

ROMANIAN CONTRIBUTIONS TO THE DEVELOPMENT OF ENVIRONMENTAL ENGINEERING

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Rezumat. *Ingineria mediului reprezintă o preocupare permanentă a inginerilor și oamenilor de știință din întreaga lume, propunând acele tehnologii care să aibă un impact cât mai mic asupra mediului. Ingineria mediului nu se referă doar la protecția mediului înconjurător împotriva factorilor de poluare antropici, dar și la protecția sănătății oamenilor sau la diminuarea vulnerabilității terestre la agresiunea factorilor extraatmosferici. Lucrarea de față prezintă munca de cercetare a unor oameni de știință români în a identifica și găsi soluții la unul dintre cele mai mari pericole care pândesc planeta noastră și anume – agresiunea factorilor de natură cosmică sau extraatmosferică.*

Abstract. *Environmental engineering is a permanent concern for engineers and scientists around the world, proposing those technologies that have the least impact on the environment. Environmental engineering is not only about protecting the environment against anthropogenic pollution factors, but also protecting people's health or diminishing the terrestrial vulnerability to the aggression of extra-atmospheric factors. The present paper presents the research work of Romanian scientists to identify and find solutions to one of the greatest dangers of our planet, namely the aggression of cosmic or extra-atmospheric factors.*

Keywords: environmental engineering, extra-atmospheric factors, web pages, energy, environment.

1. Introduction

The term of *environment* refers to the totality of the conditions a place, a zone, a planet can offer to some beings or technological creations at a given time: relief and vegetation, the gravity value, temperature and humidity, pressure and composition of the atmosphere, etc. To all this is added the human factor, his relationship with the other factors, the inter-human relations.

In the natural state, the components of the environment are in a relatively steady state. With the advent of man and his needs, many of the existing equilibria have

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begun to suffer. The increase of the number of people created the first major imbalances.

The need for more and more food, clothing and tools has made room for change. Agriculture, one of the most important discoveries of humanity, radically changed the environment on the planet. The second big change that people gave to the environment was the entry into the industrial age. Secondary products arising from human activity caused climate change. Greenhouse gases as well as increased atmospheric humidity and pollution made the environment start to react unpredictably.

In the following charts we can see how the main planetary parameters have increased in recent years: carbon dioxide (see Figure 1), global temperature (see Figure 2), change in sea level (see Figure 3), cosmic radiation (see Figure 4), the intensity of solar cycles (see Figure 5).

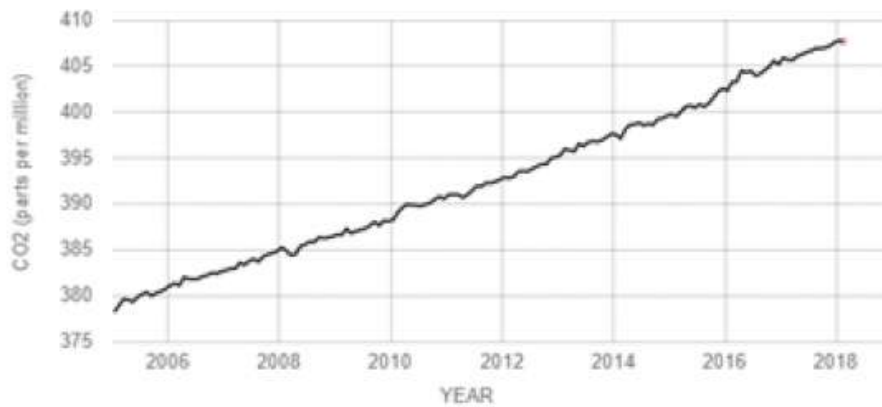


Fig. 1: Evolution of carbon dioxide emissions in atmosphere during the period 2005-2018

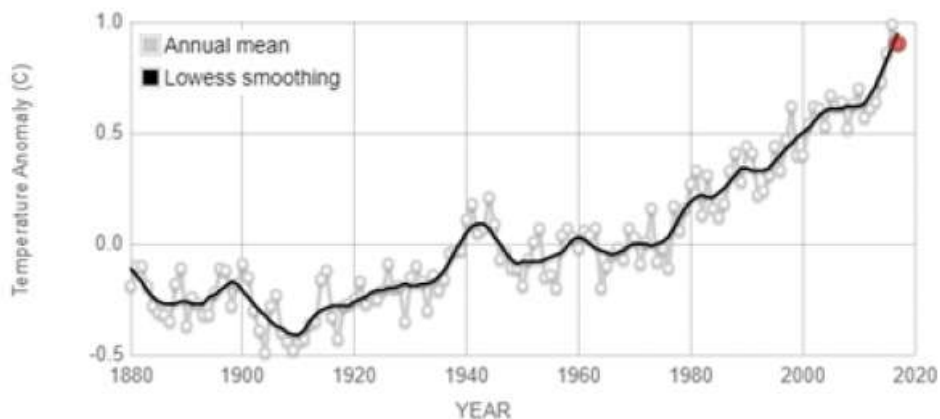


Fig. 2: Evolution of global temperature during the period 1880-2018

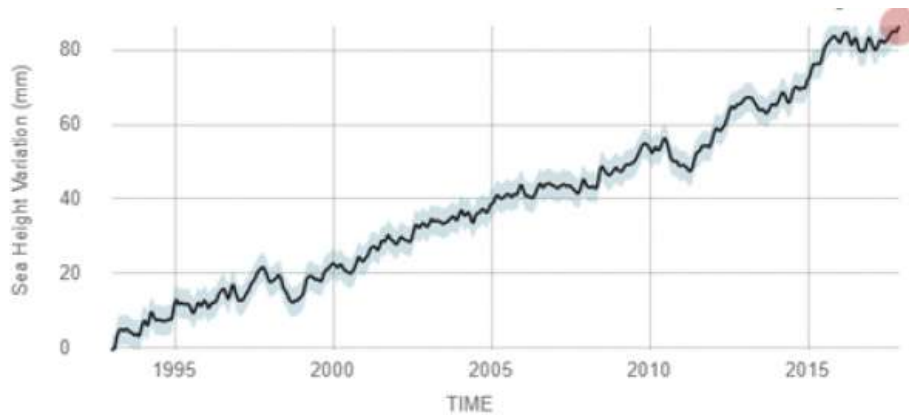


Fig. 3: Variation of the sea level during the period 1995-2018

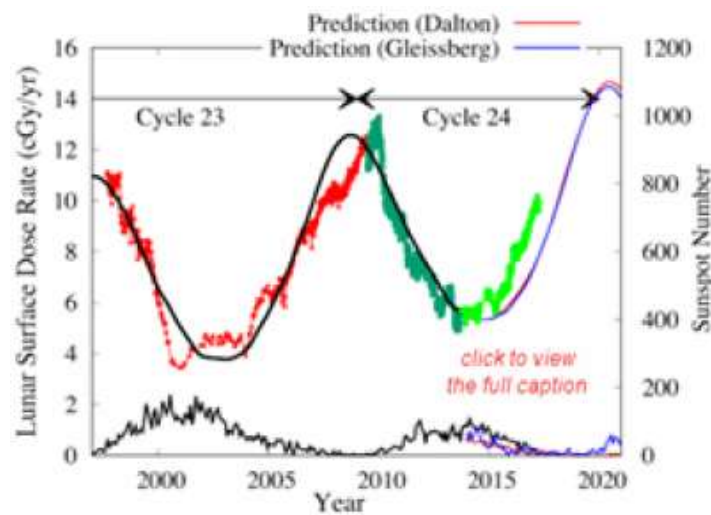


Fig. 4: Variation of cosmic radiation during the period 1995-2018 and prediction until 2020

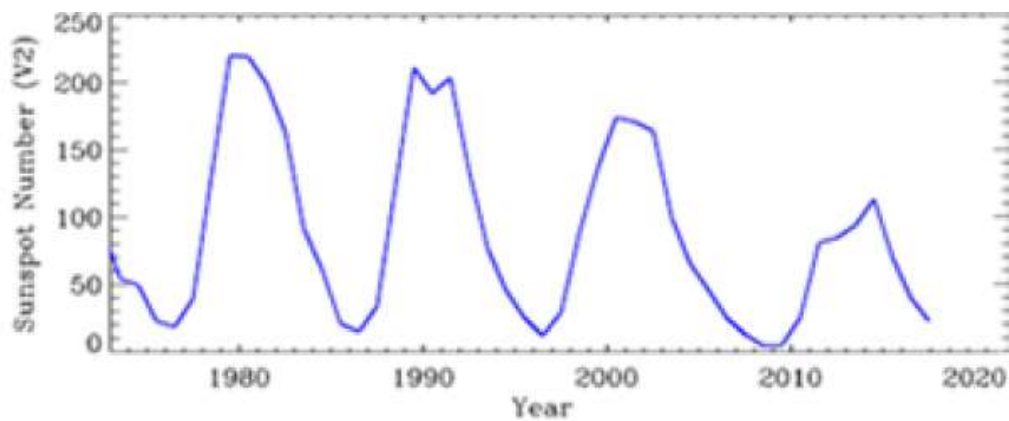


Fig. 5: Intensity of solar cycles during the period 1970-2018

If the Earth-to-Earth system evolves to the detriment of both the environment and man, the solar system as well as cosmic radiations come with major contributions to the imbalance of the environment.

The sun is now very close to the 24th solar cycle minimum. The measurements began in 1755 and the current cycle in 2008 on January 8.

For years, it has been claimed that the planet Earth is in a global warming process where man and his activity are the main source of imbalance.

People on the planet suffer year after year because of phenomena of extreme nature, phenomena attributed to the global warming process.

Romania, a country situated in the middle of the European continent, is increasingly feeling the devastating effects of these extreme phenomena, 2018 being, in our opinion, a beginning in this respect.

In 1840, the Vasilian School in Iasi teaches the first courses of meteorology.

In 1880, the Romanian Meteorological Service was established under the leadership of Ștefan Hepiteș, founding member of the International Meteorological Organization.

The data and experience gained in the last years have begun to outline the intimacy of atmospheric phenomena, and today, with enough accuracy - using evolved mathematical methods - to be able to make forecasts over different periods of time, issuing bad weather alerts.

In 2016 there appeared the necessity of setting up new disciplines, through which we could study in detail and find solutions to the violent phenomena we are confronted with. The idea is older on our continent, with some countries currently providing services for the permanent monitoring of these phenomena. Here we can cite France, Norway, England and recently Romania.

2. Space Meteorology Centre in Romania

In Romania, in the town of Răcari in Dâmbovița County, a space meteorology centre begins to take shape, whose purpose is to study the phenomena in the proximity of the terrestrial atmosphere as well as how they influence the climate, people's lives and the existing technologies.

The Space Meteorology Centre is a first in Romania, the targets and the aspirations rising to the top at international level.

Space meteorology describes the conditions in the near cosmic space and how they affect the Earth and its technological systems: climate, satellites, communications, power distribution, the life and health of human communities, critical infrastructures, etc.



Fig. 6: Romanian Space meteorology Centre photos

The Space Meteorology Centre is the only national structure that continually follows and processes the information of cosmic origin and can provide analysts and prognoses with specific character at the disposal of decision-makers. Also in S.M.C. Răcari are made daily analyses of how cosmic phenomena induce interference with natural ground phenomena, releasing daily informational bulletins and specific alerts.



Fig. 7: Romanian Space Meteorology Centre:
a. Equipment 1. b. Equipment 2. c. Equipment 3.

We are pursuing climate at the local and global level, the evolution of the Sun, the cosmic radiation and their interaction with the local bios, we develop warnings and alerts, and we find solutions. Through the energy department of the environment, unique in Romania, S.M.C. Răcari:

- ✓ develops studies correlating climate change with the existing reality,
- ✓ may develop implementing rules and proposals for legislative changes,

- ✓ warns when critical infrastructures are endangered by climate change (the possibility of interruption of electricity supply, the possibility of fire on gas distribution installations, extreme phenomena, etc.),
- ✓ has the ability to set critical intervention times in case of natural calamities,
- ✓ can develop maps and risk studies on climate change,
- ✓ provides specialist advice.



Fig. 8: Romanian Space Meteorology Centre:

a. Equipment 4.

b. Equipment 5.

c. Equipment 6.

The objectives of S.M.C. Răcari are the following:

- In-depth study of the global warming phenomenon
- Analysis of the dynamics of climate change
- Prevent or mitigate the effects of extreme phenomena
- Terraforming analysis
- Study of cosmic phenomena in direct impact with climatic changes
- Construction and launching of satellites to support research
- Creating a national / regional database on the evolution and effects of climate change
- In-depth study of the Black Sea surface
- Develop strategies and technologies to adapt to climate change
- Protecting Romania's territory by specific activities and alerting to aggressions in the outer space and extreme phenomena

The S.M.C. Răcari structure includes the following departments: Space Engineering, Energy-Environment, Auxiliary Support, Applied Biology, Astronomical Observatory, Unconventional Technologies. Also, it has planned a departmental structure with a core centre and 5 to 10 territorial centres.

The creation of S.M.C. represents for Romania a factor of progress and safety, a hope for the future.

3. Web Pages in the Field of Energy

A pilot project for open education under the aegis of the Centre for Creativity Development within Section VI - Technical Sciences - Academy of Romanian Scientists, the web pages in the field of energy are created and maintained starting with the academic year 2017/2018 for the students of the Faculty of Power Engineering, POLITEHNICA University of Bucharest.

Table 1. First step – creation and testing of the websites using *DokuWiki.org* free software

No.	Technologies used for websites	Software	Version
1.	Wiki	DokuWiki	
2.	Analytics	Google Analytics UA	
3.	JavaScript Framework	jQuery	
4.	Font Script	Font Awesome	
5.	Web Framework	Twitter Bootstrap	
6.	Miscellaneous	HTTP / 2	
7.	Web Server	Apache / Nginx	
8.	Programming Language	PHP	
9.	CDN	CloudFlare	

Table 2. Second step - registration of free e-mail addresses at *gmail.com*

No.	Title	Gmail account @gmail.com	Registration Date
1.	General Power Engineering	energetica.general	September 4, 2017
2.	Electrical Equipments	echipamente.energetice	September 4, 2017
3.	Installations for Electrical Energy	instalatii.electroenergetice	March 17, 2018
4.	Creativity of Engineers	creativitate.ingineriasca	March 13, 2018

Table 3. Third step - registration of free web hosting at *infinityfree.net*

No.	Title	infinityFree Hosting	Registration Date
1.	General Power Engineering	energetica-general.freecluster.eu	September 4, 2017
2.	Electrical Equipments	echipamente-electrice.freecluster.eu	September 4, 2017
3.	Installations for Electrical Energy	instalatii.rf.gd	March 17, 2018
4.	Creativity of Engineers	creativitate.rf.gd	March 13, 2018

Table 4. Fourth step - registration of free top-level domain names at *freenom.com*

No.	Title	freenom Domains	Registration Date
1.	General Power Engineering	energetica.cf energetica.ml energetica.ga energetica.gq	October 22, 2017
2.	Electrical Equipments	echipamente.cf echipamente.ml	October 22, 2017

		echipamente.ga echipamente.gq	
3.	Installations for Electrical Energy	instalatii.ml instalatii.ga instalatii.cf instalatii.gq	March 8, 2018
4.	Creativity of Engineers	creativitate.tk creativitate.ml creativitate.ga creativitate.cf creativitate.gq	March 8, 2018
5.	PECSE Laboratory old website	pecse.tk pecse.ml pecse.ga pecse.cf pecse.gq	March 8, 2018

Conclusions

Environmental engineering is a permanent concern for engineers and scientists around the world, proposing those technologies that have less impact on the environment. Environmental engineering is not only about protecting the environment against anthropogenic pollution factors, but also about protecting people's health or diminishing the terrestrial vulnerability to the aggression of extra-atmospheric factors.

REFERENCES

- [1] NASA Goddard Space Flight Center
- [2] <https://climate.nasa.gov/>
- [3] <http://www.spaceweather.com/>
- [4] Archives of SC Prime Teh – tehnologii alternative și neconvenționale SRL.
- [5] J.R. Anderson, *The Architecture of Cognition* (Harvard University Press, Cambridge Mass., U.S.A., 1983).
- [6] S.M. Bădulescu, *Formarea formatorilor ca educatori ai creativității* (Editura Didactică și Pedagogică S.A., Bucharest, Romania, 1995).
- [7] B.G. Davis, *Tools for Teaching* (Jossey-Bass, San Francisco, U.S.A., 2001).
- [8] W.O. Dick, L. Carey and J.O. Carey, *The Systematic Design of Instruction* (Allyn&Bacon, Boston, U.S.A., 2004).
- [9] H. Jaoui, *Clefs pour la créativité* (Paris, France, 1983).
- [10] J. Mezirow, E.W. Taylor, *Transformative Learning in Practice: Insights from Community, Workplace, and Higher Education* (John Wiley & Sons, U.S.A., 2011).
- [11] A. Miel, *L'enseignement comme fonction médiatrice* (PUF, Paris, France, 1990).
- [12] M. Stubbs, *Keeping in Touch: Some Functions of Teacher-talk* (London, U.K., 1983).
- [13] J. Valsiner, A. Uchoa Branco, *Communication and Metacommunication in Human Development* (Information Age Publishing, U.S.A., 2006).