THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

8th Annual International Forum on Water

13-16 July 2020, Athens, Greece

Edited by
Gregory T. Papanikos

2020

Abstracts
8th Annual International Forum on Water
13-16 July 2020, Athens, Greece

Edited by Gregory T. Papanikos

First published in Athens, Greece by the Athens Institute for Education and Research.
ISBN: 978-960-598-360-4

8 Valaoritou Street
Kolonaki, 10671 Athens, Greece
www.atiner.gr

TABLE OF CONTENTS

(In Alphabetical Order by Author's Family name)

Preface

This book includes the abstracts of all the papers presented at the ***8th Annual International Forum on Water*** *(13-16 July 2020)*, organized by the Athens Institute for Education and Research (ATINER).

A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into 6 divisions and 37 units. Each unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together. Specific individuals are listed on the following page.

Gregory T. Papanikos
President

8th Annual International Forum on Water, 13-16 July 2020, Athens, Greece

Scientific Committee

All ATINER's conferences are organized by the Academic Council. This conference has been organized with the assistance of the following academic members of ATINER, who contributed by chairing the conference sessions and/or by reviewing the submitted abstracts and papers:

1. Gregory T. Papanikos, President, ATINER & Honorary Professor, University of Stirling, U.K.
2. Saif Uddin, Director, Center for Environmental Pollution, Climate & Ecology (CEPCE) & Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait.

FINAL CONFERENCE PROGRAM
8th Annual International Forum on Water, 13-16 July 2020, Athens, Greece

PROGRAM

Monday 13 July 2020

12.00-12.30
Registration

12.30-13.30
Opening and Welcoming Remarks: Gregory T. Papanikos, President, ATINER.

14:00-14:30
Ana Moldovan, Research Assistant, Technical University of Cluj-Napoca, Romania.
Title: *Assessment of Groundwater Quality as Drinking Water in Rural Communities from Dobrogea Region, SE Romania.*

14:30-15:00
Yongliang Yan, PhD Candidate, The University of Hong Kong, Hong Kong.
Title: *Common but Differentiated Responsibility for Environmental Protection in Outer Space.*

15:00-15:30
Vsevolod Yutsis, Professor, Instituto Potosino de Investigación Científica y Tecnológica, Mexico.
Title: *Geological-Geophysical Modelling of the Intraplate Volcanic Zones. La Polvora Case Study (Mexico)*

15:30-16:00
Kurt Olson, Professor, Massachusetts School of Law at Andover, USA.
Title: *World Leaders Fiddle while the Planet Burns.*

16:00-16:30
Athanasios Mihalakas, Global Professor of Practice in Law, University of Arizona, College of Law, USA.
Title: *Implementation of Nationally Determined Contributions under the Paris Agreement – Comparing the Approach of China and the EU.*

16:30-17:00
Tomás de Jesús Guzmán Hernández, Professor, Technology Institute of Costa Rica, Costa Rica.
Javier Mauricio Obando Ulloa, Professor, Costa Rica Institute of Technology, Costa Rica.
Guillermo Castro Badilla, Professor, Costa Rica Institute of Technology,

Costa Rica.
Title: *Active and Passive Solar Dryers: A New Design and Application in the Northern Huetar Region of Costa Rica.*

Tuesday 14 July 2020

13:00-13:30
Evrim Coban, Instructor, Mugla Sitki Kocman University, Turkey.
Title: *Investigation with Regard to Mineralogical-Gemological, Geochemical and Mining Potential of Diagenetic Gemmy Opal (Sio_2 + Nh_2o) in the Seydiler Ooze (Diatomite And Chalk) Deposit in the Afyonkarahisar-Seydiler Region.*

13:30-14:00
Tomás de Jesús Guzmán Hernández, Professor, Technology Institute of Costa Rica, Costa Rica.
Cristian Moreira-Segura, Environmental Management and Culture Emphasis Coordinator, Costa Rica Institute of Technology, Costa Rica.
Title: *Impact in Latin America of the Postgraduate Program "Doctorate in Natural Sciences for Development" after Fifteen Years of Work".*

Evrim Coban
Instructor, Mugla Sitki Kocman University, Turkey
Gursel Yanik
Professor, Kütahya Dumlupinar University, Turkey
Murat Hatipoglu
Professor, Dokuz Eylül University, Turkey
&
Nurdane Ilbeyli
Professor, Akdeniz University, Turkey

Investigation with regard to Mineralogical-Gemological, Geochemical and Mining Potential of Diagenetic Gemmy Opal ($SiO_2 + nH_2O$) in the Seydiler Ooze (Diatomite and Chalk) Depozite in the Afyonkarahisar-Seydiler Region

As an economic mining potential, blackish-mottled, gem quality, multi-colored opal ($SiO_2 + nH_2O$) (microcrystalline quartz variety) blocks are present in a sedimentary depositional environment in the Seydiler (Afyonkarahisar) region of Turkey. This Miocene-aged sedimentary series in the region is composed of three different geological units; it begins a marl (clayish calcareous) unit and the thin interlaid vitreous material strata at the bottom, over an ooze unit consisting of essential diatomite (siliceous), less chalk (calcareous) and the thick interlaid gemmy and common opal strata at the middle, finally over a tuffite (detrital) unit and the thin interlaid vitreous material strata. They are all deposited as horizontal layers and intercalations in a palaeo-lacustrine basin. However, this sedimentary series is largely covered with a volcanic series consisting of the ignimbrite and basaltic (partly andesitic) lava cover in the study area. As a result, it is state that the sedimentary series including gemmy opals overlies an unconformable metamorphic complex at the basement and a volcanic series below. In the study, Seydiler Ooze are defined for the first time in the literature. In order to elucidate the diatom and to dominate the morphology, the macroscopic samples obtained from three different pure diatomite layers which are deposited in a lacustrine basin were the first identified for the non-marine silica-rich diatom fauna with the FEI Nova Nano 650 scanning electron microscope and energy dispersive X-ray spectrometer (SEM-EDX). During diagenesis in the Miocene period, the diatomite strata were transformed into both fine gemmy opals' [opal-CT (cristobalite/tridimite) and opal-C] as well as common opals' strata, which are up to 80 cm in thickness. This transformable formation is unusual because of the presence of gemmy opal specimens, thus the Seydiler ooze has a unique and more valuable

to include both in Turkey from all other the world ooze deposits. Many multi-colored samples of the Seydiler gemmy opals exist as tons of thousands in the mine field. However, blackish-speckled reddish brown-green- and yellowish green-colored types are those of the most abundant, and therefore they are considered as the representative investigated blocks because of their economic significance regarding mining potential. Therefore, scientific interest has been given to the research of this kind of opals. Before the emphasizing their mining potential, for the provenance characterization, mineralogical-gemmological and geochemical properties of these gemmy opals were the first described in detail in this study using XRF, ICP-AES, XRD, FT-IR, DCµR spectroscopic methods. According to oxygen isotope analyses (V-SMOW), these representative reddish brown-green opals (δ18O =24.40‰, δD (‰) =193) and yellowish-green opals (δ18O = 25.03 ‰, δD (‰) =189) suggest that gemmy opals' (opal-CT) strata in the Seydiler ooze deposit are transformed from the over silica-rich diatomite strata at upper levels of the ooze during diagenesis at medium temperature of around 51-53°C. Considering the geological foundation and physico-chemical nature of the opal-bearing Seydiler ooze, the nutritious pyroclastic materials coming from previously volcanic activity during the Neogene neotectonic evolution of the region in large scale, stimulate abundant development of lacustrine diatoms as well as less algae and radiolarians. The stratigraphy study in the Seydiler ooze revealed that the presence of opal layers observed in the commercial chalk mine in the area, which is still in operation, indicates more than 2,000 tons of visible gemmy opals in the region. It is thought that there are more than 10,000 tons of possible gemmy opal reserves in the Seydiler ooze.

Tomas de Jesus Guzman-Hernandez
Professor, Costa Rica Institute of Technology, Costa Rica
Javier Mauricio Obando Ulloa
Professor, Costa Rica Institute of Technology, Costa Rica
&
Guillermo Castro Badilla
Professor, Costa Rica Institute of Technology, Costa Rica

Active and Passive Solar Dryers: A New Design and Application in the Northern Huetar Region of Costa Rica

Modified hybrid forced active solar systems, as well as autonomous passive solar systems with a complement of photovoltaic panels were implemented in different agricultural and agro-industrial production units in the Northern Huetar region of Costa Rica through a local pilot program. This program has been financed since 2016 by the Ministry of Agriculture and Livestock, the National Institute of Rural Development, the Foundation for the Promotion, Research and Transfer of Agricultural Technology of Costa Rica and the Program for University Regionalization of the Technology Institute of Costa Rica. The objective of this program has been to improve the drying process of cocoa and other seeds by using clean production systems in small and medium producers. In previous works, the thermal solar systems previously designed were passive and active, namely thermosiphon and forced hybrid with air and hot water and equipped with an auxiliary LP gas system respectively. However, these systems have been improved in order to increase their performance. In the passive system, a 1 KW photovoltaic system was applied, while radiant floor was added to the active system. Both systems were equipped with computerized devices for data recording. The results obtained from 2016 to 2019 have allow verify the reduction in energy consumption, greenhouse gas emissions, thanks to the use of a clean energy source. In addition, the production units that improved their production processes by reducing the processing time and increasing the efficiency, quality and safety of their products. The application of this work has demonstrated the energy independence of local suppliers, so that processed products could acquire the category of ecological, which would represent a competitive advantage in the regional, national and international market of local production.

Tomás de Jesús Guzmán Hernández
Professor, Costa Rica Institute of Technology, Costa Rica
&
Cristian Moreira-Segura
Environmental Management and Culture Emphasis Coordinator, Costa Rica Institute of Technology, Costa Rica

Impact in Latin America of the Postgraduate Program "Doctorate in Natural Sciences for Development" after Fifteen Years of Work"

The management and rational use of natural resources, agroforestry systems, care for the environment and clean production systems, together with the use of technology and applied research, are the raison d'être of the postgraduate program Doctorate in Natural Sciences for Development (DOCINADE). This program arises as a need to strengthen applied research at the level of Mesoamerica and Latin America, making use of the concept of sustainability of systems and achieving theses that solve specific problems of production and Natural Sciences, and also applying clean systems and appropriate technologies. It began in 2005, as an interuniversity network, in which participates countries of Central America and North America, joining efforts and resources of public universities. The program works under the bimodal pedagogical mediation model throughout face-to-face academic activities, virtual in real time, synchronous, asynchronous and distance. The permanent contact tool is constituted by virtual platforms, web pages, the permanent contact with a group of high-level academics from different parts of the world. It is a program accredited by the Central American Graduate Accreditation Agency (ACAP), with international quality certification. It has four emphasis: Agricultural Production Systems, Environmental Management and Culture, Applied Electronic Technologies and Natural Resources Management, coordinated by Costa Rican public universities, like National University, State Distance University and Technological Institute of Costa Rica and including institutions from Mexico, Nicaragua and other countries. Admission is extended to professionals with an academic master's degree. The objective of the program is to develop human capacities for scientific and technological research at doctoral level, in association with the development needs of the Latin American Region to improve people's quality of life and their relationship with sustainability. The impact is 75 graduates to date and more than 150 publications in indexed journals. Finally, it is shown the results of fifteen years of interuniversity work of quality and integration.

Athanasios Mihalakas
Global Professor of Practice in Law, University of Arizona, College of Law, USA
&
Emilee Hyde
Independent Consultant, Environmental Science and Sustainability - Nazareth College, USA

Implementation of Nationally Determined Contributions under the Paris Agreement – Comparing the Approach of China and the EU

Climate change is a pressing global issue that is rapidly requiring a global response under international law. The UN Framework Convention on Climate Change was created by the UN to unite States in coordinating efforts to lower greenhouse gas emissions while continuing to develop in a more sustainable way. The Kyoto Protocol and the Paris Agreement were two succeeding efforts under the UNFCCC to decrease emissions and prepare adaptations for the effects of climate change. The Kyoto Protocol required mandatory reduction in carbon emissions by wealthy developed nations, and it inevitably collapse. The Paris Agreement required voluntary reduction of carbon emissions by all member states In this paper, we look at the evolution of the international climate change legal regime, from the UNFCCC adaptation at Rio De Janeiro, to the failed Kyoto Protocol and the innovation of the Paris Agreement. In particular, we look at the role of the EU and China efforts to comply with the Paris Agreement, as two of the major carbon emitters on the planet who are still parties to the agreement. Although both China and the EU set lofty goals in accordance with the Paris Agreement requirements, neither state provided enough details on how to achieve their goals, nor are their plans adequate to deal with global warming in the long run. We argue that the greatest innovation of the Paris Agreement is in climate change related information gathering, sharing, and reporting. The rapidly deteriorating condition of the global climate makes accurate information on national carbon emission and carbon reduction efforts, essential for long-term prediction and planning. Therefore, in the fight against global warming, timely and reliable information on carbon emissions and how national governments are dealing with that have become more valuable than just complying with global targets. Finally, we look at the implications and possibilities for better dealing with climate change due to the recent Covid-19 pandemic, which offers

national governments a new opportunity to better plan domestic policies on carbon emissions.

Ana Moldovan
Research Assistant, Technical University of Cluj-Napoca, Romania
Oana Cadar
Researcher, Technical University of Cluj-Napoca, Romania
Maria-Alexandra Hoaghia
Researcher, Technical University of Cluj-Napoca, Romania
Marius Kenesz
Researcher, "Emil Racovita" Institute of Speleology, Romania
Ruxandra Năstase-Bucur
Researcher, "Emil Racovita" Institute of Speleology, Romania
Traian Brad
Researcher, "Emil Racovita" Institute of Speleology, Romania
Razvan Adrian Arghir
Researcher, "Emil Racovita" Institute of Speleology, Romania
Erika Andrea Levei
Researcher, Technical University of Cluj-Napoca, Romania
Oana Teodora Moldovan
Researcher, "Emil Racovita" Institute of Speleology, Romania
&
Valer Micle
Professor, Technical University of Cluj-Napoca, Romania

Assessment of Groundwater Quality as Drinking Water in Rural Communities from Dobrogea Region, SE Romania

Providing drinking water of appropriate quality is a worldwide challenge. Communities without access to centralized drinking water supply networks often use wells as water source, without any knowledge about its quality or the risk posed by its consumption. The aims of this study were to provide an overview of drinking water sources from Dobrogea region (Romania) and to identify the risk raised by groundwater consumption for human health. The studied sources of water originate from aquifers located in the Sarmatian limestone, an extremely porous environment, where the human impact on the surface is not buffered by soil, vegetation or other impermeable deposits or rocks.

The physico-chemical parameters and microbiological content of four groundwater sources used by locals as drinking water were analyzed and compared with the thresholds set for drinking water by national legislation. Also, in order to evaluate the quality of the groundwater and its impact on the human health, several quality indices, like WQI – water quality index, HEY – heavy metal evaluation index; HPI - heavy metals pollution index, CDI - chronic daily intake,

HQ - hazard quotient and C - carcinogenic potential of contaminated groundwater, were used.

The results show that three out of four analyzed water samples meet, both, the physico-chemical and microbiological criteria for drinking water. The fourth well meets the requirements for the physical-chemical parameters, but have inappropriate microbiological content, having high contents of *Enterobacteriaceae*, *E.coli*, *Staphilococcus aureus* and *Listeria sp*. For that particular one, it is required an appropriate disinfection treatment and a monitoring system before human consumption.

Kurt Olson
Professor, Massachusetts School of Law at Andover, USA

World Leaders Fiddle while the Planet Burns

This paper will examine the disconnect between the scientific, empirical evidence that often irreversible effects of climate change have been occurring for more than 50 years and the intransigent denial which continues to be demonstrated by fossil fuel companies and their political enablers in Washington, D.C. and other world capitals. In 1988, Dr. James Hansen (at the time the Director of NASA's Goddard Institute for Space Studies) one of the world's leading experts on the deleterious effects of rising CO_2 levels in the atmosphere, starkly testified before the Energy and Natural Resources Committee of the U.S. Senate that "the greenhouse effect is here." Before Hansen became concerned that increased levels of CO_2 would inevitably increase global temperatures with potentially catastrophic consequences for life on the planet, he had studied the atmosphere and surface of Venus, where CO_2 levels are so high that life there cannot exist. Hansen decided to change the focus of his research because he realized that failure to take action to reduce and eventually eliminate emissions of carbon dioxide could lead to superstorms, increased drought, increased flooding, and often unimaginable wildfires (such as the wildfires in Attica which have been described as the second deadliest in history) which would burn with increasing frequency and intensity. Many concerned with these issues (such as the United States Defense Department) now realize that perhaps the biggest short-term threat is the likelihood of increasing numbers of environmental refugees who have to flee their homelands because they can no longer grow food to feed their families or find water to drink because of the ravages of increasing temperatures. As pointed out in the 2019 United Nations Emissions Gap Report: Today we still have the chance to limit global temperatures to 1.5°C. While there will still be climate impacts at 1.5°C, this is the level scientists say is associated with less devastating impacts than higher levels of global warming. Every fraction of additional warming beyond 1.5°C will result in increasingly severe and expensive impacts. Regrettably, most countries have not taken the steps necessary to begin curtailing their emissions from smokestacks, the transportation sector, or the aviation sector. In fact, China, the country which is likely to soon become the biggest contributor to global emissions, has planned more than 300 coal-fired power plants throughout the world in addition to the plants currently in the planning stages on its own territory. This is a frightening prospect because burning coal for electrical energy

generation is probably the single most carbon-intensive fuel source. What this means is that if we continue on a business-as-usual track, we are likely to come closer to a 3-6 degree rise in global average temperatures by the end of the century. Most scientists who develop and rely on computer models to project what is likely to happen given different scenarios have concluded that a temperature increase of this magnitude is likely to drastically change life on the planet. As they say, Earth will probably survive, but prospects for humans and other species with whom we share the planet are less sanguine. Under these circumstances, one has to wonder why even extremely wealthy people and corporations think they will be spared from dire consequences.

Yongliang Yan
PhD Candidate, The University of Hong Kong, Hong Kong

Common but Differentiated Responsibility for Environmental Protection in Outer Space

The common but differentiated responsibility (CBDR) evolves from the concept of "common heritage of mankind" and carries the implication of the principle of equity in international law. There is an international debate associated with the application of the CBDR principle to assign the responsibilities of different spacefaring nations in the protection of the space environment, which is primarily involved with the passive mitigation and active removal of space debris, in particular that with nuclear radiation arising out of the use of the space nuclear power sources. The space debris is categorized into the existing in-orbit and future debris. The author disagrees with the application of the CBDR principle to divide the responsibilities of different spacefaring nations in the passive mitigation of space debris, and holds that all spacefaring nations should take the common and same responsibility to contribute to the mitigation of the future space debris, and the advanced spacefaring nations should provide technical assistance to the developing spacefaring countries to enhance their capability in the areas of design, manufacture, launch, operation and disposal of space objects for the purpose. In the clean-up operation, however, the CBDR principle should be a basic principle for the allocation of responsibilities among different spacefaring countries. On the one hand, it should be confirmed that all spacefaring actors should be responsible for environmental protection of outer space, including the Moon and other celestial bodies, and thus should offer their contribution to the active removal of the existing in-orbit space debris. On the other hand, the differences in the responsibilities of different countries should be made based on a range of factors, including the historical contributions to the creation of the existing in-orbit space debris, special needs of developing countries for sustainable development in carrying out the clean-up operation. The concrete responsibilities could be categorized into the technical and financial responsibilities. Accordingly, those with relevant technical capabilities should be imposed the international obligation to conduct the clean-up operation by using their technology, techniques, facilities, etc. whereas those spacefaring nations without relevant technical capabilities should contribute to the funds used to support the active removal operation. The financial responsibility of different countries should be differentiated based on a range of factors, such as the economic development levels of different countries, the number of space objects they launched into the Earth's orbit, how many

anti-satellite weapon tests or other intentional collisions are conducted by they in the past, etc. Most importantly, the creation of an international fund is an optimal alternative to release the financial burden of those developed countries with relevant technological capabilities to take such action.

Vsevolod Yutsis
Professor, Instituto Potosino de Investigación Científica y Tecnológica, Mexico

Geological-Geophysical Modelling of the Intraplate Volcanic Zones: La Polvora Case Study (Mexico)

Volcanic activity is located mainly in plate boundaries. However, important volcanic activity also occurs in intraplate environments. In some cases, it has been reported that volcanism was simultaneous with normal failure. However, in most cases the relationship between extension and intraplate magmatism is tenuous (Aranda-Gómez et al., 2005). Due to the location of some of the volcanic fields it is suggested that the rise of intraplate magmas was favored by faults that delimit regional tectonic domains in the basement. In the study region, intraplate magmatism has a strict spatial relationship with old basement faults that delimit tectonic blocks. The study area is located in the state of San Luis Potosí, in the municipality of Guadalcázar; its coordinates are (355896.03 m E, 2539408.02 m N) and (364122.15 m E, 2533368.13 m N), its average elevation is 1337 meters above sea level. Sedimentary rocks, limestone of the Abra Formation, shales and calcareous sandstones of the Cárdenas Formation are located in the study area. The igneous rocks found in the area are basaltic effusions and diorite porphyry. Recently we located near the cinder cone "La Polvora" the presence of two intrusive bodies whose trajectory forms a NW alignment right in the center of the valley defining two anticlinal elongated in the same direction. Gravity, magnetic and gamma ray study was carried out in this area. Aeromagnetic and satellite gravity data were obtained too. As a result, 2D geological-geophysical model of the Polvora dome was revealed. Maps of gravity and magnetic basement, deep and near surface structural lineaments were mapped. Euler deconvolution, first and second derives, upward continuation of potential fields, power spectral analysis and other tools were applied to observed and processed geophysical data. The basement was found at the depth from 1200 up to 1800 m. There are three general directions of structural lineaments (faults): N-S, NW-SE and W-E. The first one presents the deep (basement) faults and the others are of the near surface origin. The presence of the high concentration of uranium and thorium and xenoliths of olivine shows the mantle source of the intrusions material.