GOCE DELCEV UNIVERSITY, SHTIP, NORTH MACEDONIA

FACULTY OF ELECTRICAL ENGINEERING

ETIMA 2021

FIRST INTERNATIONAL CONFERENCE

19-21 OCTOBER, 2021

TECHNICAL SCIENCES APPLIED IN ECONOMY, EDUCATION AND INDUSTRY

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UNIVERSITY „GOCE DELCHEV” - SHTIP
FACULTY OF ELECTRICAL ENGINEERING

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PREFACE

The Faculty of Electrical Engineering at University Goce Delcev (UGD), has organized the International Conference ***Electrical Engineering, Informatics, Machinery and Automation - Technical Sciences applied in Economy, Education and Industry-ETIMA*.**
ETIMA has a goal to gather the scientists, professors, experts and professionals from the field of technical sciences in one place as a forum for exchange of ideas, to strengthen the multidisciplinary research and cooperation and to promote the achievements of technology and its impact on every aspect of living. We hope that this conference will continue to be a venue for presenting the latest research results and developments on the field of technology.
Conference ETIMA was held as online conference where contributed more than sixty colleagues, from six different countries with forty papers.
We would like to express our gratitude to all the colleagues, who contributed to the success of ETIMA'21 by presenting the results of their current research activities and by launching the new ideas through many fruitful discussions.
We invite you and your colleagues also to attend ETIMA Conference in the future. One should believe that next time we will have opportunity to meet each other and exchange ideas, scientific knowledge and useful information in direct contact, as well as to enjoy the social events together.

The Organizing Committee of the Conference

ПРЕДГОВОР

Меѓународната конференција ***Електротехника, Технологија, Информатика, Машинство и Автоматика-технички науки во служба на економија, образование и индустрија-ЕТИМА*** е организирана од страна на Електротехничкиот факултет при Универзитетот Гоце Делчев.
ЕТИМА има за цел да ги собере на едно место научниците, професорите, експертите и професионалците од полето на техничките науки и да представува форум за размена на идеи, да го зајканува мултидисциплинарното истражување и соработка и да ги промовира технолошките достигнувања и нивното влијание врз секој аспект од живеењето. Се надеваме дека оваа конференција ќе продолжи да биде настан на кој ќе се презентираат најновите резултати од истражувањата и развојот на полето на технологијата.
Конференцијата ЕТИМА се одржа online и на неа дадоа свој допринос повеќе од шеесет автори од шест различни земји со четириесет труда.
Сакаме да ја искажеме нашата благодарност до сите колеги кои допринесоа за успехот на ЕТИМА'21 со презентирање на резултати од нивните тековни истражувања и со лансирање на нови идеи преку многу плодни дискусии.

Ве покануваме Вие и Вашите колеги да земете учество на ЕТИМА и во иднина. Веруваме дека следниот пат ќе имаме можност да се сретнеме, да разменime идеи, знаење и корисни информации во директен контакт, но исто така да уживаме заедно и во друштвените настани.

Организационен одбор на конференцијата

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NEW INNOVATIVE TOURISM PRODUCT FOR REANIMATING RURAL AREAS

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Abstract
During the COVID-19 pandemic, the tourism industry was severely affected, and the travel patterns dramatically changed. Yet, the love for travel and leisure remained with a focus on the environment and rural areas. The paper presents new insights into the possibility of developing innovative tourism product based on the Earth's natural electromagnetic waves with an extremely low frequency of 7.83[Hz]. It discusses the option for using the Schumann resonance for tourism purposes. The main objective of the research is to demonstrate the way some rural areas have the potential to apply the therapeutic benefit of the Earth's magnetic field to tourists and visitors. Data measurements are collected in the village Lesnovo (North Macedonia) during 2019. It was found a presence of positive and harmonious energy vibrations, thus pointing to the possibility of creating a completely new dimension for rural areas. This may attract more visitors and boost the rural economy if raising the awareness that villages may offer much more than just an ordinary rural ambient. The paper adds to the scarce literature on Schumann's effects on tourists along with its practical contribution for proposing new frontiers and innovative solutions for tourism development based on positive vibrations of the rural areas.

Keywords
Rural areas, Tourism, Positive effects, Earth's natural electromagnetic waves.

Introduction

Tourism was severely affected by the COVID-19 pandemic provoking changes in demand and travel patterns [4], [8], [25], [28]. Due to numerous safety restrictions, travel patterns dramatically changed. Yet, the love for travel and leisure remained but this time with a focus on the natural environment, unexplored and isolated destinations, and rural areas. This urged tourism policymakers to try to create a new dimension for attracting visitors by considering numerous constantly changing travel restrictions. The idea was to create a perception for a safe destination that offers a new leisure experience with the priority on the health issue. Thus, the rural areas emerged as one of the most required destinations for relaxation and vocation.

Besides the untouched nature, the breathtaking scenery, and the moment of isolation, the rural areas may offer another interesting and new aspect for developing a completely different rural tourism product. The symbiosis may be found in the potential for synchronizing the positive emotions and good vibrations to the cardiovascular, respiratory, immune, and nervous systems influenced by the Schumann resonance (SR) [24]. The Earth produces natural electromagnetic waves at an extremely low-frequency level of 7.83[Hz] spreading the signal and affecting everyone and everything in the natural environment. Though the literature on SR is continuously growing, the issue of the effects on tourists and visitors is barely discussed. Some exceptions for the use of the SR for tourism purposes are already discussed [5], [21]. This paper adds to the state of the art by arguing the potential to use the rural areas as destinations with

therapeutic benefit to tourists and visitors produced by the Earth's magnetic field. Moreover, it discusses the option for developing innovative rural tourism product by using the SR as a signal with positive effects on humans in the natural environment. The presented research is carried in a small village as a sample location in North Macedonia and offers some new frontiers for innovative tourism product based on harmonious energy present in the rural area.

The paper is divided into several sections. After the introduction, a brief literature review on the SR environmental effects is presented. This is followed by the research methodology explaining the study method. The next section discussed the results, being followed by the main conclusion of the study.

1. Literature review

The issue of the SR [24] as a spectrum of resonant electromagnetic waves in the extremely low-frequency range in the Earth-ionosphere cavity [2] is vastly explored. The interest in the literature is still permanently growing offering a variety of interpretations. [16] - [18] explore the SR when evaluating the characteristics of the thunderstorm activity and the global lightning. Some research is focused on monitoring the global upper-tropospheric water vapor changes [22], on the monitoring of the planetary temperature [27], while some explored it on the lower ionosphere parameters on celestial bodies [19].

Furthermore, many scholars explain the effects of the Earth's magnetic field on living beings, starting from the fundamental frequency of 7.8[Hz] to the higher harmonic components at 14[Hz], 20[Hz], 26[Hz], 33[Hz], 39[Hz], and 45[Hz] [6]. These harmonics directly overlap with the central nervous system alpha waves being associated with the psychophysiological coherence of 0.1[Hz], the approximate 10-second cycle of ocean waves, and the hypothetical resonant frequency of the Earth [14], [15]. Furthermore, the postulation of feedback loops between all living systems and the Earth's magnetic field is discussed [3], which enables electromagnetic interactions within and between people [11], [13], [23]. This provokes implications for bone growth and ligament healing, capillary formation, fibroblast proliferation, and decrease skin necrosis [10]. Other numerous positive impacts of the SR on the human condition is already vastly discussed related to the heart rate, blood pressure, brain activity, nervous system activity, calming, athletic performance, memory, and other tasks [1], [7], [9], [12], [14], [20], [26].

2. Research methodology

Case study – village Lesnovo (North Macedonia)

Having in mind that North Macedonia has over 70% of rural areas rich with amazing natural scenery, it is selected as suitable for investigation. Lesnovo is a very small mountain village with only 40 inhabitants located in the northern part of the country. It is two hours drive from the capital city of Skopje, and 13 km from the nearest town Probištip. It is one of the oldest villages in the country laying in a well-preserved fossil volcanic crater being a natural geological monument in the western part of the Osogovo Mountains. The village is vastly visited due to the main monastery St. Gavril Lesnovski, constructed on the site of a much older monastery, and dating from 1347 or thereabouts. Many tourists, visitors, and pilgrims visit the main church and enjoy the fresco paintings and the iconostasis which are powerful and full of mystery. The village is also famous for its high-quality watermill rocks that have been made for centuries, traditional rural architecture, several cave churches, and many beautiful fountains built in traditional style with natural material (Figure 1).

Fig. 1 Lesnovo
Source: Authors

Study method

The study attempted to investigate the possibility of creating new innovative tourism product for rural areas based on a presence of positive and harmonious energy vibrations. For that purpose, it applied: (1) Qualitative method – A desk research with an in-depth review of literature on the SR is made, and (2) Quantitative method – Data were collected in the village Lesnovo on April 17th, 2019 with a 16 Bit AD converter as the main measurement instrument (Figure 2). Along with the original signal of the location, the low bandpass Butterworth filter 1-35[Hz] was applied, and the Fast Fourier Transform spectrum was done.

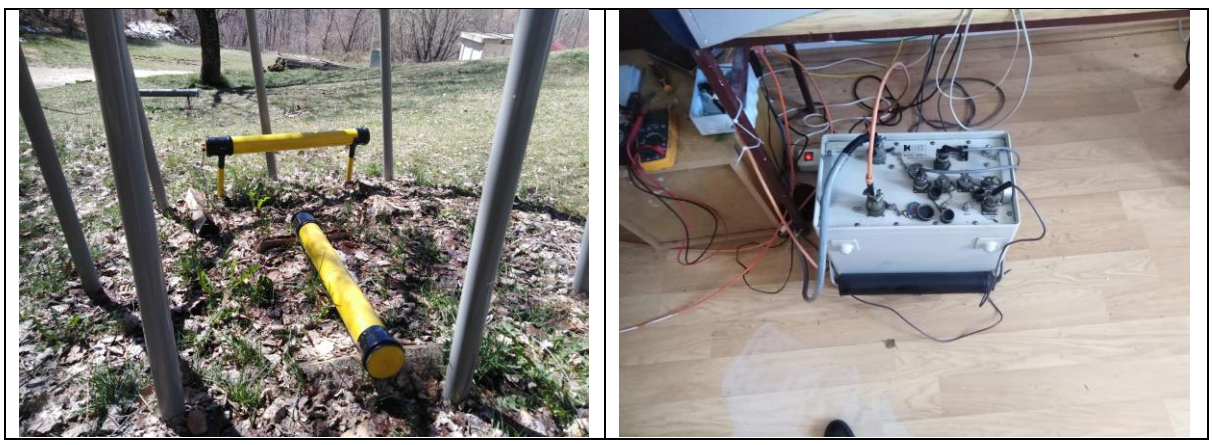

Fig. 2 Measurement instruments
Source: Authors

On the location, the measurements were repeated in different time momentums during the day since the effects of the solar wind and magnetization differ and vary on a range of timescales from minutes to hours.

3. Results

Collected data from the village Lesnovo are visually presented in Figures 3-5. Figure 3 presents the basic signal and the Butterworth filter 1-35[Hz], Figure 4 presents the spectrogram, and Figure 5 presents the spectrum. It is visible that village Lesnovo has a significant presence of the basic pulsation of the SR of 7.8[Hz] along with other harmonics.

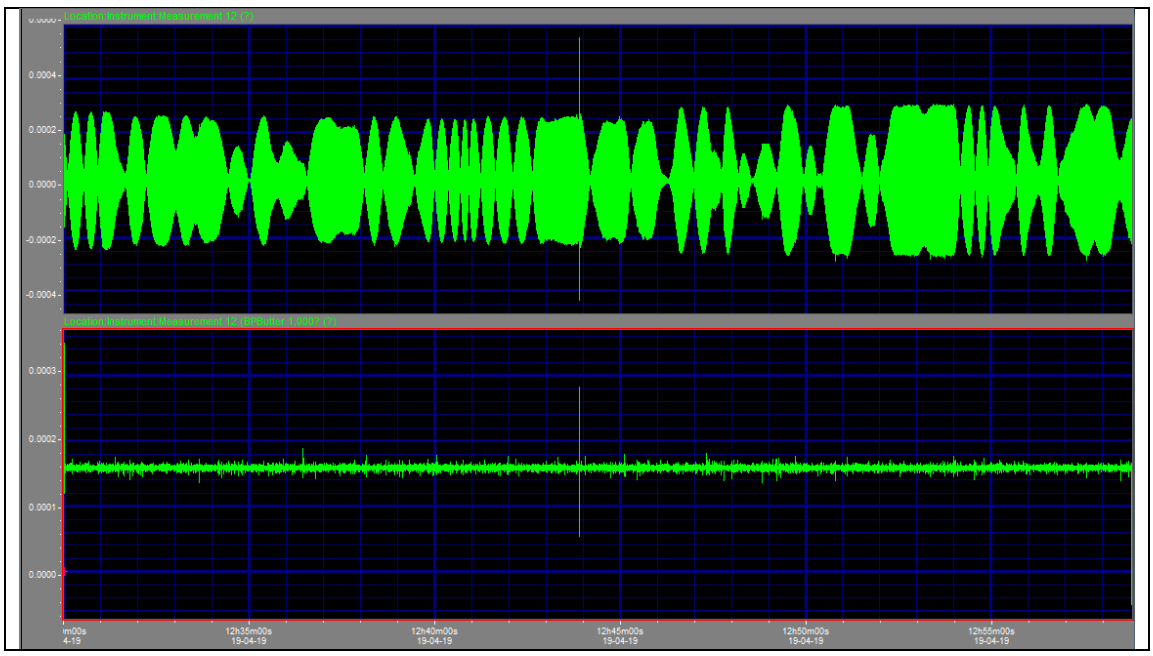

Fig. 3 Basic signal and the Butterworth filter 1-35[Hz]
Source: Authors

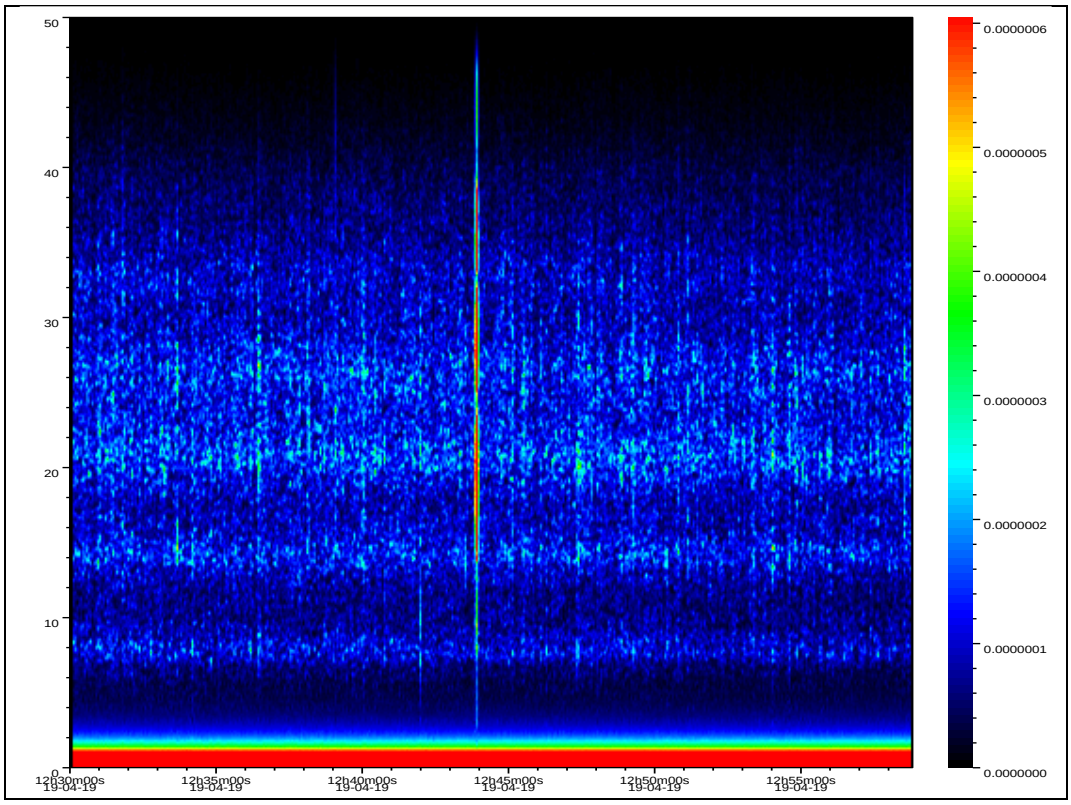

Fig. 4 Spectrogram
Source: Authors

A closer look at Figure 5 reveals many positive harmonics of the basic pulsation of the SR of 14.4[Hz], 20.5[Hz], 27.5[Hz], and 33.6[Hz]. Such impulses provoke positive therapeutic effects on the human body [1], [7], [20]. Moreover, bone growth and ligament healing may be supported by the frequencies between 7-8[Hz], and a capillary formation, fibroblast proliferation, and decrease skin necrosis by the frequencies between 14-15[Hz] [10]. Other detected positive harmonics of the registered magnetic field may positively affect tourists and visitors of the village Lesnovo by supporting the overall health condition, heart rate, blood pressure, and calming [9], [12], [14], [26].

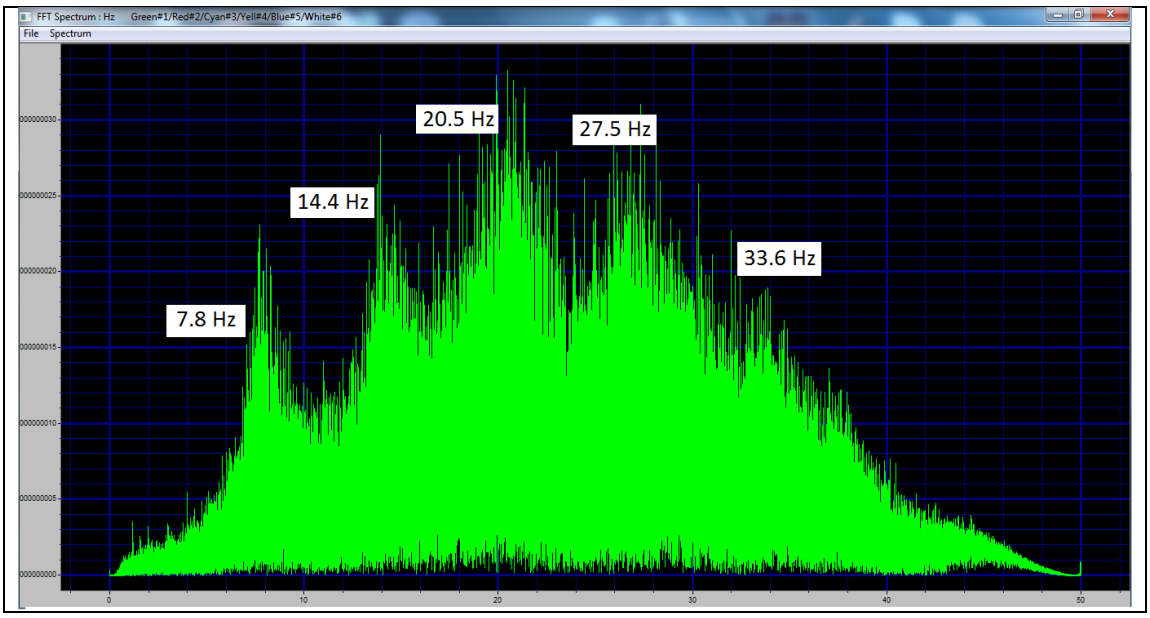

Fig. 5 Spectrum
Source: Authors

Conclusion

The study measured the SR in a rural area to detect new frontiers for creating innovative rural tourism product. It found a presence of positive and harmonious energy vibrations, thus pointing to the possibility of creating a completely new dimension for rural areas. This may attract more visitors and boost the rural economy if introducing new product pointing that villages as recreational and leisure areas may offer much more than just an ordinary rural ambient. The results point that village Lesnovo may be promoted as a destination that offers positive and harmonious energy vibrations in addition to the well-known preserved environment. As such, tourism supply may be dramatically expanded thus attracting visitors, one-day trippers, excursionists, and nature-lovers. Yet, the awareness of the positive Earth's magnetic field on the psychological, physiological, and neurological health of tourists and visitors, is very low among locals and tourism-policy makers. One may presume that when tourists are going to be familiarized with the fact that Lesnovo offers symbiotic harmonics which positively encode and interact with their consciousness, emotions, and thoughts, they will be much interested in extending the stay and revisiting the destination.

Only when rural areas are promoted as locations that offer the therapeutic benefit of the electromagnetic field radiation on human's health, it is to expect to gain an added value. Then, a new dimension may be highlighted with a focus on a new product that may result in an ultimate satisfaction in a harmonious ambient fulfilled with energy vibrations. In this line, rural areas like the village Lesnovo, must develop a new tourism product based on the positive impulses from nature that has no seasonality, contributes to sustainability, and provokes zero negative impacts on the environment caused by tourism development. As such, traditional rural tourism may exceed the conventional approach and proactively offer a new solution for rejuvenation and overall wellbeing.

The paper adds to the scarce literature on how the SR affects tourists and visitors when recreating in a rural natural environment. Additionally, its practical contribution is in the fact that proposes new strategic dimensions for introducing an advanced solution for tourism development based on positive vibrations present in villages.

The research has several limitations. First, the data is collected only in one day, so additional time extension and measurement repetitions are needed. Second, the measurement is performed with only one mobile instrument, so more mobile induction antennas are advisable enabling data comparison. Finally, the research applied the case study which brings the risk for overrating generalization of the findings. All these notes suggest some further issues to be addressed. However, besides contributing to the current literature review on the SR, the paper posts new directions for rural tourism development.

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