2016

Environment Abstracts

Eleventh Annual International Symposium on Environment 23-26 May 2016, Athens, Greece

Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

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(In Alphabetical Order by Author's Family name)

Preface

This abstract book includes all the abstracts of the papers presented at the 11th Annual International Symposium on Environment, 23-26 May 2016, organized by the Athens Institute for Education and Research. In total there were 23 papers and 26 presenters, coming from 14 different countries (Australia, Brazil, China, Germany, Korea, Kuwait, Nigeria, Poland, Russia, Spain, Sweden, Thailand, Turkey and USA). The conference was organized into seven sessions that included areas of Air Pollution and other related fields. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books and/or journal of ATINER.

The Institute 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 in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 400 international conferences and has published over 200 books. Academically, the Institute is organized into seven research divisions and thirty-nine research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
President

FINAL CONFERENCE PROGRAM
11th Annual International Symposium on Environment, 26-29 May, 2016, Athens, Greece

PROGRAM

Conference Venue: **Titania Hotel, 52 Panepistimiou Avenue, Athens, Greece**

C O N F E R E N C E P R O G R A M

Monday 23 May 2016
(all sessions include 10 minutes break)

08:00-08:30 Registration and Refreshments

08:30-09:00 Welcome & Opening Address (ROOM A)

- Gregory T. Papanikos, President, ATINER.
- George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.

09:00-11:00 Session I (ROOM B): Biological Impact and Other Issues

Chair: Olga Gkounta, Researcher, ATINER.

1. George Antonious, Professor, Kentucky State University, USA. Assessment of Soil Enzymatic Activity Following Incorporation of Recycled Sewage Sludge at Three Locations in Kentucky.
2. *Wanida Jinsart, Professor, Chulalongkorn University, Thailand & Borworn Mitmark, Postgraduate Student, Chulalongkorn University, Thailand. Using GIS Tools to Estimate Health Risk from Biomass burning in Northern Thailand.
3. Beata Szyszka, Ph.D. Student, Poznan University of Economics, Poland & Alina Matuszak-Flejszman, Deputy Dean of the Commodity Science, Poznan University of Economics, Poland. The Role of Stakeholders in the Eco-management and Audit Scheme.
4. John Sansalone, Professor, University of Florida, USA. Particulate, Chemical and Microbiological Management as Sustainable Practices for Urban Societies.

11:00-13:30 Session II (ROOM B): Air Pollution I

Chair: *Wanida Jinsart, Professor, Chulalongkorn University, Thailand.

1. *Krassi Rumchev, Senior Lecturer, Curtin University, Australia, S. Kostova, Bulgarian Academy of Sciences, Bulgaria, S. Popova, Bulgarian Academy of Sciences, Bulgaria & T. Antova, National Centre of Public Health and Analyses, Ministry of Health, Sofia, Bulgaria. Air Quality and Respiratory Health - Comparison Between Two Cities. (Panel on Air Pollution)
2. *Saif Uddin, Research Scientist, Kuwait Institute for Scientific Research, Kuwait. Use of Satellite Images to map Spatio-temporal variability of PM2.5 in Air.
3. Egor Iasenko, Ph.D. Student, National Research University ITMO, Russia, Vladimir

Chelibanov, Ph.D. Candidate, National Research University ITMO, Russia & Alexander Marugin, Ph.D. Candidate, JSC OPTEC, Russia. Monitoring of Ozone Ground Concentration at Temperature Inversions in the Atmosphere.

4. Antonio Lopez, Ph.D. Student, Public Health Laboratory of Valencia, Spain, Vicent Yusa, Deputy Director Genenal for Food Safety and Public Health Laboratories, Public Health Laboratory of Valencia, Spain, Amalia Munoz, Reasearcher, Instituto Universitario UHM-CEAM, Spain & Clara Coscolla, Head of Food Safety Area, Public Health Laboratory of Valencia, Spain. Risk Assessment of Airbone Pesticides in a Rural Region of Spain. (Panel on Air Pollution)

13:30-14:30 Lunch

14:30-16:00 Session III (ROOM B): Nature, Environmental Impact & Life Cycle Assessment

Chair: *Saif Uddin, Research Scientist, Kuwait Institute for Scientific Research, Kuwait.

1. Ying Zhang, Associate Professor, Beijing Forestry University, China. Responses of N Content and δ15N Value of Dominant trees to Atmospheric Nitrogen Deposition in Beijing, China.
2. Bongjae Lee, Head Researcher, Korea Testing and Research Institute, Korea & Jeong-il Lee, Center Leader, Korea Testing and Research Institute, Korea. The Characteristic for Removal Efficiency of non-CO2 Gas using QMS-FTIR in Fabrication Process.

16:00-17:30 Session IV (ROOM B): Water Pollution

Chair: Anu Shrestha, Ph.D. Student, Curtin University, Australia

1. *Guleren Doner, Professor, Istanbul Technical University, Turkey. A Novel Effective Adsorbent for the Removal of Aniline Blue Dye from Sea Water.
2. *Arzu Yakar, Assistant Professor, Afyon Kocatepe University, Turkey, Minel Caliskan, Engineer, Afyon Kocatepe University, Turkey, Yasemin Caliskan, Engineer, Afyon Kocatepe University, Turkey & Gunnur Pesmen, Assistant Professor, Afyon Kocatepe University, Turkey. Production of Activated Carbon by Using Sugar Beet Pulp and Usage in Water Treatment.

21:00-23:00 Greek Night and Dinner (Details during registration)

Tuesday 24 May 2016

08:00-09:30 Session V (ROOM B): Air Pollution II

Chair: *Krassi Rumchev, Senior Lecturer, Curtin University, Australia, S. Kostova, Bulgarian Academy of Sciences, Bulgaria.

1. Fatih Aktas, Assistant Professor, Düzce University, Turkey, Fatih Taspinar, Assistant Professor, Düzce University, Turkey & Zehra Bozkurt, Assistant Professor, Düzce University, Turkey. Hourly Predictions of PM10 Emissions for Emergency Episode Perception Comparatively using ANN and SVM-R Techniques.
2. Zehra Bozkurt, Assistant Professor, Duzce University, Turkey, Fatih Taspinar, Assistant Professor, Duzce University, Turkey, Eftade O. Gaga, Anadolu University,

Turkey, Beyhan Pekey, Kocaeli University, Turkey, Hakan Pekey, Kocaeli University, Turkey, Ozlem Ozden Uzmez, Anadolu University, Turkey & Tuncay Dogeroglu, Anadolu University, Turkey. Mass Concentrations and Elemental Compositions of Pm10 in Duzce, Turkey. (*Panel on Air Pollution)*

3. *Yang Cao, Assistant Professor, Institute of Environmental Medicine, Sweden, Xin Fang, Ph.D. Candidate, Institute of Environmental Medicine, Sweden, Runkui Li, Associate Professor, University of Chinese Academy of Sciences, China, Haidong Kan, Professor, Fudan University, China, Matteo Bottai, Professor, Institute of Environmental Medicine, Sweden & Fang Fang, Associate Professor, Karolinska Institutet, Sweden. Application of Bayesian Model Averaging Method in Assessing the Association between Inhalable Coarse Particles and Respiratory Mortality. *(Panel on Air Pollution)*
4. Anu Shrestha, Ph.D. Student, Curtin University, Australia, Krassi Rumchev, Senior Lecturer, Curtin University, Australia, Ben Mullins, Associate Professor, Curtin University, Australia, Linda Selvey, Director, Faculty of Health Sciences, Curtin University, Australia & Yun Zhao, Senior Lecturer, Curtin University, Australia. Evaluation of Exposure to Particulate Air Pollution and Its Lung Deposition among Cyclists in the Perth Metropolitan Area. (Panel on Air Pollution)

09:30-11:00 Session VI (ROOM B): Energy and Fuel

Chair: *Yang Cao, Assistant Professor, Institute of Environmental Medicine, Sweden.

1. Janusz Cieslinski, Professor, Gdansk University of Technology, Poland & Slawomir Smolen, Professor, City University of Applied Sciences Bremen, Germany. Application of Nanofluids in Thermal Energy Storage Systems.
2. *Timothy Mark Young, Professor, Graduate Director, University of Tennessee, USA. Assessing Site Locations for Biorefineries Using Bayesian Methods.
3. Angela Inmaculada Barreda, Ph.D. Student, University of Cantabria, Spain, Francisco Gonzalez, Professor, University of Cantabria, Spain & Fernando Moreno, Professor, University of Cantabria, Spain. Shape Effects of High Refractive Index Dielectric Nanoparticles as Enhancers of Energy Harvesting in Solar Cells.

11:00-14:00 Educational and Cultural Urban Walk Around Modern and Ancient Athens (Details during registration)

14:00-15:00 Lunch

15:00-16:30 Session VII (ROOM B): Special Topics

Chair: Angela Inmaculada Barreda, Ph.D. Student, University of Cantabria, Spain.

1. Paulo Roberto Santos, Civil Engineering Coordinator, Faculdade Integrada Metropolitana de Campinas – Metrocamp, Brazil. Analyzing the Effects of Reusing the Ornamental Rocks Residues with Conventional Concrete.
2. Aletea Madacki, MSc Student, University of Sao Paulo – USP, Brazil & Andre Felipe Simoes, Professor, University of Sao Paulo – USP, Brazil. Decarbonising the Brazilian Aviation Sector – Analysis of Selected Strategies.
3. Hannah Johnson, Graduate Student, Sam Houston State University, USA &

Madhusudan Choudhary, Associate Professor, Sam Houston State University, USA. A Clean Purple Sweep: Gold Bioremediation Using *Rhodobacter Sphaeroides.*

4. *Samuel Agele, Lecturer/Researcher, Federal University of Technology, Nigeria. Mainstreaming Adaptation, Resilience and Disaster Risk Reduction into Extension of Frontiers of Cacao to Marginal Soils and Climate of the Humid Tropics in the Wake of Climate and Weather Variabilities.

21:00-22:30 Dinner (Details during registration)

Wednesday 25 May 2016
Cruise: (Details during registration)

Thursday 26 May 2016
Delphi Visit: (Details during registration)

Samuel Agele
Lecturer/Researcher, Federal University of Technology, Nigeria

Mainstreaming Adaptation, Resilience and Disaster Risk Reduction into Extension of Frontiers of Cacao to Marginal Soils and Climate of the Humid Tropics in the Wake of Climate and Weather Variabilities

Climate change is expected to impact crop productivity and the areas suitable for crop production, and the damage will be disproportionately concentrated in the developing countries in tropical and sub-tropical latitudes. However, smallholder farmers are the most vulnerable to climate change/variability and weather extremes with regard to food security. Predictions from crop-climate models show that in the tropics even moderate warming can reduce yields significantly, because many crops are already at the limit of their heat tolerance. Cacao is highly sensitive to changes in the growing environmental (weather and soil) conditions, the consequences of the debilitating effect ofdrought and high temperatures is consistent decreases in yield (output) and hence the aggravated vulnerability of cocoa production and livelihoods. Global environmental change created new environmental boundaries occasioned by the new regimes of rainfall and temperature and GEC-related seasonal shifts. It is imperative to reappraise the fitness of the humid rainforest and fringe of the rain forest (forest-savannatransition) agroecologies for the production of cacao. In circumstances of the increasing marginality of growing environmental conditions, implicates-the need to expand the land area for cocoa cultivation. However, farmers would have to adoptrecommended best cacao farming practices as options to overcome GEC-related constraints on cacao cultivation and hence to optimize plant establishment, yields and sustainability of cacao production.Strategies and solutions to achieve sustainable improvements and environmental performance of tropical agriculture should be developed. In order to build/integrate climate resilience into agricultural practices, concerted efforts should be geared towards monitoring impact of climate change and identify, develop and scale-out best-fit innovative production practices and technologies with climate-smart potentials from of tropical small holder farms and farming systems in Sub-Saharan Africa. In addition, more efforts should be geared towards the development of management packages and guidelines, products and services for enhanced, productivity, food security and livelihoods in the wake of a changing climate and weather variabilities. These practices and agro-technological tools may attenuate GEC-enhanced plant stresses, and are basic for harnessing

opportunities and potentials presented by the GEC for the extension of the frontiers of cacao cultivation to marginal agroecologies(weather and soils) of the humid rainforest of West Africa.

Fatih Aktas
Assistant Professor, Düzce University, Turkey
Fatih Taspinar
Assistant Professor, Düzce University, Turkey
&
Zehra Bozkurt
Assistant Professor, Düzce University, Turkey

Hourly Predictions of PM10 Emissions for Emergency Episode Perception Comparatively using ANN and SVM-R Techniques

Predicting short-term levels of air pollutant's emission is an important issue in air pollution field considering its potential to help local authorities to enact preventative measures. The aim of the present work is to comparatively develop reliable artificial neural network and support vector machine regression models (ANN and SVM-R) to obtain accurate predictions of future hourly PM10 concentrations in the atmosphere for one, two and three hour(s) ahead. A hourly based air pollution data with meteorological factors have been used in training and testing stages of constructed models. The inputs to models were structured using a combination of time sequenced meteorological and air pollution data from a lagged-dataset. Time series plots of the data showed seasonal air pollution of PM10 emissions which hourly values were up to 899 μg/m3. Thus, in the pollution monitoring region PM10 levels may adversely affect human health. The obtained models were utilized in establishing an alert system for online PM10 emissions based on the threshold values reported in National Air Quality Assessment and Management Regulation. ANN models optimized with Broyden Fletcher Goldfarb Shanno (BFGS) algorithm and SVM-R parameters were optimized by k-fold cross-validation. The results of the statistical analysis of the models have shown reasonable accuracy in terms of perception of short-term pollution episodes.

George Antonious
Professor, Kentucky State University, USA

Assessment of Soil Enzymatic Activity Following Incorporation of Recycled Sewage Sludge at Three Locations in Kentucky

There is a continuing search for inexpensive, locally available sources of organic matter for use in growing horticultural crops. Municipal sewage sludge (SS) is currently applied to agricultural soils as an alternative to conventional inorganic fertilizers. With increasing cost and shortage of inorganic nitrogen fertilizer, there is increased emphasis on use of SS for land farming. However, SS may contain heavy metals that potentially affect soil microbial growth and the enzymes they produce. Soil samples were collected from three agricultural locations in Kentucky (Adair, Meade, and Franklin Counties) from areas where SS was applied as a soil amendment to investigate the impact of SS on soil biological processes and accumulation of heavy metals in growing plants. Microorganisms, play a significant role in keeping the main nutrients (C, N, and P) in soil through recycling from or

ganic matter. Soil microorganisms (bacteria, fungi, protozoa, algae) excrete a variety of enzymes (ureases, invertases, dehydrogenases, cellulases, amylases, and phosphatase) that are primary means of degrading xenobiotics in soil and water systems, mineralization of organic compounds, and release of nutrients for plant uptake. Accordingly, soil enzymatic measurements could be explored as a biological index of soil fertility and biological processes. Hydrolysis of the fluorescein reagent revealed that the total soil enzymatic activities were enhanced significantly in SS amended soils compared to native soils. The activities of the enzymes hydrolyzing urea (urea amidohydrolase, EC 3.5.1.5), sucrose (β-D-fructofuranosidase) and *p*-nitrophenyl phosphate (acid and alkaline phosphatase) were also greater in SS amended soil compared to native soil. The elevated soil urease and invertase activities (47 and 89%, respectively) as well as acid and alkaline phosphatase (23 and 26%, respectively) in soil amended with SS provided evidence of increased soil microbial population and the enzymes they produce.

Angela Inmaculada Barreda
Ph.D. Student, University of Cantabria, Spain
Francisco Gonzalez
Professor, University of Cantabria, Spain
&
Fernando Moreno
Professor, University of Cantabria, Spain

Shape Effects of High Refractive Index Dielectric Nanoparticles as Enhancers of Energy Harvesting in Solar Cells

Nanotechnology has revolutionized science during the last years with important theoretical and practical developments. In particular, the interaction of light with metallic nanoparticles (NPs) has been a vastly investigated field in different areas like: materials science, sensing, optical communications, clean energy sources.

Metallic NPs have been proposed to improve the energy efficiency of solar cells. The enhancement of the electric field in the surroundings of these nanostructures helps to increase the absorbed light in the dielectric substrate (usually made of silicon), increasing the generation of electron-hole pairs and consequently, the electric current.

In spite of the strong response of metallic NPs in the visible and near-infrarred spectral regions, their inherent ohmic losses make them inefficient in many applications. High Refractive Index dielectric NPs

have been suggested to overcome this drawback. Some of their most important advantages are they do not show loses and also they can show new scattering effects due to magnetic contributions even for non-magnetic ($\mu = 1$) materials. This magneto-dielectric behavior is responsible for interesting directionality properties. Under certain conditions, proposed by Kerker et al, the forward and backward scattered intensity is almost null or null respectively. Recently, these conditions have been demonstrated experimentally for spheres.

In this work, we analyze the influence of the shape effect on the Kerker's conditions for HRI dielectric NPs.

In particular, we study both oblate and prolate shaped ellipsoids as compared with the purely spherical shape, in order to determine their geometrical influence on the directionality of the scattered radiation. In particular, we center our study on the Zero-Backward condition which is the most interesting for optimization of the energy harvesting efficiency in solar cells. Under that condition, most of the scattered energy by one of those scatterers is concentrated in the forward direction hemisphere where the photosensitive surface is located.

Zehra Bozkurt
Assistant Professor, Duzce University, Turkey
Fatih Taspinar
Assistant Professor, Duzce University, Turkey
Eftade O. Gaga
Anadolu University, Turkey
Beyhan Pekey
Kocaeli University, Turkey
Hakan Pekey
Kocaeli University, Turkey
Ozlem Ozden Uzmez
Anadolu University, Turkey
&
Tuncay Dogeroglu
Anadolu University, Turkey

Mass Concentrations and Elemental Compositions of Pm10 in Duzce, Turkey

Particulate matter (PM) is one of the most important air pollution problem in the city. In this study, mass concentrations and elemental compositions of PM_{10} were determined in Düzce atmosphere. Düzce province is located in north-western Turkey and it is generally characterized by hilly to mountainous topography which covers about 85% of the province. The prevailing wind flow to the central district of Düzce is blocked by the rough and hilly geography, resulting in exposure to elevated levels of air pollutants. Two sampling campaigns were performed between 28 January and 25 March 2015 and between 22 June 2015 to 16 August 2015 to evaluate differences between summer and winter concentrations of pollutants. Concurrent measurements were carried out in the city center and University Campus that has semi-urban property. PM_{10} sampling was performed by high-volume air samplers. Average PM_{10} mass concentration measured at urban station was 85.67 $\mu g/m^3$ and 53.16 $\mu g/m^3$ respectively winter and summer, while it was measured as 27.13 $\mu g/m^3$ and 34.70 $\mu g/m^3$ at semi-urban station. Seasonal variations of PM_{10} concentration in urban station showed significant differences in the winter than in the summer. Higher PM_{10} concentrations were measured at urban location often exceeding the limit values of 50 $\mu g/m^3$in winter. On the other hand, PM_{10} limit value was not exceeded in none of the measurement days at the semi-urban sampling station. In this study the relationship between particulate matter concentration and meteorological variables such as wind direction, wind speed and rainfall was investigated and it was found that meteorological factors have significant effects on the

measured PM mass concentrations. PM mass collected on quartz fiber filters were digested in acid mixture and analyzed with ICP-MS. Concentrations of elements, Al, Fe, Sc, V, Cr, Mn, Co, Ni, Cu, Zn, As, Se, Mo, Ag, Cd, Sn, Sb, Ba, Pb and Bi were determined in daily collected filters. Trace element concentrations measured at urban station which is close to major sources such as traffic and domestic heating were found to be higher than semi-urban station. The results of the chemical measurements were discussed in detail to determine possible sources of pollutants.

Yang Cao
Assistant Professor, Institute of Environmental Medicine, Sweden
Xin Fang
Ph.D. Candidate, Institute of Environmental Medicine, Sweden
Runkui Li
Associate Professor, University of Chinese Academy of Sciences, China
Haidong Kan
Professor, Fudan University, China
Matteo Bottai
Professor, Institute of Environmental Medicine, Sweden
&
Fang Fang
Associate Professor, Karolinska Institutet, Sweden

Application of Bayesian Model Averaging Method in Assessing the Association between Inhalable Coarse Particles and Respiratory Mortality

Objective: To demonstrate application of Bayesian model averaging (BMA) method within generalized additive mixed model (GAMM) frame and provide novel modeling technique to assess the association between inhalable coarse particles (PM_{10}) and respiratory mortality in time-series studies.

Design: A time-series study using regional causes of death registry between 2009 and 2010.

Setting: Eight districts in a metropolis in Northern China.

Participants: Permanent residents of the eight districts who died of respiratory diseases between 2009 and 2010.

Main outcome measures: Percent increase in daily respiratory mortality rate (MR) per interquartile range (IQR) increase of PM_{10} concentration and corresponding 95% confidence interval (CI).

Results: The optimal GAMM and BMA after GAMM of single-pollutant showed comparable results for the effect of PM_{10} on daily respiratory MR, i.e. one IQR increase in PM_{10} concentration corresponded to 1.39 (95% CI: -1.08, 3.93) and 1.38 (95% CI: -1.09, 4.28) percent increase, respectively, in daily respiratory MR. Although neither result was statistically significant, the first principal component in both GAMM and BMA after GAMM was statistically significant, indicating the existence of joint effects of PM_{10} with other pollutants.

Conclusion: We suggest using BMA method to take into account the modeling uncertainty in time-series studies when evaluating the effect of PM_{10} on fatal health outcomes.

Janusz Cieslinski
Professor, Gdansk University of Technology, Poland
&
Slawomir Smolen
Professor, City University of Applied Sciences Bremen, Germany

Application of Nanofluids in Thermal Energy Storage Systems

The shortage of fossil fuels and environmental considerations – first of all reduction of carbon dioxide emission, motivated the researchers to use alternative energy source such as solar energy. However, the temporal difference of solar energy and energy needs made necessary the development of storage system. Therefore, the storage of thermal energy has become an important aspect of energy management.

There are three main physical ways for thermal energy storage: sensible heat, phase change reactions and thermochemical reactions. Storage based on chemical reactions has much higher thermal capacity than sensible heat but are not yet widely commercially viable. Large volume sensible heat systems are promising technologies with low heat losses and attractive prices.

The medium applied in thermal energy storage is a fluids or phase change material (PCM). In general, the thermal conductivity of these materials is poor leading to a slow charging and discharging rate. The charging and discharging rate can be enhanced by applying the heat transfer enhancement methods. The literature shows numerous methods to enhance the thermal conductivity of the materials used in thermal energy storage systems varying from metal ring and metal matrix insertion, encapsulation, and many others. The novel concept is application of nanoparticles in base fluid to obtain so called nanofluids. The thermal response tests shows the addition of nanoparticles remarkably decreases the supercooling degree of base liquids, advances the beginning freezing time and reduces the total freezing time.

This study aims to evaluate the potential of water-Al_2O_3 nanofluids as a sensible heat storage material in free convection systems.

The test chamber consisted of a cubical vessel made of stainless steel with inside dimensions of 150 mm x 150 mm x 250 mm. Commercially available stainless steel tubes having 10 mm OD and 0.6 mm wall thickness were used to fabricate the test heater. The effective length of a tube was 100 mm. The ends of primary heater are soldered to short cooper cylindrical ends to minimize any additional electrical resistance. The test specimens were heated by using the tubes themselves as resistance heaters. The power supply can be adjusted by an electrical

transformer. A K-type thermocouple was used to measure temperature inside the tube.

In the present study Al_2O_3 nanoparticles were used while distilled, deionized water was applied as a base fluid. Ultrasonic vibration was used for 4 h in order to stabilise the dispersion of the nanoparticles. Alumina nanoparticles were tested at the concentration of 0.01% by weight. Silica (SiO_2) nanoparticles, of spherical form have diameter from 5 nm to 250 nm; their mean diameter was estimated to be 47 nm according to the manufacturer (Sigma-Aldrich Co.).

Guleren Doner
Professor, Istanbul Technical University, Turkey

A Novel Effective Adsorbent for the Removal of Aniline Blue Dye from Sea Water

A new magnetic composite material was prepared using a simple coprecipitation method in the presence of Fe(II) and Fe(III) and rice husk ash (RHA) by potassium hydroxide solution. The magnetic composite-Fe_3O_4-RHA was characterized by surface area (BET), X-Ray Diffraction Analysis (XRD), Scanning Electron Microscopy (SEM) and Fourier Transform-Infrared Spectroscopy (FT-IR). Batch studied were carried out for the adsorption of aniline blue organic dye onto adsorbent from aqueous solutions under different experimental conditions such as pH, adsorbent mass, adsorbate amount, contact time and temperature. Equilibrium sorption data were confirmed with Langmuir and Freundlich adsorption isotherms. Langmuir isotherm was found a better model (R^2=0.9574) and the maximum adsorption capacity of the sorbent was determined to be 232.56mg/g at 298.15K and pH 5.5. The kinetic data were well fitted to the pseudo-second-order model. Different thermodynamic parameters, like enthalpy (19.70 kJ mol^{-1}), entropy (73.21 $Jmol^{-1}.K^{-1}$), Gibb's free energy (-2.13 kJ mol^{-1}) and activation energy (32.13 kJ mol^{-1}) of the adsorption process have been evaluated and the results reveal that the adsorption process is spontaneous with a physical adsorption. Optimum adsorption procedure was successfully applied for the removal of aniline blue from dye spiked Galata Bridge's sea-water and 92.8 % of 100ppm dye was collected onto adsorbent in 90 minutes.

Egor Iasenko
PhD Student, National Research University ITMO, Russia,
Vladimir Chelibanov
PhD Candidate, National Research University ITMO, Russia
&
Alexander Marugin
Ph.D. Candidate, JSC OPTEC, Russia

Monitoring of Ozone Ground Concentration at Temperature Inversions in the Atmosphere

It is known that formation of temperature inversions in the low troposphere is followed by active accumulation of the polluting substances in a ground layer. Ozone is one of dangerous pollutants of atmospheric air, is capable to be collected in significant amount as a result of "secondary" photochemical reactions with hydrocarbons, nitrogen oxides, and carbon monoxide. The formed ozone is considered as precursor of possible formation of toxic smog. It is revealed that the applied method of determination of ozone concentration in network based on absorption of ultra-violet radiation on wavelength 2537Å gives the considerable error exceeding 50% in the conditions of polluted atmosphere. The analysis of data for ozone received in the real atmosphere of the large industrial city allows to recommend application of reference measuring instrument on the basis of gas-phase chemiluminescent reaction of ozone with ethylene, for example, Ozone analyzer BENDIX 8002. The method of heterogeneous solid-state chemiluminescence is rather close in ideology. The executed experiments in cameral conditions (the artificial multicomponent gas atmosphere was created) and in natural conditions with use of the chemiluminescent analyzer 302P-A and several optical analyzers, allow to speak about an ozone measurement correctness by chemiluminescence method in relation to the considered task.

Wanida Jinsart
Professor, Chulalongkorn University, Thailand
&
Borworn Mitmark
Postgraduate Student, Chulalongkorn University, Thailand

Using GIS Tools to Estimate Health Risk from Biomass burning in Northern Thailand

The assessment of adverse health effect from air pollutants exposure in the north of Thailand was studied. Eight provinces were in the risk areas from biomass burning pollutants which occurred in the dry season from January to April annually. The haze pollutants are from the burning of agricultural waste materials to prepare for the next crops plantation in addition to natural forest fires. The pollutants such as, fine particulate matter (PM_{10}), carbon monoxide (CO) and ozone (O_3) have adverse health effects to the resident and tourists in this area. Daily concentrations of three monitored air pollutants (PM10, O_3, CO) during January 2011–December 2015 were provided by Pollution control department, Thailand. Each individual was geo-coded in ArcGIS10.1 software. The spatial distribution of five pollutants and the temporal-spatial specific air pollutants exposure level for each individual was estimated by ordinary Kriging Interpolation. Hazard Quotient (HQ) of PM_{10}, CO and O_3 were calculated from the ratio of exposure concentration and reference concentration. Hazard Index ($HI_{PM10,CO,O3}$), summation of HQ were calculated. The HI of each co-ordinate areas were compared and illustrated by GIS-based map. The association between exposure concentration and risk areas were compared. In the dry season, HI of eight provinces was more than 1 which indicated potential health risk. From hazard map identification, Chiang Rai and Mae Hong Sorn where located close to country border and Prae, new urbanized town were three high risk provinces in the north Thailand.

Hannah Johnson
Graduate Student, Sam Houston State University, USA
&
Madhusudan Choudhary
Associate Professor, Sam Houston State University, USA

A Clean Purple Sweep: Gold Bioremediation Using *Rhodobacter Sphaeroides*

Rhodobacter sphaeroides belongs to α-3 subdivision of the *Proteobacteria* that is metabolically capable of tolerating high levels of toxic heavy metals (lead, zinc, gold and/or mercury). These heavy metals constitute a major pollution that is contributed to by a variety of sources, such as industrial effluents, leaching out metal ions from the soil, and acid rain. These pollutions pose a serious problem to human health and therefore require bioremediation of such toxic metals from the streams, lakes, and soils. Previous studies have shown that some bacterial species tolerate varying levels of heavy metals in their environments. Gene homologs of previously identified genes involving metal tolerance in *Pseudomonas putida* were identified in the genome of *R. sphaeroides*; these genes include sensor kinases, membrane bound transporters, and enzymes involved in carotenoid biosynthesis. It is suspected that a number of these genes might have altered expression patterns under selective growth condition, which will be measured by real time RT polymerase chain reaction analysis. A growth curve analysis was performed on *Rhodobacter sphaeroides* cells grown in both aerobic and photosynthetic growth conditions. Strains grown under aerobic and photosynthetic growth conditions were analyzed for the localization of gold nanoparticles in the membrane and cytosolic fractions of cells using inductively coupled plasma (ICP) analysis. Results of the current study will have an array of applications to scavenge heavy metals from polluted environments at a larger scale.

Bongjae Lee
Head Researcher, Korea Testing and Research Institute, Korea
&
Jeong-il Lee
Center Leader, Korea Testing and Research Institute, Korea

The Characteristic for Removal Efficiency of non-CO2 Gas using QMS-FTIR in Fabrication Process

Due to global warming, a rapid climate change is occurring these dates. The whole world now is making efforts to reduce greenhouse gas emissions. Meanwhile, non-CO2 gases(CF4, NF3, N2O, SF6 and so on) are being widely used in fabrication process of semiconductor manufacturing, and etching/deposition process of display manufacturing process. Although their Global Warming Potential (GWP) value is 20,000 times higher than CO2, which means it is 20,000 times more powerful greenhouse gases than CO2.

In particular, greenhouse gas calculation method of the electronics industry, which has been provided by the IPCC, if there is a facility for the reduction of non-CO2 gas reduction efficiency to the process by supporting excluded from greenhouse gas emissions.

In accordance with the present study, the paper was studied the characteristic for removal efficiency for the SF6, NF3, N2O, CF4 gas which affect the global warming potential

Considering the effect of the removal efficiency measured on the process parameters of pressure change and flow rate of inflow and the outlet was measured using the QMS-FTIR to determine the removal efficiency and the correction of the concentration by the flow rate was used for Kr gas.

In addition, we studied the removal efficiency, as measured, analysis was performed by using a standard gas. The reaction characteristics same as Linearity, accuracy, measuring range of the measuring device in accordance with variation in the concentration, , and the like were investigated range.

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Risk Assessment of Airbone Pesticides in a Rural Region of Spain

A wide variety of pesticides can be applied in agriculture and their identity depends on a range of factors including the specific pest and crop of interest. The potentially adverse effects of exposure to pesticides on the general population, and specifically on the more susceptible groups such as infants and children, are a public health concern.

In this study, 31 ambient air samples from two rural sites in Valencia Region (Spain) were collected during the application period of 2013-2014, and analysed for pesticides in the particulate phase (PM 10). Total concentration (particle + gas phases) was estimated using a distribution model previously developed. Samples were extracted with ethyl acetate and analyzed by UHPLC-HRMS in target and retrospective analysis.

Overall, 15 pesticides (acetamiprid, carbendazim, imidacloprid, metalaxyl, myclobutanil, omethoate, tebuconazole, thiabendazole, terbuthylazine, bendiocarb, dioxacarb, endothal, 2-phenylphenol, prohexadione, tricyclazole) were detected with average concentrations ranging from 11 to 113.4 pg m^{-3}. The frequency of detection of these pesticides ranged from 6 % to 90 %.

The estimated chronic inhalation risk was assessed for adults, children and infants in this region. Hazard Quotient (HQ) was <1 for all pesticides in all groups of population.

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Decarbonising the Brazilian Aviation Sector – Analysis of Selected Strategies

Ever since the Kyoto protocol, there has been a strong recommendation for the aviation and marine transportations sectors to lower their GHG emissions.

The aviation sector, currently accounts about 2% of global GHG emissions, announced their goal to reduce their emissions by half, in comparison with their own in 2005.

The plan for this goal takes in consideration measures of mitigation in short and medium term with technologic and economic instruments for decarbonizing.

For example, the data research of the GHG emissions in the sector as a whole operation, the footprint in the air travels, new alternatives in short distance travels, retrofit planning, and incentives to the biofuel incrementation as power source, lowering the fossil fuels subsidies and adding taxes for their use.

An academic research was developed with the available data for the characterization of the art status and this way it was possible to the make the estimative of which strategies would be more fitted in the context of the Brazilian aviation sector.

The fitting level considered as criteria was the easiness of the operationalization of the technological and economic instruments, the level of acceptance, the impact in the emissions, the mapping of the factors already inserted in the decarbonizing process of the Brazilian aerial fleet and their impact in the other players in the sector for to change system's modus operandi.

Through this, it was possible to make a series of suggestions about the strategies for decarbonizing in the Brazilian context. The complete execution for this plan of mitigation to get the sector goal is essential for the fulfillment of the Paris Agreement (2015), so it does not compromise the system's planetary resilience.

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Air Quality and Respiratory Health – Comparison between Two Cities

There is now considerable evidence to show that daily hospital admission for cardiovascular diseases is linked to elevated levels of particulate and gaseous ambient air pollution. Because populations are exposed to mixtures rather than to individual pollutants, studies conducted in multicity have the potential to add insights into some of these issues. In Europe emissions of the main air pollutants declined significantly, however, particulate matter (PM), ozone (O3) and nitrogen dioxide (NO2) are Europe's most problematic pollutants in terms of harm to health and in particular in Sofia, the capital of Bulgaria. According to the recent report on Air Quality in Europe 2013, in Sofia the annual PM2.5 (with aerodynamic diameter ≤ 2.5 μm) concentration for the period 2007-2009 was the highest in comparison to other European countries with the average concentration of more than 35 μg/m3 which exceeded the European annual guideline value of 25 μg/m3. Similar in Australia, peak concentrations of PM, O3 and NO2 have been recorded at or above the Australian National Air Quality Standards and showing no consistent downward trend in some of the largest cities including Perth, the capital of Western Australia.

In this paper we compare the exposure levels to PM and NO2 and the cardiovascular hospital admissions between Sofia, Bulgaria and Perth, Australia for the period 2004-2008, (average monthly.) The results showed that exposure levels for PM and NO2 were significantly higher in Sofia when compared with those in Perth. In general, In Sofia more people, aged 18-64 years, were hospitalized with cardiovascular illnesses when compared with Perth. However, hospitalization for some specific cardiovascular illnesses was higher in Perth than in Sofia. The study outcomes confirm that air pollution may still play an important role in cardiovascular hospitalization regardless of the place of residency.

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Particulate, Chemical and Microbiological Management as Sustainable Practices for Urban Societies

Particulate matter (PM), associated chemical and microbiological loadings from human activities, urban infrastructure and lack of maintenance activities represent a chronic health impact to urban societies around the world. Current sustainability and maintenance operations for resource recovery from urban infrastructure systems such as sewers, drainage, unit operations and pavements are economically viable and benefit human health even in difficult economic conditions for our urban-based societies around the world. Such operations are simple and economical in all societies and can significantly reduce PM, chemical and microbiological loadings (including vectors transmitting the Zika virus, now in Florida) that along with wastewater discharges contribute to impairment of urban waters. Quantifying the load recovery and economics thereof is beneficial for all citizens. Furthermore, chemicals such as phosphorus is a limited resource and the world's supply (largely in areas of armed conflict), is being depleted as a raw commodity. These operations recover detritus, PM and associated chemicals/vectors from the urban inventory; inventory that is transported through, stored in, and on urban infrastructure systems. This PM is the primary source and sink of chemicals and microbiological contaminants that result from the interaction and imposition of anthropogenic/biogenic activities and urban infrastructure design practices/materials on the hydrologic cycle. Quantifiable knowledge of sustainability operations with several years of data collection across 14 cities in the State of Florida is demonstrated to provide a defensible foundation to build the allocation of load reduction credits. The economics and nutrient load reduction of primary sustainability operations (pavement and urban infrastructure appurtenance material recovery practices) are compared to conventional unit operations and best management practices (BMPs).

Results are quantified from these data collection efforts across Florida and are categorized in terms of hydrologic functional units (HFU) and land use in cities. Florida is the leading state in the USA for wastewater reuse, with over three thousand cubic meters per day that is reclaimed after advanced wastewater treatment. Results are also examined for wastewater reuse areas. Florida-based results indicate that the metrics of chemical loads are log-normally distributed, an observation that is important for allocation of load and economic credits because the results are not represented by a singular

concentration [mg/kg] but by log-normal distributions thereof. A Florida-based metric for a kg of urban PM recovered is converted to mg of chemical recovered by a sustainability operation or BMP. Results indicate that both sustainability operations are significantly more economical than current BMPs. In lieu of such current BMPs, engineered unit operation and process systems at centralized locations designed for soluble and fine PM-based chemicals are needed. Such systems incorporate modern tools such as continuous simulation (as with the Storm Water Management Model, SWMM) and computational fluid dynamics (CFD). Study results have been codified in Florida regulations, has become very successful across Florida and expanding to other states in the USA. On an annual basis in Florida, thousands of metric tons of chemicals have been recovered by the sustainably and maintenance practices in Florida urban environs.

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Analyzing the Effects of Reusing the Ornamental Rocks Residues with Conventional Concrete

Especially at the developing countries, with the advance of civil engineering increasingly growing at last two decades appears at the same pace of development environmental impacts and its consequences as follow: materials that are discarded inadequately, rivers being used as the synonym of landfill, lack of planning of reusing materials and other aspects that have become common in current days. With focus on the scale of the problems generated by the residues from the civil construction, emphasizes the extreme importance of engineers and all involved people in the sector, attenuating the high numbers of waste that are discarded erroneously in the environment. The civil construction sector has a range of divisions of services, and many constructions systems use high amount of ornamental rocks. Brazil is the fifth largest producer of ornamental rocks in the world, and is very high the amount of waste in this production (around 30 %). To avoid or mitigate the problem, it is essential to find ways to recycle the materials, to find uses for the wasted ones and to minimize the wrongs discards. One alternative is to reuse the ornamental rocks residues in order to benefit the conventional concrete. One restriction at this point is that the use of residues cannot decrease the compressive strength. The proposal of this experiment was to analyze the effects of this use, comparing the resistance of conventional concrete with the concrete with the addition of the residue of the cut of granite. To control the experiment, was made addictions of 20% in mass of the weight of Cement Portland and tested its strength at seven, fourteen and twenty eight days. It was checked the consistency, resistance and the workability of the concrete. In experimental result, the residue of the addicted pieces with cut of granite, obtained higher resistance compared with the conventional concrete. The values found show that the addicted concrete can be used at the activities developed daily at the jobsite as concrete pipes, sidewalks, cribs, alas among others as provides the Brazilians Controller Departments Allowing you to be an excellent alternative to minimize the environmental impacts caused by these materials to discard that are made erroneously from day to day.

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Evaluation of Exposure to Particulate Air Pollution and Its Lung Deposition among Cyclists in the Perth Metropolitan Area

Introduction: Cycling is often promoted as a means of reducing vehicular congestion, noise, and greenhouse gas and air pollutant emissions in urban areas. It is also indorsed as a healthy means of transportation in terms of reducing the risk of developing a range of physical and psychological conditions. However, people who cycle regularly may not be aware that they can become exposed to high levels of Vehicular Air Pollutants (VAP) emitted by nearby traffic and therefore experience adverse health effects as a result (Martinelli, Olivieri, & Girelli, 2013).

Aim:

The aim of the study is to assess the spatial and temporal exposures to particulate air pollution among cyclists commuting in Perth.

Methodology: The proposed study was conducted in Perth, Western Australia and consisted two groups of cyclists cycling near high (2 routes) and low (2 routes) vehicular traffic roads at high and low levels of exertion, during summer and winter. One hundred and fifty six participants who cycled at least 80 km/week were selected for this study. Those who reported cardiovascular and other chronic health conditions (not asthma) were excluded from the study. Personal and ambient air monitoring, lung function test and respiratory rate/hear rate were measured and then used in the Multiple Path Dosimetry Model (MPPD) to determine the deposition pattern of ultrafine and fine particulate matter (PM) in lungs.

Table 1. *Study Design*

	High Traffic Routes		Low Traffic Routes	
	Routel	**Route 2**	**Route 3**	**Route 4**
Summer	n=39 high and low exertion	n=39 high and low exertion	n=39 high and low exertion	n=39 high and low exertion
Winter	Same cohort as above high and low exertion	Same cohort as above high and low exertion	Same cohort as above high and low exertion	Same cohort as above high and low exertion

Significance: To the best of our knowledge, this study is the first of this kind to assess the spatial lung deposition of ultrafine particles among cyclists, while incorporating (real-world) temporal exposure and particle morphology data. Such work will prove vital for assessing the toxicological dose, and potential adverse health effects among cyclists.

The study will highlight the present scenario of ambient air pollution level in different cycling routes in Perth, and it will develop concepts with regard to personal exposure levels of particulate air pollution among cyclist. In addition, the application of the MPPD model will contribute to our understanding about the deposition pattern of particulate matter with different size throughout the respiratory system. This model will not only demonstrate the ideas of particulate deposition but will also provide information on how the deposition varies according to age, gender, height, respiration route , level of exertion and PM concentrations. The study will also assist cyclists in selecting routes for exercise or commuting.

Findings: The data collection is ongoing, however it will finish by mid of December, 2015 and the result will be ready by early next year.

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The Role of Stakeholders in the Eco-management and Audit Scheme

Membership in the European Union obliges organizations to adhere to high standards of environmental protection. Implementing standards of environmental management – both – formal (eg. certified for compliance with ISO 14001 or registered in the Eco-management and Audit Scheme – EMAS) and informal (eg. Cleaner Production or Responsible Care) gains popularity.

Environmental responsibility of organizations is not just about taking direct actions in order to reduce the impact on the environment. It is also essential to identify relations between internal groups of interests and external surroundings. In order to provide proper management, it is necessary to ensure that the communication is effective and the flow of information is proficient – both – within the organization (eg. between employees, management board) and also with external interested parties (eg. customers, suppliers, inspection authorities, the local community, neighboring organizations).

Communication with stakeholders is particularly important in the EMAS system. EMAS strictly requires the inclusion of employees in the management of environmental aspects and communication information about the environmental aspects to the external stakeholders. One of the objectives of recent EMAS regulation amendment was targeted to influence beyond the registered organizations. It was intended to achieve that through the implementation of requirement that registered organizations should consider environmental aspects during the selection of suppliers and service providers.

The implementation of the organization's environmental policy often requires the cooperation with various groups of stakeholders, which directly or indirectly affects the organization. Inclusion different interest groups in the environmental management system – both – those related to market (eg. customers, employees, suppliers, competition, creditors), as well as those related with the organization at the level of building the image and credibility (eg. local communities, NGOs, government agencies, social activists, media) can lead to increase the company's attractiveness perceived by business partners

and access to new markets. Benefits are not limited to environmental benefits, but also include social benefits, thus demonstrating the essence of the sustainable development concept.

The article attempts to assess the role of stakeholders in the EMAS system. Based on the experience and the results of researches carried out on organizations registered in EMAS. The article consists of theoretical part and research part. The first section is devoted to the analysis of the literature related to the subject of stakeholders in the environmental management system. This part describes the division of a stakeholders and explains the requirements of the EMAS system in the context of various groups of stakeholders. The second part contains the results of studies that were conducted on the EMAS registered organizations. This section describes activities undertaken by organizations in terms of various groups of stakeholders. Finally the article refers to the organization's objectives that either influence stakeholders or are carried out jointly with stakeholders.

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Use of Satellite Images to Map Spatio-temporal Variability of PM2.5 in Air

Dust storm episodes are among the most important weather phenomena in arid countries around the world. Fine particulate matter in air is a major health hazard besides, dust storms can alter air temperatures as a result of scattering and absorption of solar radiation. The size and type of aerosol have a major influence on the radiation, in addition to cloud cover and surface albedo. Heavy dust storms have been reported to result in the lowering of ocean temperatures which may affect primary productivity of seas and oceans, and impact carbon dioxide sequestration. The rates of dust fallout in Kuwait had been reported to be among the highest in the world with mean monthly concentrations as high as 1400 μg m^{-3}. Remote-sensing measurements by virtue of their synoptic monitoring capabilities were used to quantify dust on a large spatiotemporal scale. The satellite data set from Multiangle Imaging Spectro Radio Meter (MISR) and Moderate Resolution Imaging Spectroradiometer (MODIS) were used for the determination of aerosol optical depth (AOD) over land and ocean surfaces through observation at visible and infrared wavelengths. The AODs were used for $PM_{2.5}$ quantification and generation of $PM_{2.5}$ spatio-temporal trends. These data sets were downloaded from Atmospheric Sciences Data Center of the National Aeronautical and Space Administration (NASA) Langley Research Center (LARC) for the years 2008 to 2014. The satellite-derived particulate matter (PM) counts were verified by field measurements using infrared particle counter and high-volume air samplers. One high-volume air sampler (HVAS) equipped with a six-stage cascade impactor was deployed at each of two sites: one in Abdalli (Iraq-Kuwait Border) and another at Kuwait City (KISR). Particulate counts and particulate mass are being recorded using Aerocet 531 particle counters at both sites to further calibrate the measurements. The accuracy of the MISR determination was 68% and that of MODIS was 62%. This satellite data derived $PM_{2.5}$, using aerosol optical depth (AOD) can be used as surrogate for PM measurement.

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Production of Activated Carbon by Using Sugar Beet Pulp and Usage in Water Treatment

Today, water constitutes one of the most important natural resources. Fresh surface water sources, such as rivers and lakes has smaller rate from about 1% of total water in the world. Increasing world population, irregular urbanization, rapid industrialization and climate change reduces the number of clean and potable water every day. Contamination of existing drinking water resources will lead to the emergence of problems, such as drought, in the future. Therefore, subjects of environmental pollution and the treatment of water have recently been the focus of great interest of scientists [1-4]. In this study; activated carbon was produced by using sugar beet pulp. After the grinding and moisture removal process of sugar beet pulp, it was treated with phosphoric acid, then it was treated with heat in a high temperature furnace. For the purpose of material characterization, the obtained activated carbon was analyzed in various analyesis techniques (XRD, SEM, BET, etc.). Availability of prepared activated carbon sample in water treatment was investigated in the Afyonkarahisar Drinking Water Treatment Plant. The obtained results have shown that the activated carbon produced can be used to water treatment.

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Assessing Site Locations for Biorefineries Using Bayesian Methods

Logistic regression models combined with Bayesian inference were developed to predict locations and quantify factors that influence the siting of biorefineries that use woody biomass in the Southeastern United States. Predictions were developed for two groups of mills, one representing larger capacity mills similar to pulp and paper mills (Group II), and another group of smaller capacity mills similar to sawmills (Group I). "Median Family Income," "Road Density," "Slope," "Timberland Annual Growth-to-Removal Ratio," and "Forest Land-Area Ratio" were highly significant in influencing mill location for Group I. "Slope," "Urban Land Area Ratio," and "Number of Primary Wood Processing Mills" were highly significant in influencing mill location for Group II. In validation the sensitivity of the model for Group I was 86.78% and specificity was 79.26%. In validation the sensitivity for Group II was 80.95% and specificity was 84.10%. The higher probability locations (> 0.8) for Group I mills were clustered in the southern Alabama, southern Georgia, southeast Mississippi, southwest Virginia, western Louisiana, western Arkansas, and eastern Texas. The higher probability locations (> 0.8) for Group II mills were clustered in southeast Alabama, southern Georgia, eastern North Carolina, and along the Mississippi Delta.

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Responses of N Content and δ15N Value of Dominant trees to Atmospheric Nitrogen Deposition in Beijing, China

Anthropogenic introduced reactive nitrogen (N) emission had kept increasing in the last century, and resulted in enhanced atmospheric N deposition all over the world. With 60% of the total area located in the North China Plain, Beijing suffered with very high atmospheric nitrogen (N) deposition in the south part, which was as high as 100 kg ha^{-1} yr^{-1} including both organic and inorganic nitrogenous species from both wet and dry deposition. To test the responses of foliar N contents of plants and the potential biomonitoring effects of plants, a collection of deciduous broadleaf tree leaves was conducted across Beijing areas.

Typical deciduous broadleaf trees, *Populus* and *Salix* were selected at 189 sites, which were firstly designed at 5-decimal minute in latitude and longitude grid resolution and then excluded sites without *Populus* or *Salix* species. The foliar N contents were 24.0±4.0 g $kg^{-1}$and 25.9±4.1 g kg^{-1} on average for *Populus* and *Salix*, respectively. Spatial variations of both the two genus showed similar trends, with higher foliar N contents in the southeast and lower foliar N contents in the northwest, consisting with the spatial variation of atmospheric N deposition in Beijing area. The foliar $\delta^{15}N$ values were 1.15±2.48‰ and 2.31±2.60‰ on average for *Populus* and *Salix*, respectively. However, the spatial variation trends of $\delta^{15}N$ values were contrary with the foliar N contents. Higher $\delta^{15}N$ values were found in the city center and northwest, while lower $\delta^{15}N$ values were found in the southeast. With the different $\delta^{15}N$ values of potential sources, the higher $\delta^{15}N$ values in the city center indicated the traffic emission sources, the higher $\delta^{15}N$ values in the northwest indicated the natural N cycling, while the lower $\delta^{15}N$ values indicated both the agricultural and traffic pollution.