

Труды IX Международной крымской конференции «Космос и биосфера 2011»  
При цитировании или перепечатывании ссылка обязательна.

Адрес этой статьи в интернете: [www.biophys.ru/archive/crimea2011/abstr-p107-1.pdf](http://www.biophys.ru/archive/crimea2011/abstr-p107-1.pdf)

---

## **The Solar Activity, the Cosmic Rays and Bio-substrata (*The risks of Astronauts Health*) .**

***Faraone Piero A.R.***

CIFA V.President

In the last Crimea Conference (*Proceeding of the VIII International Conference of Crimea, Sudak, 2009*) the A. emphasized the opportunity to insist always more frequently in the searches about the possible correlations of the external energies as CR and S.A. with many other biosphere-substrata. This to confirming more clearly if these energies combining both their activity are presumably dominant factors in influencing directly or indirectly, the atmosphere-substrata generally and especially bio-substrata.

The A. deduced the share of this opportunity in his experimental. daily researches.( 1970-1991), on biological.substrata said.CSD(*Colony Sectoring*). He examined more than 4 million of bacterial colonies .The CSD frequency resulted significantly correlated with SA(*Solar Activity, Wolf's-Number*) and with RC (*Cosmic Rays ,Neutron flux*) : when the SA increased neutralizing the cosmic rays effects in our biosphere, we had lower CSD-frequency. On the contrary, when SA was lower , the CR was higher and the CSD frequency increased ( 1-2 ). The A. thinks advisable to refer here also the data obtained from other AA in several substrata ; these data resulted in correlation with SA and RC activity as CSD frequency data before said :

Variations of the Ozone-hole and Cosmic Rays (CR). Canadian researchers recently, found several significant correlations between size variations of the ozone-hole and CR [1981-1992 and 1990-2007] in the Antarctic Hemisphere (0-65 degrees, south latitude) . The researchers noted effectively a significant positive correlation between the CR Activity and the enlargement of the ozone-hole . When SA [Solar Activity (*Wolf's Number*)] shall be very much low there is also a low possibility that SA neutralize the cosmic rays effects in our biosphere and then we have consequently a more enlarged ozone-hole. These researchers hypothesized also a probable

confirming of these correlations in the next years 2008-2009 and 2019-2020 . From <http://www.science.uwaterloo.ca/~qblu/Lu-2009PRL.pdf>

Cosmic ray decreases affect atmospheric aerosols and clouds? From University of Denmark, Copenhagen, Svensmark says: Close passages of coronal mass ejections from the sun are signaled at the Earth's surface by Forbush decreases in cosmic ray counts. We find that low clouds contain less liquid water following Forbush decreases, and for the most influential events the liquid water in the oceanic atmosphere can diminish by as much as 7%. Cloud water content as gauged by the Special Sensor Microwave / Imager (SSM/I) reaches a minimum 7 days after the Forbush minimum in cosmic rays and so does the fraction of low clouds seen by the Moderate Resolution Imaging Spectroradiometer (MODIS) and in the International Satellite Cloud Climate Project (ISCCP). Parallel observations by the aerosol robotic network AERONET reveal falls in the relative abundance of fine aerosol particles which, in normal circumstances, could have evolved into cloud condensation nuclei. Thus a link between the sun, cosmic rays, aerosols, and liquid-water clouds appears to exist on a global scale. From <http://www.agu.org/pubs/crossref/2009/2009GL038429.shtml>  
<http://wattsupwiththat.com/2009/08/04/a-link-between-the-sun-cosmic-rays-aerosols-and-liquid-water-clouds-appears-to-exist-on-a-global-scale/> .

Correlation between cosmic rays and temperature of the stratosphere ? What they observed was a strikingly close relationship between the cosmic-rays and stratospheric temperature . This they could understand : the cosmic-rays, known as muons are produced following the decay of other cosmic rays, known as mesons. Increasing the temperature of the atmosphere expands the atmosphere so that fewer mesons are destroyed on impact with air, leaving more to decay naturally to muons. Consequently, if temperature increases so does the number of muons detected. What did surprise the scientists, however, were the intermittent and sudden increases observed in the levels of muons during the winter months. These jumps in the data occurred over just a few days. On investigation, they found these changes coincided with very sudden increases in the temperature of the stratosphere (by up to 40 °C in places!). Looking more closely at supporting meteorological data, they realised they were observing a major weather event, known as a Sudden Stratospheric Warming. On average, these occur every other year and are notoriously unpredictable. This study has shown, for the first time, that cosmic-ray data can be used effectively to identify these events. What did surprise the scientists, however, were the intermittent and sudden increases observed in the levels of muons during the winter months. These jumps in the data occurred over just a few days. On investigation, they found these changes coincided with very sudden increases in the temperature of the stratosphere (by up to 40 °C in places!). Looking more closely at supporting meteorological data, they realised they were observing a major weather event, known as a Sudden Stratospheric Warming.

On average, these occur every other year and are notoriously unpredictable. This study has shown, for the first time, that cosmic-ray data can be used effectively to identify these events . From <http://wattsupwiththat.com/2009/01/22/correlation-demonstrated-between-cosmic-rays-and-temperature-of-the-stratosphere/>;

[http://www.cpc.noaa.gov/products/stratosphere/strat-trop/gif\\_files/time\\_pres\\_HGT\\_ANOM\\_ALL\\_NH\\_2009.gif](http://www.cpc.noaa.gov/products/stratosphere/strat-trop/gif_files/time_pres_HGT_ANOM_ALL_NH_2009.gif)  
[http://www.google.it/search?as\\_q=Stratosfera+%2Cimprovvisi+elevati+incrementi+della+temperatur+a+della+stratosfera+%28fino+a+40+%C2%B0+C+in+alcuni+luoghi%21%29.+i&hl=it&num=10&btnG=Cerca+con+Google&as\\_epq=+&as\\_oq=&as\\_eq=&lr=&cr=&as\\_ft=i&as\\_filetype=&as\\_qdr=all&as\\_occt=any&as\\_dt=i&as\\_sitesearch=&as\\_rights=&safe=images](http://www.google.it/search?as_q=Stratosfera+%2Cimprovvisi+elevati+incrementi+della+temperatur+a+della+stratosfera+%28fino+a+40+%C2%B0+C+in+alcuni+luoghi%21%29.+i&hl=it&num=10&btnG=Cerca+con+Google&as_epq=+&as_oq=&as_eq=&lr=&cr=&as_ft=i&as_filetype=&as_qdr=all&as_occt=any&as_dt=i&as_sitesearch=&as_rights=&safe=images)

Cosmic pattern to UK tree growth. The growth of British trees appears to follow a cosmic pattern, with trees growing faster when high levels of cosmic radiation arrive from space. Variation in cosmic rays impacted tree growth more than changes in temperature or precipitation. When the intensity of cosmic rays reaching the Earth's surface was higher, the rate of tree growth was faster. The effect is not large, but it is statistically significant. The intensity of cosmic rays also correlates better with the changes in tree growth than any other climatological factor, such as varying levels of temperature or precipitation over the years. Experiments in space have shown that cosmic rays can have some positive impacts on biological materials (the trees had been planted in 1953 and felled in 2006). From [http://news.bbc.co.uk/earth/hi/earth\\_news/newsid\\_8311000/8311373.stm](http://news.bbc.co.uk/earth/hi/earth_news/newsid_8311000/8311373.stm) The researchers before said, clearly confirmed what the A. obtained in his studies about CSD frequency, during a long period of observations (1970/1991) ; their results confirm also the important role of the SA and the CR activities, influencing directly or indirectly several substrata in our biosphere . But the A. want here remark particularly the influence

of these energies on biological substrata, remembering his studia of CSD frequency and especially remarking the interesting reserarches of the AA. next referred, and considering also the risks of future astronauts-health. Moreover the CSD could be related, according to the literature, with probable bacterial mutations. This suggests an undeniable influence of these physical phenomena on microorganisms with a possible involvement of the bacterial-DNA in the dependence of the solar or the cosmic radiations. The ability to detect bacterial mutations in correlation with the external energies is corroborated beyond any doubt, from a U.S. studies done on bacteria isolated in a space-shuttle during spaceflight. G. Fox and Wilson R. (3) shown that genetically the bacteria isolated from the space shuttle suffered relatively frequent mutations, giving modified microbial strains, able to causing disease risks for the health of astronauts. ...Bacteria of the genus Salmonella grown in the space, aboard the space-shuttle, have shown unusual genetic activity becoming more virulent (4). The discovery could provide valuable guidance in the development of drugs for our terrestrial use in the prevention and medical care for extended missions in the space. It is known that the permanence in space has significant effects on human physiology .

This permanence weakens the muscles and skeletal system; and is also detrimental to the human immune system. The research team, led by Cheryl Nickerson(4), an associate professor at Arizona State University, Biodesign Institute, found that Salmonella grown in the Space Shuttle mission STS-115, in 2006, expressed deep genetic modifications. When this Space-strain was administered to mice, after returning to the Earth, this Salmonella was more deadly than the strains grown on the Earth-strain. The Pseudomonas aeruginosa bacterium, has caused, in the 1970, the unique severe infection till now, of an astronaut . In returning to our planet with Apollo 13, the astronauts left the main part of the space-shuttle to close themselves in the lunar module, on returning to Earth after an explosion on board of Apollo 13. There, they suffered conditions of low oxygen, water and energy. For these difficult conditions, the astronaut Fred Haise developed a severe prostate infection caused by Pseudomonas. He was seriously ill for weeks, after his return. Most of the infections contracted by astronauts in space, were light still now, even though it was never caused by Salmonella . And so as it's seen, in the examples just mentioned (3.4), the cosmic rays are therefore of great importance to give genetic changes in biological substrates. D.M.Klaus and H.N.Howard (5) remarked that various factors associated with the space flight environment have been shown to potentially compromise the immune system of astronauts, increase microbial proliferation and microflora exchange, alter virulence and decrease antibiotic effectiveness. An acceptable resolution of the above concerns must be achieved to ensure safeguard and efficient space habitation. ... ..P. W.Taylor and Andrei P.Sommer(6) hypothesised that in the next 15–30 years, very extended space flights will become a reality and astronauts will be likely to spend at least very long time away from Earth . Time spent in such extreme environments will result in a diminution of immune status and profound changes in the human bacterial microflora. In microgravity, the efficacy of antibiotics is reduced and microbial mutation rates increase very much. These factors will impinge on the capacity to treat effectively the infections that will doubtless arise during such long and stressful travels. Concluding MC.Maccarone, (7)-First-Reseacher of the Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo(IASF-PA), confirms that cosmic rays can be considered. of great importance in biology, contributing to their genetic changes especially in the long term .These energies are likely to have ever played and continue to play an important role in the evolution of life on the Earth. And now, what may impede the A. to conclude his article, hypotithing that cosmic energies as AS and RC, could be very important factors that directy or indirecty , may influence the human health, his ageing process and the end of his same existence ?...

## References

1. CIFA-Site [http://www.cifa-icef.org/index\\_ita.html](http://www.cifa-icef.org/index_ita.html), § Publications,1970 / 2002 ;§ Cifa News Bulletins , n° 29 /44 , 2001/2011.
2. I.'Ormenyi Ph.D., Hungarian Section of the Internat. Comm . of Study and Research of Environm. Factor, 1061.Kiraly u.52.Budapest. "Long Term Experiments of Meteorological and Solar Wave and Particle Radiation on Air Bacteria / CSD / Level . Technologiezentrum, TNOVA,K.Berichte ,band 43, 243-249,2000. It's possible to ask this paper writing to [passfahren@tin.it](mailto:passfahren@tin.it)
3. Fox G., Wilson R., "Getting to grips with mistery space bugs". New Scientist,2003,177,20,
4. Site [www.technologyreview.it/index.php?p=article&a=993](http://www.technologyreview.it/index.php?p=article&a=993) Simili News Letter N.5,Sept-Oct 2007.

5. David M. Klaus, Heather N. Howard . Aerospace Engin. Sciences Dep. Univ. of Colorado, USA, "Antibiotic efficacy and microbial virulence during space flight",. Trends in Biotechnology Volume 24, Issue 3, March 2006, Pages 131-136 Source :Antibiotic efficacy and microbial virulence during space flight
  6. Peter W. Taylor a , Andrei P. Sommerb "Towards rational treatment of bacterial infections during extended space travel".Journal of Antimicrobial Agents Volume 26, Issue 3, Pages 183-187 (September 2005) Source: [http://www.ijaaonline.com/article/S0924-8579\(05\)00164-0/abstract](http://www.ijaaonline.com/article/S0924-8579(05)00164-0/abstract)
  7. Maccarone M.C. "Dall'esperimento di Hess alla missione EUSO: alla ricerca dei raggi cosmici".Sources::C.Maccaroneselectedpublications1980/2009; [www.pa.iasf.cnr.it/~maccarone/papers.html](http://www.pa.iasf.cnr.it/~maccarone/papers.html); "Alla ricerca dei raggi cosmici di più alta energia Formato file: PDF/Adobe Acrobat - Visualizzazione rapida
-