Energy, Environment, Ecosystems, Development & Landscape Architecture

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Energy, Environment, Ecosystems, Development & Landscape Architecture

Proceedings of the 5th International Conference on Energy, Environment, Ecosystems and Sustainable Development (EEESD '09)

Proceedings of the 2nd International Conference on Landscape Architecture (LA '09)

Vouliagmeni, Athens, Greece, September 28-30, 2009

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Preface

This year the 5th International Conference on ENERGY, ENVIRONMENT, ECOSYSTEMS and SUSTAINABLE DEVELOPMENT (EEESD '09) and the 2nd International Conference on LANDSCAPE ARCHITECTURE (LA '09) were held in Vouliagmeni, Athens, Greece, September 28-30, 2009. The conferences remain faithful to their original idea of providing a platform to discuss environment and sustainable development, sustainable management, indoor air quality in offices and houses, quality of water, solar energy systems, biodiversity, landscape design, traditional building, sanctuary gardens, cemeteries, golf courses, plazas, labyrinths, memorials, sculpture gardens, wall gardens, forest landscape design etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

A Conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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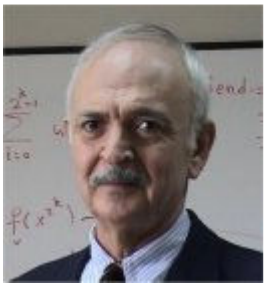
Keynote Lecture

High Dimensional Model Representation(s) as Multilinear Array Decomposition Method(s)



Professor Metin Demiralp
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Abstract: The multilinear array decomposition is an intensely investigated area today. Although it is mostly used for three index arrays some other higher dimensional applications are also encountered. There are different approaches to this end although the most preferable one is the singular value decomposition's multilinear counterpart. It aims to decompose the multilinear array under consideration to a sum over outer products composed of more than two factors. The construction is based on the suppression of the Euclidean distance between the approximant and the target array by finding optimal values for the proposed unknown entities. The decomposition attempts to additively represent the target array in terms of lower rank arrays. This type methods present quite nonlinear problems as long as the products appearing in additive representation contain more than two unknown factors. This happens when the multilinear dimensionality (the number of the indexes) is at least three. However, by keeping the number of each product's unknown factors in the representation equal to two one can use the standard linear algebraic spectral tools to determine the unknowns. The author and Emre Demiralp (author's son, PhD student in cognitive neuroscience program of the Psychology Department in University of Michigan at Ann Arbor) started to deal with the development of such decomposition methods in last two years. The purpose was and still is to find some ways which bypasses certain technical and sometimes conceptual difficulties encountered in the employment of the standing methods. Their inspiration resources were basically high dimensional model representation which was developed in last two decades and the fluctuation free matrix representation as a recently developed efficient approximation tool. Their efforts take the fruits in certain applications and now new openings seem to be appearing in the horizon. High dimensional model representation (HDMR) and its quite new extension, Enhanced Multivariance Product Representation (EMPR) developed by the author can also be used as a decomposition method if the target function is considered as a data set given on the nodes of an orthonormal hyperprismatic grid and discrete geometry is utilized. HDMR can be considered as a particular case of an additive representation over the single factor products. The terms are ordered in ascending multivariance. EMPR, on the other hand, uses products, each of which contains same number of univariate factors within a one-to-one relation to the independent variables (indexes in the discrete case). However, this increasing number of factors is balanced by keeping the number of unknowns in each product just as 1 for easy determination. The given factors have certain common properties also and we call them "supports" since one can control the approximation quality even in the very crude cases of constant or univariate level truncations. Speech focuses on certain details of these issues by referring the original findings of the author and his group.

Brief Biography of the Speaker:
Metin Demiralp was born in Turkey on 4 May 1948. His education from elementary school to university was entirely in Turkey. He got his BS, MS, and PhD from the same institution, Istanbul Technical University. He was originally chemical engineer, however, through theoretical chemistry, applied mathematics, and computational science years he was mostly working on methodology for computational sciences and he is continuing to do so. He has a group (Group for Science and Methods of Computing) in Informatics Institute of Istanbul Technical University (he is the founder of this institute). He collaborated with the Prof. Herschel A. Rabitz's group at Princeton University (NJ, USA) at summer and winter semester breaks during the period 1985–2003 after his 14 months long postdoctoral visit to the same group in 1979–1980.
Metin Demiralp has more than 70 papers in well known and prestigious scientific journals, and, more than 110 contributions to the proceedings of various international conferences. He has given many invited talks in various prestigious scientific meetings and academic institutions. He has a good scientific reputation in his country and he is the full member of Turkish Academy of Sciences since 1994. He is also a member of European Mathematical Society and the chief–editor of WSEAS Transactions on Mathematics currently. He has also two important awards of Turkish scientific establishments.

Plenary Lecture 1

SEHE Scheme for Electric Energy Production from Solar Radiation using Hydrogen as an Energy Career

Associate Professor Camelia Petre
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Abstract: A scheme of computation, design and optimization of solar Stirling power plant using hydrogen/oxygen fuel cells is presented. The proposed system is composed of two main parts: a combined solar-dish/receiver, Stirling engine, and electric generator that transforms solar energy in electricity and a second part of the system becomes operating when the electricity produced by the first part exceeds the demand. It consists of an electrolyser generating hydrogen, and storage tanks for the produced hydrogen. When solar radiation is missing or/and during the peak periods of electricity demand, fuel cells operating on the stored hydrogen are used to produce electricity.
A method for predicting the total efficiency and power output of Stirling engines using concentrated solar radiation as a power source was previously developed by our research team and the results have proved a high accuracy when having compared to experimental data. This method allows us to simulate the system operation during the whole year in a specific geographic location by predicting the electric power of the solar assembly as a function of the monthly variation of the solar radiation intensity. As we take into consideration the alternative of producing electricity by the use of hydrogen as an energy career, the above method is further developed by electrolyser and fuel cell performance calculations, yielding a global system performance prediction. We consider experimental data for an electrolyser and a fuel cell system, having variable efficiencies function on the power consumption by the user. Different case-studies are presented to analyse the influence of different parameters on the system operation performances.
As a practical example, this analysis applied to a residential area having a specific electricity demand provides information about the supply potential of the proposed global system.

Brief Biography of the Speaker:
Date and place of birth:
April the 24th, 1979, Bucharest, Romania
Studies:
– PhD in Mechanical Engineering, 2007 – double diploma: University “POLITEHNICA” of Bucharest and Universite “Henri Poincare” de Nancy I
– Master Degree Diploma, 2003 - Thermal Transfer Processes and Devices Specialization University “POLITEHNICA” of Bucharest, Faculty of Mechanical Engineering and Mecatronics.
– more professional training programs and summer schools attendances.
Actual academic position:
Associate professor - University “POLITEHNICA” of Bucharest, Faculty of Mechanical Engineering and Mecatronics
Scientific activity:
Co-author at 7 research articles published in ISI and national Journals, about 30 articles published in Proceedings of International and National Conferences, 10 scientific and student-use books. Co-participant at more than 20 Research Contracts.
Fields of research: Irreversible Thermodynamics; Optimization of thermal machines; Stirling machines; Stirling solar engines; Hydrogen production and use as an energy career; Renewable energies.

Plenary Lecture 2

Influencing Factors of a Successful Adoption of a Product-Service System toward a Sustainable Production Consumption Paradigm

Professor Flavio Tonelli
Department of Production Engineering, Thermoenergetics, and Mathematical Models
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Abstract: A Product-Service System (PSS) is a new business proposition for functional goods competing on the traditional Product-Oriented (PO) markets. Hence a PSS proposition on an existing PO market is a perturbation that can be or not successful, depending on some factors, and leading to a new equilibrium state. Many Authors report reasonable success factors: higher profits over the entire life-cycle, diminished environmental burden, and localisation of required services, toward a more sustainable production consumption paradigm. What are, however, the main parameters and variables influencing the successful adoption of a PSS on an existing traditional PO market? Organisations undergoing fundamental PSS strategy are, indeed, concerned about change and inertia key processes, which despite market equilibrium theory and because of negative feedback loop could undermine economical return of their PSS value proposition. What could end-users gain in adopting a Product-Service approach? In this lecture it is proposed a qualitative analysis in order to improve the knowledge on main factors influencing success of a PSS proposition under a set of given and justified assumptions and showing current limitations in its adoption.

Brief Biography of the Speaker:
Flavio Tonelli is Assistant Professor of Industrial Production Systems and Operations Management at Genoa University, Industrial Engineering Faculty and has written and published over 80 articles, some of them in academic journals of Engineering, Economics, and Management Science. Main research fields are lean manufacturing and supply chain management including logistics, layout, forecasting, inventory, master planning, scheduling, industrial cost management, performance management, enterprise information systems (ERP, SCM, APS, MES).
Other interests range on analysis, modeling and design of complex socio-technical systems from the sustainability point of view.
He is a member of the Italian Society for Industrial Plant Design (ANIMP), EUROMA, Supply Chain Council (SCC), American Production and Inventory Control Society (APICS), and he is a Chartered Engineer.
Tonelli's professional experience includes analysis of Enterprise Information Systems for production planning and control and performance measurement, and consulting engagements in manufacturing and lean production initiatives in discrete manufacturing industries such as: industrial equipment manufacturers, motorcycles, aircrafts, textile, and fashion.

Plenary Lecture 3

Bicycle policy for a sustainable city - Greek reality and international experience

Professor Eleni Stamatiou
Architect NTUA, MSc in Regional Development
Dr. Town and Regional Planner
Professor-Consultant at the Hellenic Open University
Greek representative to the Architects' Council of Europe (ACE),
Greece
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Abstract: This article aims to study the principles, the terms and the conditions that make a bicycle net infrastructure applicable on a modern city. Thus, the main policies as well as the scientific and designing solutions are presented through successful examples of systems and practices (from Greece, EU countries etc.) in a theoretical and also a practical point of view. Finally, through a study of the Greek reality, conclusions and perspectives are being made in terms of the combined transportation network, urban mobility and sustainable city policy.

Brief Biography of the Speaker:
Dr Eleni N. Stamatiou, Architect-Engineer NTUA, MSc Regional Development, Dr. in Town & Spatial Planning (PHD, PPHD). Completed her studies with Scholarships of the Greek State (IKY). Professional Experience (since 1989), Scientific, Teaching and Research Experience (since 1997) from overseas and in Greece (Assoc Professor at the University of Thessaly, Professor-Consultant at the Hellenic Open University / Post Graduate program, National School of Public Administration, etc.), Vice President of the Greek Regionalists Association(ΣΕΠ).
She has lectured at several Greek Universities (National Technical University of Athens, Harokopeio University, National School of Public Administration, etc.) and was invited to speak in several overseas Universities (in France, Russia, U.K. and USA) has been and continues to oversea Masters and Doctors degrees in addition to being a member of the professors exams committee (National School of Public Administration, Hellenic Open University, etc.). She has taught numbers of training seminars to adults with a degree, for higher company and Ministerial executives etc. She has overseen and published several books and published articles in Greek, English, Russian and French. Member of the Editorial Board of scientific publications and journals. Participation and co-authorship in the creation of university graduate study programs. Member of Greek, French, European and International Associations (UIA, SFA, ECTP, ERSA, etc.). Fundamental and instrumental active participation in International scientific committees in Europe and the USA (INRECON, ENVIRON, etc.). Member of Scientific organizations and representative for Greece in International forums and programs (with the Russian Research Institute of Land Planning, The Russian Academy of Social Sciences, etc.).
Co-editor and session-chief in International conferences of the Greek Regionalists Association. National Representative for Greece of ΣΑΔΑΣ (Association of Greek Architects) at the European Council of Architects (ACE) / ''Urban issues''. Participation as principal member of scientific organizations and committees (Evaluation of European town-planning awards ECTP, etc.). Member of work groups, Member of the Permanent Arbitration Committee (2006-2007) and Domain Expert of the Technical Chamber of Greece (TEE). Her Scientific and professional Interests concern subjects of architecture, spatial and regional planning and related legislation, regional development, environmental management, cultural and built environment, sustainable development, etc., these principles she applied and promoted successfully throughout her professional career through her many held managerial positions (as member of the board, senior scientist, etc.). She is married to the IT Consultant / International Researcher Richard-Nicolas LACROIX and they have two sons.

Plenary Lecture 4

Computational Algorithms for Power Systems Optimization

Professor Panos M. Pardalos
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Director, Center for Applied Optimization
Department of Industrial and Systems Engineering
University of Florida
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Abstract: We provide a review of the existing algorithms solving problems resulting from power systems. This field of research is very rich as the optimization problems resulting from power systems come from all areas of optimization. This talk focuses on specialized algorithms for selected power system problems as well as general deterministic and stochastic optimization algorithms.

Brief Biography of the Speaker:
Dr. Panos Pardalos is Distinguished Professor of Industrial and Systems Engineering at the University of Florida. He is also affiliated faculty member of the Computer Science Department, the Hellenic Studies Center, and the Biomedical Engineering Program. He is also the director of the Center for Applied Optimization.
Dr. Pardalos obtained a PhD degree from the University of Minnesota in Computer and Information Sciences. He has held visiting appointments at Princeton University, DIMACS Center, Institute of Mathematics and Applications, FIELDS Institute, AT & T Labs Research, Trier University, Linkoping Institute of Technology, and Universities in Greece.
He has received numerous awards including, University of Florida Research Foundation Professor, UF Doctoral Dissertation Advisor/Mentoring Award, Foreign Member of the Royal Academy of Doctors (Spain), Foreign Member Lithuanian Academy of Sciences, Foreign Member of the Ukrainian Academy of Sciences, Foreign Member of the Petrovskaya Academy of Sciences and Arts (Russia), and Honorary Member of the Mongolian Academy of Sciences.
Dr. Pardalos received the degrees of Honorary Doctor from Lobachevski University (Russia) and the V.M. Glushkov Institute of Cybernetics (Ukraine), he is a fellow of AAAS, a fellow of INFORMS, and in 2001 he was awarded the Greek National Award and Gold Medal for Operations Research.
Dr. Pardalos is a world leading expert in global and combinatorial optimization. He is the editor-in-chief of the Journal of Global Optimization, Journal of Optimization Letters, and Computational Management Science. In addition, he is the managing editor of several book series, and a member of the editorial board of several international journals. He is the author of 8 books and the editor of several books. He has written numerous articles and developed several well known software packages. His research is supported by National Science Foundation and other government organizations. His recent research interests include network design problems, optimization in telecommunications, e-commerce, data mining, biomedical applications, and massive computing.
Dr. Pardalos has been an invited lecturer at many universities and research institutes around the world. He has also organized several international conferences.

Plenary Lecture 5

Modern Hyphenated Analytical Techniques for the Analysis of Environmental, Food and Biological Matrices

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Abstract: Currently there is strong and urgent demand for accurate and sensitive analytical techniques, capable to measure traces of toxic substances in environmental and biological matrices. This demand comes as a result of the fast development of the countries all over the world and also of the technological globalization. The society becomes extremely sensitive in important issues affecting the safety and quality of human life and in response to this need, analytical chemistry is currently developing new powerful detection methods. This is a global trend and in all countries their state, research or academic laboratories are shift to be self-consistent in methodologies concerning the analysis of human environment.

For this purpose and because of the complexity of such samples, analytical chemistry offers today sophisticated techniques in order to estimate or determine the levels of many hazards and, among them, of toxic heavy metals. Modern hyphenated techniques combine a separation technique and a detector. The most commonly applied separation techniques are liquid and gas chromatography, as well as extraction to various solvents or materials. On the other hand, the most sensitive detectors are based on the mass spectrometric determination of chemical substances or the atomic spectrometric determination of elements through their spectral lines. Sophisticated softwares for optimization of the experimental procedure or interpretation of the results are developed for this purpose.

Elements like mercury, cadmium, lead, chromium, etc. are found in the environment and should be monitored in regular basis. It is well known that their high toxicity to living organisms depends on their species. In some cases the elemental state of these heavy metals is critical however in other cases their various organometallic species are more hazardous.

Accordingly, in this work, various examples showing the improved possibilities of the instrumentation of modern analytical techniques are presented and discussed.

Brief Biography of the Speaker:

Dr George Zachariadis is an Associate Professor of Analytical Chemistry at the Department of Chemistry of the Aristotle University of Thessaloniki, in Macedonia, Greece. He teaches quantitative analytical chemistry and instrumental analysis to undergraduate and postgraduate students during the past fifteen years. He was the author or co-author of 6 books of Analytical Chemistry and of almost 75 scientific papers in the field of development, optimization and evaluation of modern instrumental analysis techniques. He has actively participated in almost 25 international conferences with more than 80 announcements. He is reviewer in 12 scientific journals of Analytical, Environmental and Food Chemistry. His main research activities are focused on Atomic and Mass Spectrometric techniques for the determination of heavy metals and trace elements of special interest, because inorganic substances even in very low concentrations play extremely important role in biological systems and also in the environment. He has also special research activities in Chemometric approaches for Archaeometric and Bioanalytical applications, as well as Food and Drug analysis, with almost a thousand of citations in his published work.

Plenary Lecture 6

Particulates and Nitrogen Dioxide in the Brussels Ambient Air Need Drastic Emission Reduction

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Abstract: Over the past 40 years ambient air quality in Brussels improved significantly. This was especially true for sulphur dioxide, lead, nitrogen monoxide, carbon monoxide, benzene and Benzo (a) pyrene.
With respect to the air quality objectives imposed by the most recent European directive 2008/50/EC two major problems remain, nitrogen dioxide and particulates (PM10 – PM2,5). Analysis of measured air quality data show that it will be extremely difficult to become fully compliant, in due time, in all of the different city environments. A comparison of the average concentration levels in Brussels with those in the surrounding regions, the interpretation of the average daily and weekly concentration profiles and some special observations (e.g. car free Sundays) make clear that some drastic measures will be needed if compliance is to be assured only by measures on the local scale.

Brief Biography of the Speaker:
Peter Vanderstraeten has a university degree in chemical engineering, University of Ghent 1975 (Belgium), and has more than 30 years experience with air quality monitoring and air quality data analysis. Main interests are the relation between air quality and traffic. He is senior scientist at the IBGE-BIM and responsible for the air quality network in the Brussels Capital Region. Author of about 100 reports on air quality and about 40 scientific contributions at national and international conferences and in scientific journals.

Plenary Lecture 7

Climatic Variability in Eastern Mediterranean: Dynamic Mechanisms and Impact on Regional Climate

Assistant Professor Helena A. Flocas
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Faculty of Physics
University of Athens, Greece
E-mail: efloca@phys.uoa.gr

Abstract: Teleconnection patterns appear as preferred modes of natural variability of low frequency atmospheric circulation, with fixed centres of action, that influence the regional climate and the occurrence of extreme weather events.
The existence of teleconnection patterns centered in Eastern Mediterranean, a region with intense topographic features and limited climatological research, was examined through the climatological data analysis of the Northern Hemisphere geopotential heights, for the period 1958-2006. This analysis leaded to the identification of a teleconnection pattern, in the winter fields of 300 and 500 hPa geopotential heights, with its poles located over Eastern Mediterranean and Northeastern Atlantic, respectively, and it will be referred to as Eastern Mediterranean teleconnection Pattern (EMP). An index, the EMP Index, was defined in order to discriminate the two phases of the pattern, the positive and the negative and that could be applied in the dynamical study of EMP and its impact on regional climate.
During positive (negative) phase of EMP, o strong anomalous anticyclonic (cyclonic) circulation prevails over northeastern Atlantic, while a weaker anomalous cyclonic (anticyclonic) exists over Eastern Atlantic, leading to an increased meridional (zonal) circulation over Europe and Mediterranean.
The frequency analysis revealed that the prevailing frequencies of EMP classify the pattern in the intermate scale of variability (10-30 days). The instant frequencies analysis of the Hilbert-Huang tramformation was applied, in order to find the temproral period of each winter, during which the EMP signal is maximized.
The theoretically proposed processes and mechanisms that lead to the formation of teleconnection patterns were examined: a) in planetary scale, the Rossby wave propagation from orographic or thermal forcing, b) in synoptic scale, the influence of transients (eddies defined as departures from time mean zonal circulation) and c) interaction between stratosphere and troposhere.
Studying the aforementioned processes, it was found that the positive phase of EMP forms when a forcing of tropical heating appears in tropical Pacific, along with an anomalous southern flow over the region of north Pacific. As a consequence, a Rossby wave-train propagates initially to the northeast and then it obtains a zonal structure over Atlantic and Europe, forming a ridge over Atlantic and a trough over eastern Mediterranean. The polar frontal jet shifts northward, having an anticyclonic circulation that creates o blocking system and so the storm track moves to the north. As the jet moves across Scandinavia, the transient eddies activity becomes enhanced taking energy from the mean flow, while in the mid-latitude Atlantic the existence of low-frequency eddies decelerates the mean flow, enhancing the blocking system.
During the negative phase, the existence of a tropical heating does not seem to force a wave-train propagation to the mid-latitudes. The Rossby wave-train has a zonal structure, while the Rossby waves are not clearly formed on the westerly flow. This fact is confirmed by the polar jet, which has zonal structure and comes charging into Europe. The northern pole of the pattern forms at the poleward side of the jet, while the southern pole forms at the equatorward side of the jet, due to the anticyclonic shear at this side of the jet and the topography of this region. The role of transient eddies in this case is to enhance the westerly flow.
The study of the interaction between stratosphere and troposphere, through tropopause dynamics, showed that the Atlantic storm track follows a different life cycle during each phase of the pattern. In the positive phase, the wave is dominated by a NE-SW shear then the trough becomes thinner, producing finally a cut-off cyclone. In the negative phase, there is less equatorward movement of the trough and the wave has a broader zonal structure.
The impact of each phase of EMP on mean regime of temperature and precipitation along with their extreme events was examined applying the Regularised Canonical Correlation Analysis (RCCA) and the analysis of the composite anomalies on the respective parametres. It was found that EMP indeed affects the mean winter patterns of temperature, precipitation and their extreme events inversely between the two phases. In particular, the positive (negative) phase of EMP is related to a decrease (increase) of temperatures and an increase (decrease) of

precipitation. The extreme events of precipitation increase (decrease), the dry spells decrease (increase) and the extreme cold (warm) events intensify, during positive (negative) phase.

Brief Biography of the Speaker:
Flocas Helena is Assistant Professor at the University of Athens. She received her B.Sc. in Physics from University of Thessaloniki, Greece in 1987, her M.Sc. in Meterology from University of Reading, UK, in 1990, and her PhD in Meteorology from University of Thessaloniki in 1993. She worked as research assistant since 1990 in the Universities of Thessaloniki, Reading and Athens. She elected Lecturer in the University of Athens in 2000 and Assistant Professor in 2004. The fields of her scientific activities are Synoptic - Dynamic Meteorology, Climate Dynamics, Climatic changes, Bioclimatology, Atmospheric Boundary Layer and Air quality. She has participated in 50 research projects as research assistant (including 14 European projects). Coordinator of 2 research projects, funded by EU and private and/or national funds. She has published 58 papers in international journals, 68 in international conference proceedings and 16 in national conferences. She is reviewer in 14 journals. She has granted Scholarship from the National Institution of Scholarships during her undergraduate studies, Scholarship from NATO, through the Greek Ministry of Economics, during her postgraduate studies in UK, Scholarship from British Council for postdoctoral research at the University of Reading. She is member of the American Meteorological Society and Royal Meteorological Society.

Plenary Lecture 8

A New Technique for Biological Monitoring

Professor Fukiko Ueda
Nippon Veterinary and Animal Science University
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E-mail: fueda@nvlu.ac.jp

Abstract: Biological monitoring using wildlife is a useful method of investigating environmental contamination. We have been measuring the levels of contamination in wild birds caused by exposure to several toxic elements including cadmium (Cd) since 1992, in order to evaluate the degree of biological contamination. However, such studies are often limited by a lack of epidemiological information for wildlife, such as information on age, sex, migratory patterns and food habitants/diet, and it is often not possible to compare the same species in different countries. Further, most biological monitoring studies using wildlife have usually compared the mean metal levels in the organs, in spite of obtained individual data often representing a wide range of values. Extreme values found in wild populations may be identified statistically based on the results of experimental studies, but so many results from both experimental and wild animal populations are needed to assess the significance of the level of environmental contamination. Therefore, this method is opposed to the animal welfare spirit. How should we reduce a sacrifice?
We initially compared the data from wild bird populations with that from many references of Cd-uncontaminated animals including birds to access the significant contamination. In the process, we found out a new index of Cd uncontaminated animals. This new Cd index (Cd standard regression line: CSRL) is based on 101 data points selected from previous references. The data points represent the Cd contents (arithmetic means) of kidneys and livers from uncontaminated animals. This index has a significant correlation of $R2=0.943$, $p<0.01$.
The CSRL was compared with data obtained from animals experimentally administered Cd, and from humans, including patients with Itai-itai disease. The data from Cd-contaminated animals and patients diverged significantly from the CSRL, whereas the data from uncontaminated animals and human were in agreement with the CSRL. These results suggest that the CSRL could be a useful tool for assessing the levels of Cd contamination in animals. Comparison with the CSRL requires only a small sample size. Cd pollution should be suspected when the Cd contents of livers and kidneys from the target sample diverge significantly from the CSRL.
We are in the process of comparing data from more wild bird populations with the CSRL in order to confirm its usefulness in monitoring Cd levels in wild populations.

Brief Biography of the Speaker:
Fukiko Ueda (DVM, MSc, PhD) is a professor of Veterinary environmental Health at Nippon Veterinary and Animal Science University, Japan. Her research interests concern biological monitoring of heavy metals by wildlife, and concern molecular epidemiology of bacteria. Although her field is in the epidemiology of both a toxic substance and pathogenic bacteria, especially, she has been developing a new index in the biological monitoring for environmental pollutants, and has been reporting unique methods. Her area of expertise for government (key words) is “biological monitoring, wildlife, heavy metal, toxicology, molecular epidemiology, L. monocytogenes, bacteria, and food-poisoning”. She is an author and an editor of books on Japanese “Veterinary Public Health”. She is a member of the veterinarian-related committee of Ministry of Agriculture, Forestry, and Fisheries, Japan, and a member of the two committees of the Japanese Society of Veterinary Science and Japan Veterinary Medical Association.

Plenary Lecture 9

Risk Assessment of GMOs and Associated Pesticides: A Problem For Sustainable Development? The Case of GM Maize MON 863

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Abstract: CRIIGEN consists of an administrative and a scientific council of approximately 20 researchers from France, Belgium and other countries, which are in favour of well-controlled GMOs (Genetically Modified Organisms), and GMO research on efficiency, strategy and goals and for an independent analysis of evaluation. They think that tests required on environmental and health effects of GMOs before commercialization today are insufficient. Partners during the period 1998-2008 have been among others EU during the WTO conflict on moratorium, the Dir. Agriculture of the European Commission, the Ministry of Environment of Quebec, the Ministry of Agriculture in Italy, the food industry such as Carrefour Group, Auchan, European Federation of Food Distribution, the University of Montreal, and Greenpeace.

Are GM more risky than classical hybridization? The American position is that the compositional analysis (substantial equivalence) and minor environmental trials on risks are sufficient - there is no traceability.

The other position is the one of Europe and 100 other countries: we need further analyses and labeling. How can we assess whether GMOs are good or bad if we don't know in what foods they are and what they do in our fields?

98 % of the edible commercial GMOs are produced in northern, central and southern America. They can develop easily where there is no effective labeling, no traceability and with no long tests on environment. There is a lot less GMOs in countries that have signed the Cartagena protocol (more than 100 countries).

There is low diversity among the GMOs today (only four products). These either tolerate or produce pesticides. The outcome is that some of the GM plants (such as Bt 176) have not been resistant, they did not produce enough insecticides as they should have. Today 63% are herbicide tolerant, and especially Roundup tolerant, 15% produce their own insecticides and 22% produce both. Less than 1 % include all other possible characters.

For instance transgenic soya is herbicide tolerant, there is a possibility of accumulation of Roundup residues because of herbicide tolerance. The residues pollute already rivers. Side effects could be due to the fact that pesticides are developed to be toxic. These residues have been demonstrated to be toxic on human embryonic, umbilical and placental cells at levels present in GMOs (Richard et al., 2005; Benachour et al., 2007a; Benachour & Seralini, 2009).

Pesticides are not reduced by GMO plants, since the plant now produces or contains high levels of pesticides. That does not make them less toxic. 99.9 % are plants designed to contain pesticides that they absorb or produce. There is nothing new changing this trend on a large scale for the next coming 5 – 10 years.

CRIIGEN has performed studies on xenobiotics as endocrine disruptors, including fungicides, herbicides, insecticides, and other pesticides (Benachour et al., 2007b).

The mixture of pesticides is dangerous. The thresholds must be given by mixtures and not by one pesticide alone. It is not sufficient because within two years the formulation of the pesticide is not tested. Thus effects on hormonal, nervous or immune system, reproduction and cancer are not well studied. This is due to lobbying from the companies.

For GMOs, the problem is substantial equivalence. The methodologies to study subchronic toxicity on rats (90 days) are not even obligatory. For new or pending GMOs: chronic toxicity tests (more than 90 days) on rats on two other mammals should be performed but are not.

The directive 2001/18 is the best in the world on paper but how are mid and long term effects on environment and health measured? Chronic tests are not even done. One month studies cannot seriously be considered as a long term study. This is a scientific mistake. Animals, such as pigs, that are fed on commercial GMOs are not studied on a long term basis. Companies say that seeds can not be tested like chemicals, this is too expensive.

There are many published effects on mammalian cells from GMOs, for example effects of Roundup GM soy, by Malatesta et al. (2003).

The CRIIGEN study on MON863 showed signs of toxicity in liver, and kidneys (Seralini et al., 2007). During a 3 month study on rats a weight increase was observed in the females and problems in livers and kidneys were noticed.

The male rats had even more problems in kidneys. These significant effects were disregarded by the Company and some authorities because there were not similar in males and females, nor linear to the two doses of GMO received. This answer was not serious according to CRIIGEN.
What are the risks we are talking about?
There are risks due to the pesticides contained by GMOs.
There are also the unintended effects possibly due to metabolic disruption due the technology (insertional mutagenesis).
There is also for GMOs expected environmental pollution due to pesticides, such as Roundup or artificial Bt toxins.
The risk of irreversibility due to self-multiplying genetic and living pollution may alter the efforts of sustainable development and environment, because the actually commercialized GM plants help the industrial agriculture consuming pesticides such as Roundup; and the patents on life enhance these problems.
All these problems are detailed in Pr Seralini's presentation and books.

Brief Biography of the Speaker:
- Born in 1960 in Algeria, french.
- From 1991, full professor of molecular biology at the University of Caen (chair).
- Researcher and teacher, team leader and writer (8 books and more than 150 scientific papers or publications in international meetings).
- Area of research: effects of environment on health, in particular effects of GMOs and pesticides on health, sexual steroids, reproduction and cancer, xenobiotics, gene expression.
- Area of interest and expertise for governments (key words): pesticides, GMOs, aromatase, environment, reproduction, cancer, mammals, nutrition, molecular biology, toxicology.
- One of the first scientists asking for a European moratorium; and awaiting for more research before GMO commercial release (1996-1997)
- Member (1998-2007) of two governmental commissions in France on GMO evaluation (CGB and Comite de Biovigilance).
- Expert for the European Union on environment ethics, chemical and biotechnological risks and for the conflict on GMO moratorium between United States and EU at the WTO level.

Prof. Gilles-Eric SERALINI is a molecular biologist at the University of Caen, team leader and author of books on environment and GMOs. He is expert for the french government and the European commission on GMOs, president of the scientific council for independant research on genetic engineering (CRII-GEN).

Plenary Lecture 10

'Clean' Energy and Poor People: Ecological Impacts of Hydroelectric Dams on Fish and Fishermen in the Amazon Rainforest

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Abstract: Hydroelectric power generated from man-made reservoirs is sometimes regarded as a 'clean' or environmental friendly energetic source, due to the lack of pollution mainly from liquid and solid effluents. However, several researchers have been claiming that such form of energy production may sometimes generate intense and irreversible environmental impacts, especially when large reservoirs are built in natural tropical regions, which usually have a rich biodiversity of aquatic and terrestrial organisms. Our major goal is to provide a brief review of one dimension of such reservoirs' impacts in a large tropical region: the ecological effects of large dams and reservoirs to fish and fisheries in the Brazilian Amazon rainforest. We also analyzed in detail the ecological effect of Tucurui reservoir on fish and fisheries of the Lower Tocantins River, as a study case. Amazon people rely mostly and sometimes solely on fisheries as their main source of animal protein and cash income. Some of the large reservoirs may had potentially affected this economic activity mainly in the region downstream from the dam, due to changes in the flooding regime, retention of nutrients in the reservoir and blockage of reproductive migrations of economically important fishes. Such effects may generate or enhance poverty in short time, social conflicts and economic isolation of riverside fishing communities, but these problems are less understood than direct changes on fish communities. In a recent survey (2006-2008) in the Lower Tocantins River, interviewed fishers from eight communities mentioned impacts of the Tucurui reservoir, such as decrease in the abundance of fish. Nevertheless, these fishers still maintain a frequent fishing activity, which indicates that at least some commercial fishes have been able to cope with the reservoir effects, some may have even benefited from this, although the composition of fish catches changed compared to pre-impoundment period (before 1985). A possible factor allowing the persistence of fishes and fisheries in this region may be the floodplain with several lakes, which are important fish spawning sites, according to fishers and biological data. This survey also highlights that effects of a large dam may extend far beyond the reservoir itself, and that fishers have a good deal of knowledge about their aquatic environments and changes to it. Also, the potential effects of alleged 'less impacting' energy production on people and fish should be better acknowledged in political and economic decisions regarding energy issues.

Brief Biography of the Speaker:
I have been doing research dealing with artisanal fisheries, fish ecology and ethnobiology since 1994, participating in about 11 research projects conducted in marine, estuarine and freshwater environments in the southeast and northeast Brazilian coasts, as well as the Brazilian Amazon. Currently, I am a research and professor in the department of Ecology of the Federal University of Rio Grande do Sul in Porto Alegre, Brazil. I published about 16 peer-reviewed articles in journals such as Environmental Biology of Fishes, Fisheries Research, Ecological Economics, Hydrobiologia and Aquatic Conservation. I presented either orally or as poster more than 30 abstracts in Brazilian and international scientific meetings.
I have been also reviewing manuscripts to Brazilian and international scientific Journals, such as Environmental Biology of Fishes, Fisheries Research, Human Ecology, Environmental Management and Journal of Ethnobiology.
Since December 2007, I am an official advisor of the International Foundation for Science (IFS) (Sweden), evaluating research projects for funding.

Plenary Lecture 11

Desert Solar Technologies

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Abstract: The solar energy arriving on the earth's surface is approximately ~1.2•109 TWh/year or ~ 4.2•106 Quads/year (1 Quad=1015 BTU).
The surface area of the sun-belt deserts is approximately 36 million Km2. Each m2 of these desert areas is receiving in average 2000 KWh/year of solar irradiation, thus the whole desert area of our planet is receiving not less than 7.2•107 TWh/year or ~ 2.5•105 Quads/year (~ 6% of the overall solar energy arriving on earth).
The primary (thermal energy) consumption for 2009 is estimated to 500 Quads while the electricity demand will be less than 28000 TWh or ~100 Quads (~20% of primary consumption). It is estimated that this figure most probably could be doubled in the next 30-40 years partly because that transportation fuels could be replaced by electricity or Hydrogen made by electrolysis of clean electricity.
Let us assume that Desert Solar technology is used in desert or semi-desert areas, with an efficiency of ~1%. In order to cover 40-50% of the future electricity demand i.e. 80-100 Quads or ~22,000-28,000 TWh, we should use a desert area of 1.1-1.4 million Km2 . This is ~3-4% of desert or semi desert areas of our planet.
Desert or semi-desert areas of high solar irradiation exist in all continents and close to the big carbon emission producers.
Europe can cover its 40-50 % of its electricity demand by Desert Solar technology application in North Africa and Middle East desert and semi desert areas. An area of (300 Km X 300 Km) is sufficient.
Appropriate areas for Desert Solar technologies can be found in South West States of USA (Arizona, California, New Mexico, Nevada etc.) where the high solar irradiation is combined with mild winds. A 6% of the areas of Arizona, New Mexico and Nevada can cover USA 40-50% electricity demand.
Taklamakan desert areas in East China can be used in order to cover China's 30-40% of China's present and future electricity demand.
In India, Australia, South and Central America and Africa there are more than enough desert or semi- desert areas for a large scale Desert Solar technologies application.
Thus Desert Solar Technologies can be applied everywhere, where appropriate climate conditions exist.

There are three major Desert Solar technologies generating uninterrupted power electricity.
1. The Photo-Voltaic (PV) technology equipped with batteries in order to generate uninterrupted power of electricity.
2. The Concentrating Solar Power Plants (CSP) with Thermal Storage for uninterrupted power supply.
3. The Floating Solar Chimney (FSC) Technology generating uninterrupted power supply due to ground thermal storage.
A investment cost comparison is presented between these three major technologies leading to the results presented in the following table:

Technology of Uninterrupted	Capital Expenditure per Produced GWh/year In Million EURO	Direct Production Cost Per Produced MWh/year In EURO
Photo-Voltaic and Batteries	**>3.0**	**~300.0**
Parabolic Through CSP and Thermal Energy Storage	**>2.0**	**~200.0**
Floating Solar Chimney Ground Thermal Storage	**>0.5**	**~60.0**

Although FSC technology looks superior for desert application in comparison to the other solar technologies we should notice that the FSC technology has not yet been tested in a demonstration project.

Brief Biography of the Speaker:
Prof. Christos Papageorgiou is a mechanical and electrical Engineer graduate of National Technical University of Athens (1966). He obtained his PhD by the Imperial College. He is an associate Prof. of N.T.U.A. in Electromechanical systems of Thrust and Power. His recent research interests are focused in solar thermal technologies and he is the inventor of the "Floating Solar Chimney" (www.floatingsolarchimney.gr). In his professional career was appointed in many top managerial positions in public and private sector. The most important of which were: C.E.O. of "Olympic Airways", Chairman and President of "Hellenic Railways".

Plenary Lecture 12

Non-Regulated Exhaust Pollutants Emitted from Passenger Cars of Different Technology

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Abstract: European regulations set upper limits on the emission of some exhaust pollutants of passenger cars. These pollutants are called regulated pollutants (RP) and are CO, HC and NOx in the case of gasoline passenger cars and CO, HC, NOx and particulate matter (PM) in the case of Diesel ones. Those upper limits change every 3-5 years and the current ones are much lower than those of the initial regulations. However, passenger cars emit several other pollutants which are not regulated (non-regulated pollutants, NRP). These pollutants are emitted in much lower concentrations than the regulated ones; however, they are sometimes much more dangerous for the environment or the human health. This work shows the emissions of several non-regulated pollutants of gasoline and Diesel passenger cars. The impact of technology, which are related with the emission level of regulated pollutants, and of mileage are presented and discussed.

Brief Biography of the Speaker:
Efthimios Zervas has a degree of Chemical Engineering of National Technical University of Athens, Greece and a Ph.D. of Institut Francais du Petrole (IFP) and University of Haute Alsace - France. He worked for several years in Renault in the field of emission control and development of after-treatment devices. Since 2006, is Assistant Professor in the Department of Environmental Engineering of Democritus University of Thrace where he deals with energy policy, the control of pollutants emitted from combustion systems, the development and use of alternative fuels. He is author of about 40 publications in international scientific, more than 50 presentations in conferences, is referee of more than 80 papers of international scientific journals, is member of the National Biofuels Platform of Greece and member of the Editorial Board of the «Open Environmental Journal».

Plenary Lecture 13

Engaging the Community through a Strategy for Public Art

Professor Annaliese Bischoff
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Abstract: "Creativity takes courage" - Henry Matisse
To help our communities with spirit and sustainability, we need to foster creativity. Helping the community of Turners Falls, Massachusetts, in the United States, this research began with "RiverCulture," a nonprofit organization committed to developing creative and cultural industries in the region. The two main objectives of this research were to illustrate how public art can be employed to help grow the economy creatively as part of the regeneration efforts underway and to propose a specific strategy for meaningful public art projects in the area . Projects that engage a sense of place, reflect upon a sense of time, contribute to the sense of community, address cultural memory, and consider sustainability enrich the community by adding to its vitality. Public art can engage the community actively in the process while addressing sustainability issues. In a process to identify useful case studies, define the needs of the community, and develop an action plan, RiverCulture has innovatively begun to implement a model strategy supporting new public art proposals. By illustrating the success and outcomes of this research partnership, it can serve as a model for other communities.

Brief Biography of the Speaker:
Annaliese Bischoff is an Associate Professor in the Department of Landscape Architecture & Regional Planning at the University of Massachusetts Amherst. She has authored several articles and book chapters about cultural influences which shape the landscape with a particular interest in the relationship between art and nature. She has received merit awards in research and design from the American Society of Landscape Architects, served as President of the Council of Educators in Landscape Architecture and the President of the Design Communication Association, and was awarded a Fulbright senior research grant to Berlin. She is currently authoring a book about the life and work of Frank A. Waugh with the Center for American Places and the University of Chicago Press. Professor Bischoff received her B.A. degree from Brown University and her M.L.A. from the State University of New York, the College of Environmental Science and Forestry.

Plenary Lecture 14

Energy Balance, Health and Environment

Professor Anne Vernez Moudon
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Brief Biography of the Speaker:
Anne Vernez Moudon is Professor of Architecture, Landscape Architecture, and Urban Design and Planning; Adjunct Professor of Epidemiology and Civil and Environmental Engineering at the University of Washington, Seattle, where she also directs the Urban Form Lab (UFL). Dr. Moudon holds a B.Arch. (Honors) from the University of California, Berkeley, and a Doctor es Science from the Ecole Polytechnique Federale of Lausanne, Switzerland. Dr. Moudon was past-President of the International Seminar on Urban Morphology (ISUF), a Faculty Associate at the Lincoln Institute of Land Policy, in Cambridge, MA; and a Fellow of the Urban Land Institute in Washington, D.C. She is a National Advisor to the Robert Wood Johnson Foundation program on Active Living Policy and Environmental Studies.
The UFL specializes in the spatial analysis of the built environment using micro-scale data in Geographic Information Systems. This urban form research addresses such topics as land monitoring, neighborhood and street design, non-motorized transportation, physical activity, and access to food environments. The work has been supported by the U.S. and Washington State Departments of Transportation, the Centers for Disease Control and Prevention, the Robert Wood Johnson Foundation, the National Institutes of Health, and local agencies.
Dr. Moudon's has published many articles in urban design, transportation, and public health journals. Her books include Built for Change: Neighborhood Architecture in San Francisco (MIT Press 1986), Public Streets for Public Use (Columbia University Press 1991), and Monitoring Land Supply with Geographic Information Systems (with M. Hubner, John Wiley & Sons, 2000). She also published several monographs, such as Master-Planned Communities: Shaping Exurbs in the 1990s (with B. Wiseman and K.J. Kim, distributed by the APA Bookstore, 1992) and Urban Design: Reshaping Our Cities (with W. Attoe, University of Washington, College of Architecture and Urban Planning, 1995).

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