THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book
13th Annual International Symposium on
Environment
28-31 May 2018, Athens, Greece

Edited by
Gregory T. Papanikos

2018

Abstracts

13th Annual International Symposium on Environment

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(In Alphabetical Order by Author's Family name)

Preface

This book includes the abstracts of all the papers presented at the *13th Annual International Symposium on Environment (28-31 May 2018)*, organized by the Athens Institute for Education and Research (ATINER).

In total 19 papers were submitted by 26 presenters, coming from 12 different countries (Australia, Brazil, Canada, China, Germany, Italy, Kuwait, Poland, Romania, Russia, Slovakia, and USA). The conference was organized into 8 sessions that included a variety of topic areas such as erosion, pollution and more. 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 seven research divisions and 37 research units. Each research 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

13th Annual International Symposium on Environment
28-31 May 2018, Athens, Greece
Organizing and Academic Committee

ATINER's conferences are small events which serve the mission of the association under the guidance of its Academic Committee which sets the policies. In addition, each conference has its own academic committee. Members of the committee include all those who have evaluated the abstract-paper submissions and have chaired the sessions of the conference. The members of the **academic committee** of the 13th Annual International Symposium on Environment were the following:

1. Gregory T. Papanikos, President, ATINER.
2. Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.
3. Nicolas Abatzoglou, Head, Environment Unit, ATINER & Professor, Department of Chemical & Biotechnological Engineering, Université de Sherbrooke, Canada, Chair Pfizer, PAT in Pharmaceutical Engineering, Director GREEN-TPV and GRTP-C & P.
4. Saif Uddin, Director, Center for Environmental Pollution, Climate & Ecology (CEPCE), ATINER & Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait.
5. Patricia Hanna, Head, Philosophy Unit of ATINER & Professor, University of Utah, USA.
6. Krassi Rumchev, Academic Member, ATINER & Deputy Director, WHO Collaboration Centre for Environmental Health Impact Assessment, Curtin University, Australia.
7. Peter Siska, Professor, University of St. Cyril and Methodius, Slovakia.
8. Roland Leduc, Professor, Université de Sherbrooke, Canada.
9. Hanen Saidi, Academic Member, ATINER & Associate Professor, University Tunis El Manar, Tunisia.
10. Marzena Smol, Assistant Professor, Mineral and Energy Economy Research Institute, Polish Academy of Sciences, Poland.
11. Vassilis Skianis, Research Associate, ATINER.
12. Olga Gkounta, Researcher, ATINER.

The **organizing committee** of the conference included the following:
1. Hannah Howard, Research Assistant, ATINER.
2. Despina Katzoli, Researcher, ATINER.
3. Eirini Lentzou, Administrative Assistant, ATINER.
4. Konstantinos Manolidis, Administrator, ATINER.
5. Kostas Spyropoulos, Administrator, ATINER.

FINAL CONFERENCE PROGRAM
13th Annual International Symposium on Environment,
28-31 May 2018, Athens, Greece
PROGRAM
Conference Venue: Titania Hotel, 52 Panepistimiou Street, 10678 Athens, Greece

Monday 28 May 2018

08:00-08:45 Registration and Refreshments

08:45-09:30 (Room C - 10th Floor): Welcome and Opening Address

Gregory T. Papanikos, President, ATINER.
Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.

09:30-11:00 Session I (Room A - 10th Floor): Water Resources and Wastewater Treatment

Chair: Olga Gkounta, Researcher, ATINER.

1. Jan Schwarzbauer, Professor, RWTH Aachen University, Germany, Larissa Dsikowitzky, Senior Scientist, RWTH Aachen University, Germany & Piero Bellanova, PhD Student, RWTH Aachen University, Germany. Tracing the Organic Pollution of Coastal Areas in Space and Time with Molecular Indicators.
2. Roland Leduc, Professor, Université de Sherbrooke, Canada & Jean-Claude Labbe, Student, Université de Sherbrooke, Canada. Comparative Coagulation-Flocculation Treatment of Leachate from Municipal Solid Waste with Alum and Chitosan.
3. Sam Andriani, Professor – Research Scientist, Andriani Institute Research Center, USA. Photochemical Transformation of Polycarboxylic Acids Induced by Complexation with Ferric and Cupric Ions in Aqueous Solution.

11:00-12:30 Session II (Room A - 10th Floor): Air Pollution

Chair: Krassi Rumchev, Deputy Director, WHO Collaboration Centre for Environmental Health Impact Assessment, Curtin University, Australia.

1. Paola Palestini, Associate Professor, Università degli Studi di Milano-Bicocca, Italy. Oxidative Stress and Inflammation Induced by Acute and sub-Acute UFPs Exposures: Contribution to Neurodegenerative Disease Onset.
2. Sanda Voinea, Assistant Professor, University of Bucharest, Romania. The Comparative Study of Aerosol Properties at Eforie Nord (Romania) and Athens (Greece) using AERONET Data.
3. Shyam Pariyar, Researcher, Universität Bonn INRES, Germany & Georg Noga, Professor, Universität Bonn INRES, Germany. Do Pollution Particles Matter for Plant Health Grown under Peri Urban Environment and Changing Climate?
4. Xiaoxiao Liu, Postgraduate, Beijing Forestry University, China. Distribution Characteristics of Air Quality Index in Beijing in 2016.

12:30-14:00 Session III (Room A - 10th Floor): Waste Management

Chair: Roland Leduc, Professor, Université de Sherbrooke, Canada.

1. Dimitri Tamalis, Professor and Chair, California State University, San Bernardino, USA & Sheldon Landsberger, Professor, University of Texas at Austin, USA. The Presence of Naturally Occurring Radioactive Material in the Oil and Gas Industry in Texas and Implications for Public Health.
2. Marzena Smol, Assistant Professor, Mineral and Energy Economy Research Institute, Polish Academy of Sciences, Poland. Presentation of Circular Economy Assumptions in the Phosphorus Management.
3. Graziela Ferreira Guarda, Professor, Universidade Católica de Brasília, Brazil, Luiz Fernando Whitaker Kitajima, Professor, Universidade Católica de Brasília, Brazil & Beatriz Rodrigues de Barcelos, Professor, Universidade Católica de Brasília, Brazil. EPR for e-Waste Efficiency in Brazil and USA: A Comparative Analysis.

14:00-15:00 Lunch

15:00-16:30 Session IV (Room A - 10th Floor): Coastal Erosion

Chair: Marzena Smol, Assistant Professor, Mineral and Energy Economy Research Institute, Polish Academy of Sciences, Poland.

1. Patrick Aiken, Secretary / Regional Coordinator, Coastal Residents Association Incorporated / New South Wales Coastal Alliance, Australia. Community Engagement and Consultation in Coastal Management.
2. Lorenzo Mentaschi, Scientific Officer, Joint Research Centre, European Commission, Italy, Michalis Vousdoukas, Joint Research Centre, European Commission, Italy, Jean-Francois Pekel, Joint Research Centre, European Commission, Italy, Evangelos Voukouvalas, Joint Research Centre, European Commission, Italy & Luc Feyen, Joint Research Centre, European Commission, Italy. Global Long-term Patterns of Coastal Erosion and Accretion.

16:30-18:30 Session V (Room C - 10th Floor): ATINER's 2018 Series of Academic Dialogues: A Symposium Discussion on the Challenges of Teaching at Higher Education Institutes in a Globalized World

Chair: Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA & Patricia Hanna, Head, Philosophy Unit of ATINER & Professor, University of Utah, USA.

Invited Speakers:
1. **Robin Root**, Professor, City University of New York, USA. *"Teaching Global: Meanings and Methods"*.
2. **Peter Siska**, Professor, University of St. Cyril and Methodius, Slovakia. "*Spatial and Temporal Comparative Analyses of Teaching Effectiveness and its Future in Higher Education*".
3. **Tennyson Samraj**, Professor, Burman University, Canada. *"The Challenges Involved in Teaching Post-Modern Minds"*.
4. **Changming Duan**, Professor, University of Kansas, USA. *"How to Integrate a True International Perspective in Teaching Psychology?"*
5. **Mark Ludorf**, Professor, Stephen F. Austin State University, USA. *"Addressing Student Heterogeneity in the Classroom"*.

21:00-23:00 Greek Night and Dinner

Tuesday 29 May 2018

07:45-11:00 Session VI: An Educational Urban Walk in Modern and Ancient Athens

Chair: Gregory A. Katsas, Vice President of Academic Affairs, ATINER & Associate Professor, The American College of Greece-Deree College, Greece.

Group Discussion on Ancient and Modern Athens.
Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

11:15-13:00 Session VII (Room A - 10th Floor): Environmental Impact Evaluation & Remediation

Chair: Peter Siska, Professor, University of St. Cyril and Methodius, Slovakia.
1. <u>Saif Uddin</u>, Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait, Montaha Behbehani, Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait & Abdulnabi Al-Ghadban, Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait. An Experimental Simulation of Climate Change to Assess Gross Calcification of Arabian Gulf Corals. 2. <u>Terezinha C. de Brito Galvao</u>, Professor, Spelman College, USA, Arnaldo Teixeira Coelho, Director, Ingá Engenharia, Brazil, Gustavo Borel de Menezes, Professor, California State University, USA & Ênio Marcus Brandão de Fonseca, Director, Centrais Elétricas de Minas Gerais, Brazil. Study of Erosion Control Techniques Applied to Hydroelectric Power Plants Reservoir Margins. 3. <u>Emmanuel Iyiegbuniwe</u>, Professor & Director of Public Health, California State University San Marcos, USA & Alexander Ufelle, Assistant Professor, Slippery Rock University, USA. Noise Exposure Assessment for University Police Officers during Rifle and Shotgun Qualifications. 4. <u>Nadezhda Kudryasheva</u>, Professor, Institute of Biophysics (IBP), SB RAS, Russia, T.V. Rozhko, Siberian Federal University, Russia, A.S. Petrova, Institute of Biophysics (IBP), SB RAS, Russia & G.A. Badun, Moscow State University, Russia. Luminous Marine Bacteria as a Tool for Study Toxic and Activation Effects of Low-Level Radiation.

13:00-14:00 Lunch

14:00-15:30 Session VIII (Room A - 10th Floor): Air/Atmospheric Pollution Evaluation and Abatement

Chair: Saif Uddin, Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait.
1. Krassi Rumchev, Deputy Director, WHO Collaboration Centre for Environmental Health Impact Assessment, Curtin University, Australia. Exposure Assessment to Air Pollutants during Car Idling at Primary Schools. 2. <u>Peter Siska</u>, Professor, University of St. Cyril and Methodius, Slovakia, Vaughn Bryant, Professor, Texas A&M University, USA & Pierre Goovaerts, Chief Scientist, BioMedware, USA. Pollen Distribution Patterns and Their Relationship to Geomorphology. 3. Masoumeh Mofarrah, PhD Student, Zhejiang University, China. Micro Gas Cyclone Design and Performance Evaluation to Collect Dust Particles.

20:00- 21:30 Dinner

Wednesday 30 May 2018 **Mycenae and Island of Poros Visit**
Thursday 31 May 2018 **Delphi Visit**
Friday 1 June 2018 **Ancient Corinth and Cape Sounion**

Patrick Aiken
Secretary/Regional Coordinator, Coastal Residents Association
Incorporated / New South Wales Coastal Alliance, Australia

Community Engagement and Consultation in Coastal Management

There is increasing recognition in Australia that many coastal erosion issues are not just about property owners whose properties are affected by a coastal hazard. Australia's public beaches are an integral part of the Australian community. They are part of the coastal environment that the majority of Australians live and work in; they have a unique social and cultural importance and play an important role in maintaining the economic viability and livelihood of Australia's coastal communities.

Before, during and after a major coastal erosion event the focus is always on the damage that affects those frontline properties immediately landward from our beaches. In reality this simplistic view overshadows a far more complex situation.

Despite the importance of the protection these frontline properties provide in protecting private and public assets that are behind them, there is an ongoing conflict between the owners of beachfront land, public authorities, political bodies and community organisations that are intent on protecting our public beaches, often to the detriment of landholders.

The dichotomy is stark but in communities where development has been allowed to extend right to the beach-front, the balance of costs and benefit associated with protecting privately owned beachfront property is generally overlooked.

These issues have led to a growing need for public consultation in making coastal planning decisions that affect all coastal communities and all members of those communities.

My presentation will examine the role of public consultation and cost benefit analyses in particular coastal erosion hotspots in New South Wales Australia. There will also be a brief consideration of those questions related to community perceptions and community engagement and consultation following the New South Wales coastal storm of June 2016 and possible solutions for coastal communities faced with these perplexing issues.

Sam Andriani
Professor – Research Scientist, Andriani Institute Research Center, USA

Photochemical Transformation of Polycarboxylic Acids Induced by Complexation with Ferric and Cupric Ions in Aqueous Solution

The investigation is about the phototransformation of polycarboxylic acids in aqueous solutions, such as rivers, lakes, or underground waters. Two aminocarboxylic acids were studied: nitrilotriacetic acid and iminodiacetic acid, non-absorbent compounds, induced by complexation with ferric and cupric ions in aqueous solution. This research is comprised in the general domain of environmental pollutant phototransformation, assisted by metallic cations found in natural waters. Apart from one exception, the photochemical reaction has been a redox reaction between the ligand (pollutant or water molecule) and the metallic center.

A wavelength effect is observed. Quantum yields of the reactions have been measured as a function of different parameters controlling the reaction. Ferric complexes have high quantum yield (up to 0.5) whereas the cupric complexes are less of one or two magnitude. They are depending on the excitation wavelength: the quantum yield of reduction of the metallic center is doubled when the wavelength goes from 365 nm to 254 nm. The reaction photoproducts are ferrous and cuprous cations, formaldehyde, carbon dioxide, and iminodiacetic acid (degradation of nitrilotriacetic acid) or glycine (degradation of iminodiacetic acid). The loss of an acetate group does not lead to the formation of HCHO and CO_2 as described for ferric nitrilotriacetate.

Terezinha C. de Brito Galvao
Professor, Spelman College, USA
Arnaldo Teixeira Coelho
Director, Ingá Engenharia, Brazil
Gustavo Borel de Menezes
Professor, California State University, USA
&
Ênio Marcus Brandão de Fonseca
Director, Centrais Elétricas de Minas Gerais, Brazil

Study of Erosion Control Techniques Applied to Hydroelectric Power Plants Reservoir Margins

This large-scale streambank erosion control study covers an area of 4,000 m^2. It provides relevant information on the erosional processes at reservoir margins, which are very significant to various regions of the world, including Brazil, in where the perimeter of hydroelectric reservoirs is about the same as the Brazilian coast perimeter – 6,000 km. Eleven different treatments – vegetated and armored were implemented on 27 parcels in three study-areas: i) Straw logs and Coir logs (Deflor - Bermalonga), iii-v) Metalic Gabions coated with polymers and PVC (Maccaferri – types Box, Bag and Reno mattress), vi) PP (polypropylene) geomattress (North American Green P550), vii) RECP (Rolled Erosion Control Product) composed by coir and PP (North American Green C350) viii) Nylon RECP (Maccaferri MacMat), xix) Wood crib wall, and two RECP's from Deflor. Laboratorial and field studies were performed, including geotechnical parameters, biomass, fertility, turbidity, wind velocity (and direction), wave height, stratigraphy of the study area, in situ permeability, and *in situ* soil strength. Results were collected over 2 years, and posted in a Performance Matrix, which was validated through topographic studies before and after the treatment implementation. This differential topography was plotted using ArcGIS and gave good results of the sediment deposition in front of each treatment. Under the studied conditions the best results for controlling streambank erosional processes were Metallic Gabions (type bag and Reno Mattresses) and HDPE (high density polyethylene) geo-mattress, while vegetation alone was not efficient.

Graziela Ferreira Guarda
Professor, Universidade Católica de Brasília, Brazil
Luiz Fernando Whitaker Kitajima
Professor, Universidade Católica de Brasília, Brazil
&
Beatriz Rodrigues de Barcelos
Professor, Universidade Católica de Brasília, Brazil

EPR for e-Waste Efficiency in Brazil and USA: A Comparative Analysis

Nowadays, it is assumed that the recycling or prevention of high production of electronic waste is a necessary thing to do. However, there are still some questions about how to do it and who should do it. In this way, this article analyzes one of the main means of doing so: the Producer of Extended Responsibility (EPR). In analyzing the EPR, it is assumed that the liability is the majority for the producer for some reason. This article also brings an economic approach to EPR so that producer responsibility is profitable for it and hence applicable. In addition, the concept of circular economy, its benefits, successes, and failures is used both to support the EPR and to analyze laws in Brazil and the United States, making a comparison and drawing some conclusions, advising and lessons. The selection of Brazil and the United States is important because, in the first case, there is the largest producer of electronic waste in South America, the second because it is the largest consumer of consumer electronics in the world. In the US case, the country produced about 16.9% of all global electronic waste (in 2014), EPR laws work better than in the first case, however, they still have a considerable lack of efficiency in some aspects. In Brazil there are not even precise numbers on the total of recycled electronic waste, although for comparison purposes, the country only recycled 3% of the total solid waste, and therefore the actual total values are expected to be correspondingly small. In the United States, the same number is 25% (in the year 2012). These data consider both waste from EPR systems or not. In the Brazilian case, this inefficiency may be related mainly to a National Waste Policy that was not fully implemented, low consumer awareness regarding Reverse Logistics, corruption, among others and in the United States, with illegal exports, corruption and low number of legal proceedings.

Emmanuel Iyiegbuniwe
Director of Public Health (Master of Public Health Program), California
State University San Marcos, USA
&
Alexander Ufelle
Assistant Professor, Slippery Rock University, USA

Noise Exposure Assessment for University Police Officers during Rifle and Shotgun Qualifications

Police and other law enforcement officers are routinely exposed to hazardous noise levels during normal working conditions. Occupational noise exposure is a known risk factor for noise induced hearing loss as well as other documented health effects. The purpose of this study was to assess noise exposures among selected police officers and their instructors at a university in Kentucky during routine rifle and shotgun qualifications at an outdoor firing range. The assessment was conducted among 17 police officers and 2 instructors over a period of three days in accordance with the requirements of the noise standards (29 CFR 1910.95) stipulated by the United States Occupational Safety and Health Administration (OSHA). We measured both personal and area sound pressure levels using calibrated noise dosimeters and sound level meters. Average personal noise levels during shotgun and rifle qualifications ranged from 74 to 101 dBA and 90 to 101 dBA, respectively. The results of area noise measurements for shotgun and rifle ranged from 107 to 121 dBA and 106 to 114 dBA, respectively. Without consideration of hearing protection, personal exposures exceeded OSHA's noise standards (i.e., Permissible Exposure Limit of 90 dBA and Action Level of 85 dBA, averaged over an 8 hour work-shift). The results indicate potential health risks from continuous exposures of these police officers and instructors. Recommendations are made for continued adherence to and enforcement of all elements of OSHA's hearing conservation program.

Nadezhda Kudryasheva
Professor, Institute of Biophysics (IBP), SB RAS, Russia
T.V. Rozhko
Siberian Federal University, Russia, A.S. Petrova, Institute of Biophysics (IBP), SB RAS, Russia
&
G.A. Badun
Moscow State University, Russia

Luminous Marine Bacteria as a Tool for Study Toxic and Activation Effects of Low-Level Radiation

Effects of alpha- and beta-emitting radionuclides (americium-241 and tritium), and gamma radiation (^{137}Cs-containing particles) on luminous marine bacteria were studied under conditions of chronic low-dose irradiation (< 0.2 Gy) in aqueous media; bioluminescent intensity was used as a tested physiological parameter. The luminous bacterium is a proper tool for study the low level exposures due to simplicity and high rates of assay procedure, providing a lot of samplings under comparable conditions and, hence, a proper statistical treatment. Non-linear dose-effect dependencies were demonstrated. Three successive stages in the bioluminescent response to alpha- and beta-emitting radionuclides were found: 1 - absence of effects (stress recognition or threshold effect), 2 - activation (adaptive response), and 3 - inhibition (suppression of physiological function, i.e. radiation toxicity). Gamma irradiation demonstrated only stages 1 and 3, while the bioluminescence activation stage (2) was not found. The bacterial response was found to be independent on activity concentrations of radionuclides or dose rates of gamma-radiation. The nonlinear dose-effect dependencies of ionizing radiation with activation phenomenon included (stage 2), were ascribed to the "hormesis" phenomenon. The effects of gamma-radiation were described in terms of "threshold" toxicity model. Experiments with tritiated water and tritium-labeled polyethylene films (liquid and solid courses of beta-particles, respectively) showed that activation of the intracellular bioluminescence process can take place without penetration of tritium into the cells. Sequence analysis did not reveal mutations in bacterial DNA under conditions of the experiments. The results give preference to a "non-genomic" mechanism of bioluminescence activation. Probably, the activation effects result from ionization of aqueous media followed by the intensification of cellular membrane processes. Biological role of reactive oxygen species, secondary products of radioactive decay, is discussed.

Roland Leduc
Professor, Université de Sherbrooke, Canada
&
Jean-Claude Labbe
Student, Université de Sherbrooke, Canada

Comparative Coagulation-Flocculation Treatment of Leachate from Municipal Solid Waste with Alum and Chitosan

Background: Municipal solid wastes (MSW) are generally disposed in sanitary landfills, in which the biodegradable portion of the waste is degraded. The process generates leachate, which is water from landfills that contains high and variable amounts of dissolved, colloidal and particulate materials, both in organic and inorganic forms. Part of this material is biodegradable, but it also contains numerous xenobiotics that may be harmful to aquatic life. Hence, leachates need treatment before their discharge in natural water bodies or in municipal sewers for further treatment in municipal wastewater treatment plants. Numerous treatment technologies exist for leachate treatment, which belong in two broad categories, biological and physical-chemical. In the latter, coagulation-flocculation is very commonly used either as a pre-treatment or as a polishing treatment. Al-based salts and polymers (such as alum, aluminum chloride and poly-aluminum chloride PACl) are widely used as coagulants. However, Al-based coagulants may generate residual dissolved Al species in the treated leachate. The bioavailability of this element in waters is controversial because of the links with Azheimer's disease or other neurotoxic effects evoked in the scientific literature, yet the controversy remains unresolved. To avoid this problem, the search for alternate, non-Al coagulants, is open.

Objectives: The objectives of this study were to compare the performance of alum with that of chitosan (CH), as an alternative to alum, for leachate treatment. Chitosan offers a number of advantages over synthetic coagulants, such as biodegradability and nontoxicity among others.

Methodology: Leachate samples, collected from the effluent of a pond system treating landfill leachate, were stored at 4°C in the laboratory. The CH solutions were made of 0.5% CH and 0.5% acetic acid (AA). Coagulation/flocculation experiments were carried out with the jar testing procedure using square 2-liter jars in a Phipps and Bird apparatus. Dosages of alum [$Al_2(SO_4)_3 \bullet 18H_2O$] and CH ranged from 0 to about 1.0 g/L in both cases. Global indicators of water quality (pH, 5-day biochemical oxygen demand BOD5, chemical oxygen demand COD, suspended solids SS and turbidity) were measured. Sludge volumes, after 1 h and 24 h settling time, were obtained with 1-L Imhoff cones.

Results: Concentrations of the sampled leachate were low for the parameters measured, with values in the range corresponding approximately to those of an old leachate. Both alum and chitosan reduced pH from values in the range of 7.8 to 8 before treatment, to 7.0-7.1 at maximum dosages, thus meeting the discharge compliance criteria (pH 6.0-9.5). Actually both coagulants decreased pH to near neutrality which is a much desirable result.

COD reached 364 mg/L with alum, meeting the 400 mg/L compliance criteria. However, AA in the CH solution contributed significantly to COD but, taking into account the contribution of AA to COD, it was found that chitosan did decrease the COD of the leachate very significantly. SS were reduced in the best cases to 70 mg/L with alum and to 92 mg/L for CH, nearly reaching the 65 mg/L compliance criteria. This corresponded to 82% removal efficiency for alum and 76% for CH.

Turbidity was reduced by 80% with alum, while CH reached 93%, however turbidity is not subject to a compliance criteria. Turbidity remained nearly constant (almost no removal) with increasing CH concentration from 0 to 0.5 g/L, but a sudden decrease in turbidity occurred at 0.56 g/L. As well, big flocs formed at that concentration, but these two phenomena did not occur with alum. These large-size flocs settled quickly, representing an advantage for CH over alum.

Sludge volumes with alum were 153 mL/L after 1 h settling time, but reached 50 mL/L after 24 h as a result of compression. However, the larger CH flocs resulted in a large volume of settled sludge. For CH, volumes after 24 h were in the range of 100-150 mL/L, but with little difference between 1 h and 24 h settling time, indicating that sludge compression did not occur.

Conclusions: Testing has shown that the two coagulants were efficient for treating the leachates. Globally, alum reached leachate discharge compliances for pH, BOD5 and COD, while CH did so for pH and COD. However, coagulation-flocculation of leachate, when used as a pre-treatment, is not expected usually to meet discharge compliance criteria. Based on the water quality parameters that we used, this study shows that chitosan seems to provide an alternative to Al-based coagulants for coagulation-flocculation of low-strength sanitary landfill leachates.

Xiaoxiao Liu
Postgraduate, Beijing Forestry University, China

Distribution Characteristics of Air Quality Index in Beijing in 2016

The Beijing area is one of China's political centers and China's economic development center; the regional area is vast, densely populated and economically developed. In recent years, due to the rapid economic development, the rapid increase in population, coupled with its special terrain and atmospheric environment characteristics, air pollution has become increasingly serious, causing widespread concern. According to China Environmental Protection Agency's Technical Regulation on Ambient Air Quality Index (on trial) and ambient air quality standards, AQI is from the six pollutants (SO_2, NO_2, $PM10$, $PM2.5$, O_3, CO) the basic project to select the highest air quality index for the air quality index. In order to further understand the air pollution situation in Beijing and to provide scientific and effective control and governance of air pollution necessary theoretical basis, the spatial and temporal distribution characteristics of AQI and primary pollutants in Beijing area were analyzed by using environmental data of 2016 daily air quality and a statistical analysis method.

Lorenzo Mentaschi
Scientific Officer, Joint Research Centre, European Commission, Italy
Michalis Vousdoukas
Joint Research Centre, European Commission, Italy
Jean-Francois Pekel
Joint Research Centre, European Commission, Italy
Evangelos Voukouvalas
Joint Research Centre, European Commission, Italy
&
Luc Feyen
Joint Research Centre, European Commission, Italy

Global Long-term Patterns of Coastal Erosion and Accretion

Our coasts undergo constant erosive/accretive processes that have broad consequences on the sustainability of coastal communities, structures and ecosystems. Though local measures of coastal morphological changes exist in many places, understanding long-term changes at global scale remains a challenge. Here we present a global and consistent evaluation of coastal morphodynamics over the past 32 years (1984-2015) using the Global Surface Water database derived from millions of LANDSAT satellite images[1]. Lost/gained land was estimated based on changes in water presence along more than 2 million virtual transects, with a spatial resolution of 30 m in the cross-shore direction and 250 m in the long-shore direction. We find that the overall surface of eroded land is about 28,000 km2, twice the surface of gained land, and that often erosion and accretion are in the order of kilometers. The morphological changes of the coasts are caused by several drivers, among the others the occurrence of natural disasters like tsunamis and extreme storm. And from our observations the anthropogenic factor clearly emerges as prominent, both as a planned exploitation of coastal resources, such as building coastal structures, and as an unforeseen side effect of intensive human activities, like the installment of dams, irrigation systems and structures that modify the flux of sediments, or the clearing of coastal ecosystems like mangrove forests, or intensive agriculture and deforestation in river catchment areas. The observed global trend in coastal erosion could be enhanced by sea level rise and increasing extreme events in view of climate change. These circumstances underline the necessity of context-aware coastal planning and timely adaptation strategies in several areas.

Masoumeh Mofarrah
PhD Student, Zhejiang University, China

Micro Gas Cyclone Design and Performance Evaluation to Collect Dust Particles

The objective of this study is to develop a particle collector by using a micro gas cyclone with a body diameter of 10 mm. Design and performance of a cyclone separator is determined by collection efficiency and pressure drop. The behavior of a rectangular inlet-type cyclone for relatively high solid loading rates is reported in this study. For different solid loading flow rates varying from 11.7 to 16.7 liter per min, pressure drop and collection coefficient were evaluated through simulation and experimental work. The experimental part of this study was conducted using Snifter MA+ device. Since the Snifter MA+ is designed to handle flows which are approximated by laminar conditions and the flow regime within the cyclone is mostly turbulent, in order to achieve a suitable performance, the flow in the cyclone should be controlled to be close to laminar conditions. Given these circumstances, the highest cyclone efficiency was recorded for the lowest flow rate and in turbulent condition. The obtained efficiency shows that the cyclone has a reliable performance. As flow rate decreases, pressure drop reduces as well. In order to investigate the pressure drop behavior, velocity and flow trajectories for different flow rates, SOLIDWORKS software, which is applied for drawing and also for simulation was utilized to simulate the model. The simulation results show that by increasing the flow rate, pressure drop also increases.

Paola Palestini
Associate Professor, Università degli Studi di Milano-Bicocca, Italy

Oxidative Stress and Inflammation Induced by Acute and sub-Acute UFPs Exposures: Contribution to Neurodegenerative Disease Onset

Particulate matter (PM) is a complex mixture of solid and liquid particles suspended in the air, and this suspension could be formed by a variety of particles of different size and composition depending on their origin. Among the different fractions, ultrafine particles (UFPs) are thought to have the greatest health effects because of different characteristics: their small size, their high surface-to-volume ratio (high reactivity), their prolonged residence time in the lungs because of mitigated clearance efficiency, and their possible translocation rates across epithelial/endothelial barriers into the blood and lymphatic circulation. UFPs derive primarily from combustion processes in urban settings and, in the Lombardy Region, solid biomass burning for residential heating and diesel combustion used for private and public transport represent their major sources. Exposure to PM has been identified as the cause of several health effects including increased hospital admissions, emergency room visits, respiratory symptoms, exacerbation of chronic respiratory and cardiovascular diseases, decreased lung function and premature mortality.

Interestingly, emerging evidences from different studies suggest that neurological diseases, such as AD, PD and stroke, may be strongly associated with ambient PM. It has been demonstrated that continuous exposure to significant levels of airborne PM may result in the direct translocation of pollutants to different extra pulmonary sites, including central nervous system (CNS), or trigger the release of soluble inflammatory mediators from primary entry organs or secondary deposition sites. Systemic inflammation could activate cerebral endothelial cells, alter BBB integrity, or trigger signaling cascades that lead to the activation of mitogen-activated protein kinase (MAPK) and nuclear factor kappa-light-chain-enhancer of activated B cells (NFκB) pathways. Notably, post-mortem examinations of adult humans resident in highly polluted urban areas exhibited significantly higher brain COX-2 expression and accumulation of Aβ42 when compared to subjects living in cities with low pollution levels.

The aim of this presentation is to show the detrimental effect of UFPs exposure, regarding oxidative stress, inflammation and the possible physiopathological correlation between these two mechanisms and AD neurodegeneration, on *in-vitro* and *in-vivo* models of CNS.

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Do Pollution Particles Matter for Plant Health Grown under Peri-Urban Environment and Changing Climate?

Anthropogenic aerosol pollution has been increasing in the recent years. Plant surfaces accumulate a major part of aerosol particles in the terrestrial ecosystem. The deposition of atmospheric aerosols on plant surfaces is a continuous process and is expected to be high at peri-urban agricultural environments. However, the deposited aerosols can be wash-off by rain and rainfall is projected to increase due to climate change. The degree of rain wash-off of aerosol particles depends on frequency and the rain intensity. In this study, we tried to find out how climate change i.e. rainfall affects the particles deposition on field crop and how UV radiations can influence crop-aerosol pollution interaction on the physiology and biochemical responses of economically important cereal crop barley grown at field condition near peri-urban environments. Firstly, we quantified the leaf surface particle accumulation and their elemental ionic concentration at ambient and rain-exclusion environments. Secondly, we observed the crop photochemistry and physiological responses under UV and UV-exclusion environments. Barley, having hydropobic (water repelling) and narrow leaves, has accumulated 0.5-1.0 µg (Na^+, K^+, Ca^{2+}, Cl^-) per square centimeter leaf area, whereas other measured ions (Mg^{2+}, SO_4^{2-}, NO_3^-, PO_4^{3-}) were less than 0.3 µg cm^{-2}, and rainfall itself has added a part of ions besides particles wash off. Thus, few rain events did not affect long-term ionic mass accumulation on barley leaves. Similarly, integrated effects of aerosols and UV on fresh mass and dry mass did not differ significantly. However, chlorophyll content and plant height significantly reduced to 20-30% under rain and UV exclusion environment. Leaf surface microstructures, area and orientation can affect the aerosol accumulation irrespective of rainfall due to continuous deposition of aerosol at ambient conditions. Rainfall could have positive response to aerosol particles-crop interaction, whereas UV could induce negative responses on their interactions.

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Exposure Assessment of Air Pollutants during Car Idling at Primary Schools

The areas immediately surrounding major roadways are frequently referred to as 'traffic hot spots' – locations where levels of traffic-related air pollution are elevated. Residing in close proximity to these traffic sources has been associated with both exacerbation and development of respiratory illnesses including asthma. The microenvironment of children, however, includes locations outside of the home, including schools and inside vehicles during transit to and from school. The school environment may be especially relevant to traffic related air pollution because often public schools in metropolitan regions are located within close proximity of an interstate or highway where levels of air pollutants have been shown to be elevated. Studies have reported that car idling near schools can be a significant predictor of black carbon and fine particulate air pollution in the school vicinity.

This project was conducted in the Perth Metropolitan area with the aim to assess exposure levels to selected air pollutants during car idling by parents at drop -off and pick- up times in primary schools.

We assessed exposure to particulate air pollution and selected gases before and during pick- up and drop- off times near primary schools.

The results showed that there is a significant difference in exposure levels before and after the pick-up and drop-off times. The study demonstrates that children may be exposed to elevated levels of air pollution during car idling and this can be potential for adverse health impacts on children during these times.

This research provides awareness and knowledge with regard to potential hazards related to car idling and can support the development of school policy and practice related to car idling that will lead to a reduction in school children's exposure to air pollution that are dangerous to their health.

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Tracing the Organic Pollution of Coastal Areas in Space and Time with Molecular Indicators

During the past century of rapid urbanization and accelerated economic growth in many countries, especially coastal areas have been more densely populated than ever before and have been subject to substantial transformations. An increasing pollution of coastal ecosystems is related to this development, which is causing much concern. Adverse effects on marine biodiversity, and a contamination of fishery and drinking water resources in many coastal areas have been demonstrated.

This illustrates the importance of a tool which allows to trace the distribution of anthropogenic emissions in coastal ecosystems in space and time. Molecular indicators are organic compounds that are characteristic for anthropogenic emissions, are emitted in high quantities and are stable in the environment, and thus can be used as such a tool. We will present examples of ongoing research which show the usage of molecular indicators in different contexts.

Due to the accumulation of particle-associated pollutants in coastal sediments, the sediments act as pollutant sink and thus as a record of pollution history. Polycyclic aromatic hydrocarbons (PAHs) turned out to be useful indicators to trace the harbor usage during the time of the ancient Roman civilization in sediment cores from Ephesos, Turkey. In sediment cores from Japan, the remobilization and transport of coastal sediments to near-shore terrestrial areas during the 2011 tsunami event is reflected by elevated concentrations of PAHs and other molecular indicators. Source-specific indicators for anthropogenic activities are characteristic municipal sewage constituents. We used such compounds to trace the seasonal flushing out of contaminated river sediments from the tropical megacity Jakarta into the adjacent coastal ecosystem during the monsoon season with its extreme rainfall events. Furthermore, these indicators have been used for prospective evaluation of planned coastal infrastructure implementations. The presented examples are illustrating the broad range of possible applications and the high potential of molecular markers in interdisciplinary investigations.

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Pollen Distribution Patterns and Their Relationship to Geomorphology

Airborne pollen in a natural or urban environments plays a significant role in the transfer of genetic material in the biosphere; it is also an important factor influencing human health. In recent years, interest in the understanding of climate change has been rapidly increasing, and the pollen record from prehistoric times is an excellent indicator of bioclimatic changes on this planet. In order to establish a good pollen and plant relationship, detailed studies of pollen distribution and accumulation in the environment are needed. In this research, special attention has been paid to the geographic distribution of pollen with respect to elevations in a closed geomorphic environment. The spatial patterns of two bioclimatic variables: temperature and evapotranspiration is studied with respect to similarities and differences in the distribution of arid and forest pollen types. Statistical tests and Geographic Information System (GIS) tools are used to determine the distribution patterns of pollen and bioclimatic parameters. The results indicate that there is a significant relationship between elevation, pollen depositions patterns, and changes in the bioclimatic parameters. This relationship exhibits a concentric pattern which reflects a basin geomorphology. The importance of understanding the correlation between pollen dispersion patterns and actual vegetational communities is one of the essential tools used to understand paleo-vegetational records, and it can become an important guide in geolocation questions related to using pollen as a forensic tool. Developing multiple linear regression models to study the changes of pollen quantities with the elevation is also included in this research. It will help to understand the influence of geomorphology on pollen distribution and the formation of ecosystems in a basin environment.

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Presentation of Circular Economy Assumptions in the Phosphorus Management

Phosphate rock is indicated as one of 27 Critical Raw Materials (CRMs) in European Union (COM, 490, 2017). Phosphorus (P) has a strategic importance for the EU manufacturing industry and value chain. Moreover, P is an essential element for human nutrition, yet limited resource, which cannot be replaced by any other element. The inclusion of phosphates in the EU CRMs list should drive development of EU policies to promote sustainable phosphorus management - compatible with Circular Economy (CE) model, data gathering on resources and use, research and development (R&D) and recovery and recycling policies.

As Europe has no significant P mines, it is highly dependent on the import of P ore. In order to achieve P security on the continent, some European regions have already taken actions aimed at sustainable management of phosphorus from both primary (phosphate rock deposits) and secondary sources (from waste streams). The paper presents the possible ways of implementation the CE assumptions in the management of phosphorus in the selected European countries. Switzerland and Germany have a regulatory framework relating to the recovery of phosphorus. Since the 1st January 2016 P recovery and recycling from sewage sludge and slaughterhouse waste is obligatory in Switzerland, and in Germany, the new sewage sludge ordinance which came into force at 1st January 2017 makes P recovery from sewage sludge obligatory for all German wastewater treatment plant in the next 12-15 years (transition period). Moreover, Austria also opts for proposed mandatory phosphorus recovery from sewage sludge in order to keep the security and close the P cycle. For now, there is no special regulation for P recovery in other countries, however it is expected that next regulatory framework will be introduced in the coming years. The presented sustainable P management solutions in selected EU countries should be transferred to other European regions, mainly to regions where the P current usage involves waste and losses at every stage of its lifecycle.

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The Presence of Naturally Occurring Radioactive Material in the Oil and Gas Industry in Texas and Implications for Public Health

The presence of NORM (Naturally Occurring Radioactive Materials) in the oil and gas industry is well-documented. Specifically, radium isotopes such as ^{226}Ra and ^{228}Ra as well as ^{235}U, ^{238}U, and ^{232}Th are present. The process of bringing oil to the surface has the unintended consequence of enriching the level of radioactive radium on these sites because barium and calcium salts are replaced by the chemically similar radium. These low-level radioactive materials represent a small but potentially significant health risk for workers in the industry. While short exposures are hypothesized to be harmless, exposures over long periods of time have health consequences. In addition, the presence ^{210}Pb one of the daughter products of ^{226}Ra adds a chemical hazard to the radioactive one. From our previously published results, we have found NORM in high concentrations in several sites in west Texas in samples from soil, pipes, and tank sludge. This represents a public health hazard for the workers in these sites and in the industry in general. Here we calculate approximate yearly dosages over the course of a typical worker's time spent on the field. In addition, we evaluate the local, state, and federal public health response to this hazard in terms of communication, prevention, and responsiveness, and make recommendations.

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An Experimental Simulation of Climate Change to Assess Gross Calcification of Arabian Gulf Corals

The coral reefs are an intrinsic part of the marine ecosystem, harboring a large part of the marine biodiversity. Increase in sea surface temperature and lowering of pH are two most significant phenomena of climate change that affects the marine environment. The measurements of sea surface temperature and salinities show an increase while the pH of seawater depicts a drop. These factors are known to affect the ability of coral symbiosis negatively. To understand the response of corals in the Gulf to these climatic stressors an experimental study was conducted. Two species of corals *Acropora pharaonis* and *Porites lutea* were tested under three temperature and two pH conditions that simulate the current and the representative concentration pathway (RCP) 8.5 to ascertain the gross calcification. The two pH condition was 8.2 and 7.5, and three temperatures were 22.5, 27.5 and 32.5. The gross calcification rate was measured using ^{45}Ca radiotracer. The gross calcification rate at 8.2 pH among branched coral *Acropora pharaonis* at 22.5^oC, 27.5^oC and 32.5 ^oC temperature varies between 4.36 – 4.77, 3.6 - 3.98, 2.23 – 2.39, while at 7.5 pH these rates were 2.77 – 3.29, 2.89 – 3.52, 1.99 – 2.30, μmol $CaCO_3$ g^{-1} d^{-1}. The gross calcification in massive coral *Porites lutea* at 8.2 pH and 22.5^oC, 27.5^oC and 32.5 ^oC temperature was 4.13 – 4.55, 3.35 – 3.69, and 2.01 – 2.18 and at 7.5 pH was 2.49 – 2.95, 2.53 – 3.12 and 1.65 – 1.88 μmol $CaCO_3$ g^{-1} d^{-1}. The study divulges a interesting observation: net calcification in massive coral *Porites lutea* at lower pH of 7.5 was higher at 27.5^oC temperature rather than 22.5^oC. Is this an indicator of adaptability of these corals to warmer Gulf waters. However, there is a need for more comprehensive assessments by undertaking oxygen isotropic ration to trace the paleo-thermometry in Gulf.

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The Comparative Study of Aerosol Properties in Eforie Nord (Romania) and Athens (Greece) using AERONET Data

The aim of our work was to analyze the optical properties of aerosol, using data from Aerosol Robotic Network (AERONET), at two different sites: Eforie Nord (1 km from Black Sea) and Athens (10 km from Mediteranean Sea). The parameters aerosol optical depth (AOD) , single scattering albedo (SSA) and Angstrom exponent (AE) were used to compare the aerosol properties and to determine the aerosol types at the two sites for three years (2010-2012). Aerosol types were classified on the basis of the dominant size mode and radiation absorptivity determined by the fine mode fraction (FMF) and (SSA), respectively. Using this classification it can distinguish between dust, sea salt, mixture, black carbon (BC), and non-absorbing anthropogenic aerosol (NA). The results of analysis have shown that NA aerosol (55%) and BC slyghtly absorbance aerosol (25%) dominated at Eforie Nord. For Athens we had obtained NA aerosol in proportion of 46% , BC slyghtly absorbance aerosol and mixture about the same percentage (20%). Also, the average of AOD values was 0.203 ± 0.094 for Eforie Nord, respective AOD =0.194±0,099 for Athens. At Eforie, AE average value is 1.424 ± 0.266, with minimum value 0.210 and maximum 1.938. In the case of Athens, AE average value is 1.376 ± 0.380 with minimum value 0.041 and maximum 2.101. These values emphasized the dominant types of aerosol at the two sites and were supported by many other studies from Romania and Greece.