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*Advances in Environmental and Geological Science and Engineering*

# **Advances in Environmental and Geological Science and Engineering**

*Proceedings of the 8<sup>th</sup> International Conference on  
Environmental and Geological Science and Engineering (EG '15)*

*Salerno, Italy, June 27-29, 2015*

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University of Salerno  
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**Preface**

This year the 8th International Conference on Environmental and Geological Science and Engineering (EG '15) was held in Salerno, Italy, June 27-29, 2015. The conference provided a platform to discuss geosciences and earth engineering, management and technology of energy systems, geology and environmental systems, geophysics, atmospheric physics, biodiversity conservation, air pollution etc. with participants from all over the world, both from academia and from industry.

Its 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 this conference are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences 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





# Table of Contents

<b><u>Plenary Lecture 1: Airport Air Quality – A Review</u></b>	14
<i>Costas G. Helmis</i>	
<b><u>Plenary Lecture 2: An Operational Integrated Airport Environmental Monitoring System: The Case of the New Athens International Airport</u></b>	15
<i>Dimosthenis N. Asimakopoulos</i>	
<b><u>A Review of Building Retrofit in UK, West Midlands Social Housing Organisations: Exploring Challenges and Replication Potentials</u></b>	17
<i>David Oloke</i>	
<b><u>A Review of 10 Years of Research of Offshore Wind Farms in Germany: The State of Knowledge of Ecological Impacts.</u></b>	25
<i>Jens Lüdeke</i>	
<b><u>Experiments of Dike Erosion Due to a Wave Impact</u></b>	38
<i>Stefania Evangelista, Cristiana Di Cristo, Angelo Leopardi, Giovanni De Marinis</i>	
<b><u>Simulated Thermal Response of the Bedrock Heat Battery System</u></b>	45
<i>Hafiz M. K. U. Haq, Birgitta Martinkauppi, Erkki Hiltunen</i>	
<b><u>A Proposal of Resilience Indicators for Natural Spaces</u></b>	54
<i>Julián Mora Aliseda, Jacinto Garrido Velarde</i>	
<b><u>Hyper-Concentrated Flow and Surface Velocity Estimation by Digital Imaging Technique: a Study Case</u></b>	63
<i>Termini Donatella, Alice Di Leonardo</i>	
<b><u>The Dimensioning of Pillars in the Mining Rooms and Pillars Method Through a Detailed Evaluation of the Stress Conditions in the Rock</u></b>	68
<i>Fahimifar A., Oreste P., Ranjbarnia M.</i>	
<b><u>Current Status of the Potential Induced Degradation in Czech Republic</u></b>	78
<i>Petr Mastny, Jan Moravek, Jiri Pitron, Michal Vrana</i>	
<b><u>Effects of Turbine Noise from Wind Farms on Local Residents' Decision to Adopt Mitigation Measures</u></b>	84
<i>Anabela Botelho, Pedro M. Arezes, C. A. Bernardo, Hernâni R. Dias, Lígia M. Costa Pinto</i>	
<b><u>Complex Efficiency of Sports Facilities Multicriteria and Financial Analysis for Swimming Pools</u></b>	96
<i>Gianluigi De Mare, Maria Fiorella Granata, Antonio Nestico'</i>	
<b><u>Climate Change and Species Composition of Plants in Historical Gardens</u></b>	104
<i>Tamara Reháčková</i>	

<a href="#"><u><b>SPH Modelling as Alternative Numerical Method for Wave Loading Assessment</b></u></a>	111
<i>Corrado Altomare, Tomohiro Suzuki, Toon Verwaest, Alejandro J. C. Crespo, Jose M. Domínguez, Moncho Gómez-Gesteira</i>	
<a href="#"><u><b>Physical and Mathematical Modeling of Infiltration Through Layered Pyroclastic Covers</b></u></a>	118
<i>Greco R., Damiano E., Guida A., Olivares L., Picarelli L.</i>	
<a href="#"><u><b>Conditional Efficiency of Wastewater Treatment Plants in Valencia, Spain.</b></u></a>	127
<i>Ramón Fuentes , Teresa Torregrosa, Enrique Ballenilla</i>	
<a href="#"><u><b>Analysis of Environmental Risk Communication Failures and Building Social Trust through Uncertainty Communication</b></u></a>	134
<i>Janmaimool Piyapong, Tsunemi Watanabe</i>	
<a href="#"><u><b>Valorization of Wine Wastes for Added-Value and/or Biological Products</b></u></a>	152
<i>Moschona Alexandra, Ziagova G. Maria, Aryal Mahendra, Liakopoulou-Kyriakides Maria</i>	
<a href="#"><u><b>Lidar for Analysis of Hydraulic Risk Territories</b></u></a>	157
<i>Vincenzo Barrile, Giuseppe M. Meduri, Giuliana Bilotta</i>	
<a href="#"><u><b>Improving the Efficiency and Lowering the Operating and Manufacturing Costs by Suitable Power Distribution of Medium Speed Two Stage Planetary Gearboxes for Next Generation Wind Turbines</b></u></a>	162
<i>Attila Csobán</i>	
<a href="#"><u><b>Innovative Numerical Model to Study Wave-Breakwater Interaction</b></u></a>	169
<i>Fabio Dentale, Ferdinando Reale, Eugenio Pugliese Carratelli</i>	
<a href="#"><u><b>The Influence of Tailwater Depth on 3D Dam-Break Wave Propagation in an Enclosed Domain</b></u></a>	173
<i>Selahattin Kocaman, Hasan Guzel, Stefania Evangelista, Hatice Ozmen-Cagatay</i>	
<a href="#"><u><b>Treatment of Residual Dichloromethane by Gas-Phase Hydrodechlorination with Platinum Nanoparticles Supported on Activated Carbon Catalysts</b></u></a>	178
<i>María Ariadna Álvarez-Montero, Juan Jose Rodriguez, Luisa María Gómez-Sainero</i>	
<a href="#"><u><b>An Investigation Study on the Effect of Brine Composition on Silica Dissolution</b></u></a>	188
<i>Ahmed F. A., Elraies A. K., Mohammed A. A., Gaafar R. G.</i>	
<a href="#"><u><b>Structural Analysis of Cultural Heritage Assisted by 3D Photogrammetry</b></u></a>	193
<i>Vincenzo Barrile, Giuliana Bilotta, Enzo D' Amore, Rocco Marando, Giuseppe M. Meduri, Sandro Trovato</i>	
<a href="#"><u><b>Biopolymer Foil Materials</b></u></a>	199
<i>Gabriella Zsoldos, Mariann Kollár, Kornél Szóda</i>	
<a href="#"><u><b>Soil Texture Descriptions of Tropical Land Farming in Muna Island, Indonesia</b></u></a>	204
<i>Yulius B. Pasolon, L. M. A. Minta, S. N. Ole, Namriah, Usman Rianse</i>	
<a href="#"><u><b>Effects of Collision and Fragmentation Mechanisms in the Runout Length of Granular Debris Flows or Avalanches</b></u></a>	208
<i>Francesco Federico, Chiara Cesali</i>	

<a href="#"><u><b>A Numerical Study of Liquid Impact on Inclined Surfaces.</b></u></a>	218
<i>Vittorio Bovolin, Eugenio Pugliese Carratelli, Giacomo Viccione</i>	
<a href="#"><u><b>Coagulant Transformation - the Way from Solution till Floccs</b></u></a>	224
<i>Istvan Licsko</i>	
<a href="#"><u><b>Load Forecasting Based Photovoltaic Power Using New Particle Swarm Neural Networks Model</b></u></a>	234
<i>S. H. Oudjana, A. Hellal, I. H. Mahamed</i>	
<a href="#"><u><b>Experimental Tests on a Specific Machine for Distribution of Pesticides in Vineyards of Apulian Region: Size and Ecological Criteria</b></u></a>	239
<i>Ferruccio Giametta, Lucio Brunetti, Roberto Romaniello, Biagio Bianchi</i>	
<a href="#"><u><b>Land Tenure Dynamic on the Forest Area of Jompi Watersheds, Indonesia</b></u></a>	247
<i>Usman Rianse, Abdi La Abdi, Weka Gusmiarty Abdullah, Dasmin Sidu, Raden Marsuki Iswandi, Muhidin, La Ode Midi, Samsul La Samsul, Zulfikar La Zulfikar</i>	
<a href="#"><u><b>Analysis of Subsidence Phenomena via DInSAR Data at Different Scales</b></u></a>	255
<i>Dario Peduto, Livia Arena, Settimio Ferlisi, Gianfranco Fornaro</i>	
<a href="#"><u><b>Modelling Metapopulation Dynamics of Wildlife Animals in Fragmented Environment</b></u></a>	261
<i>Asrul Sani, Mukhsar, Usman Rianse</i>	
<a href="#"><u><b>Optimization for Multi-Parameter Calibration in the Numerical Analysis of Submerged Flows for Jet Grouting</b></u></a>	266
<i>Stefania Evangelista, Gaspare Giovinco, Giuseppe Modoni, Lidia Wanik</i>	
<a href="#"><u><b>Approaches for Estimating Soil-Atmosphere Interaction Fluxes in a Pyroclastic Cover</b></u></a>	273
<i>Alfredo Reder, Guido Rianna, Luca Pagano</i>	
<a href="#"><u><b>Assessing the Environmental Impacts of Coal Mining Using Analytical Hierarchy Process: A Case Study of Jharia Coal-Field, India</b></u></a>	281
<i>Varinder Saini, R. P. Gupta, M. K. Arora</i>	
<a href="#"><u><b>A Tiered Approach to Natural Background Level (NBL) Assessment in Groundwater Under a Non Hazardous Waste Land Fill in Latium Region (Italy)</b></u></a>	290
<i>Giuseppe Sappa, Stefania Vitale</i>	
<a href="#"><u><b>Information and Communication Technology Prospective on the Development of an Integrated Green Tourism Area in Tiworo Archipelago, Indonesia</b></u></a>	296
<i>Hasmina Tari Mokui, Wa Kuasa Baka, Analuddin Kangkuso, Andi Septiana, La Ode Santiaji Bande, Abdi, Usman Rianse</i>	
<a href="#"><u><b>Some Remarks about SPH Propagation Modelling of Flow-Like Landslides</b></u></a>	302
<i>Sabatino Cuomo</i>	
<a href="#"><u><b>Impact of the Fractures on the Capacity and Security CO2 Geological Storage</b></u></a>	308
<i>Djebbas Faycal, Zeddouri Aziez, Khelifa Cherif</i>	
<a href="#"><u><b>Bimodal Behavior of a Silty Sand and its Effects on Slope Stability</b></u></a>	320
<i>Fabio Ciervo, Maria Nicolina Papa, Francesca Casini, Riccardo Rigon</i>	

<a href="#"><u><b>Design, Implementation and Testing of an Indirect Solar Potato Dryer</b></u></a>	326
<i>Mahmoud Mohamed El-Ghobashy El-Hagar</i>	
<a href="#"><u><b>A Numerical Investigation of the Interaction Between Debris Flows and Defense Barriers</b></u></a>	332
<i>Giacomo Viccione, Settimio Ferlisi</i>	
<a href="#"><u><b>The Potential of Novel Liquid PMMA Oligomer as Electrolyte in Electrochemical Devices</b></u></a>	343
<i>Norashima Kamaluddin, Famiza Abdul Latif, Ruhani Ibrahim, Sharil Fadli Mohamad Zamri</i>	
<a href="#"><u><b>On the Hydraulic Efficiency of Distributed Detention Basins: a Case of Study</b></u></a>	348
<i>Pierfrancesco Rufolo, Giacomo Viccione, Paolo Villani</i>	
<a href="#"><u><b>Mining Phenomenon of Agate Gemstone to Change of Environment, Social and Economic at Southeast Sulawesi Province</b></u></a>	352
<i>Weka Widayati, Ida Usman, Muliddin, Firdaus, Irfan Ido, Weka Gusmiarty Abdullah</i>	
<a href="#"><u><b>Improved Modelling of Orographic Effects in the Regional Analysis of Extreme Rainfall in Campania (Italy)</b></u></a>	358
<i>Anna Pelosi, Pierluigi Furcolo</i>	
<a href="#"><u><b>Evaluation of Factors Affecting Turbidity in Dez Dam Reservoir Using Decision Tree Forests and Group Method of Data Handling</b></u></a>	363
<i>Hamid Khakzad</i>	
<a href="#"><u><b>Improved Chitosan Production from Tiger Shrimp Shell Waste (Penaeus Monodon) by Multistage Deacetylation Method and Effect of Bleaching</b></u></a>	373
<i>L. O. Ahmad, D. Permana, Wahab, S. H. Sabarwati, L. O. A. N Ramadhan, U. Rianse</i>	
<a href="#"><u><b>Urban Stormwater Runoff Reduction by Green Roofs Under Different Climate Conditions</b></u></a>	379
<i>Mirka Mobilia, Antonia Longobardi, Joachim Friedrich Sartor</i>	
<a href="#"><u><b>Experimental and Computational Studies on the Inhibitive Effects of Newbouldia Laevis Extracts and Magnetic Fields on Copper Corrosion in Aqueous Acidic Media</b></u></a>	384
<i>Kelechukwu B. Okeoma, Ihebrodike M. Mejeha, Sydney C. Akajiaku, Francis C. Eze</i>	
<a href="#"><u><b>Aboveground Biomass Status and Management Effort of Unprotected Mangrove Forest at the Surrounding Areas of Rawa Aopa Watumohai National Park, Indonesia</b></u></a>	393
<i>Analuddin Kangkuso, Jamili, Andi Septiana, Izal, Loa Fajar, Rasas Raya, Idin Sahidin, Usman Rianse, Saban Rahim, Alfirman, Sahadev Sharma, Kazuo Nadaoka</i>	
<a href="#"><u><b>Modelling Fast-moving Flow-like Landslides by Cellular Automata: Simulations of Debris Flows and Lahars</b></u></a>	401
<i>V. Lupiano, G. Machado, G. M. Crisci, S. Di Gregorio</i>	
<a href="#"><u><b>Prediction of Winter Rainfall Using Adaptive Fuzzy Neural Networks, Case Study: Khorasan Razavi Province, Iran</b></u></a>	412
<i>Gholamabbas Fallah Ghalhari, Fahimeh Shakeri</i>	
<a href="#"><u><b>Heavy Metals Concentrations in Ground Water from Northern Nigeria</b></u></a>	428
<i>I. S. Shabanda, J. I. Shabanda</i>	

<b><u>The Case Study of Vilanculos (Mozambique) Water Network: Criticalities and Solutions</u></b>	434
<i>Alessandro Muraca, Elisa Magalini</i>	
<b><u>Impact of Gold Mining on Water Quality in Bombana Regency Southeast Sulawesi Province, Indonesia</u></b>	444
<i>Irfan Ido, Sawaludin, Mukhtar, Asrun Lio</i>	
<b><u>Numerical vs Experimental Continuous Pipe Flow in Microwave Heating</u></b>	457
<i>Gennaro Cuccurullo, Laura Giordano</i>	
<b><u>Geology and Geographical Implications on Food Related Health Hazards and their Remedial Measures</u></b>	464
<i>R. C. Yadav</i>	
<b><u>Remote Sensing &amp; GIS Monitoring Change in Salinity</u></b>	478
<i>Sadia Iqbal, Nikos Mastorakis</i>	
<b><u>Analysis of Wind Potential for City of Firoozkooh in Iran</u></b>	485
<i>Seyyed Mohsen Kamali, Mohsen Dehghan Manshadi</i>	
<b><u>Authors Index</u></b>	496

## Plenary Lecture 1

### Airport Air Quality – A Review



#### Professor Costas G. Helmis

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Faculty of Physics  
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**Abstract:** It is well known that local air quality is a limiting factor in the development of many airports at different countries. In fact, the ambient concentrations of air pollutants at various airports are already close to or above the limit values according to the regulations, while there is not yet certain evidence of safe thresholds regarding health effects and the air pollutants limit values. Thus, if air traffic is to continue to increase, its impact on local air quality over the greater airport area will have to be better understood and certain solutions have to be found. This presentation gives an overview of the related issues and the studies that have to be conducted regarding the airport air quality (AAQ). More specifically the emissions, transport and chemical transformation of pollutants are of different scales (aircraft engine, exhaust plume, whole aircraft, airport scale, regional scale and global scale) and require appropriate different methodologies of measurements and estimations. The AAQ modeling is a complicated task involving physical and numerical modelling characterized with different scales (e.g. airport scale with the regional scale). Also, in order to assess the impact of airport all sources, an emission inventory should be considered, which has to satisfy all scales, for past and real time forecasting, including the information of the “hot spots” of airport air quality. The above mentioned issues were studied in details in the framework of the European project “A European Network of Excellence for an Environmentally Compatible Air Transport System (ECATS)” where the University of Athens was a partner and it is worth mentioning here certain suggestions or solutions as well as certain tools to overcome these difficulties, which are outcomes of this project. Thus, examples and results of studies will be given including the methodologies of measurements related with air pollutants, the development of AAQ databases and the influence of airport and aircraft emissions upon the air quality in the surroundings.

**Brief Biography of the Speaker:** Dr. Costas G. Helmis is Professor in the Department of Environmental Physics and Meteorology, Faculty of Physics of the Athens University, Greece. He received his BSc in Physics in 1972, MSc in Electronics in 1975, MSc in Automation in 1976 and PhD in Physics in 1981 from the University of Athens. The fields of his scientific interests/activities are Atmospheric Physics, Climatology, development of instrumentation for remote and in-situ measurements, Atmospheric Boundary Layer (ABL) Physics over land and sea, the Physics of buildings, applications of wind energy and passive cooling systems, urban air pollution (outdoor and indoor) and trans-boundary air pollution. Professor Helmis has participated in 83 international, European and national research projects, in 34 of the above he acted as a principal investigator (PI) and he has great experience in the design and realization of experimental campaigns and the development/use of innovated in-situ and remote systems covering the needs for monitoring basic meteorological parameters and air pollutants. This experience is reflected in studies related with the lower troposphere, the atmospheric boundary layer structure, the airflow patterns over urban areas, the microclimatic characteristics, the acquisition of datasets and analysis of air pollutant's concentration and the classification of atmospheric circulation with respect to air pollution episodes. He has 124 publications in scientific journals, 195 publications in conference proceedings, 94 participations in technical reports, 55 other publications and over of 1.900 citations on publications in International Journals and Conferences, excluding self-citations. He has been Chairman of the Faculty of Physics (2008-2012), Director of the Department of Applied Physics (2000-2007), Director of the Department of Environmental Physics and Meteorology (2013-today), Head of the Lab. of Meteorology (1997-2000), Vice President of the Board of Directors of the Centre of Renewable Energy Sources (1997-2000), member of the Council of Scientists-INTAS (1996-1998), board member (1988-1991) and President (1994-1996) of the Board of the Greek Physical Society and he has collaborated with the European Environmental Agency on air quality issues (ETC/AQ) during the period 1996-2000.

## Plenary Lecture 2

### An Operational Integrated Airport Environmental Monitoring System: The Case of the New Athens International Airport



#### Professor Dimosthenis N. Asimakopoulos

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National and Kapodistrian University of Athens  
Greece

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**Abstract:** In recent years the tremendous development of the operational needs of international airports, alongside the presence of new types of aircrafts which require environmental monitoring support, necessitated the need of advanced design and performance instrumentation. In this respect, both in situ and remote sensing instrumentation should be engaged to provide information on the vertical structure of the meteorological parameters of the lower atmosphere over the airport, covering mean values and associated statistics.

The present work will focus on the details of the instrumentation lay out over the Athens new International Airport, (AIA), which was designed by the NKUA scientific consultancy group elaborating on the measurement potential. Furthermore selected results from the instrument operation will be given. In particular some statistical data from the acoustic sounder operation, the standard and atmospheric turbulence probes as well as the other conventional sensors will also be presented. This very interesting atmospheric condition 'picture', will be discussed so that the background atmospheric condition lay out will be formulated which in turns determines the unique for each airport environmental condition identity.

Since the AIA is satisfactory covered with environmental air quality monitoring sensors, a case study of pollution dispersion map will also be presented and discussed incorporating the background meteorological monitoring network as well as additional instrumentation. This case was studied in details in the framework of the European project "A European Network of Excellence for an Environmentally Compatible Air Transport System (ECATS)" where the University of Athens was a partner.

**Brief Biography of the Speaker:** 1. Name: Dimosthenis Asimakopoulos

2. Organization of primary employment: Professor, Department of Physics, Director of the Laboratory of Meteorology and former Rector of the University of Athens, Panepistimioupolis, Building Physics 5, 157 84 Athens, Greece.

3. Education: Diploma and Ph.D, University College London, Electronic and Electrical Eng. Dept., DSc.University of Athens, School of Physics and Mathematics.

4. Professional Experience. UCL academic personnel, Researcher WPL/National Oceanic and Atmospheric Administration USA, visiting professor at Polytechnic School of Torino and Trier University. Vice Rector and Rector of the University of Athens, Director at the National Observatory of Athens, President of the National Center of Marine Research, President and Executive Director of the Euginidion Hospital, Chairman of the Research Account Committee and Director of the Center for Continues Education of the University of Athens, Vice President of the Onasion Cardio Surgical Center, Vice President of the European Environment Agency.

5. Main Fields of Scientific Directions: Coordination of Large Scientific and Teaching Programs, Study of Physics of the Built Environment, Air Pollution, Instrumentation Technology, Renewable Energy Sources, Climatic Change.

6. Published Work: Over 639 articles international scientific journals, Conferences and scientific Reports.

7. Decorations: Ph.D., D.Sc., Fellow of the Institute of Electrical Eng., (FIEE, UK), Chartered Eng. (UK), Fellow of the Royal Meteorological Society, (FRMS, UK), Member of the Technical Chamber of Greece, (GR), Chartered Eng. (GR), Fellow of the Hellenic Meteorological Society, (GR) Member of the European Environment Research Organisation, (EERO), Foreign Member of the Georgian Academy of Sciences, Foreign Member of the Russian Academy of Natural Sciences. Member of the Euro Mediterranean Academy of Arts and Sciences –Head of the Greek Chapter. Lord Notarius of the Alexandrian Patriarch. Saint George Great Cross of the Hellenic Church. Decorations from National and International Organizations for his contribution and Management of large programs.