes in the concentration of cloud condensation nuclei, (b) thunderstorm electrification and (c) ice formation in cyclones. (9)-(14) The concentration of cloud condensation nuclei depends on the light ions produced during cosmic ray ionization, based on a laboratory experiment in which a gas mixture equivalent to chemical composition of the lower atmosphere was subjected to UV light and cosmic rays, reported that the released electrons promoted fast and efficient formation of ultrafine aerosol particles which may grow to become cloud condensation nuclei. The flux of incoming Cosmic Rays at the upper atmosphere is dependent on the Solar Wind, the Earth's magnetic field, and the energy of the cosmic rays. For cosmic radiation high energy particles originating outside a solar system. Cosmic rays are also responsible for the continuous production of a number of unstable isotopes in Earth’s atmosphere. Cosmic rays can be used for validating magnetospheric field models during very severe storms. Cosmic rays are high-energy radiation, mainly originating outside the Solar System. Solar energetic particles and high-energy particles emitted by the sun. Measurements of the energy and arrival directions of the ultra-high-energy primary cosmic rays by the techniques of density sampling and fast timing of extensive air showers. When cosmic rays enter the Earth's atmosphere they collide with atoms and molecules, mainly oxygen and nitrogen.

II. Impact on Climate change with the increasing of Atmospheric Nanoparticles:

Depending on their compositions and sizes of the atmospheric nanoparticles influence global climate through both warming and cooling effects. Nanoparticles readily coagulate with larger particles, increasing their sizes and changing their properties, at which point they seriously affect optical properties and thus climate. The influence of aerosol particles on climate recognizing that the major players are particles that have grown from the nanoparticle range. However, since the nanoparticles are the major precursors to larger particles that interact with radiant energy, nanoparticle influence on climate can be huge. The Aerosol particles themselves scatter and absorb sunlight, as well as light reflected from the ground. When they scatter light, some portion of the energy returns to space, resulting in net cooling of Earth. The reverse occurs when they absorb light, resulting in a warming effect like that produced by greenhouse gases. Through their interaction with sunlight, aerosol particles contributed directly to the planetary energy balance. This type of interactions is called the direct effect. If the particles are hydrophilic, and if growth is sufficiently rapid to avoid loss by coagulation, they can also act as CCN and change the sizes, numbers, and lifetimes of cloud droplets, increasing the scattering of sunlight and resulting in a netcooling effect. (19), (20) The influence of particles on clouds is called the indirect effect and is one of the largest uncertainties in global climate models. Thus the aerosol hygroscopicity is an important issue for global climate modeling. The contributions of aerosol particles and gases to the global climate are measured by radiative forcing, which is "the rate of energy change per unit area of the globe as measured at the top of the atmosphere". Since aerosol particles counteract the warming effects of greenhouse gases, knowledge of the types and abundances of aerosol particles is critical for understanding changes in the global climate. Sulfate aerosol particles are extremely abundant, and they produce a net cooling effect of -0.4 W m⁻². If soot particles (largest contributor to warming among aerosol particles) are coated with sulfate or organic compounds which is common in the ambient atmosphere, their radiative forcing increases to about 0.6 W m⁻². In such cases, their radiative forcing is the second largest contributor to global warming. Climate system, atmospheric chemistry and even life on the Earth are dependent on Solar Radiation. (21)-(25) Approximately 30% of the incoming solar energy is reflected back to space. The remaining 70% is absorbed by the surface-atmosphere system of the Earth. This energy heats the planet and the atmosphere. As the surface and the atmosphere become warmer, they release the energy in form of infrared radiation. This process continues until the incoming solar energy and the outgoing heat radiation are in balance. This radiation energy balance provides a powerful constraint for the global average temperature of the planet. Atmospheric greenhouse gases and particles affect the climate by altering the incoming solar and outgoing thermal radiations. In other words changing the atmospheric abundance or properties of these gases and particles can lead to a warming or cooling of the climate system. The influence of a factor that cause change of climate system are typically evaluated in terms of its radiative forcing, which is an estimate of how the energy balance of the Earth-atmosphere system is influenced when the factor in question is altered. Atmospheric nanosized particles are the main precursors of larger particles. (26), (30) They promote their growth and modify the optical properties thus affecting the radiative properties of the atmosphere. It was generally believed that particles reflect sunlight back to space before it reaches the surface, and thus contribute to a cooling of the surface. During time as the concentrations of particles increased their cooling effect has masked some of the greenhouse warming. This It was found that atmospheric particles may also enhance scattering and absorption of solar radiation thus causing direct warm-up. Especially, carbonaceous particles are considered as one of the major contributors to global warming, if they are coated with sulfate or organic compounds their radiative forcing can increase up to about +0.6 W m⁻². Indirectly nanoparticles can also cause a negative radiative forcing through changes in cloud formations and properties. They can act as cloud condensation nuclei and modify size and number concentrations of cloud droplets. (27)-(29) In clean air, clouds
are composed of a relatively small number of large droplets. As a consequence, the clouds are somewhat dark and translucent. In polluted air with high concentrations of particles water can easily condense on the particles, creating a large number of small droplets. These clouds are dense, very reflective, and bright white. Due to the decrease of the size of water droplets, these clouds are less efficient at releasing precipitation. They cause large reductions in amount of solar radiation reaching Earth’s surface, a corresponding increase in atmospheric solar heating, changes in atmospheric thermal structure, surface cooling, disruption of regional circulation systems such as the monsoons, suppression of rainfall, and less efficient removal of pollutants. In general the indirect effects of particles are only partially understood. The interactions between aerosol particles and clouds are complex and most instruments cannot measure aerosols within the clouds. Climatologists consider the role of clouds to be the largest single uncertainty in climate prediction. The close relation between climate and air quality also reflects on the impacts of climate change on air pollution levels. The particle pollution levels are strongly influenced by shifts in the weather. While closely related, climate change and air pollution have mostly been treated as separate problems. At the international level, various efforts have helped to reduce air pollution levels.

The largest reductions have been achieved for emissions of sulphur dioxide which decreased in Europe by 82% between 1990 and 2010. The implementation of EU regulation limits setting levels of sulphur dioxide in urban areas and various political actions to control urban atmospheric emissions have contributed to these reductions. In addition, significant reductions were also obtained for emissions of air pollutants that are primarily responsible for formation of harmful ground-level ozone: non-methane volatile organic compounds and nitrogen oxides. However, based on the future climate scenarios the IPCC still projected declining air quality in cities into the future as a result of climate change. The climate change could have various negative impacts on national air quality levels that included both increases and decreases in particle pollution. Thus in order to protect human health and environment, joined efforts to control air pollution and mitigate climate change have to be done in future: air pollution abatement measures may help protect the regional and global climate whilst taking certain climate change measures may yield additional benefits through improved local and regional air quality.

**Impact on biological disorder of public health with the increasing of the Galactic Cosmic Rays:**

The galactic cosmic rays impact on biological disorder of public health. It is the cause of health risks. It occurs cancer. It damages the central nervous system. It occurs the cataract problem. It is the risk of acute radiation sickness and also have hereditary effects. Health threatening from different sides is the effect of galactic cosmic rays. The HP threats from cosmic rays is a danger posed by galactic cosmic rays and solar energetic particles to astronauts on interplanetary missions or any missions that venture through the Van-Allen Belts or outside a Earth’s magnetosphere. It signifies risk for cancer. Increased life time risk of fatal cancer because of occupational exposure to ionizing radiation is 1 in 4200 for 6 mSv/year effective dose. The potential acute and chronic health effects of space radiation as with other ionizing radiation exposures, involve both direct damage to DNA, indirect effects due to generation of reactive oxygen species and changes to a biochemistry of cells and tissues which can alter gene transcription and a tissue microenvironment along with producing DNA mutations. Acute effects result from high radiation doses and these are most likely to occur after solar particle events. Likely chronic effects of space radiation exposure include both stochastic events such as radiation Carcinogenesis. The health threat depends on a flux, energy spectrum and nuclear composition of a radiation.(32)-(35)

**Impact on biological disorder of public health with the increasing of the Atmospheric Nanoparticles:**

Toxicity of nanoparticles is of increasing interest because of the rapid development and growth of nanotechnology. When nanoparticles are absorbed or ingested, their behavior differs from that of larger particles. They pose a particularly large health risk because they are likely to be more reactive and toxic than larger particles. Nanoparticles may be taken into the body through the skin, lung, and gastrointestinal tract. When inhaled, they deposit on all regions of the respiratory tract by diffusion, with particles smaller than 20 nm having the highest deposition efficiency. (31) After nanoparticles deposit in the alveolar region, only ~20% of them are removed, whereas 80% of particles larger than 500 nm are removed. In contrast to larger particles, nanoparticle travel into the circulatory and lymphatic systems. Their toxicity depends on their surface areas and compositions, and surface atoms and molecules work as catalysts for chemical reactions. The smallest particles have the largest specific surface areas, making nanoparticles especially reactive. Thus, they potentially cause adverse effects such as oxidation stress, pulmonary inflammation, and cardiovascular events like heart attacks and cardiac-rhythm disturbance. Due to intensive research, there is an emerging evidence that exposure to nanoparticles may adversely affect human health. (36)-(38) The nanoparticles enter human body through the skin, lung and gastrointestinal tract. When they are inhaled, their behavior differs from coarse particles. Their small size allows them to be breathed deeply into the lungs where they are able to penetrate alveolar epithelium and enter the pulmonary interstitium and vascular space to be absorbed directly into the blood stream. They may also translocate within the body to the central nervous system, the brain, into systemic circulation and to organs like...
A Review work on Atmospheric Nanoparticles and Cosmic Ray activity are the cause of
the liver. They are more reactive and toxic due to the larger surface areas, leading to detrimental health effectssuch as oxidation stress, pulmonary inflammation and cardiovascular events. Though the toxicological studies have provided evidence of the toxicity of nanoparticles, epidemiologicalevidence of the health effects is limited. Unlike for coarse and fine particles there are relatively few epidemiological studies on the health effects of atmospheric nanoparticles. The first conducted studies on atmospheric nanoparticles have been panel studies, which generally showed associations between short-term exposure to nanosized particles and occurrence of acute respiratory symptoms and lung function. Some of these studies have suggested that nanoparticles might be even more strongly associated with adverse respiratory outcomes than fine particles whereas other studies found similar associations in health outcomes of nano and fine particles.

III. Conclusion:

Atmospheric Nanoparticles are of growing interest to many investigators for two - nanosized particles in technology and in the atmosphere Nanosized particles are a subgroup of atmospheric particles. Though humans have been exposed to Nanosized particles throughout their evolutionary stages, the respective exposure has dramatically increased over the last century due to contribution from various anthropogenic sources. The Airbourne particles are one of the most important pollutants of present times and their presence in the atmosphere has harmful effects both on human health and environment. Cosmic Ray Ionization maintains the atmosphere as very dilute electrically conducting plasma, allowing a continuous electrical current to pass from the ionosphere to Earth's surface. The influence of a factor that cause change of climate system are typically evaluated in terms of its radiative forcing, which is an estimate of how the energy balance of the Earth-atmosphere system is influenced when the factor in question is altered. Atmospheric nanosized particles are the main precursors of larger particles. The potential acute and chronic health effects of space radiation as with other ionizing radiation exposures, involve both direct damage to DNA, indirect effects due to generation of reactive oxygen species and changes to a biochemistry of cells and tissues which can alter gene transcription and a tissue microenvironment along with producing DNA mutations.

DOI: 10.9790/4861-1204024449 www.iosrjournals.org
A Review work on Atmospheric Nanoparticles and Cosmic Ray activity are the cause of

References:

[1.] Cosmic rays and space weather: effects on global climate change, L. I. Dorman, Received: 01 Feb 2011 – Revised: 12 Sep 2011 – Accepted: 09 Oct 2011 – Published: 04 Jan 2012
[15.] Cosmic ray acceleration via magnetic reconnection of magnetic islands/flux-rope/Anil Raghab, Zubair Shaikh(Submitted on 30 Oct 2016 (v1), last revised 17 Nov 2016 (this version, v2))
[16.] Cosmic rays and space weather: effects on global climate change, L. I. Dorman, Received: 01 Feb 2011 – Revised: 12 Sep 2011 – Accepted: 09 Oct 2011 – Published: 04 Jan 2012
[19.] "Detecting cosmic rays from a galaxy far, far away". Science Daily. 21 September 2017. Retrieved 26 December 2017

DOI: 10.9790/4861-1204024449 www.iiosrjournals.org 48 | Page
[50]. Solar activity, cosmic rays, and Earth’s temperature: A millennium-scale comparisonI. G. Usoskin M. Schüssler S. K. Solanki K. Mursula