



RESEARCH ARTICLE

SOLAR COSMIC RAYS AND CLIMATE.

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Abstract

The purpose of this paper is to show the public solar cosmic rays irradiated the early solar system after its birth five billion years (5 Ga) ago, still do, and influence Earth's climate today. Cosmic rays are one of many ways the Sun's pulsar core maintains invisible contact with atoms, lives and planets in the solar system. Cosmic rays produce tracks of ion pairs (charge separation) on traversing Earth's atmosphere. The attractive force of water vapor condensation into water droplets along ion tracks produces electrically charged clouds, rain, lightening and thunder as frequent reminders a solarpulsar controls human destiny.

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Introduction:-

Einstein (1905) discovered Aston (1922) measured, then Weizsäcker (1935), Bethe and Bacher (1936) obscured the exact mass (m) stored as energy (E) in atoms of the chemical elements that comprise all matter. Kuroda (1992) - the scientist who noticed and reported a misunderstanding of nuclear energy after Aston's lecture at the Imperial University of Tokyo on 13 June 1936 - died (Manuel, 2001), as Manuel et al. (2000; 2001a,b) were first reporting neutron-repulsion as the Sun's primary source of energy. The next year Manuel et al. (2002) reported deep-seated magnetic fields from the Sun's pulsar core or its super-conducting iron-rich mantle caused solar eruptions and climate change vs conventional views of solar magnetic fields (Solanki et al, 2006).

The universe expands because neutron-repulsion triggers emission of neutrons - compacted electron-proton (e^- , p^+) pairs from cores of galaxies and stars - that decay to the hydrogen atoms that are later discharged to interstellar space in stellar winds, flares, eruptions, and explosions (Manuel, 2011). Without deciding the mechanism (Manuel, 2002; Hwaung, 2012) that focuses stellar energy on cosmic ray particles, flares, eruptions, sunspots, collimated beams and bullets (Sahai, et al., 2016), we present evidence solar cosmic ray particles bombarded the early solar system and still do so today.

Neutron repulsion was not accepted as the primary source of cosmic and solar energy (Manuel, 2011, 2012) until Manuel (2016a,b) identified the theological error obscuring neutron-repulsion in Weizsäcker-Bethe's "nuclear binding energy" and Manuel (2016c,d) reaffirmed neutron-repulsion as a common source of energy generating super-solar flares by the same mechanism that produces such eruptions in younger stars with stronger surface magnetic fields (Karooff et al., 2016). This finding of super-solar flares - with one expected every thousand (~1,000) years - was widely reported (Clery, 2016; Persson, 2016; Gibney, 2016).

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Deep-seated magnetic fields (Manuel et al., 2002) or compression (Hwaung, 2012) from a star's compacted core (Toth, 1977; Manuel, 2012, 2016c) may continue accelerating hydrogen into cosmic rays as surface magnetic fields decrease and stellar radii increase in stellar evolution (Glagolevskij, 2014).

The recent findings confirm the basic misunderstanding of nuclear energy that Kuroda noted in his 1936 class-notes following Aston's lecture at the Imperial University of Tokyo (Kuroda, 1992) and the validity of Kuroda's insight into the beginning of the world, while standing in the ruins of Hiroshima one day in August 1945: *"The sight before my eyes was just like the end of the world, but I also felt that the beginning of the world may have been just like this"* (Kuroda, 1982, page 2). Richard Carrington (1859) had already reported the immediate effects on Earth from a large solar flare, Hess had received a Nobel Prize for discovering cosmic rays (Hess, 1936), and Forbush (1937, 1938) had reported impulsive decreases in cosmic ray intensity from solar-induced geomagnetic storms.

Perhaps Kuroda imagined that an even larger solar eruption, or a super-solar explosion birthed the world and rebirthed the Sun, as two of Kuroda's former students finally suggested thirty years later (Manuel and Sabu, 1975), after they and their students started to uncover evidence that chemically and isotopically heterogeneous debris from a super-solar, supernova formed the entire solar system (Manuel et al, 1972).

Kuroda and Manuel (1970) had reported a common mass-dependent fractionation of the solar system's neon and xenon isotopes before Manuel et al. (1972) found xenon in carbonaceous meteorites to be a mixture of isotopically distinct "strange xenon" (Xe-2 - with almost twice the normal abundances of ^{136}Xe and ^{124}Xe) – and mass fractionated "normal xenon" (Xe-1 - in air, in the Sun and in bulk meteorites).

Authors of the current report found only "normal xenon" (Xe-1) in meteoritic troilite (FeS) (Hwaung and Manuel, 1982) and concluded that this distinct mix of nucleogenetic xenon components was *"dominant in a central Fe- and S-rich region of the proto-planetary nebula."* "Normal xenon" was therefore assumed for the bulk Sun in calculating the enrichment of lightweight elements and isotopes of other noble gases in the solar photosphere and in the solar wind from mass-dependent fractionation (Manuel and Hwaung, 1983). Their analysis showed *the solar interior consists mostly of the same elements that comprise the matrix of ordinary meteorites and rocky planets: Fe, Ni, O, Si, S, and Mg.* Measurements during the Galileo probe of Jupiter later confirmed the Sun's iron-rich interior (Manuel et al., 1998).

The next section compares a recent summary of mainstream opinions on cosmic rays (Howell, 2016) with measurements and observations that suggest solar waste products are the correct answer to her lingering question, *"What are cosmic rays?"*

Results and Discussion:-

1. Howell's lingering question suggests an error in the first sentence of the report, *"Cosmic rays are atom fragments that rain down on the Earth from outside of the solar system"* (Howell, 2016). Schindler and Kearney (1972) and McCanney et al. (1998) reported direct observations of cosmic rays from the Sun. Measurements of Y-rays from a solar flare in Active Region 10039 on 23 July 2002 with the RHESSI spacecraft spectrometer revealed protons accelerated to the energy required to fuse hydrogen into helium, via the CNO cycle in closed solar magnetic loops at the solar surface (Mozina et al., 2006). The occurrence of this CNO cycle at the solar surface produced ^{15}N over geologic time, and explained the otherwise mysterious increase in the $^{15}\text{N}/^{14}\text{N}$ ratio at the solar surface (Kerridge, 1975, 1993, Kim et al., 1995) over geologic time.
2. Table 1 is a summary of the cosmic ray exposure of major types of meteorites in the solar system (Eugster et al., 2006).

Level of Cosmic Ray Exposure	Type of Meteorite	Cosmic Ray Exposure Age	Reference
Highest Exposure Ages	Iron Meteorites	0-1500 Ma	page 842
Medium Exposure Ages	Stone Meteorites	0 - 100 Ma	pp. 839-840
Lowest Exposure Ages	Most Carbonaceous C1, CM Meteorites	0 - 10 Ma	page 840

Iron-rich supernova debris nearest the pulsar remnant formed iron meteorites, trapped “normal xenon” (Xe-1) and received the highest exposure to cosmic rays from the pulsar remnant. Stone meteorites formed further away, also trapped mostly “normal xenon” (Xe-1), and received less exposure to early cosmic rays. Carbonaceous meteorites formed even further from the pulsar remnant, trapped “strange xenon” (Xe-2) that Manuel and Hwaung (1983) predicted would be found in Jupiter and received the lowest exposure to cosmic rays from the supernova pulsar remnant.

- Howell (2016) concluded cosmic rays “*can be created in supernovas, there may be other sources available for cosmic ray creation. It also isn't clear exactly how supernovas are able to make these cosmic rays so fast*”. Supernovas and super-stellar eruptions certainly release sufficient energy, but it is unclear how energy is focused on cosmic ray particles, collimated beams and bullets (Sahai, et al., 2016) by deep-seated Meisner ejections of magnetic fields from a rotating, super-fluid, super-conductor (Ninham, 1963; Manuel et al., 2002) or simple compression (Hwaung, 2012). Ordinary stars have pulsar cores and iron-rich mantles, inside an outer veneer of gravitationally-retained hydrogen from neutron-emission and decay (Manuel, 2016a,b, c,d). This outer layer increases and the star expands during stellar evolution, from a young, T-Tauri type star with strong surface magnetic fields to the Red Giant stage, about to be reborn by discharging the outer layer in a supernova and starting over again.
- Measurements of xenon isotopes as Galileo probe descended in Jupiter atmosphere confirmed Manuel and Hwaung (1983) prediction of “strange” Jovian xenon. As shown below, hydrocarbon contamination increased as the probe descended and the apparent value of the ($^{136}\text{Xe}/^{134}\text{Xe}$) ratio decreased. The method described by Windler (2000) was used to calculate a value of $^{136}\text{Xe}/^{134}\text{Xe} = 1.04 \pm 0.06$ for the point of zero hydrocarbon contamination from eleven mass-spectrometric scans.

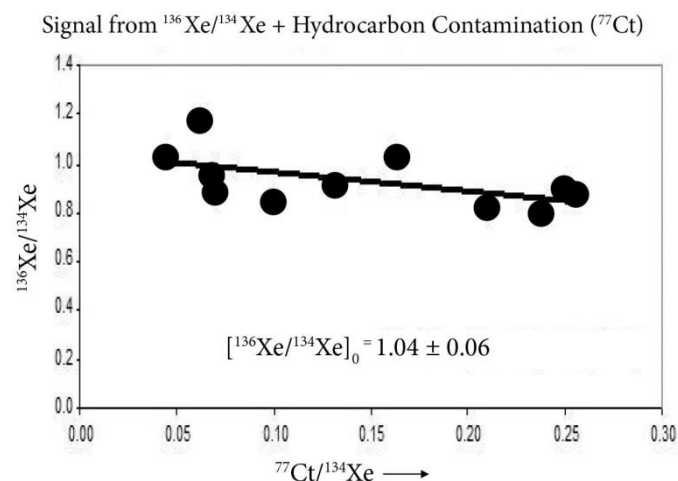


Figure 1:Eleven mass-spectrometric sweeps of the mass-to-charge signals at $m/e = 77, 134$ and 136 as the Galileo probe descended in Jupiter’s atmosphere yield a value of $^{136}\text{Xe}/^{134}\text{Xe} = 1.04 \pm 0.06$ for “hydrocarbon-free” xenon in Jupiter. Lewis et al. (1975) reported $^{136}\text{Xe}/^{134}\text{Xe} = 1.04$ for the “strange xenon” (Xe-2) in Allende’s mineral separate, 3CS4.

- Simple geometric consideration of the decrease in the 4π flux of cosmic rays as the 3rd power (cube) of distance from source illustrates why the local source of cosmic rays must be considered if the source of energy that powers ordinary stars, galaxies and the expanding cosmos is neutron repulsion (Manuel et al., 2000, 2001b,c, 2011, etc.). Earth’s closest star is the Sun, 1 AU away. The next closest one is $\sim 3 \times 10^5$ AU (4.2 light years) away. The Crab Nebula, produced by the supernova explosion of a star in 1054 AD is $\sim 4 \times 10^8$ AU (6,500 light years) away.

Thus the probability of a cosmic ray from the Sun striking Earth is $\sim 3 \times 10^{16}$ times more likely than the probability a cosmic ray from the next closest star would strike Earth, and $\sim 6 \times 10^{25}$ times more likely than the probability that a cosmic ray from the Crab Nebula would strike Earth.

Conclusion and Acknowledgements:-

Invisible force fields hold Earth and other planets in a stream of waste products from the Sun—solar energy, solar neutrinos, solar wind, and solar cosmic rays. These produce ion-tracks in air, on which water vapor condenses to electrically charged clouds that discharge rain, lightening and thunder. We realize we know only a little. More will be revealed, if we adhere to basic principles of science.

Many students, friends and colleagues encouraged us to report the Sun's influence on human affairs, although we have not yet shown if solar cosmic rays are produced by compression conversion of matter into energy (Hwaung, 2012) in the Sun or by the acceleration of solar hydrogen by impulsive Meisner emissions of deep-seated magnetic fields from the Sun's super-conducting interior (Ninham, 1963). This is like deciding how neutron-repulsion causes emission of electrons from neutron-rich nuclei and proton-repulsion causes emission of positrons from proton-rich nuclei. Regardless how, they do.

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