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5th World Conference on **Climate Change**

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Posters

Tae-in Ohm et al., Environ Pollut Climate Change 2018, Volume 2
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Effect of steam injection into incinerator on thermal destruction of waste refrigerant (HFC-134a)

Tae-in Ohm[1], **Jong-seong Chae**[1] and **Seung-hyun Moon**[2]
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The reuse of hydrofluorocarbons (HFCs) with a global warming potential (GWP) of >150 is prohibited in developed countries. Decomposition and subsequent neutralization of the produced hydrogen fluorides is currently widely used for the treatment of high-GWP waste HFCs. However, there is the need to reduce the high auxiliary energy consumption of the utilized incinerator. For this purpose, we developed two versions of a burner for injecting fuel, oxidizer, refrigerant, and steam into the incinerator. The simultaneous supply of the waste HFCs and steam into the incinerator was expected to enhance the destruction of the former, thereby reducing the energy consumption. The following were determined from the results of experiments that were performed to evaluate the effectiveness of the developed type-1 burner. The simultaneous supply of steam and waste HFCs into the incinerator increased the internal temperature of the incinerator when using either version of the type-2 burner. With the simultaneous supply of steam and the HFCs, the internal temperature of the incinerator increases with increasing steam supply, regardless of the version of the burner used. When using the type-2 burner, by which steam is supplied to the incinerator in the same direction as the flame, the NO_x concentration decreases from 71 ppm to 62 ppm with increasing steam feed rate. In the case of using the type-1 burner, there is no decrease in the NO_x concentration. The HFCs decomposition rate is 100% for a HFCs feed rate of up to 2.8 kg/h with no steam supply, while the 100% decomposition is maintained up to HFCs feed rates of 3.0 and 3.4 kg/h when using the types 1 and 2 burners with steam supply. The decomposition rate of the HFCs for the two types of burners are the same for steam feed rates above 0.5 kg/h.

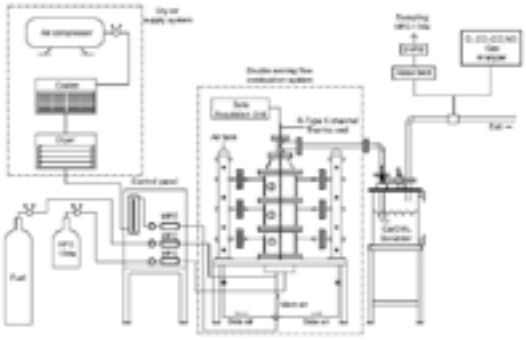

Figure 1: Schematic diagram for the decomposition system of the waste refrigerant

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5. Wang H P, Liao S H, Lin K S, Huang Y J and Wang H C (1998) Pyrolysis of PU/CFCs wastes. J Hazard Mater 58:221–226.

Biography

Tae-in Ohm has been Professor at the Department of Environmental Engineering, Hanbat National University since 1995. He is interested in designing of incinerator for wastes, municipal solid waste, waste refrigerant, liquid industrial wastes and RDF. Also, he has experience in drying technology of organic waste with high water content.

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Marium Alleyne et al., Environ Pollut Climate Change 2018, Volume 2
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A climate change vulnerability and capacity assessment (VCA) model for Caribbean Small Island Developing States (SIDS)

Marium Alleyne and **John Charlery**
The University of the West Indies, West Indies

Climate change is a high consequence issue for Small Island Developing States (SIDS) due to its proportional impact. While climate change is expected to aggravate environmental and socioeconomic conditions, SIDS possesses inherent characteristics which make them highly vulnerable to climate change. Vulnerability is a critical framework used to delineate the extent of climate change. A comprehensive understanding of the vulnerability of Caribbean SIDS specific to climate change will become a fundamental factor in ensuring sustainability and viability, as it provides the foundation for the identification of the optimum restorative action to reduce impacts through effective implementation. Traditional approaches to climate vulnerability assessment are limited by their ability to be transferred to SIDS, specifically the Caribbean region. Vulnerability is dynamic and despite strides in research, there is limited knowledge about the manner in which the dynamism of vulnerability operates, but any assessment methodology or tool must possess the ability to determine a balance in the system and any trends occurring. As knowledge about climate change impacts increases and changes in socio-economic and political circumstances occur there will be a continuous demand and need for new vulnerability approaches, tools and methods. Focusing on Caribbean SIDS, this research seeks to review the existing climate change vulnerability assessment methodologies, tools and models, highlighting strengths, weaknesses and resultant gaps, and pays particular attention to the potential elements of transferability to SIDS, with the aim of these to the Caribbean context. The resultant information will be used to develop a climate change VCA Model for Caribbean SIDS, based on the adaptation of VCA tools and methodologies for SIDS. This research contributes a climate change VCA model for Caribbean SIDS which could be applicable to others.

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2. Scandurra G, A A Romano, M Ronghi, and A Carfora (2018) On the vulnerability of Small Island Developing States: A dynamic analysis. Ecological Indicators 84:382–392.
3. Jurgilevich Alexandra, Aleksi Räsänen, Fanny Groundstroem and Sirkku Juhola (2017) A systematic review of dynamics in climate risk and vulnerability assessments. Environmental Research Letters 12(1):013002.

Figure 1: Adapted Conceptual Framework for Climate Change Vulnerability Capacity Assessment (VCA) for SIDS from O'Brien et al. (2007) and Nicholls (2003).

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Biography

Marium Alleyne is currently pursuing a PhD in Environmental Studies with specialization in Climate Change Vulnerability at the University of the West Indies, Cave Hill Campus, Barbados, W. I. She has her expertise in natural resource and environmental management, with an emphasis on climate change and is dedicated to contributing to the work on vulnerability and adaptive capacity to climate change and disaster risk management and reduction in Small Island Developing States (SIDS). She has four years' experience, working on 14 climate change related projects in the Caribbean region. She has comprehensive knowledge of climate variability and climate change and its impacts on SIDS; experience in designing and structuring solutions that address/mitigate disaster and climate risks and contributed to increase climate change awareness and capacity at the country level.

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Andreas Andreou et al., Environ Pollut Climate Change 2018, Volume 2
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Assessing climate-sensitive energy use under the current climate trajectory

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Statement of the Problem: Growing concerns about the impacts of climate change have led to increased research to identify the risks borne by energy systems. Energy use in residential and commercial buildings is particularly sensitive to changing climatic conditions; warmer outdoor temperatures are expected to reduce demand for space heating in the winter, while increase that for cooling during summer months. Despite the significant contribution of these end-uses to final energy consumption, future projections do not sufficiently capture the variety of routes through which climate influences sectoral energy demand. The purpose of this research is to study the short-term relationship between energy use and weather, as well as to explore ways through which buildings will respond to different climate trajectories in the long-term. Initially, the project evaluates the impacts of climate change on residential electricity consumption and compares them with those of evolving population, personal income and fuel prices, using the case of United States.

Methodology & Theoretical Orientation: The methodological framework is based on an econometric model of monthly electricity consumption (2005-15) which processes variables of climatic and non-climatic nature. Scenario values are then fed into the model to build projections of U.S. residential electricity consumption in the mid-21st century.

Findings: On an annual basis, personal income has the largest and most uncertain effect on future (per capita) residential electricity use, followed by electricity prices and, finally, climate change. Monthly results, however, show that climatic impacts become much more significant when examining the variation of peak electricity consumption in the summer.

Conclusion & Significance: The results stress the importance of accounting for socio-economic and energy pricing effects in models advising public policy about long-term baseload capacity requirements. Moreover, strategies aiming to downscale power sector's output should consider the demand for extra reserve capacity to be deployed during the summer.

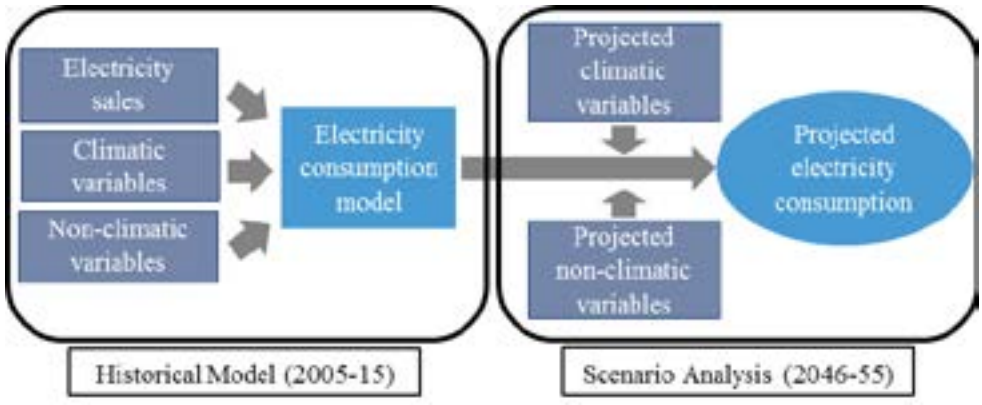

Figure 1: Framework with schematic representation of the inputs to the historical model of U.S. electricity consumption and the product of scenario analysis.

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4. Ciscar J-C, Dowling P (2014) Integrated assessment of climate impacts and adaptation in the energy sector. Energy Economics 46:531-538.
5. Auffhammer M, Mansur ET (2014) Measuring climatic impacts on energy consumption: A review of the empirical literature. Energy Economics 46:522-530

Biography

Andreas Andreou is a doctoral student with a major interest in the assessment of climate change impacts on energy systems. With his PhD research revolving around climate-sensitive energy use, he aims to identify stress points in the provision of space heating and cooling services for various climate change scenarios. His work will ultimately provide policy makers with useful tools to construct future adaptation and decarbonisation pathways suitable for regional building sectors. Prior to joining the University of Leeds as a post-graduate researcher, Andreas has completed an MSc degree in the UCL Energy Institute where he explored the various applications of Integrated Assessment Models (IAMs) in the formulation of global climate change policies.

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Notes:

Pablo López Filun et al., Environ Pollut Climate Change 2018, Volume 2
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Landslide susceptibility models in Tumbes Peninsula, South-Central Chile coast (36°S)

Pablo López Filun[1], **Carolina Martínez**[2,3], **Cristian Henríquez**[2] and **Jorge Qüense**[2]
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In the last few decades, the recurrence associated to landslides has evidenced a significant increased, especially in urban areas, where the effects related to these types of processes have generated human losses and infrastructure damages. In Chile, there is still no standardized methodology for assessing areas prone to landslides on a regional and local scale, consequently in the past years many efforts have been made to incorporate different methodologies from an institutional aspect, especially to guide territorial planning from a disaster risk management view. In this context, the purpose of this research is the application of the Linear Generalized Model (GLM) and the Generalized Additive Model (GAM) in the East coast of Tumbes Peninsula (36°S) to compare their predictive performance and their integration capacity as a methodology to guide territorial planning and risk management at local scales. The landslide susceptibility in Tumbes Peninsula (36°S) was evaluated through multivariate statistical methods. An analysis of the physical - natural factors of greater contribution to the susceptibility was made and the processes of greater recurrence and spatial activity were recognized. The analysis of the physical - natural factors was done through soil cover, geomorphology and derived models. The process recognition was carried out through the elaboration of a landslide inventory, where the lithological structure and type of movement associated with each process were identified. The susceptibility level was determined through the comparison of a Generalized Linear Model (GLM) and a Generalized Additive Model (GAM), where the areas of greater susceptibility to landslides processes were identified. The elaboration of the landslide inventory indicated that the rotational landslides are the most active, these were characterized by being conformed in a lithologic structure of silt - clay, loamy type, very fragile under saturation, during periods of intense precipitation. The execution of GLM and GAM models indicated a good spatial prediction of susceptibility with AUCROC values of 0.913 and 0.990. However, the level of significance of the predictor variables presented less statistical evidence in the GLM model with an AIC value 177,7 and greater significance in the GAM model with an AIC value of 10,2 indicating the high precision of the GAM model in the spatial estimation of susceptibility.

Rotational landslide triggered by an extreme rainfall event during July 2016

Biography

Pablo López Filun, Ph.D. in Civil Engineering student, University of Bristol, U.K. MSc in Geography, Pontifical Catholic University of Chile and BSc in Geography, University of Concepcion, Chile.

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Carolina Martinez et al., Environ Pollut Climate Change 2018, Volume 2
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Coastal erosion and storm: the new natural hazards in Chile

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[1]Pontifical Catholic University of Chile, Chile
[2]University of Valparaíso, Chile
[3]University of Playa Ancha, Chile
[4]Bristol University, United Kingdom

The Chilean coast is characterized by the development of recurring natural hazards on the coast, including major earthquakes, tsunamis and alluviums. To these, coastal erosion is now added, aggravated by intense storms, which since 2015 have generated great impact in the coastal zone. Among these effects is the violent loss of mass in the sandy littoral, changes in the morphodynamics of the beaches, loss of human lives and considerable damage to the coastal infrastructure. The purpose of this research is to explore the stability condition of the sandy littoral in central-southern Chile and to guide conservation, adaptation or mitigation measures. Satellite images and topographic surveys were used in order to determine spatio-temporal changes in the shoreline. These changes were linked to the long-term behavior of oceanographic variables such as wave climate and mean sea level. To determine changes in the relative shoreline position, DSAS 4.3 (USGS) extension for GIS was used. Erosion/accretion processes for each beach were classified according to Rangel-Buitrago et al., (2015). Changes in profile were determined by topographic survey of beach profiles, with which volumetric and granulometric changes were obtained. The behavior of the historical swell and its relationship with the morphological changes of the beaches was analyzed, as well as the relationship between ENSO phases and the recurrence of storms. The results to date, establish an erosive tendency and accelerated by the storms in the majority of the sandy systems, which present different magnitude. A direct relationship between warm phases ENSO and recurrence of tidal waves was determined. In all cases, erosion rates increased due to the level rise of up to 30 cm observed during ENSO warm phases and an increase in the frequency of extreme storms, which shifted from nearly 5 events per year in the 1960s to more than 20 in recent years.

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Biography

Carolina Martínez is a Professor at the Geography Institute at the Pontificia Universidad Católica de Chile (PUC).Associate Researcher at the Research Center for Integrated Disaster Risk Management (CIGIDEN) and member of the Ibero-American University Association for Post Graduate Studies in Integrated Coastal-marine Management (IBERMAR-AUIP Network). Her area of research is geomorphology and costal environment dynamics, coastal and natural risk management. Her recent works are focused on analysing factors of change on tectonic coasts that are recently affected by natural disturbances such as earthquakes, tsunamis and swells. She also studies the socio-territorial effects on costal locations.

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Nicola Anne Beresford, Environ Pollut Climate Change 2018, Volume 2
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Testing for anti-androgenic activity, pitfalls and possible misinterpretations

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Androgens (such as dihydrotestosterone) are a major class of steroid hormones that have key functions in the development and maintenance of the male reproductive system. Chemicals in the environment that act as anti-androgens (able to bind to the androgen receptor and block the normal action of androgens) could impact human and wildlife development and reproduction. Yeast based anti-androgen assays can give false positive results depending on various factors. Some misinterpretations are due to the nature of the chemicals and others are due to the way that the assay is run. This article examines a group of environmental chemicals for anti-androgenic activity and compares the results from two yeast-based assay methods to determine which is the most robust. Over 100 environmental chemicals were tested using a recombinant yeast cell line expressing the human androgen receptor. Both were colorimetric assays with method-1, wherein the substrate was added to the medium at the start of the incubation and in method-2, where the substrate was only added to the medium once the cells had been lysed. By both methods, the anti-androgenic potencies of 16 chemicals were very similar but method-2 was less prone to false positive results when close to toxic concentrations. We therefore consider method-2 to be a more robust assay.

Biography

Nicola Anne Beresford has been carrying out Environmental Research at Brunel University London for 22 years. She now leads the Environment and Health Technical Team in addition to working part-time on her PhD in Environmental Sciences. Whilst working at Brunel, she has authored almost 30 publications and half of these present results from yeast-based assays.

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Notes:

Seyed Jamaleddin Shahtaheri et al., Environ Pollut Climate Change 2018, Volume 2
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Health risk assessment of chemical pollutants in an automobile manufacturing, Iran

Seyed Jamaleddin Shahtaheri, Bahram Harati, Ali Karimi and **Kamal Azam**
Tehran University of Medical Sciences, Iran

Background: In recent years, many national and international expert groups have considered specific improvements in risk assessment of chemical pollutants. This study has considered to assess the risk of workers exposed to the air pollutants followed by inhalation exposure in an automobile manufacturing in Iran.

Methods: A cross-sectional research was done in. Methods number 1501 and 7602 of the National Institute of occupational safety and Health (NIOSH) were used for sampling and analysis of compounds BTEX and silica in the air. A total of 40 samples of compound BTEX were taken and analyzed by Gas Chromatography-Flame Ionization Detector (GC-FID). A total of 6 samples of silica were collected during the campaign. Silica analyses were performed by using visible spectrophotometry. Risk ranking was calculated using the hazard and exposure rate. Finally, the relative risk of blood cancer caused by exposure to benzene was estimated.

Results: The result demonstrated that, workers were exposed to 5 chemicals including silica, benzene, toluene, ethyl-benzene, and xylene during their work in manufactory. Among the pollutants in the breathing zone of workers, silica and benzene were hazardous chemicals at high risk level. Following the estimation of relative risk of blood cancer caused by exposure to benzene, workers cumulative exposure to benzene was obtained to be 23.1 ppm per year and the capture relative risk was 1.1. The significant relationships were also seen between the workers exposed to benzene in both age and work experience, so that, degree of exposure decreased steadily with increasing age and experience ($P<0.001$).

Conclusions: This research demonstrated that, benzene and silica had the highest exposure risk in the automobile manufacturing. Also, painting hall workers were directly exposed to benzene possibly increase the blood cancer risk. Therefore, an essential education and occupational protection programs needed to be considered in order to reduce risk assessment associated with the chemicals in industries like automobile manufacturing.

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Biography

Seyed Jamaleddin Shahtaheri completed his PhD from Surrey University, Guildford, England in 1996. He is an Academic Member of the Department of Occupational Health Engineering, Tehran University of Medical Sciences, Iran, acting as the Dean Research Deputy at the Institute for Environmental Research at the same university. He is a Member of the Persistent Organic Pollutant Review Committee (POPRC) under the Stockholm Convention, UNEP, UN. He has published more than 150 papers in reputed journals and has been serving as an Editorial Board Member of seven national and international journals.

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Effects of composted sludge application on greenhouse gases emissions from paddy soil and heavy metals accumulation in soil and plant

Jing Ma, Yaping Shi, Haiyang Yu, Kaifu Song, Hua Xu and **Guangbin Zhang**
Chinese Academy of Sciences, China

With the increase in municipal sludge, applying sludge in agriculture has been of great concern. A field experiment was conducted to investigate the effects of three different fertilization practices (CK, no N-fertilizer application; N240, applying N-fertilizer at a rate of 240 kg N ha-1; OF, applying composted sludge at a rate of 240 kg N ha-1) on methane and nitrous oxide emissions from paddy soils and heavy metals accumulation in soil and plant. The results showed that methane emission of treatment OF was 68.09 kg ha-1, being approximately 2-fold those of treatments N240 and CK ($p<0.05$). The N2O emission of treatment OF was 0.94 kg N ha-1, being 46% lower than that of treatment N240 ($p<0.05$) and 6-fold that of treatment CK ($p<0.05$). The contents of the total heavy metals in the soil were far below the national standard of environmental quality standards for soils for Grade II (GB 1518-1995) and no significant difference was observed among three treatments ($p>0.05$). Different heavy metals accumulated in different parts of the plant. The accumulation of Zn, Cd was straw>crust >seed, and Cr, Ni, Cu was crust>straw>seed. For treatment OF, the content of Cu in rice grain was 10% ($p>0.05$) less than that of treatment N240, but the contents of Cr, Zn and Cd in rice grain were 76%, 31% and 50% ($p<0.05$) higher than that of treatment N240, respectively.

Recent Publications

1. Guangbin Zhang, Jing Ma, Yuting Yang, Haiyang Yu, Yaping Shi, et al. (2017) Variations of stable carbon isotopes of CH4 emissions from three typical rice fields in China. Pedosphere 27(1):52–64.
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4. Xianfang Fan, Haiyang Yu, Qinyan Wu, Jing Ma, Hua Xu, et al. (2016) Effects of fertilization on microbial abundance and emissions of greenhouse gases (CH_4 and NO_2) in rice paddy fields. Ecology and Evolution 6(4):1054–1063.
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Biography

Jing Ma has her expertise in greenhouse gases emissions and mitigation mechanisms in agriculture

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e-Poster

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Bisphenol A affects the pulsing rate of *lumbriculus variegatus* via an estrogenic endocrine disrupting mechanism

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[2]University of Cincinnati, USA

Bisphenol A (BPA) is a widely used component of consumer plastics and a common environmental chemical. Previously, we showed that BPA affected the physiology of the freshwater oligochaete *Lumbriculus variegatus.* In the present study, we examined whether the impact of BPA on *L. variegatus* was mediated by an endocrine disrupting mechanism, using pulsing rate of the dorsal blood vessel as the endpoint. Both long term and acute exposures to BPA increased the pulsing rate. The former had a distinct inverted-U dose response relationship, while the latter had a monotonic one. The effects of BPA were mimicked by the synthetic estrogen ethinylestradiol. The sensitivity of *L.variegatus* to estrogens was exquisite, with detectable effects at pM range. Both the long term and acute effects of BPA were partially or fully blocked by various antagonists of mammalian estrogen receptors, including ICI 182,780, MPP and G15. Our results suggest that the impacts of BPA on pulsing rate of *L. variegatus* are likely mediated by activation of an estrogen receptor. Our results also have implication for the endocrine physiology of oligochaete, and for the evolution of estrogen receptors.

Biography

Yuyang Wang is a senior at Hefei No 8 Senior High School and is interested in zoology and biology. She performed the experiments reported here during the 2018 summer recess in Dr. Hong-Sheng Wang's laboratory in the Department of Pharmacology and Systems Physiology at the University of Cincinnati.

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Accepted Abstracts

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Hydrodynamic and geomorphological transformation of Yangtze estuarine delta under the impact of coastal engineering and climate-induced sea level rise

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[2]NSFC-NWO-EPSRC, China

Dynamics of flow, sediment and morphology of estuarine deltas worldwide have been profoundly altered by anthropogenic interventions and climate warming since the last century. The Yangzte estuarine delta (YED) is ideal to study such alterations and recent studies there have mostly focused on the impact of Three Gorges Dam. Our new studies and observations show that coastal engineering constructions and climate-induced sea level rise are transforming YED. For the past four decades, we observed local tidal datum rise of 15–43 cm in which climate warming-induced sea level rise accounted for 8 cm. During the same period, the tidal limit has migrated about 220 km upstream to Jiujiang, where it was located more than 2000 years ago during the Jin Dynasty. Since 2013, a unique shift of bed morphology from a muddy flat bed to a dune bed made of coarse silt also appeared in the channels of estuarine turbidity maximum. These results have global implications in formulating strategies to combat the combined effects of climate change and other human interventions driven by coastal development needs.

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Advanced visualization of big data for adoption of agriculture on climate change

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Since the mid-20th century, the Earth's climate has been rapidly changing. Amongst others, this includes changes of average, maximum and minimum temperatures, rainfall patterns including the number of days without rain or with heavy rainfall, as well as altered wind patterns. Climate change poses a serious challenge for many production sectors, and especially for agriculture. Climate change could bring new crop pests and diseases. Changes in seasonal temperature and rainfall patterns could result in flooding, drought and more frequent extreme weather events. Climate change is a major global driver, which has influence on the world agricultural product market. Adoption of agriculture on climatic change requires collection, storage, sharing and analysis of large quantities of spatially and non-spatially referenced data. These data flows currently present a hurdle to uptake of precision agriculture as the multitude of data models, formats, interfaces and reference systems in use, result in incompatibilities. In order to plan and make economically and environmentally sound decisions, a combination and management of information is needed. Big data is moving into agriculture in a big way. Sensors on fields and crops are starting to provide data points on soil conditions, as well as detailed info on wind, fertilizer requirements, water availability and pest infestations, GPS units on tractors, can help determine optimal usage of agriculture machinery, Unmanned aerial vehicles, or drones, can patrol fields and alert farmers to crop ripeness or potential problems, RFID-based traceability systems can provide a constant data stream on farm products as they move through the supply chain, from the farm to the compost or recycle bin. Individual plants can be monitored for nutrients and growth rates.

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CH_4 capture and sequestration for feed, food and farm facilities—the Southeast Asian experience

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Agriculture and food production is the biggest contributor of anthropogenic greenhouse gas. While this has not caught the limelight as car emissions in the cities have done in the recent past, its effect on climate change is certainly significant. Because countries in Southeast Asia are developing, there is tremendous pressure on both sides. On one side there is the pressure to produce more energy to power industry. But as the demand for energy increases, the price per kilowatt-hour also gets higher. In the Philippines for example, the high price of electricity (highest electricity rate in Southeast Asia) has also affected growth of the economy. While the region is busy on increasing development, the population in these developing countries is also increasing. On the other side of growth there is also a corresponding pressure to manage waste—the constant co-product of development. There is no way of going around this cycle, more development means more production. More production means more people. More people produce even more waste. And the more waste that is produced, the bigger the carbon footprint globally. This paper examines the strategies, pitfalls and success stories of how the Southeast Asian region in general has tried to mitigate carbon dioxide emission by sequestering methane, a more powerful greenhouse gas and constant co-product of food production. This experiential narrative will give listeners a comprehensive background of what solutions has worked in the region and also those technologies that had failed miserably. It can serve as a model for other tropical regions to follow.

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Bringing *algae* to the data centers

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The main problem faced by both modern and traditional data centers is carbon usage efficiency (CUE) and power usage efficiency. As per a report, in over 10 years, data centers will waste over £0.5M in power charges and emit 80% of CO_2, but the chances of increasing the percentage in coming years are more, thus creating data centre a 'villain-destroyer of Earth'. This paper illustrates and explains about the new algae concept for carbon usage efficiency and power usage efficiency. *Algae,* a unicellular microorganism are a billionaire solution for all the current data centers. It can absorb tons of carbon dioxide in few minutes, whereas a single tree can't even do in its life time. Algae undergo photosynthetic reaction and gives biogas and biofuel as a by-product, thus, turning CO_2 into valuable products leading to significant changes in data centers. This new CO_2 controlling technique to save the environment with the help of *algae* panels can give us the most profitable business. By moving to *algae* centered power plant (ACPP) model, we can achieve sustainability, energy efficiency and global conservation. Data center operators are no longer a pure consumer, but they are also becoming a producing consumer–a "prosumer". The opportunities to change a data center from the consumer to prosumer are more diverse here. This technology is a pioneer in green *algae* power and carbon neutrality. Using this *algae* technology, data centre can change its image from "CO_2 villain to an environment savior".

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CO_2 emissions, organic carbon and nitrogen under conventional tillage in an arid region, Northwest of Mexico

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Conventional tillage systems in the production of agricultural crops often use excessive application of nitrogen fertilizer, which is a source of generation of greenhouse gases (N_2O and CO_2). The information regarding the assessment of greenhouse gases emissions in conventional tillage a system, which is most widely used in the Mexicali Valley, is limited. The aim of this study was to evaluate the CO_2 emission, organic carbon and soil nitrogen related to the application of nitrogen fertilizer in a soil cultivated with wheat under conventional tillage in the Mexicali Valley, Baja California. The experimental plot, with a soil AquicHaplotorrert was cultivated with wheat (*Triticum durum*), with applications of doses of nitrogen fertilizer (0, 200 and 400 kg ha-1). Organic carbon was measured by Walkley & Black method. Soil samples were incubated under 65% of field capacity at a temperature of 30°C. CO_2 emanated from the treatments was measured after 4, 22, 46 and 142 hours of incubation. Nitrogen mineralization (NO_3-) was obtained from KCl extraction and Kjeldahl method. The tendency was described by a lineal function (y = ax + b) and a statistical means trial test was carried out (Tukey a=0.05). Organic carbon values were between 0.87 to 1.02%; no difference was found at different doses. The emission of CO2 was 194, 247 and 238 mg/g/h for doses 0, 200 and 400 Kg N ha-1, respectively, and there was not significantly difference ($p>0.05$) (Table 1). The magnitude of the nitrogen mineralization was 753, 942 and 1125 mg N for doses 0, 200 and 400 Kg N ha-1, respectively, with differences ($p>0.05$) between them (Table 2). Highest doses of nitrogen applied to the soil does not necessarily correspond to a higher emission of CO_2 or organic carbon, but increase ($p<0.05$) the nitrogen mineralization, at least under evaluated conditions.

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CO_2 bio-sequestration by *Chlorella vulgaris* in response to different levels of CO_2

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The purpose of this study is to assess technology of capturing carbon dioxide (CO_2) emissions generated by industry that use combustion systems by utilizing microalgae *Chlorella vulgaris.* The microalgae were cultivated in bioreactor culture pond raceway type. The experiment is expected to be useful in mitigating the effects of greenhouse gases in reducing the CO_2 emissions. The aim of this study was to sequestrate CO_2 by microalgae *Chlorella vulgaris* under the different level of CO_2. The research activities included: 1. characterization of boiler flue gas; 2. operation of culture ponds; and 3. sampling and sample analysis. The results of this study showed that the initial assessment absorption of the flue gas by microalgae using 1000 L raceway pond completed by heat exchanger were quite promising. The results indicated that transfer of CO_2 into the pond culture system was run well. This was identified from the success of cooling the boiler flue gas from the temperature of about 200°C to below ambient temperature. Except for temperature, the gas bubbles into the culture media were quite fine. Therefore the contact between the gas and the media was well performed. Efficiency of CO_2 absorption by *Chlorella vulgaris* reached 0%, 99.8% and 96.2% with average CO_2 level concentration of 0%, 6.2% and 8.1% respectively. The ultimate CO_2 sequestration rate of *Chlorella vulgaris* was 0.1462g/L/d recorded at 8.1% CO_2 concentration.

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Electrophysiological methods for environmental toxicology and pharmacology: Standard organisms and amphioxus models

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Mirroring developments in safety pharmacology, the search for high-throughput, electrophysiological methods for the testing, screening, and establishment of environmental regulatory monitoring protocols is a worthwhile, as an adjunct to bioassays, such as whole effluent toxicity (WET) tests. A lingering problem with WET testing is assessing initial vitality of the organism. Accessible, metabolically active tissues, such as respiratory membranes of minnows and mussels, are possibilities for electrophysiological recording and early detection of toxicity. Excitable tissues are additionally useful, especially those with tonic or phasic bursting that may be up and down regulated, expanding the dynamic range of responses to contaminants (e.g., fish lateral line cells). The spinal neural networks of lamprey underlying motoneuronal commands for fictive sinusoidal swimming are readily challenged with minimal-volume perfusate containing substances have been well studied with extracellular, intracellular and patch-clamping methods. Measures of unilateral burst quality, intersegmental phase lag (forward and backward swimming) and alternation quality (sinusoidal swimming) are candidates for developing figures of merit. Amphioxus possesses the general Bauplan of the Chordate nervous system and could be expected to respond to a range of contaminants. Amphioxus possesses a quasi-tubular (U-shaped), nervous system involuted from the embryonic ciliated exterior which, in larval form, is confluent via an opening between ambient water and the central canal. The latter possesses excitable cilia (mechanically and chemically) and photic cells. The cilia may represent a system by which the larval form sampled nutritive gradients of peptides, carbohydrates and noxious substances in ambient water and moved accordingly. Ependymal cilia also are motile and sensitive to body movements. Spinal networks, governed by the brain, mediate the basic approach and withdraw behavior (with potential for correlative behavioral assay of noxious contaminants). With all of the potential for WET testing, these organisms offer numerous additional opportunities for electrophysiological approaches to identifying and monitoring contaminants.

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Assessments of heavy metals in soils and perceived health risks at artificial city in Saudi Arabia by using XRF technique

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By using X-ray fluorescence (XRF) technique, We were evaluate the soil pollution with heavy metals like (As, Cr, Cu, Ni, Pb, V and Zn) in the Artificial city at ALKHARJ, south west of Riyadh, Saudi Arabia.The soil samples were collected in an open areas at different depths, at different distances from the metallurgical plant. XRF analyses were carried out by using a low-energy mini-X-ray generator and a Si-PIN detector. The experimental results indicate that the concentrations of heavy elements decrease with the distance from the metallurgical works and they are greater than the levels detected in a control soil collected from a zone situated far from traffic and industrial activity. For the majority of metals, pronounced maximum concentrations for all depths were detected in the sites located in influence zones of industrial objective with ferrous processing activities. Anthropogenic releases give rise to higher concentrations of the metals relative to the normal background values and in some locations their levels exceed the alert level admitted by the Saudi guideline.

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Valorization of wastes of agrifood industries for animal feeding

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In Morocco, the halieutic sector has an important role in the national economy, but it can generate a lot of waste. Due to lack of funds or an absence of binding legislation, these wastes are usually rejected into the environment without any treatment. In order to reach sustainable production and consumption with respect to the environment, the goal is to develop industrial processes that are sustainable and focus on three strategies: prevention, recovery and recycling. The technological biotransformation theory suggests that in order to get an interesting product, the elemental composition of starting mixtures (source of carbon, nitrogen and phosphorus) must be balanced and must be optimized and the conditions necessary for growth and microbial activity must be ensured. It is therefore essential to distinguish what optimal configuration will ensure that this biotransformation is directed towards the generation of a product with high added value. The objective of this study is to use statistical approach to design and analysis of mixture experiments containing covariate(s) that will yield a better understanding and study biotransformation of ternary mixture of industrial wastes: fish waste, molasses and yeasts in order to produce an interesting poultry food with a best quality. This methodology was chosen for its simplicity and its opportunity to offer good information, reducing number of tests, time and cost incurred. This study shows that it is possible to realize easily in optimal time and at low cost, a poultry food rich in protein, fat and carbon-based sardine waste, 12% of molasses and 18 % of yeast. This product also has good hygienic properties. The performance tests as a well poultry feed have shown that our products are more interesting than some commercially available products.

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KIM-1 as a promising biomarker of kidney injury for human health risk assessment

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Chronic kidney disease (CKD) is a serious public health problem with a high prevalence (~13%) worldwide. In addition to the traditional risk factors of CKD, such as diabetes and hypertension, chronic exposure to environmental toxicants can contribute to increasing the predisposition for development and/or progression of CKD. There are some hotspot areas with high prevalence of CKD with unknown etiology (CKDu), where environmental risk factors have been suggested as important triggers of this disease. Early detection is essential for estimating true prevalence and guiding preventive management. Proximal tubule is the main target of environmental toxicants such as heavy metals and pesticides. One of the most sensitive and specific biomarkers for kidney proximal tubular (PT) injury is KIM-1 (Kidney Injury Molecule-1). KIM-1 is a novel non-invasive biomarker able to detect subclinical PT injury in a very sensitive and specific manner. We have investigated KIM-1 performance on detecting PT injury in human populations living in different scenarios of environmental risks and vulnerability. KIM-1 outperforms other kidney injury biomarkers having strong associations with environmental exposures, distinguishing populations that may be more prone to developing CKD. KIM-1 may be a good candidate as a risk stratification biomarker for environmental risk assessment.

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MMP9 in lung disorders: Identification and analysis of gene-environment interaction between the MMP9 C–1562T variant and cigarette smoke in the occurrence and severity of COPD

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MMP9 is an elastolytic enzyme, the expression and activity of which are tightly regulated. In healthy lungs, MMP9 is not expressed, but in response to inflammatory cytokines, pulmonary and immune cells may secrete MMP9. The deregulation of MMP9 is implicated in various lung disorders, e.g. chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis, cystic fibrosis (CF), carcinoma, etc. Accordingly, understanding the effect of environmental factors on MMP9 expression in lungs is of great importance. Cigarette smoke, infections, LPS and chemical agents increase the production of MMP9. Besides, genetic factors such as MMP9 C–1562T (rs3918242) functional variant, has been recognized as a risk in several disorders, but its role in COPD is controversial. Herein, results about the identification and functional assessment of gene-environment interaction between the MMP9 C–1562T variant and cigarette smoke in the pathogenesis of COPD are presented. Interaction between the C–1562T variant and cigarette smoking was analyzed using a case-control model. The effect of CSC on MMP9 expression and activity was determined by real-time PCR and gelatine zymography. The response of the C–1562T promoter variant to CSC was examined using a dual luciferase reporter assay. The frequency of T allele carriers was higher in COPD group than in smoker controls (P=0.027). Interaction between the T allele and cigarette smoking was identified in COPD occurrence (P=0.005) and severity (P=0.001). Expression of MMP9 mRNA and pro-MMP9 gelatinolytic activity were dose-dependent ($p<0.01$, $p<0.05$). A functional analysis of the C–1562T variant demonstrated a dose-dependent and allele specific response ($P<0.01$) to CSC. Significantly higher MMP9 promoter activity following CSC exposure was found for the promoter harbouring the T allele compared to the promoter harbouring the C allele ($P<0.05$). Our study is the first to reveal an interaction between the MMP9–1562T allele and cigarette smoke in COPD, emphasising gene-environment interactions in complex lung disorders, such as COPD.

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Effects of size and surface chemistry on the uptake of Au ENPs into sediment-dwelling *Lumbriculus variegatus*

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Considerable efforts have being made to study the potential toxicity of engineered nanoparticles upon the uptake by aquatic organisms. It is often stated that the uptake is related to physiochemical properties of engineered nanoparticles (ENPs), such as particle size and surface coating. However, these claims are not sufficiently backed up with the evidences where conflicting results are obtained in the published data. This study is hence focused on illustrating how these physiochemical properties of Au ENPs affect the uptake of the ENPs in the sediment-dwelling *Lumbriculus variegatus*. The experiment was composed of the uptake and depuration study of Au ENPs in sediment dwelling *Lumbriculus variegatus* as well as respective sedimentation process in natural sediment. Studied Au ENPs were coated with either citrate (Au CIT), mercaptoundecanoic acid (Au MUDA) or bovine serum albumin (Au BSA) and featured the size of 5 nm or 30 nm. Surface coating and particle size were both found to be factors affecting the uptake and persistence of ENPs into the *Lumbriculus variegatus*. Comparing with Au3+, the results showed that Au ENPs took more time to settle in the sediment, had more uptake during exposure and also had more elimination during depuration. Eventually the persistence of Au in *Lumbriculus variegatus* ranked in regards to the ENP size in the following order Au3+ > 5 nm > 30 nm. Surface coating influenced the uptake and persistence of Au ENPs in *Lumbriculus variegatus* through the sedimentation efficiency and tissue affinity. The persistence of the Au ranked with regards to ENP surface coating is Au BSA > Au CIT > Au MUDA. However, synchrotron XRF images showed that *Lumbriculus variegatus* exposing to Au CIT has more uptake of Au and healthy tissue, while ones exposing to Au MUDA have less uptake but damaged tissue. It suggests that more and persisting ENPs uptake in the organism do not necessarily produce more extensive tissue damage.

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