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Impact of solar radiation on ionospheric disturbances

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Abstract- **Solar radiations affect the total electron content of the ionosphere that may disturb the radio-frequencies used in telecommunications. It may state with full confidence that the increase in the critical frequencies of the F_2 layer from the values observed in the morning hours to the afternoon maximum frequencies, is due to ultraviolet (UV) radiation from the Sun. During an ionospheric storm, some radio frequencies are absorbed and others are reflected, leading to rapidly fluctuating signals and unexpected propagation paths. In the present work, we have shown that the effect of various solar activities that effects the electron densities of the ionosphere and how they affect our telecommunication system. During solar maximum years, maximum variations of electron density of the ionosphere have been observed. Hours of maximum disturbance due to increased electron density of the ionosphere were obtaining measuring electron density of the ionosphere. Solar flux is the basic indicator of solar activity that determines the level of radiation being received from the Sun. The solar flare closely related to the amount of ionization and hence the electron concentration in F_2 layer region as result it gives a very good indication of condition for long distance communication the solar flux can vary from low as 50 to high as 300; low value indicate the maximum useable frequency will low and over all condition will be very good for higher HF band. Conversely high value generally indicate there sufficient ionization to support long-distance communication at higher than normal frequencies. However it takes a few days of high values for conditions to improve. These results will provide information for space weather forecasting and also enable telecommunication industries make predictions and necessary adjustments to maximize their operational frequencies.**

Keywords: **radio frequencies, ionosphere, solar activity, electron density, communication disturbance.**

1. INTRODUCTION

The effect of the solar radiation and particles that stream out from Sun would be quite deadly for inhabitants of Earth, Earth's atmosphere, which are block out by the X-rays and most of the ultraviolet radiation. When X-ray or ultraviolet photons encounter the atmosphere they hit molecules and absorbed, causing the molecules to become ionized; photons are reemitted but at much longer (and less biologically destructive) wavelengths. The second protective mechanisms is the Earth's magnetic field is protects living organisms from the charged particles that reach the planet steadily as part of the solar wind and the much greater that reach planet steadily as part of the solar wind and the much greater bursts that arrive following mass ejections from the Sun. Solar and Interplanetary origin of Space Disturbances, as well as related Magnetospheric dynamics. The properties of the Earth's coupled magnetosphere- ionosphere system are dominated by its interaction with solar wind plasma. Mediated by magnetic reconnection at magnetopause interface as consequences; Earth's magnetosphere dynamics depend on concurrent interplanetary magnetic field (IMF). The properties of Earth's coupled magnetosphere-ionosphere system are dominated by its interaction with solar wind plasma. Mediated by magnetize reconnection at the magnetopause interface. As a consequence; primarily on the concurrent orientation of the interplanetary magnetic field (IMF).The Earth's magnetosphere is major practical relevance; as it is the plasma medium in which range of applications space craft, used for communication navigation; metrology and defense. Primary source of space weather is Sun. Variation in the electromagnetic and particulate output of the Sun is the main cause of change in the Earth's upper atmosphere and surrounding region known as Earth's magnetosphere. These effect in communication; navigation and many other space ground based system. Most of the variation occurs in the lower and upper parts of solar spectrum; the radio and X-rays bands. At these wave lengths the solar radiation can vary

by many orders of magnitude. X-radiation in particular, penetrates below about 60 km.

2. THE IONOSPHERIC DISTURBANCES

The ionosphere can be visualized as containing a number of layers. In fact, there ionization throughout the ionosphere; the layers are really peaks in the levels of ionization. The ionosphere affects radio waves because according to the level of ionization, the signals are refracted, i.e., bent away from traveling in a straight line. Often the level of ionization is sufficiently high to enable the signals to be returned to Earth. Conditions are continually varying levels of ionization in the ionosphere. The radiation coming chiefly from the Sun hits upper ionosphere, causing positive ions and free electrons. A state of "equilibrium" exists. The free electrons that affect radio waves recombine with positive ions and free electrons that affect radio wave recombine with positive ions to reform molecules. When levels of ionization are higher ionosphere are more capable of bending back radio signals to Earth. Also, high levels of ionization mean high maximum usable frequencies and better HF conditions.

The level of ionization at any given point above the Earth is dependent upon a number of factors including the time of day. The season and most important of all the sunspot cycle, it found that level of radiation activity from sun increases as the number of sunspot increases. Accordingly, the level of radiation received from the Sun peaks around the top of the sunspot cycle. Infact, it is the bright area around the sunspot called plage that emits most of the extra radiation. At the sunspot also rises, this happens as the Sun emits vast quantities of particles. There is normally a steady flow of these at time solar flares emission greatly increases, when hits the Earth's magnetic field it becomes disturbed, creating a geomagnetic storm that detected at point around the globe. Another effects is that the ionosphere itself can disturbed, giving rise to an ionosphere storm. This will degrade HF communications and when particularly bad it can lead to total HF blackout.

3. THE IONOSPHERIC LAYERS AND HF COMMUNICATION

The ionosphere is region of the upper atmosphere, extends from about 8.5 km to 600 km altitude, and includes the thermosphere and parts of the mesosphere and exosphere. It is distinguished because it is ionized by solar radiation. It plays an important role in atmospheric electricity and form the inner edge of the magnetosphere. Ionosphere has practical importance because, among other functions, it influences radio propagation to distant places of Earth; ionization depends primarily on the Sun and its activity. The amount of ionization in the ionosphere varies greatly with amount of radiation received from the Sun. thus there is diurnal effect and seasonal effect. The local winter hemisphere is tipped away from the Sun, thus there is less received solar radiation. The activity of the Sun is associated with sunspot cycle, with more radiation occurring with more sunspots. Radiation received also varies with geographical location (i.e. polar, auroral zones, mid-latitudes and equatorial regions). There are also mechanisms that disturb the ionosphere and decrease the ionization. There are disturbance such as solar flares and the associated release of charged particles in to solar wind which reaches the Earth and interact with its geomagnetic field, the ionosphere is part of Earth's upper atmosphere where free electron occur in sufficient density to have an influence on the propagation of radio frequency electromagnetic waves. Most of its ionization is produced by X-ray and ultraviolet radiation from the Sun. As Earth rotates ionization in the sunlit atmosphere and decreases on the shadowed side. Ionization appears at atmosphere levels, producing layers or regions which may be identified by their interaction with radio waves.

These layers are known as the D, E, F layers are:

A. The D layer: -

The D layer is the closet to Earth surface. Its altitudes ranges from 50 km to 90 km.due to high density, recombination is important. The overall electron density is very low. This layer is mainly present in the daytime, but during the night, Cosmic rays produce a residual amount of ionization. It does not reflect HF radio waves but mainly responsible for their absorption, particularly at lower frequencies. Consequently, the absorption is smaller at nighttime than at mid-day. The AM radio stations are best during received during the day time.

B. The E layer: -

The layer is higher in altitude, from 90 km to 120 km. It only reflects radio waves with frequency lower than 10 MHz and partially absorbs higher frequencies.

C. The F layer: -

The F layer ranges from120 km to 400 km above the Earth surface. It is responsible for most of the sky-wave radio propagation. During the day, it divides in to two layers, called F1 and F2 layers, F1 at about170 km, and F2 at about250 km altitude layer reflects radiowaves.The regular variation that affects the extent of ionization in ionosphere can divided into main classes: daily, seasonal, 11year, and 27 day variation. Daily variation in ionosphere is result of 24 hour rotation of the Earth on its axis. Daily variation on different ionospheres layer The D layer reflects VLF waves are important for long VLF communication; Ionization density of the F_1 layer depends on the angle of the Sun. It's main effect is to absorbs HF wave passing through to the F_2 layer F_2 layer important for long wave HF communications. Seasonal variation are result the Earth revolving around the Sun seasonal variation of D, E,F_2 layers correspond to highest angle of the Sun. 11-year sunspot cycle has both a minimum and maximum level of sunspot activity that occur. Sunspots are responsible for variation in ionization level of the ionosphere. Sporadic E irregular cloud like patches of unusually high ionization, called sporadic E often format heights near the normal E layer. It is known to vary significantly with latitude, and northern latitude, it appears to be closely relegated to the aurora borealis or northern lights. The sporadic E is so thin that radio wave Penetrate and are returned to earth by the upper layers. It extended up to several hundred miles and is heavily ionized. Sporadic E layer may blank out the use higher, more favorable ionospheric layers or cause additional absorption of radio wave at same frequencies. Also it can cause additional multipath problem and delay the arrival times the rays of RF energy. The sporadic E can form and disappear in short time at all transmitting or receiving station.

The lower atmospheres are primary concern of meterology; while impact of Sun and Geomagnetic process on the atmosphere-ionosphere the subject of Space weather Research. Thus, the whole atmosphere system the continuous influence of Metrological effects and space weather.

The temperature of earth's atmosphere decreases with increase of height. The rate of fall of temperature of earth's atmosphere per unit increase in altitude is called the lapse rate on clear night go round more quickly than the air, therefore heat conducts from air to earth. That is temperature increases with altitudes and hence lapse rate is negative on clear nights. The most starting of the ionospheric irregularities is known as Sudden Ionospheric Disturbance (SID). This disturbance may occur without warning and prevail for length of time, from a

few minute to several hours. SID occurs on long distance, propagation of HF radio wave almost totally blackout. When SID occur examine the Sun has revealed a bright solar eruption. All station lying wholly, or in part, on sunward side of Earth is affected. The solar eruption produces intense burst of UV light, which absorbs by F_2, F_1, and E layers, but causes a sudden abnormal increase in ionization density of D layer.

4. IONOSPHERIC STORMS

Ionospheric storms are disturbance in Earth's magnetic field. They are associated with solar eruption and the 27 Day intervals, thus corresponding rotation of the Sun, 18 hours' time difference between a SID and ionospheric storm. Ionospheric storm associated with sunspot activity may begin any time from 2 days before an active sunspot crosses the central meridians of Sun until four hour days after it passes the central meridian. However, active sunspots have crossed the central region of the Sun without any ionospheric storms have occurred when there were no visible spots on the sun and no preceding SID. Some correlation between ionospheric storms', SID, and sunspot activity is possible, ionospheric storm the most prominent effect of are turbulent ionosphere and very erratic sky wave propagation. Critical frequencies are lower than normal, particularly for F_2 layer. The correlation between the variation of ionization in F_2 layer and variation in solar activity shows the ionosphere containing number of layers. In fact there is ionization throughout the ionosphere; the layer are really peak's in the level of ionization, the ionospheric affect radio waves because the level of signal refracted, i.e., bent away from traveling in straight line. Often the level of ionization is sufficiently high to enable the signal to returned Earth. The solar radiation coming from the Sun hit's Earth upper atmosphere causing molecules to ionize, creating positive ions and free electrons, a state of dynamics equilibrium exists.

At sunspot peak the level of geomagnetic storm activity also rises. It happens when the Sun emits vast quantities of particle. When solar flares the level of emission increase they hits the Earth's magnetic field it become disturbed, creating a magnetic storm that can be detected at points around the globe. Another effect is that the ionosphere itself can disturbed, giving rise to ionospheric storm. This will degrade HF band communication and when particularly bad it can lead to total blackout. Solar flux is used as basic indicator of solar activity that determines the level of radiation being received from the Sun. Solar flux measure by solar flux unit and amount of radio noise or flux that emitted at frequency of $2800MH_Z$ (10.7 cm.).The solar flare closely related to the amount of ionization and hence the electron concentration in F_2 layer region as result it gives a very good indication of condition for long distance communication the solar flux can vary from low as 50 or 50 to high as 300; low value indicate the maximum useable frequency will low and over all condition will be very good for higher HF band. Conversely high value generally indicate there sufficient ionization to support long-distance communication at higher than normal frequencies. However it takes a few days of high values for conditions to improve.

5. THE GALACTIC COSMIC RAYS AND IONOSPHERIC STORM

Geomagnetic activity determine by A index and K index. These give indications of severity of magnetic disturbance to ionosphere. K index describes as same level of magnetic disturbance. An index reading varies from one region to the next. Value of k index between 0 to 1 represent quite magnetic condition and this would indicate good HF band condition due to sufficient level of solar flux. K index value between 2 to 4 indicate unsettled or even active magnetic conditions and are likely to be reflected in degradation of HF condition moving up the Scale for K index 5 to 6 minor storm and 7 to 9 very major storm that would result in a black out of HF communions. The

geomagnetic and ionospheric storm are interrelated it worth noting that they are different.

Ionosphere and atmosphere play important role of space weather mechanisms. The galactic cosmic rays (CRs) influence the ionization and therefore the electrical parameters in the planetary atmosphere(Singh et al., 2011).The galactic cosmic rays transfer the impact of solar activity in to atmosphere (Singh et al.2010). In such a way Cosmic ray influence the ionization, Chemical and electrical state in the region5-100km. Near ground(0-5km),there is an additional ionization source via natural radioactivity of the soil that may important in some regions related to radon gas emission(Usoskin et al 2011). The application of monte-carlo methods for investigation of cosmic ray ionization is important, because it is possible to consider explicitly the hadrons component and therefore to estimate effects in the lower(0-10km) and middle (10-100km) atmosphere, as was recently demonstrated their application in specific, realistic conditions(Mishev and Velinov, 2010) permits to study of the ionization effect, especially at different altitudes(Mishev and Velinov, 2010; Usoskin et al., 2011). Intense cosmic ray fluxes during for bush decreases can be responsible for a number of radiation effects in electronics and sensor systems of space crafts and aircrafts. The natural space radiation environment can be classified in two populations; the particles trapped by planetary Magnetosphere in belts', including Protons, electrons and heavier ions and transient particles which include protons and heavier ions. The transients radiation consist of galactic Cosmic ray(GCR) particles and particles from solar events, such as Solar Flares(SFs) and Coronal Mass ejections(CMEs).The impact of GCR on Microelectronics systems of space crafts and aircrafts. The earth atmosphere operates as natural shield, preventing most Cosmic Ray's from reaching it's surface.specifically,when primary Cosmic ray reach the atmosphere, they interact with its constituents, Nitrogen and Oxygen. Generating a Cascade of secondary Particles. on satellite orbiting outside the magnetosphere, similar interactions of Cosmic rays with space craft Materials complicate shielding evaluations, due to generation of multiple daughter products.similary,incident electrons produce penetrating X-rays,or Bremsstrahlung, as they Scatter and slow down, interacting with spacecraft materials.

Impact of cosmic rays and solar energetic particles on the Earth's environment is important not only for the atmospheric processes but also for technological and biological systems ions accelerated to several tens to hundreds of MeV are very important for the radiation hazard effects during solar radiation storms with electronic element failures on satellite, communication and biological consequences before their arrival a network by several stations operating in real time can provide useful alerts several minutes to ten of minutes in advance cosmic rays and SEP of lower energy interact with material of satellite, space crafts and airplanes and many cause failures. There is variety of effects with consequences on the reliability of the electronic elements the energy deposition in materials result results in permanent reason to study in detail the cosmic ray variability and the corresponding ionization effects (Kudela et al., 2010).

6. THE GALACTIC COSMIC RAYS AND IONOSPHERIC STORM EFFECTS ON SPACE CRAFT AND AIR CRAFTS

The GCR Population in continuously present, consisting of ions from all elements. The Level GCR is modulated by the 11-year Solar Cycle with peak of GCR population occurring near solar minimum. Superimposed on GCR levels are unexpected sudden rises in the flux levels due to Solar Energetic particles (SEPs) Events. Galactic and Solar Particles have unimpeded access to space craft outside the magnetosphere. Those particles that penetrate into Earth's magnetosphere. Those particles

that penetrate into the Earth's magnetosphere, reach near-earth orbiting space craft and are particularly hazardous to satellite in polar, highly elliptical and geostationary GEO orbits.(Berth et al., 2003). galactic cosmic ray radiation Hazards to space weather systems followings (a) galactic cosmic ray radiation damage to space craft electronics, solar cells; and materials, from the earth's trapped radiation belt particles and from solar and glactic energetic particles.;(b)single events effects (SEEs) in space craft electronics, due to ionization from galactic Cosmic Rays to ionization from secondary produced nuclear interactions between the incident heavy ions and component materials.;(c) Interference to spacecraft imaging and sensing systems; (d) electrostatic charging from "Hot" (~KeV electron temperatures) plasma and energetic (~MeV) electrons. (Daly et al., 2004).

7. SOLAR ACTIVITY EFFECTS ON SPACE CRAFTS

Geomagnetic storms disturbances in the geomagnetic field lasting one or more days,may affect orbiting space craft. During Geomagnetic stroms large Number of Charged particles are dumped from magnetosphere in to Earth's atmosphere. These Particles Ionize and heat the atmosphere through collisions the heating is first observed on minute to Hours after magnetic disturbance begins. Gosling 1993 has shown that CMEs is unique cause of all Interplanetary and geomagnetic disturbances. Nevertheless the solar Flares are often considered as a precursor of solar activity and used for prediction of interplanetary and geomagnetic disturbances(Park et al.,2002;Schwen et al.,2005).CMEs disrupts the flow of solar wind and produce disturbance that strike on earth with some times Catastrophic results. the correlations of CMEs and Intense geomagnetic Storms have been discussed by(Tsurutani et al.,1988;Tsurtani et al.,1997;Gonzalez et al.,1994;Gonzalez et al.,1998;Dubey,1998; Dubey and Mishra,2000;Gosling et al(1991). shown that the largest geomagnetic storms are often caused by **CMEs**

Solar activity has critical impact most elements with ambient environment at space craft .Variations in solar activity impact the upper atmosphere (Thermosphere) density levels. Overall thermal environment, plasma density levels, meteoroids/orbital debris levels, severity of ionizing radiation, and characteristics of Earth's Magnetic Field. When solar activity is high Ultraviolet radiation from the Sun heats and expands Earth's upper atmosphere, increase atmospheric drag and orbital decay rate of space craft. Solar flares, a major contributor to the overall radiation environment. Add accumulated radiation dose level and single upset phenomena affect electronic system.(Gorney,1990).The activity is high, Ultraviolet radiation from the sun heats and expands the Earth's Upper atmosphere ,increasing atmospheric drag and orbital decay of rate of space craft. Solar flares, a major contributor of the overall radiation environment can add accumulated radiation dose levels and single event phenomena. That affect electronics.(Gorney,1990;Allen et al,1992). Appear solar and space radiation effects into effect (1).Degradation of solar Cell, optical Glass, Thermo-control Coatings. (2).second type effects are radiation conductivity of dielectrics and Semiconductors and radiation Luminescence of materials. The bright manifestatation of such effect is single upset (SEUs) in modern electronic devices.

8. IONOSPHERIC STORM EFFECTS ON SPACE WEATHER

Geomagnetic storms is global disturbances in earth's magnetic field usually occurred due to abnormal condition in the interplanetary magnetic field(IMF) and solar wind Plasma emission caused by various solar phenomenon. Further more the magnitude of these geomagnetic storms effects largely depends

upon the configuration and strength of potentially Geo-effective solar/Interplanetary features. the study of these world wide disturbances of earth's magnetic field are important in understanding the dynamics of solar-terrestrial environment and furthermore because such storm can cause life threatening power outage, satellite-damage communication failure and navigational problem. Various kind of disturbances following strong earth quake have been studied for several decades (e.g.,Davies and Baker., 1965). The vertical crustal movement during earth quake causes displacement of the atmosphere on the earth's surface and excites atmospheric waves which propagate up to the thermosphere. they modulate the ionospheric plasma density through ion-neutral collisions.

In general space weather comes in four varieties solar element like solar flares and storms, commonly called sunspots affect earth most immediately. At the same time, constantly bombarded by interstellar elements like cosmic rays. Solar interstellar elements interact with earth's atmosphere, with profound impact on nature. The polar lights are certainly the most spectacular interact with charged particles in the ionosphere. The outermost part of the atmosphere which concentrate these charged particles near the magnetic poles. Our highly technological world is particularly exposed to electromagnetic effects of space weather. Each solar storm, for example, generates intense showers of particles and gigantic current in the ionosphere which induce major alterations in the geomagnetic fields. Electric conductors in the changing magnetic field, whether cables, pipes or sea Water; run currents called "geomagnetic ally induced current", or GICs. The bigger the sunspots and the longer the conductor, the higher the voltage and possibly the GIC.while there are natural electric currents running through natural electric current through earth and sea known as "Telluric currents". They vary during coronal mass ejections.

9. SEPs EVENTS INFLUENCE TERRESTRIAL RADIO WAVE PROPAGATION

Solar energetic particles also influence terrestrial radio wave propagation through polar region in the separate processes then caused by solar flares X-ray radiation, which affects only the sunlit side of the earth. Although energetic particles are shielded from lower latitudes by the earth's magnetic field, the gain access to the ionosphere over the polar caps, where the magnetic field shielding is less effective. Polar cap absorption(PCA) events are troublesome to radio-navigation techniques making use of nearly constant height of reflection of very low frequency waves find the propagation time, hence the distance to the becon.during the PCA events the height of radio wave reflection is lower(Davies 1990). SEPs can penetrate the polar region, which increase ionization rate there, resulting in enhanced absorption of radio-wave in the D region (i.e. Polar Cap absorption),(Shea et al 1990). High energetic ions penetrate electronic components, causing bit Flips in a chain of electronic signals that can result in improper commands with in space craft or incorrect data from instrument less Energetic particles contribute to a variety of space craft. Solar radiation and other solar activity affect the total electron content of the ionosphere and also affect various radio frequencies used Telecommunication.

10. HUMAN IMPACT OF SOLAR FLARES

Solar flare radiation and solar energetic particles have important effect the most pervasive human effects can be attributed to magnetic storms, which response of earth magnetic to magnetic storm, which response to earth magnetic field to specific in homogeneities in the solar wind. In homogeneities arise because the outer solar atmosphere. The solar wind is the expansion and escape of the outer solar atmosphere in interplanetary space. Solar wind have been

observed and identified by ground based optical and radio measurement and in situ space craft measurement. As observed near earth, solar wind speeds are typically about 400 km/s,but speeds exceeding 1000km/s have been measured. earth magnetic field activity senses and reacts to the solar wind-it's speed, density and magnetic field. Because the solar wind is variable over time scales as short seconds, the interface that separate interplanetary space from the magnetosphere (Cowely,1982)is remarkably dynamic .normally, the interface-the magnetopause-lies at a distance equivalent to about 10 earth radii in direction of the Sun. However, during episode of elevated Solar wind density velocity, the magnetopause can pushes inward to within geosynchronous altitudes (6.6 earth radii).The magnetosphere extracts energy from the solar wind, internal processes produce geomagnetic storms, increases aurora at low latitudes. And change the properties of ionosphere and upper atmosphere. Geomagnetic storms are extraordinary variation in small percentage in the surface geomagnetic field. Rapidly fluctuating magnetic field induce current in long "wires" (i.e. Power lines, pipelines, cables, and even train tracks). That led to equipment failure. The geomagnetic storm that bears responsibility for the outage total deviations in compass heading of several degrees even at middle latitudes. From blast of solar wind in energization of population of electrons and ions resident in the magnetosphere. These trapped particles, guide by dipolar geomagnetic field. They strike the molecules and atoms of thin, high atmosphere, exciting some of them glow. These auroras, exciting some of them glow. These are auroras, dynamic and delicate displays colored light seen in the night sky. An associated consequence of earth's response to blasts of solar wind is the energization of population of electrons and ion resident in the magnetosphere. These trapped particles, guided by roughly dipolar geomagnetic field. Usually enter the upper atmosphere near the Polar Regions. They strike the molecules and atom of thin, high temperature, exciting some of them to glow. The incoming particles deposit displays of colored light seen in the sky. the heated" air" rises, and density at the orbit of satellite drag, satellite lose energy and their orbits change. All low altitude frictional drag satellite loses energy and their orbits change. All low altitudes satellite are falling back to earth owing to atmospheric drag; this process accelerated during geomagnetic storm. In addition, solar storm can cause electron-static discharges, which destroy electronic devices likes solar panels. Solar storms most critical are telecommunication signals, solar storms changes the properties of the ionosphere, disturbing signals or modify them. This can mean G.P.S also because the failure of military radar systems and other shortwave transmission system like T.V. broadcasting, mapping; land surveying and exploration close to earth, air traffic is also affected especially on pole routes. Flight personal and passenger are exposed to high as radiation intensity .and they have to monitor for compliance with safety rules. This energetic radiation increasing greatly. Endangering not only people but also interfacing radio communication and electronic equipment of the plane. The electrical condition of the atmosphere depends upon it's of ionization. The main source of ionization up to the altitude of 60 k.m.inglactic Cosmic rays. The ionization rate increases with geomagnetic latitudes, and both the height of peak and the slope of ionization rate above the peak also increase. In the ionosphere the electric field produced by dynamo actions. The ionospheric wid dynamo is driven by tide generated with the thermosphere and by tides propagating upward from the lower atmosphere. Atmospheric Wind and tides pull the weakly ionized ionospheric plasma across the geomagnetic field. Thus producing an electromotive force and field is called the ionospheric wind or solar dynamo (Sq).

The earth magnetosphere is bombarded by nearly isotropic flux of cosmic rays: The penetration of these energetic charged particles in to solar system; to the vicinity of the earth influenced and modulated by the condition of the sun, during active and quiet phase of solar cycle. Magnetic fields changes associated with Geomagnetic storms directly affected operations that use the earth's magnetic field for guidance such as magnetic field surveys. Ionospheric disturbances cause errors interaction obtained from G.P.S signals. In addition, during the years of solar maximum, the sun is a recurrent source of lower energy particles accelerated during certain SFs and CMEs .these solar particle events last for several days at a time, and consist of both protons and heavier with variable composition from event to event. The sun emits radio waves, X-rays; and energetic particles in addition to visible light the total energy output is about 3.8×10^{33} $ergs^{-1}$energy from the Sun, in the form of sunlight and heat supports almost all life on earth via photosynthesis and drives the earth's climate and weather. Sun is magnetically active star; it supports a strong, changing magnetic field that varies year to year and reverse direction about every 11-year around solar maximum. The sun magnetic fields give rise to many affects that collectively called solar activity. the solar wind is responsible for the overall shape of terrestrial magnetosphere, and fluctuation in it's speed,density,direction and entrained magnetic field strongly affect earth's local space environment and radio interference can vary by fact of hundred to thousand; and shape of location of the magnetopause and bow shock wave upstream of it can change by several earth radii, exposing geosynchronous satellite to direct Solar wind. The coupling between the solar wind and magnetosphere is probably realized via a magnetic reconnection process between IMF By component and the geomagnetic field. It creates the large scale Magnetospheric convection electric field responsible for geomagnetic activity. Ionosphere and magnetosphere are closely linked together via magnetic field lines.magnetospheric electric field made up the ionosphere, creating e.g., plasma convection, frictional heating and plasma instabilities .aurora particles precipitation ionize the high latitudes atmospheres down to the ionosphere. The change Magnetospheric ion composition can have large effects on some important Magnetospheric processes. Collision bet wean the convicting ionospheric plasma and neutral atmosphere lead generation of neutral winds and Joule heating of the' neutral gas'. Neutral gas can further heated by plasma instabilities that arises due to ionospheric flashes in the ionospheric plasma is still unknown. Sun radiates more than light, these radiation are variable over scales of time of days to years. The ionosphere is mainly produce XUV emissions(Gorney,1990).originating in the chromospheres and corona The evolution of these emission is not entirely synchronized(Lean et 2001).SEPs can penetrate the polar region, which increase ionization rate there, resulting in enhanced absorption of radio-wave in the region(i.e. Polar absorption) (Shea et al 1990). Solar electromagnetic radiation, particularly notable at wave lengths of solar X-rays and extreme ultraviolet (EUV)(XUV),a second refers to solar activity events;e.g Coronal Mass ejection and Solar Proton Events. The earth's upper atmosphere absorbs, Solar radiation resulting in heating dissociation and ionization, and the Ionosphere is mainly produced Via ionization effect of Solar XUV.the solar XUV fluctuates regularly and irregularly over time scales from minute(Flares) and roughly 27 days(Solar rotation) to decades(11-year Solar cycle).with amplitudes varying up to more than 1000 times.

Solar radiation damaging effect on the technological systems that increasingly important for daily living. For example, electric power transmission system and communication links have proven Vulnerable

to solar phenomena. Bright area on the Sun is optical wave length and a burst of noise at wave lengths .during solar flares, the flux of protons emitted at X-ray wavelengths increase up to several hundred times its usual level. Solar radiation at wave length shorter than 100 nm does not reaches the earth's surface but is absorbed in the upper atmosphere(approximately 40 k.m.), producing a layer where some atom have been ionized-ray wavelengths particularly 60 and 160 k.m. radio wave can be reflected from the ionosphere like light reflect from mirror.However,the efficiency of reflection depends on the radio wave frequency and properties of the ionosphere itself, which can change over a time scale of minutes.extremly high frequencies, such as those used to communicate with satellite, pass right through the ordinary ionosphere.Radiowave from terrestrial sources with frequencies below about 30MHz are directly affected by the Ionosphere, during large solar flares, which can occur at the rate of several per day during peak activity condition, all-high frequencies(HF) radio waves(3-30MHz) reaching a daytime ionosphere absorbed for duration of flare. Such "radio Blackouts" are significant because HF radio propagation permits communication over long distances, such as short-radio broadcasting by FM as well as amateur radio. At the same time the phase of vary low wave frequencies (VLF, 3-30 kHz) reflecting the bottom side of ionosphere advances as the propagation paths shorten.

11. CONCLUSION

Solar transients; solar flares, coronal mass ejections (CMEs),solar energetic particles(SEPs) are drivers of the space weather effect in geospace. Solar transients: solar flares,CMEs and solar energetic particles are the consequence of one energy release process in which the coronal magnetic energy release in term of flashes and mass motions; solar proton events are mostly associated with solar flares and thought to be accelerated at the reconnection site in flaring plasma The CMEs initial velocity seems to have some direct or indirect connection with the nature of flaring plasma as all these solar transients:flares,CMEs,Particles found be produced from the magnetically complex regions in the solar Corona. Sun itself is natural laboratory which provides us opportunity to study the acceleration processes of charged particles up to MeV -GeV energies. solar energetic particles can escape in to interplanetary space through open field line and can be observed with in situ particles detectors allowing sampling of particles accelerated at Sun. the energy release through X-rays in solar flares is mostly X-rays in solar flares is mostly due to Bremsstrahlung emission. Good correlation has been found between spectral hardness of no thermal HXR emission and X-ray flux at the corresponding Energy(Grigis and & Benz 2004;Flecther &Hudson 2002.). Solar radiation is the most intense source of energy supplied to the terrestrial atmosphere, and there is wealth of evidence in favor of the response of atmospheric parameters to solar variations our need to asses environmental impact on human kind's technological systems requires a better understanding of electrical processes in earth's atmosphere. Further research needed to understand better the natural electrical environment and its variability and it predicts it's future evolution. The effect of solar radiation, space radiation on spacecraft materials and devices are one of the main reasons of arising of the space craft operation failure and life time reduction. main components of the space radiation are: The earth's radiation Belts(SPEs),hot magnetosphere plasma(HP).the total energy range of electron and ions of space radiation is exceedingly wide:from10^3 up to 10^{21} eV that produce various radiation effect on space craft surface and space craft.(Novikov,1999). The improved technologies being enjoyed today are adversely affected by solar activities. Therefore many warning from concerned scientist saying that

electromagnetic space storms from Sun may wipeout telephone lines and television signals cripple air craft navigation system. The effect may be particularly strong in high latitude and trigger powerful Current in telephone and electrical equipments. Impact of Sun and Geomagnetic process on the atmosphere-ionosphere the subject of Space weather Research. Thus, the whole atmosphere system the continuous influence of Metrological effects and space weather.

References

1. Allen,J.H.,and Wilkinson,D.C.:"*Solar-Terrestrial Activity Affecting System in Space and On Earth*"Published in Solar-Terrestrial Prediction_IV .Proceedings of Workshop at Ottawa Canada,May 18-22,**1992**.
2. Berth,J.L.,C.S.Dyer, and E.G., Stassinopoulos,(**2003**), *Space atmospheric and Terrestrial radiation environments*,IEEE Trans.Nucl.Sci.Vol **50**.No3.pp.466-482.
3. Cowely,S.W.H:**1982**,"*The causes of convection in the Earth's Magnetosphere:A Review of Development During the IMS*,Rev.Geophys.Space Phys.20,531-565.
4. Daly,E.J.,I.Daglis,Ed.,(**2004**),*Outlook on space weather effects on space-crafts*",NATO Science series:effect of space weather on Technology infrastructure, Kluwer Vol:**176**,pp.91-108.
5. Davis,K., and D.M.,Baker,(**1964**),*Ionospheric effects observed around the time of the Alasken earthquake of March 28,1964*,J.Geophys.Res,**70,**2252-2253.
6. Davis,K.,Ionospheric Radio,London:peter peregrines,**1990.**
7. Dubey,S.C. and Mishra,A.P.2000,*Earth Moon and Planet*,**84,**34.
8. Dubey,S.C..,1998,*Indian Journal* of Radio and Space Phys.,**27**,43.
9. Flectcher;L.,&Hudson,H.S.,**2002,**Sol.Phys.,210,307.
10. Garret,H.B.and C.P.Pike,eds.,*Space systems and their interactions with earth's space environment,NewYork:American Insitute of Aeronautics and astronautics***,1980.**
11. Gonzalez ,W.D.,Joselyn,J.A.,Kamide,Y.,Kroehl,H.W.,Rostoker,G.Tsurutani, B.T. and Vasyliunas,V.M.,1994,J.Geophys.Res.,**99**,5771.
12. Gonzalez et al.,1998,Geophys.Rev.Lett.,**25,**963.
13. Gorney,D.J.:"*Solar cycle effects on The near-Earth Envirounment*"Reviews of Geophysics,Vol.28,no.3,**1990**,pp.315-336.
14. Gosling ,J.T.,McComas,D.J.,Phillips,J.L.,and Bame,S.J.,1991,J.Geophys.Res.**96**,7831.
15. Grigis,P.C.,&Benz,A.O.,**2004,**A&A,426,1093.
16. Kudela, K., H. Mavromichalaki, A. Papaioannou and M. Gerontidou, (**2010**), *On mid-term periodicities in cosmic rays*, *Sol. Phys.*, **266**, 173-180.
17. Lanzeroti L.J.,ed.,*Impact of ionospheric/magnetospheric process on terrestrial science and technology,in solar system plasma Physics*,Vol.III,edited by L.J.Lanzerotti,C.F.Kennel,and E.N.Parker,NewYork:North Holland Publishing Co.,**1979.**
18. LeanJ.L.,WhiteO.R.,Livingston W.C.,et al. *Variability of composite chromospheric irradiance index during11 year activity and over larger time periods*.J.Geophys Res,**2001**,106:10645-10658.
19. Misehev, A., and P.I.Y. Velinov, (**2010**), *The effect of model assumptions on computations of cosmic ray induced ionization in the atmosphere*, *J. Atmos. Sol. Terr. Phys*., **72**, 476-481.
20. Novikov L.S. *Contemporary state of space Craft/envirounment interaction Research.*Rad.Measure.,**1999**,V.**30**pp.661-667.
21. Park,Y.D.,Moon,Y.-J.,etal.,**2002**,*Astrophysics and space Science*279,343-354.
22. SchwenR., Dal Lago,A.,Huttunen,E.,Gonzalez W.D.,**2005**,*Annales Geophysicae*,23,1033-1059.
23. Shea M.A. Solar Cycle D.F.:*A Summary of Major Solar Proton Events, Solar Physics*,**1990**,127:297-320.
24. Singh, A.K., D. Singh, and R.P. Singh, (**2010**), Space weather: Physics, effects and predictability, *Surv. Geophysics*,**31**, 581-638.
25. Singh, A.K., D. Singh, and R.P. Singh, (**2011**), Impact of galactic cosmic rays on Earth's atmosphere and human health, *Atmos. Environ.*, **45**, 3806-3818.
26. T surutani ,B.T. and Gonzalez,W.D.,1997,*The Interplanetary causes of magnetic storms,a Rev. in Geophys.M*onogar series.
27. Tsurutani ,B.T.,Gonzalez,W.D.,Tang,F.,AkasofuS.-I and Smith,E.J.**1988**,J.Geophys.Res.,93,8519.
28. Usoskin, I.G., G.A., Kovaltsov, I.A. Mironova, A.J. Tylka and W.F. Dietrich, (**2011**), Ionization effect of solar particles GLE events in low and middle atmosphere, *Atmos.Chem.Phys*.,**11**,1979-1988.

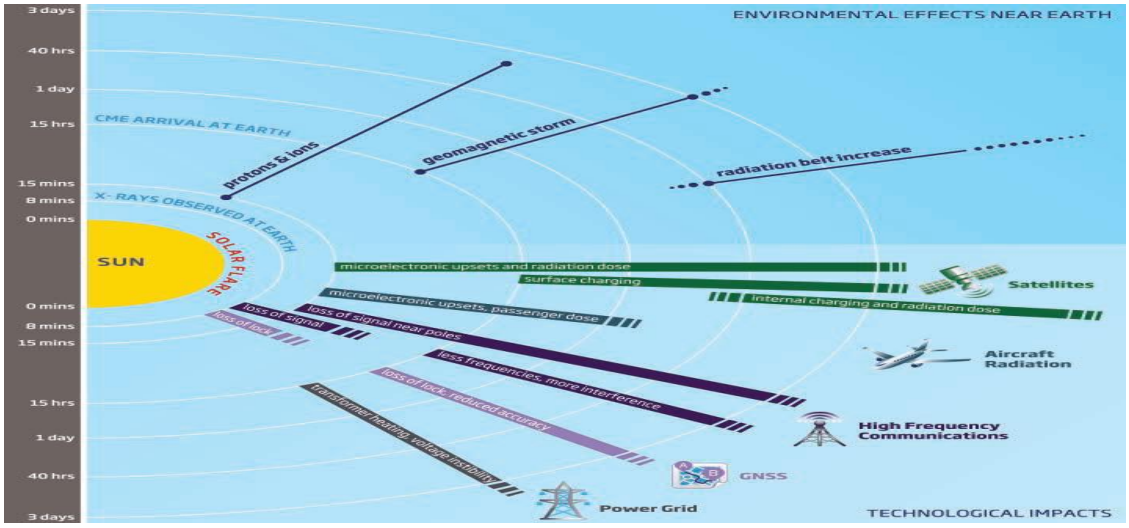

figure 1.solar radiation and it's technological impact