CARIBBEAN ACADEMY OF SCIENCES 20 th GENERAL ASSEMBLY AND BIENNAL MEETING

Yves Mazabraud, Thomas Forissier, Alain Pietrus, Olivier Gros, Claire Anjou

CARIBBEAN ACADEMY OF SCIENCES

20th GENERAL ASSEMBLY AND BIENNAL MEETING

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Fort Royal Langley Resort, Deshaies

"Biodiversity, Energy, Risks and Health"
From scientific knowledge to the emergence of innovative development strategies in the Caribbean"

The 20th CAS
General Meeting and Conference
Guadeloupe 2016

Université des Antilles

REGION GUADELOUPE

SHIMADZU
Excellence in Science

Synergîle
Partenaires pour un monde d'innovations

TABLE DES MATIERES

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PROGRAMM

THURSDAY - NOVEMBER 24TH

Main Conference Room	
13:15	**CAS GENERAL ASSEMBLY**
Coffee break	

Main Conference Room
OPENING CEREMONY
16 :10 - Thomas Forissier, CAS president of chapter DFA. - Opening welcome
16 :20 - Trevor Alleyne, CAS president
16 :30 - Jacky Narayaninsamy, Université des Antilles, provisional administrator or his representative
16 :40 - Annick Suzor-Weiner, Conference of University Presidents
16 :50 - Ary Chalus, region chairperson or his representative
17 :00 - Camille Galap, Rector of the Academy of Guadeloupe or his representative

Main Conference Room
Keynote Speakers
17 :30 - Dr Dalila ALDANA Instituto Politécnico Nacional, Mexico **Collaboration in the Caribbean with the Queen conch**
18 :00 - Pr Jean-François THIMUS Université Catholique de Louvain, Belgium **How a fly ash deposit, became a natural site, should be cleared due to risk of rupture**

Poster area
Poster Session
18 :30 - Poster Session and Welcome cocktail

Posters	Session : Mathematics and Informatics
Jean-Charles and Regis	Use of programmable floor robots for children with psychomotor disorders: a first short experience at microscopic level with unexpected results
Biabiany et al.	Climate Informatics: Identifying relevant weather types in the Lesser Antilles
Cholet et al.	Affective Computing: Classification and prediction of emotional states
Pertin et al.	Selection of textile nets as mosquito-proof shield adapted to tropical environment

Posters	Session : Interface and Material Physics – Natural Risks
Monjoly et al.	Forecasting of irradiance using Multiscale Methods
Jean-Baptiste et al.	Study of the effect of oxobiodegradable additives on the degradability of polyethylene under various ageing conditions by infrared spectroscopy
Molza et al.	In situ Raman and fluorescence micro-spectrometry investigations of contact lubrication in the presence of nanoparticles in dispersion in low viscosity lubricant bases
Thomas et al.	Development of new nanoadditives for lubricants: friction performances of fluorinated carbon blacks

	Session : Physics of the Athmosphere		**Session : Medical Sciences**
Biabiany et al.	Climate Informatics: Identifying relevant weather types in the Lesser Antilles	Goindin et al.	Screening of Deltamethrin, Malathion and Temephos resistance mechanisms in *Aedes aegypti* mosquitoes from Guadeloupe and Saint-Martin islands (French West Indies)
Hernandez-Garces et al.	FLEXPART and CALPUFF intercomparison. Guadeloupe study case	Cirederf et al.	Diabetes ketoacidosis in Afro-Caribbean subjects: characteristics and predictive factors
Plocoste et al.	Use of modeling tools to predict Methane Emission from a rehabilitated waste dome in tropical insular climate	Meunier et al.	PSA density is a predictor of aggressive tumors after radical prostatectomy in Caribbean patients initially under active surveillance
André et al.	Solar spatio-temporal forecasting in order to increase the integration of solar energy	Belia et al.	Somatostatin receptor scintigraphy
	Session : Biology		**Session : Hydrology and Hydrodynamics**
Dartron and Gros	Description of a new filamentous tropical marine cyanobacteria (*Oscillatoriaceae*) in prokaryotic mat colonizing Guadeloupe shallow-water environments	Ducreux et al.	Hydrogeological functioning and groundwater contamination of two contrasted tropical volcanic basins belonging to the Observatory of Agricultural Pollution in the French West Indies (OPALE)

Dulorme et al.	The drought resistance of the tree species in the Caribbean forests
Grimonprez et al.	Study of sulfur-oxidizing bacteria colonizing meiofauna in shallow marine environments
Guéné et al.	Contamination of food webs by chlordecone in three marine coastal habitats (mangroves, seagrass beds, coral reefs) in Guadeloupe
Rousteau et al.	Biomass mapping for Caribbean Island rainforests
Obertan et al.	Biodiversity, alimentation and health : a politically under-exploited potential for development
Lemoine et al.	Occurrence of *Perkinsus* sp. in the wild oyster *Crassostrea rhizophorae* in the Caribbean (French West Indies ; Guadeloupe)
Alleyne and Ignacio	Ligand Binding at Heme a3 of Cytochrome c Oxidase Induces Conformational Changes in Transmembrane Segments of Subunit-II of the Enzyme
Dulorme et al.	Conservation of the *Pterocarpus offinalis* swamp forest in the Lesser Antilles: Experimental reforestation of herbaceous swamps and wet meadows

	Session : Chemistry
Brudey et al.	Lead adsorption by chemical activated carbons from three lignocellulosic precursors
Rambinaisaing et al.	Investigating Dechlorination of Organochlorine Insecticide chlordecone for soils and water remediation
Rangin and Gaspard	Exploring the use of locally produced activated carbon for treatment of chlordecone contaminated animals
Manduca-Artiles et al.	Degradation of diazepam by ultrasonic and gamma radiations
González Hernández et al.	Modelling of activated sludges considering growth and simultaneous storage and extracellular polimeric substances production
Gamboa-Carballo et al.	Adsorption of chlordecone into cyclodextrins: a theoretical study
Saint-Martin et al.	Waste and biomass valorization by solar pyrolysis : The SMO process (solar micro wave)

FRIDAY – NOVEMBER 25TH

MAIN CONFERENCE ROOM			SECOND CONFERENCE ROOM		
	Chairwoman : N. Ponakala	**Session : Mathematics and Informatics**		**Chairman : W. Mellowes**	**Session : Science Education**
8:00	Ponakala	Understanding Physiological Situations with Modelling	8:00	Rémi et al.	Multimodal study of the impact of graphomotor training
			8:15	Anjou et al.	Highlighting Context Effects in a Pedagogical Innovation on Geothermal Energy in the Caribbean and North America
8:30	Mahdi	Copula methodology for risk analysis	8:30	Césaire	Traditional 'Ka' drum from Guadeloupe : Study on wood quality and vibrational characterization
8:45	Henry and Stattner	Understanding Diffusion Behaviors Through Individual Characteristics	8:45	Silvy et al.	Foundation of the interpretative activity of professors of conduct of elementary pupils
9:00	Cesar et al.	Some actions to control e-rumor	9:00	Mounsamy	Creole and mathematics
9 :15	Valmy et al.	Healthcare procedures in the poor population of Cayenne, French Guiana	9 :15	Jeannot-Fourcaud	Linguistic and biodiversity: some irrefutable links?
9 :30	St Rose and Vaillant	Contribution of scan statistics in detecting fragility spots in Martinique	9 :30	Beaubrun	Teaching of french as a language for integration to migrants in Guadalupe French West Indies: From linguistic insecurity to contextual pedagogic tools

9 :45	Nagau and Henry	A mechanism for a simplified interface for automatic identification of plants	9 :45	Anciaux	Bilingualism and Science Education in Guadeloupe
		Coffee break			**Coffee break**
10 :30	Destyl et al.	Analysis and numerical solution of a quantum physics phenomenon modeled by Nonlinear Schrödinger Equation		**Chairman : A. Gee**	**Session : Medical Sciences**
10 :45	Gros et al.	Simulations of Bacterias motion in a complex area	10 :30	Georges et al.	Assessing the quality of data available for inclusion in a national antimicrobial resistance surveillance system
	Chairman : J-L. Mansot	**Session : Physics of the Athmosphere**	10 :45	Sealy and Swanston	The Challenge to Interpret Antimicrobial Susceptibility at a Small Community Hospital
11 :00	Barnacin et al.	Infrared Desert Dust Index over the tropical rainforest of French Guyana	11 :00	Gaete and Deloumeaux	Building a network of Biological Resources Centers for research purposes in the Caribbean: a shared vision for a common goal
11 :15	Euphrasie-Clotilde et al.	Dust event intensity statistics related to air masses trajectories climatology over Guadeloupe	11 :15	Brureau et al.	Polymorphisms of genes related to oestrogen metabolism and the risk of prostate cancer in two populations of African descent
11 :30	Mathieu et al.	Air Pollution Biomonitoring with Bees of Guadeloupe: Experiments and first outcomes	11 :30	Meunier et al.	PSA density is a predictor of aggressive tumors after radical prostatectomy in Caribbean patients initially under active surveillance

11 :45	Pierre-George et al.	Comparison between biogas concentrations emitted by two open landfills: Truitier (Haiti) and Gabarre (Guadeloupe)	11 :45	Ignacio et al.	Prostate cancer: Tropical plant extract shows anticancer potential
12 :00	Atwel et al.	Determining the variability of electromagnetic signals as affected by land use in a tropical savanna	12 :00	Ranu and Sanders	Utilizing 20Hz Flash Stimulation to Effect Consistent EEG Changes
			12 :15	Moureaux et al.	Pelvimetrics measures as predictives factors of positives surgical margins after robot-assisted laparoscopic prostatectomy
		Lunch			**Lunch**

Plenary presentation
13h 30 - SHIMADZU Analytical and Measuring Instruments

MAIN CONFERENCE ROOM			**SECOND CONFERENCE ROOM**		
	Chairwoman : M. Atwell	**Session : Interface and Material Physics – Natural Risks**		**Chairman : R. Saunders**	**Session : Radiochemistry and Nuclear Medecine and Biomolecules**
14:00	Symithe and Calais	Strain Accumulation on Active faults in the Caribbean Plate	14:00	Gee et al.	Novel carbon-11 chemistry for *in vivo* molecular imaging

14:15	Zahibo et al.	Lessons learned from the collaborative program TSUNAHOULE (INTERREG CARIBBEAN): from storm surge and tsunami hazard assessment to risk management in Guadeloupe		
14:30	Jean and St Fleur	Experimental evaluation using MASW and H/V - noise in the estimation of site effects lithological of Damien's site (Haiti)	14:30 Blanco et al.	Computational modeling in the study of Tc and Re DMSA radiopharmaceuticals
14:45	Guerrier et al.	A rheological approach to the mechanical behavior of some marls samples in Haiti	14:45 Belia et al.	IMolNu-Caraibes: a platform for nuclear medicine and research on cancer
15:00	Radford	Results of IODP Leg 340 in the West Indies	15:00 Goudou et al.	First detection of bioactive glycerolipids extracted from bacterial gill-endosymbionts colonizing the marine bivalve *Codakia orbicularis* (Lucinidae)
15 :15	Minatchy et al.	How nanotribological investigations can help the understanding of macrofriction behaviors	15 :15 Brureau et al.	Chlordecone exposure and prostate cancer: Interactions with genes encoding the oestrogen
15 :30	Romana et al.	Use of nanoindention techniques as a flash test to predict polymer composite ageing under tropical environment		
15 :45	Mikosch-Cuka et al.	Nanomanipulation in SEM		
		Coffee break		**Coffee break**

16 :30	Petit et al.	Tribological, chemical and structural study of tribofilms generated during friction of nanoparticles of lamellar compounds in the presence of low viscosity bases			
	Chairman : R. Stone	**Session : INTERDISCIPLINARY ORAL SESSION**		**Chairwoman : P. Sealy**	**Session : INTERDISCIPLINARY ORAL SESSION**
16 :45	Jayaraman and Ramsubhag	Developing Integrated Disease Management systems for vegetable crops of the Southern Caribbean region	16 :30	Segretier et al.	Precision Agriculture in the Carribean Area and Big Data Techniques : Review and Perpectives
17 :00	Belia et al.	IMolNu-Caraibes: a platform for nuclear medicine and research on cancer	16 :45	Odacre et al.	Context related evolution of conception of students during professional traineeship in Guadeloupe
17 :15	Marti	Mathematics	17 :00	Segretier et al.	A data-oriented approach for flash flood prediction in the Caribbean area
17 :30	Rivas et al.	Degradation of three pharmaceutical compounds, pollutant of superficial waters, by gamma radiation	17 :15	Pun and Beharry	Enhancing the Value-Added Output of Manufacturing Sector through Innovation Practices: A Case of the Caribbean
		Break	17 :30	Benjamin and Pun	The Entrepreneurial Motivations of Engineering Students: Case from the SIDS of the Caribbean
18 :00		**Round Table** **« Science and Industry for the Energetic Transition in the Caribbean »** **Synerg'îles**			**Break**

SATURDAY – NOVEMBER 26TH

MAIN CONFERENCE ROOM			SECOND CONFERENCE ROOM		
	Chairwoman : D. Aldana	**Session : Biology**		**Chairman : J-F. Thimus**	**Session : Hydrology and Hydrodynamics**
8:00	Mira and Dulorme	Are tropical dry forest seedlings equally drought resistant than adult trees? A case study in a Caribbean island	8:00	Mansot et al.	New developments in electricity generation using wave energy
8:15	Rolle and Rousteau	Forest management: Forest fragmentation and biodiversity corridor function of riparian forest in Lesser Antilles	8:15	Farrick et al.	Prediction of clay and sand content using a chilled-mirror dewpoint technique
8:30	Marcon et al.	Estimation of the number of tree species in French Guiana by extrapolation of permanent plots richness	8:30	DeLaTorre and Longueville	Monitoring coastal erosion in the French Caribbean: Regional surveys in Guadeloupe and French Guiana
8:45	Stone	Investigating the 'dry gets drier and wet gets wetter' paradigm in Trinidad and Tobago	8:45	Clair and Ducreux	Quantitative and qualitative monitoring of groundwater in Guadeloupe (FWI): Usefulness and limits
9:00	Séne et al.	*Scleroderma bermudense* pantropical dissemination *via* seeds of its host plant *Coccoloba uvifera*	9:00	Boutouchent et al.	Modelling river hydrokinetic energy in Large rivers : Maroni river in French Guiana
9 :15	Prêcheur et al.	Year round at-sea distribution of Audubon's shearwater *Puffinus l. lherminieri*, from the Lesser Antilles (Martinique Is.)	9 :15	Brathwaite and Villarroel-Lamb	The Influence of Infiltration and Exfiltration Processes on Maximum Wave Run-up – A Study on Trinidad Beaches

9 :30	Priam	Wind turbines and Pelecanidae: recommendations based on a 6 years study of *Pelecanus occidentali*s in a wind farm in Puerto Rico	9 :30	Bilionière and Maurin	An analysis of the evolution of the time series of rainfall and temperature of Guadeloupe
9 :45	Frotté et al.	How dams & waterworks impact Caribbean freshwater species biodiversity?	9 :45	Miniño and León	Rise in water level of lake Enriquillo, Dominican Republic
		Coffee break			**Coffee break**
	Chairwoman : S. Peter	**Session : Material and Environmental Chemistry**			**Symposiums**
10 :30	Flory	Tuning polyolefin reactor design technology and rheological property for high performing data cable	10 :30		**Solar Energy Symposium** **« Solar geoengineering and the Caribbean: science and governance of research »** **Andy Parker**
10 :45	Smith and Thomas	Plastic Recycling with a Caribbean Perspective			
11 :00	Jeanne Rose et al.	Electrochimical properties of activated carbon from *Turbinaria turbinata* and *Sargassum fluitans* for use in supercapacitor			
11 :15	Yacou et al.	Structural investigation of carbon-based sorbents synthetized from Caribbean biomass for water processing			

11 :30	Melchor Rodriguez et al.	Molecular modeling of chlordecone and β-hexachlorocyclohexane interaction with acidic surface groups in an activated carbon model	11 :30	**Forestry symposium,** **Alain Rousteau**	
11 :45	Cruz Julcour et al.	Degradation of chlordecone and β-HCH by photolysis, photo-fenton and ozonation processes		Gayot et al.	Dynamics of Caribbean Island rainforests: first measurements
12 :00	Liber and Letondor	Bioaccumulation of chlordecone in grasses		Rousteau et al.	Biomass mapping for Caribbean Island rainforests
12 :15	Mohadissa et al.	Determination and removal of phosphorous and chloride in surface and ground waters from the three counties in Guyana			
		Lunch			**Lunch**

Main Conference Room

Keynote Speakers

14 :00 - Pr Bruno HOEN

Infectious and Tropical Desease Center

University Hospital, Université des Antilles

New emerging infectious diseases: the predictable and the unpredictable

14 :30 - Dr Sonia PETER

Departments of Chemistry and Environmental Sciences

Division of Natural Sciences, Barbados Community College

Biodiversity and Traditional Knowledge – the Nexus and Value as a Caribbean Resource

Coffee break

MAIN CONFERENCE ROOM		
	Chairman : M. Romana	**Session : Medical Sciences**
15:30	Garnier et al.	Biological, cellular and genetic abnormalities associated with alteration of red blood cells filterability from sickle cell trait blood donors
15:45	Garnier et al.	Microparticles of sickle cell patients: modulators of endothelial cell phenotype
16:00	Velayoudom et al.	Testosterone deficiency and cardiovascular profile in Afro Caribbean subjects with type 2 diabetes
16:15	Drané et al.	Ethnobotanic study and therapeutic potential of *Solanum triste* Jacq
16:30	Antoine-Jonville et al.	Effect of heat exposure and exercise on food intake regulation and glucose tolerance: a randomized crossover study in young healthy men
16 :45	Rinaldi et al.	Effect of cold menthol water immersion on recovery in tropical climat
17 :00	Möckesh et al.	Vasculopathy in Sickle Cell Disease
17 :15	Jumet et al.	Arterial stiffness in young patients with sickle cell disease

SECOND CONFERENCE ROOM	
	Meetings
15 :30	**Haïti collaboration symposium,** **Annick Suzor-Weiner**

17 :30	Gibot et al.	Physical activity patterns in a population of health workers: primary study
18 :00		**Round Table** **« Radiochemistry »** **Tony Gee and Ulises Jaurégui-Haza**

19 :00	**Awards Ceremony and Closure of the Conference** **Gala Dinner**

KEYNOTE SPEAKERS

1.

Collaboration in the Caribbean with the Queen conch

Dalila Aldana Aranda et al

Cinvestav IPN Unidad Mérida

Mérida Yucatán México

The queen conch, *Strombus gigas* (Linnaeus 1758) is a marine gastropod mollusk. This is an endemic species from the Caribbean Sea. It is a valuable marine benthic invertebrate of significant commercial importance in the Caribbean, second only to the spiny lobster, with a lucrative export trade worth millions of US dollars. The main international markets for conch meat are the USA (currently accounting for around 60% of the trade) and the French West Indies (29%). Conch is also consumed locally and its shell and other products sold as curios to visiting tourists in the Caribbean. This species has traditional cultural values dating back to pre-columbian times. However, populations have been depleted throughout the Wider Caribbean by overfishing, prompting numerous efforts to manage conch fisheries and trade. Current efforts are focused on regional harmonization of conch management to improve sustainability of this resource across its distribution. The scope of this work was to show various inter disciplinary research carried out in collaboration in the Caribbean with the Queen conch. These investigations range from reproductive biology studies and their application to fishery management to examples of ecological and ecotoxicology indicators. We also show some contributions of investigations that have allowed to improve the aquaculture production of the Queen conch and finally, we present results of the process of shell calcification of the Queen Conch as a model of Climatic Change and ocean acidification.

2. How a fly ash deposit, became a natural site, should be cleared due to risk of rupture

Jean-François Thimus

Ecole Polytechnique de Louvain, Institut de Mécanique, des Matériaux et de Construction, Pole Génie civil et environnemental, Université Catholique de Louvain

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Human activities can cause significant environmental problems in the long term. Thus in 1951 began backfilling the valley of two small streams near the city of Liège in Belgium. Following the geotechnical characteristics of the fly ash, due to ignorance of the basement, due to poor technical of implementation, this backfilling should be permanently discontinued in 1972 because of the risk of liquefaction. The site is then formed and becomes a natural area and bird sanctuary.

An important monitoring program is in place and several reinforcements are necessary to maintain stability.

However following the uncertainty about its long-term stability, it was decided to move the fly ash and convert them into additives in the manufacture of cement.

The talk will present 65 years from the filing: monitoring, reinforcement, numerical modelling,

3. Biodiversity and Traditional Knowledge – the Nexus and Value as a Caribbean Resource

S R Peter

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The Caribbean shares a rich history intertwined by cultural and biological diversity. The peoples of the Caribbean have relied on plant biodiversity for food, shelter, clothing, rituals and medicine. The density and endemism of plant species distributed over the estimated 229,550 km^2 of land mass offered a molecular complexity that provided solutions to many of the challenges posed for survival. The inherent traditional knowledge or 'know how' embedded within the population of translocated and indigenous peoples led to the selection of plant members from the pool of 11,000 species, 1520 genera and 6550 endemics for sustainable living. Studies in biocultural diversity have reinforced the inextricable link between cultural diversity and biological diversity. This nexus, however, has not been adequately valued in the Caribbean and centuries of accumulated traditional knowledge is being lost and not sufficiently tapped to inform sustainable utilisation of plant species.

Modern challenges from climate and environmental change, increase in the incidence of breast and prostate cancers, the impact of non-communicable diseases on health care and economic systems, all demand critical analysis of our plant stock and assessment of the value of traditional knowledge in mitigating some of these problems. The outfall of global warming will require identification of drought resistant species, new use agricultural species, land stabilising root systems and even water purification entities. Increasing levels of environmental pollution may require mitigation by plant bio-accumulators. The next antibiotic may be nestled in the leaves, bark, root or stem of a yet unclassified species in our tropical environment. Agents for the regulation of hypertension and diabetes could be silently adorning the dinner plates of an indigenous community. Antioxidant rich plants may be sequestering anti-aging secrets. The potential for discovery is buttressed by the high degree of endemism in the region and this indicates for a renewed focus on heritage preservation, plant research and conservation of biodiversity in the Caribbean.

KeyWords: plants, traditional knowledge, biological diversity, endemism, discovery

4. New emerging infectious diseases: the predictable and the unpredictable

B. Hoen

5. Understanding Physiological Situations with Modelling

Nagarani Ponakala

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Mathematical Modelling of physiological fluid flows has become a subject of great interest in recent years due to the combined efforts and joint work of physicians, physiologists, applied mathematicians, physicists, chemists and engineers. Mathematical models, using the principles of fluid dynamics, have been developed with a view to understand the complex phenomena associated with the dynamics of physiological fluid flows not only normal but also pathological conditions of the physiological systems. The knowledge we gain from these models improves our basic understanding of both physiology and pathology and the results predicted through these observations are being used for i) diagnosis of various artificial diseases ii) appraisal of newly found treatment procedure and iii) developing and designing of various artificial organs. Some of the examples of the biomedical devices influenced by these models are heart-lung bypass machines, kidney dialysis machine, biosensors and membrane oxygenators.

Modelling in physiological system differs from other branches of fluid mechanics due to the nature of the flow and fluid, deformability, curvature and branching and geometry of the vessels walls, nature and activeness of the biological structures of the vessels. The key features that distinguish physiological flows from other branches of fluid mechanics are pulsatility and deformability. For example, flows in arteries and airflow in the lung are strongly pulsatile due to the pumping of the heart and during breathing respectively. This unsteadiness nature of the flow must be investigated often within highly complex geometries. The vessels in the body that transport blood, air, urine or food are all elastic to some degree.

Hence, while modelling the physiological fluid flows, it is necessary to consider the various essential features like the rheological properties of fluid, the pulsatility of flow, branching of blood vessels and nature of the vessel walls. The general approach to the mathematical modelling of the physiological fluid flows is, to study the morphology of the chosen geometries. What kind of material it is, and what are the dimensions and determine the mechanical properties of fluid. Then establish the set of governing equations based on the fundamental laws of the fluid mechanics with the realistic boundary and initial conditions. Then these equations are solved either analytically or numerically. Assistance of any scientific software (MATLAB/Mathematica) will be used for virtual simulation of these models.

The results obtained through the mathematical models will be compared with the available or experimental data. If the efficiency of the model is established these results will be used for clinical purposes and in the design of artificial organs.

Our research group mainly working on the following models that characterize some of the key situations in physiology and pathology:

Dispersion of solute in blood flow: In physiological system, it is often necessary to introduce a quantity of solute into the blood stream and to measure its concentration at some downstream point as it flows along blood. This procedure is a common practice in physiological studies to measure the cardiac output which is known as the dye or indicator dilution technique. Further, since many intravenous medications are therapeutic at low concentration, but toxic at high concentration, it is very much important to know the rate of dispersion of drugs in the blood stream of the circulatory system.

Flow in a mild stenosed artery: Many cardiovascular diseases are closely associated with the flow conditions in the blood vessels. The majority of deaths in developed countries result from cardiovascular diseases, most of which are associated with some form of abnormal blood flow in arteries. One major type of flow disorder results from the narrowing of aorta in the arterial lumen, that is, the presence of stenosis. Stenosis means narrowing of the artery due to the development of atherosclerotic plaques rich in fatty substance or other type of tissue development. Stenosis disturbs the normal pattern of blood flow through the artery and further growth of the stenosis leads to atherosclerosis- a cardiovascular disease, which is one of the main causes of heart attacks and various peripheral vascular diseases like cerebral accident and paralysis. Atherosclerosis is found at specific sites of the arterial system often near bend and bifurcation. In the cardiovascular system, hemodynamics factors like wall shear stress and altered flow conditions such as separation and flow reversal play a role in development of arterial disease. A detailed understanding of the local hemodynamics, effects of vascular wall modification on the flow patterns and of long term adoption of the system to surgical procedures can have useful applications. In particular, stress distribution cannot be measured directly and must be assessed by combining the diagnostic methods such as X-ray, CT, and MRI with mathematical models.

Modelling of catheterized arteries: Cardiac catheterization is very common in modern medicine. Catheters are used to inject the dye and to withdraw blood samples for the purpose of measurements. The purpose may be to accurately measure the arterial pressure or pressure gradient or the average velocity of the blood flow across the cross section of the artery, or to assist by injecting the contrast medium, in the efficient X-ray examination of the arterial tree. The insertion of a catheter into an artery leads to the formation of an annular region between the catheter wall and the arterial wall which results in the alteration of flow field. Therefore, the pressure/pressure gradient or the flow velocity/flow rate recorded by the catheter-tool device will certainly differ from that of the uncatheterized artery. In order

to obtain an accurate measurement, it is very much essential to know the catheter-induced error. This can be achieved through mathematical modelling.

Peristaltic transport: The biological mechanism of the pumping of fluids in a muscular tube by means of peristaltic waves has been the object of scientists, engineers and urologists since the past few decades. The peristaltic mechanism can be found in the movement of chime in the gastrointestinal tract, transport of lymph in the lymphatic vessels, the transport of urine from kidney to bladder through the ureter the intra-uterine fluid motion etc. The distribution of pressure as function of time is measured in the ureter is one of the important diagnostic tools in urology. This is one of the biomedical approaches based on peristaltic transport. This mechanism can be achieved by considering the flow through the tube of arbitrary shape.

Till date, we achieved the results by making certain mathematical assumptions in understanding the above situations. But for real life applications, further research has to be done in the directions to develop the theory which overcomes the limitations of the existing models and our group is presently working in this direction.

Nagarani Ponakala is a senior lecturer in department of Mathematics, UWI Mona. She is a member of Mathematical Modelling (physiological fluid dynamics) group and coordinator for B.Sc in Mathematics and Modelling Processes Programme and department Graduate Coordinator. She is **Selected as Distinguished young women scientist** from Jamaica/Caribbean by **Interamerican Network of Academics of Science** (IANAS) for the year 2015. Also the winner of TWAS-CAS young Scientist for the year 2016 by The World Academy of Sciences (TWAS) and Caribbean Academy of Sciences (CAS).

6. Copula methodology for risk analysis

Smail Mahdi

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The univariate approach is still widely used in many natural and social science disciplines for risk analysis and assessment. This is mainly due to its simplicity and easy interpretation of the results. However, phenomena are often governed by a combination of relevant dependent variables which could make the decisions taken from single variable analyses erroneous . The introduction of Copulas to model the dependence structure of the underlying variables, independently of their marginal distributions, has made things easier and more tractable. Return periods of dangerous events such as flooding, droughts and economic crashes can be also computed in the copula domain. Hence, the importance of determining accurately the underlying copulas. In this presentation, we illustrate such analyses using a special subset of the well -known Danish Fire Insurance Dataset collected at Copenhagen Reinsurance over the period 1980 to 1990, where each total claim has been divided into three risks consisting of a building loss, a loss of contents and a loss of profits, caused by the same fire. The subset consists of all large claims of at least one million Danish Kroner. We show that the bivariate Gaussian copula with correlation coefficient 0.31 is appropriate for modeling the dependence structure while the distribution of building losses and content losses are adequately fit by the Log-Logistic distribution with shape parameter 2.35 and scale parameter 2.70 and Burr distribution with shape 1 parameter 0.005, shape 2 parameter = 159 and rate =0.99, respectively. The loss of profits component is irrelevant in -our analysis. Goodness of fit tests based on Cramer Von Mises statistics with rigorously computed p-values were successfully used and showed that the bivariate Meta -Gaussian distribution fits well our data.

Keywords: Risk analysis, Gaussian copula, goodness-of-fit, Log-logistic and Burr distributions

7. Understanding Diffusion Behaviors Through Individual Characteristics

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Numerous diffusion models can be found in the literature. Although these models have been widely used to address several problems related to diffusion phenomena at the individual level, they do not faithfully represent the microscopic mechanisms that take place in the real transmission processes. Today, the apparition of new communication media allows model to go further by providing data on many real cases of diffusion. In particular, these new approaches have shown that several dimensions involved in diffusion phenomena are not present in current models. In our works, we focus on two original dimensions to address the diffusion problem: the *personality* and the *neutrality* of the spreader. Our aim is to understand the influence of these two dimensions regarding the diffusion behaviours. Our approach has been used to study diffusion of messages related to several events occurred in January 2015. The results obtained provide a new and interesting lighting on the heterogeneity of the diffusion behaviors in function of personality and neutrality levels. This work provides a methodology which may be useful in marketing strategies, for instance the analysis of the features of individuals who talk about their touristic trips in Caribbean. Such an approach may also be useful to understand diffusion and exchange behaviors in the Caribbean basin. From an economic point of view, such an approach could be used for understanding the expectations, targeting individuals and proposing tailored offers.

Keywords: Social network analysis, Data analysis, Diffusion, Human behavior

8. Some actions to control e-rumor

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With the development of new communication technologies and the emergence of media on the Internet, the dissemination of information is done at a very large scale and in a short time. Namely e-rumor, it can cause a lot of damages in a society in political, financial and private life domains for instance.

Nowadays, it is important to investigate some strategies in order to control the rumor spreading on social networks. In these last decades, many studies were carried out on this topic in order to understand it and to prevent its propagation. In this talk, we consider a SIR type model examining the e-rumor spreading and we modify it by adding some externals actions. Then we are going to control them in order to minimize the propagation of rumors. For this, we use a mathematical concept named optimal control theory.

Keywords: SIR type model, e-rumor, optimal control, Pontryagin's maximum principle.

9. Structural equation modeling to identify factors associated with reluctance to go through healthcare procedures in the poor population of Cayenne, French Guiana

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In French Guiana, social inequalities exist mainly due to immigrants who represent a third of the population. In such a situation, health care inequalities are important. A survey was carried out about populations coming at the Red Cross mobile screening unit in poor urban areas of Cayenne from July 2013 to June 2014. Structured questionnaires consisted of 93 items. Written informed consent was requested at the beginning of the questionnaire.

The objective of this study was to analyze factors associated with shyness and reluctance to go through medical or administrative appointments. Previous study (1) pointed out that shyness and reluctance had high predictive values on healthcare renouncement. Therefore, a structural equation model (SEM) was developed using unobserved variables, called latent variables, such as medical knowledge, medical attitudes. Latent variables are built according to observed variables with witch they are associated. Statistical inference about the model parameters are processed by means of a R package.

Keywords: Statistical method, structural equation modeling, healthcare, precarious population, renouncement.

Reference : L. Valmy et al. Prevalence and Predictive Factors for Renouncing Medical Care in Poor Populations of Cayenne, French Guiana. *BMC Health Services Research* 16 (2015): 34.

10. Contribution of scan statistics in detecting fragility spots in Martinique

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Nowadays, there is great concern in many countries about the fragility of certain populations with respect to social and health matters. In the French West Indies and Guyana, the Observatory of fragility provides a tool for identifying risks of fragile health. Its aim is twofold: facilitating access to health care devices and promoting preventive activities with respect to the population in need. However, measuring the spatial and temporal risk level of fragility is not easy. Furthermore, some tools used in France are inappropriate in the French territories of America. Therefore, a research project was presented with the main objective being to develop tools for building fragility indexes with higher predictive values and better identification of priority areas in the French West Indies. These elements of territorial diagnosis in concertation with local deciders or authorities will contribute significantly to improving prevention activities and social service missions. A generalized scan statistic based on the newly built fragility indices is obtained by calculating the maximum of a standardized statistic over a set of spatial regions and time windows. Scanning over a grid may be a challenge because of the non-availability of many personal addresses in the geocode datasets. A data processing algorithm is under study to overcome this difficulty.

Keywords: Scan statistics, fragility index, predictors, spatio-temporal process, statistical tests, data processing

11. A mechanism for a simplified interface for automatic identification of plants

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Automatic identification of plants is a major challenge for industries requiring botanist support. The plant identification system, automatic or partly assisted, is a field that has taken a real boom with the "Pl@ntNet" since 2010. This project aims to promote, through financing, fully automatic, plant identification system. Indeed, this issue is a major concern in areas such as Health, Agriculture or Customs. This diversity of sectors, sometimes composed of no botany actors, shows the need to implement platforms equipped with easy to use interface. This interface simplicity involves the use of robust algorithms able to perform automatically all stages of the processing chain leading, from the image analysis to the identification of a plant.

The proposed objective consist of the establishment of a platform equipped with two interfaces. The first interface is dedicated to supervise learning, reserved for experts in the field of descriptive botany. The second interface is for the user of the system which carries out an identification process. The proposed system is divided into three modules, the first allows the segmentation of an image based on color. The result is a partition of the image containing all the elements of the scene. The second module allows the selection of the most relevant items based on the zones of interest where the photographer has focused his attention. Finally, the last module is responsible to perform the recognition by making multiple classifications based on the classification criteria of descriptive botany.

All of these procedures leading to a simplification of the user interface are presented throughout this work.

Keywords: image processing, pattern recognition, automatic identification, interface.

12. Analysis and numerical solution of a quantum physics phenomenon modeled by Nonlinear Schrödinger Equation

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Quantum physics is a theory that describes the behavior of matter at atomic scale and understand the nature of electromagnetic radiation. Several technological advances have been made possible thanks to this theory: The laser emission in CD, Blu-ray, printer, mouse. Medical imaging people use it in ophtalmology, in nanotechnology, optical fibers use it in computer networking, broadcasting, medical scanning, and military equipment. Due to the huge spectrum of important applications that has been generated from the Schrödinger's equation, this equation has been widely studied ([6, 1, 3]). We consider here the generalization of discrete Parity-Time-symmetric (PT) networks that is given by distributed couplers, modeled by two linearly coupled nonlinear Schrödinger equations with gain and loss.

$$\begin{cases} iu_t &= -u_{xx} + \kappa v + i\gamma u - (g_{11}|u|^2 + g_{12}|v|^2)u, \\ iv_t &= -v_{xx} + \kappa u - i\gamma v - (g_{12}|u|^2 + g_{22}|v|^2)v, \end{cases} \tag{1}$$

where all coefficients are real ($\kappa \geq 0$ and $\gamma \geq 0$). When all nonlinear coefficients are equal, the system (1) which is the PT generalization of the Manakov model ([4]), revealed several interests [5]. In the one-dimensional case, when the PT symmetry is unbroken, one shows analytically that the solution of the Manakov system can not blow up in finite time in the energy space [2]. Numerical results are provided to illustrate this theoretical behavior with a suitable numerical procedure.

Keywords: Nonlinear Schrödinger equations, Parity-Time symmetry, global existence, blow up

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13. Simulations of Bacterias motion in a complex area

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In this presentation, we consider a model of a viscous Newtonian fluid flow with rigid particles in a complex area. In this particular case of fluid-solid mixture, we assume that the particules have no influence onto the fluid. Thus the model is composed of the time-dependent incompressible Navier--Stokes equations for the fluid [1,2] and the Newton's second law of motion for the particles [3]. To solve this problem, the approach that has been chosen is to decouple the model. The solver uses an incremental projection method and finite volumes for the fluid flow [4] and a meshless method for the particles. The interactions between the particles are considered as inelastic collisions. Numerical simulations will represent bacterias motion in an aqueous medium. The domain that is considered is three-dimensional, and the software has been developed in object-oriented Fortran and C++.

Keywords: fluid-particle mixture, incompressible Navier-Stokes, Newton's second law

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14. A data-oriented approach for flash flood prediction in the Caribbean area

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In this paper, we address the critical problem of flash flood prediction in Caribbean watersheds for which current hydrological systems are not well suited. Caribbean basins have indeed small surface areas with steep slopes due to their volcanic origin, and they are subject to tropical rainfall conditions such as massive and localized precipitations.

In this paper, we present a data-oriented solution which main originality is two-fold: (1) the predictive model is defined as a set of aggregate variables that act as classifiers, (2) a genetic algorithm is implemented in order to find the best sets of such classifiers. The design of this solution was guided by three main objectives: precision, readability and flexibility. A flood forecasting solution should indeed not only provide good accuracy, but it should also give clear explanations about how and why an alert is launched or not. Moreover it should be easily adaptable on similar catchments. The concept of aggregate variables allows to reach the objective of readability by using simple rules based on threshold over-passing of aggregated values, while the data-driven nature of the solution and the use of combinations of aggregate variables allow to reach the objective of flexibility. The results obtained on the case study of a typical Caribbean river, for which runoff data are available at three locations, demonstrate the efficiency of the solution.

Keywords : Flash floods, predictive models, aggregate variables, evolutionary algorithms

15. Precision Agriculture in the Carribean Area and Big Data Techniques : Review and Perpectives

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Big data or *Data Science* is a large field that has emerged recently and is at the crossroads of various domains such as statistics, machine learning and artificial intelligence. It consists mainly of extracting knowledge - that is expected as new, helpful and informative in order to use them afterwards in different ways - from massive data sets. Decision-making is a common example of process that generally takes advantage of *Big data* techniques. The availability of massive data sets collected through multiple sources (internet, sensors, field surveys...) that are not easily processed by classical approaches has led to use big data techniques and data mining tools. In this paper, we focus on the area of precision agriculture that provides farmers with various tools in order to optimize their practices regarding criteria such as their ecological footprint or their productivity. In the Caribbean region, the climate change impact increasing rainfall especially during the dry season which facilitates the development of pathogens. We propose a review of existing implementation with sensors and techniques in data analysis and big data processing specifically dedicated to collect agricultural and environmental data and to extract knowledge from them. For this purpose, we identified 4 main axes among which we can classify these approaches: (1) design and implementation (2) practice optimization (3) pesticide reduction (4) productivity increase. We then discuss how these axes are complementary and we show how they can be used to improve the agricultural situation in the Caribbean region. Finally, we detail different perspective directions to propose efficient online tools for local farmers adapted to their requests and local specific issues such as reducing pesticide and water consumption.

Keywords: Precision agriculture, Data mining, Big data techniques, Wireless sensors network

16. Use of programmable floor robots for children with psychomotor disorders: a first short experience at microscopic level with unexpected results

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A growing number of countries modify their educative programs in order to learn computer science since their primary schools: actually, computer science brings pedagogical benefits concerning notions like constructivism and enables children to become actors (and not only consumers) in the digital world. Thus, computer science becomes a study field for pupils in a classical classroom. Furthermore, an increasing number of children have psychomotor disorders and few studies have been conducted to analyze the positive or negative impact of the introduction of computer science on children with learning difficulties.

In this study, we propose to use programmable floor robots for children having psychomotor disturbances, and we qualitatively estimate the impact of this use on the performance of the children. The study was realized during 8 months at a microscopic level (15 children). The first observations show that the use of programmable robots has positive impacts on these children. Even if the positive impacts of programmable floor robots have limits, the use of these robots and more generally the initiation and training to computer science should enable children with learning difficulties to develop or improve new skills.

Keywords : programmable robots, computer science, psychomotor disorders.

17. Climate Informatics:

Identifying relevant weather types in the Lesser Antilles

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In order to inform people of the risks, meteorologists or climatologists process big volumes of recorded data to predict the effects of the climate change (floods, droughts, rising sea levels, etc.). Weather types have ever been defined in temperate climate of Europe. Such a discrimination yields to identify or localize dry seasons for instance. However in tropical climates as in the Lesser Antilles, so far no result has been set about identifying and discriminating relevant weather types.

Researchers in Climate Informatics, who are physicists or computer scientists, are used to apply statistical methods on climate model outputs as data. The objective of the present work is to show how Machine Learning methods allow to detect and identify relevant weather types in the Lesser Antilles.

Several clustering algorithms were compared on data recorded in the frame of the european project ERA-Interim : *thirty-six* years of meteorological parameters, each recorded four times a day, have been downloaded and stored, which represents about *5To* of data. The best results were obtained with the Agglomerative Hierarchical Clustering algorithm that is presented in the poster. The method led to the identification of a specific cluster associated to cyclonic events. This weather type has never been identified by algorithm in the Lesser Antilles.

18. Affective Computing: Classification and prediction of emotional states

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"Affective Computing is computing that relates to, arises from, or deliberately influences emotions" (*R.W. Picard, MIT Press, 1997*). Specifically, psychosocial equilibrium is now considered as a major issue for both individual and public health. Predicting human emotions via non-intrusive methods is a great challenge triggered by the rise of intelligent assisting systems. In order to determine the emotional state of a subject having a potential psychosocial disorder, it is required to process both neutral and expressive emotions. A computer-engineered method aiming to provide emotional information from videos is proposed. An original approach for affect classification and its interpretation is presented.

The database is part of the HUMAINE database, and consists of a large volume of video clips, each displaying individuals, depressed or not, talking with a conversational agent. Both the high-dimensionality of data and its temporal aspect require a pre-training that consists of cleaning, sorting and feature selection, in order to make relevant information usable for further processing by Machine Learning methods. Next step consists in classifying the affective state of subjects according to their positivity or negativity (*Russell's model, 1980*). By means of six independent classifiers, each running a Support Vector Machine algorithm, separate performances are obtained for each class of emotions. The results reveal an interesting "neutral area phenomenon", where emotions tend to be harder to be detected. Though more frequent, neutral emotions seem to carry less discriminant information than expressive ones. This issue will be a key for designing a tuning step in further research.

Keywords: Emotional state, affective computing, machine learning, intelligent assisting systems.

SESSION: SCIENCE EDUCATION

19. Multimodal study of the impact of graphomotor training

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Graphomotor control constitutes a condition to the mastery of literacy and more widely to successful school apprenticeship. The Guadeloupian context is marked by significant rates of early school leaving and illiteracy. In such context, our research is concerned with two questions: "Does graphomotor training can help since kindergarten to strengthen graphomotor performances and the progression of literacy?" and "Which methodological approach can help to characterize the impact of graphomotor training?" By using online acquisition devices, we have tried to characterize the graphomotor skills for 132 pupils. These 3 to 5 years old children were submitted to 3 methods of graphomotor training. One of the methods that suppose family involvement, includes activities inspired by kid's early scribbles. We considered the statistical analysis of the blind feedbacks of the teachers, of the features provided by the visuo-spatial processing of handwritten productions and of features provided by the sigma-lognormal modeling of the pupils' movements. The results of this multimodal study show an increase in graphomotor control and in interest for drawing and handwriting tasks. The implication of these preliminary results on the pedagogical and co-educative choices is discussed.

Keywords: graphomotor training; litteracy enhancement ; kindergarten; visuospatial analysis; sigma-lognormal analysis; family involvement; scribbling.

20. Traditional 'Ka' drum from Guadeloupe : Study on wood quality and vibrational characterization

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The emblematic instrument of Guadeloupean culture[1,2], traditionally called "Ka" is a drum composed of a single goatskin membrane mounted on a wooden barrel. It is principally used in gwo-ka music, but in other forms of musical expression as well such as modern gwo-ka[3], zouk, hip-hop, and ragga.... While the "Ka" is more and more used, the materials necessary for its manufacture are becoming increasingly rare. The "Ka" drums are built with temperature-and moisture-sensitive materials: goatskin and wood. In order to standardize the instruments' acoustic properties and reduce their sensitivity to environmental conditions, it becomes important to have a better understanding of the mechanical behaviour of the drums in relation to the physico-chemical properties of the materials used for its manufacture.
The acoustic answer of a "ka" was studied using an experimental set-up composed of two microphones and a data acquisition system. The membrane was hit with a straight impulse applied with a hammer. The sound was recorded by the two microphones : one located in front of the membrane, the other behind the drum. The membrane of different drums (plastic or wood) was excited in different areas. The signals collected by the microphones were analyzed by Fast Fourier Transform (FFT) to obtain the power spectra. The careful study of the spectra then obtained for the different positions of the microphone, and also for the different drums allowed us to point out the influence of these various parameters on the acoustic answer of the "ka". Particular attention was paid to the effect of the barrel on the propagation of vibrations from the skin. Simulations to understand their acoustic roles are underway.
In order to select the wood species presenting the optimum stability when exposed to moisture, the hygroscopic characteristics of different wood species generally used in "ka" manufacturing (*Termina lia catappa, Swietenia macrophylla, odorata Linné* and *Tabebuia rosea)* have been determined. The density of these different wood species is determined, their water absorption ability and other hygroscopic properties are studied using different techniques such as Fourier transformed Infra-red (FTIR) spectroscopy as well as thermogravimetry and differential scanning calorimetry.
Among the various studies already conducted on drums[3,4], this study conducted in collaboration with drum manufacturers and financed by the Chamber of Trades of Guadeloupe should bring new promising results on the instrument's production and the musical practice of the Guadeloupean "ka"drum.

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21. Highlighting Context Effects in a Pedagogical Innovation on Geothermal Energy in the Caribbean and North America

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The purpose of this study is to identify links between geothermal context and the conceptions in different initial teachers training, from the Caribbean and North America. The Caribbean Islands are located in a subduction zone, creating a great potential for geothermal energy. In Guadeloupe, this potential has been harnessed and a geothermal power plant produces about 5% of the local demand for electricity. It is called high temperature geothermy. In Quebec the bedrock mainly consists of ancient Precambrian rocks from the Canadian Shield, which does not allow for electricity production. The geothermal heat is used to regulate the temperature in buildings, to create spars, to grow crops and other purposes. It is called low temperature geothermy. This design-based research (Sandoval, W. et Al., 2004) takes part in the contextualization of sciences education research works (Blanchet, P. et Al., 2009, Anciaux, F. et Al., 2013) and in the continuation of the Gounouy project (Fecil, S. et Al., 2014). A project-based learning on geothermal energy has been set up with two groups of initial teachers training from the Université du Québec à Montréal (UQAM) and from the French West Indies University (UA). The purpose is to create collaborations between each group in order to enable them to encounter, recognize and formulate their conceptions. Further, they will collectively elaborate a more complex understanding of conceptions about geothermy. More specifically, the design used in this learning study aims highlight context effects (Merlo-Leurette, S., Forissier, T., 2009). Context effects are pedagogical events occurring when there is a clash between the different conceptions of students. During courses, students investigated on different problematic related to geothermal energy. Communications via videoconferences were arranged so that the counterpart teams may discuss their investigative findings. Videos from the exchanges have been collected, as well as weekly summaries about student's accomplishment, ideas, questions and feelings. Pre-test and post-test questionnaires on geothermal energy were submitted at the beginning and at the end of the project, to compare conceptions before and after the learning process. Collected data enables to bring out the student's contextuality. Therefore, they highlight context effects, due to the differences between the geothermal contexts in Guadeloupe and in Montreal. However, data also pointed out other context effects related to differences between Anglo-Saxon and European pedagogical habits.

Keywords : science education, geothermal, context, context effects, project-based learning, conception.

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22. Linguistic and biodiversity: some irrefutable links?

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As a linguist, in this proposal I would like to deal with links we can establish between biodiversity and linguistic. Several years ago, works focusing on biodiversity generally did not take into account the speakers' communities. This seemed a priori reasonable as natural features can be mainly explained within the ecosystem to which they belong. Obviously, we now know that some external factors (human impact, climate change, natural disaster, etc.) have also incidences on biodiversity. This includes of course people who live in a given ecosystem, as a result of their behaviors and how they perceive the nature globally and, one or another species in particular.

But, can we consider that people languages could also be important when dealing with the questions of biodiversity? And if so, how? Some recent researches (Gorenflo & al.)[1] pointed out the correlations between geographical areas of great linguistic richness and areas of great biodiversity richness. From this report, we will study different reasons that could explain this fact, in particular in the Caribbean area. We will especially explore the hypothesis of a possible inter-influence between language and perception of reality, and talk about the interactions between language diversity and biodiversity.

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Keywords : linguistic, linguistic diversity, biodiversity, ethnolinguistic, endangered languages

23. Foundation of the interpretative activity of professors of conduct of elementary pupils

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This research aim focused on the interpretation of the action of pupils for two school professors in mathematics and in physical education. The research is in the field of work concerned with the process of didactic contextalisation (Delcroix, Forissier, Anciaux, 2012). It also mobilizes process of the comparative approach (Mercier, Schubauer-Leoni et Sensevy, 2002). Data processed within the limits of this communication were collected by interview of self-confrontation. The results are used to model the interpretive filters according to three axes: the practical epistemology of the professor through the categories of Shulman (1987), forms of inference employed and his organization. Our study allows us to confront, in this model, the specifics or generics, fruits of disciplinary didactics to the effects of the didactic contextualization. We note that the use of contextualization seems to act as a filter (regardless of the teacher or the discipline concerned) constitutive of a profile kind (in the sense of Clot). Finally, at the end of this research, we discuss the contribution of this type of study for the training of teachers by querying the aspect built of these filters in action-context interaction and by validating the legitimacy of this question: "What is happening in the minds of the students"?

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24. Creole and mathematics

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The study presented consists of a lexicon of creole words which express mathematical concepts in Primary Teaching in Guadeloupe. A Senate report (Doligne 2009) shows a percentage of a lower level of achievement in Overseas Departments. In these regions, French and Creole coexist, the population is bi-plurilinguism and the teaching mainly in the french language are probably some of the reasons for the difficulties in mathemathics encountered by the students. Bernardo (1998) for the problem solving and Anciaux (2007) for EPS have found a certain language compatibility in bilingual people for knowledge transfer. In other words, bilinguals who learn certain notions in one language hardly transfer these to the other language. Furthermore, a biligual person can have positive effects on his cognitive skills compared to the monolingual (Ludi, 2001). The lexical similarity between French and Creole and the semantics variations of the same word from a language to another are likely to have consequences in mathemathics learning, particularly in geometry where the sensor-motorial skills required are inseparable from the language (Duval, 2005). Besides, the lexicon of geometry is limited in French and Creole dictionaries. How create a lexicon in creole for mathemathics that is relevant from a didactic and linguistic perspective ? In 2012, during a semi- structured interview, 6 teachers chosen according to 3 criteria (degree, habilitation in creole and Mathematics Masters) suggested a geometry lexicon in creole based on 19 concepts and 10 guidelines identified in the french curriculum of 2008 for students from 8 to 11 years (key stage 2). The linguistic analysis is based on the existence of proposals in at least one of the four French and Creole translations dictionaries used. From a didactic point of view, a grid analyses the suggestions according to 6 criteria (existence in creole, familiarity for the student, homophony in French, polysemy, mental image associated, mathemathical relevance). This grid allows to the level of difficulty in mathemathics education from « unprecedented » (*corner* means in french *angle* and in creole proposal *lang* namely *tongue*) to « low » (*corner*→ *angle* → *kwen* → *square*) through « indentical » (*square*→ *carré* → *karé* → *quoin*).

Keywords : mathematics, linguisitic, lexicon, bilinguism, creole, french

25. Teaching of french as a language for integration to migrants in Guadalupe French West Indies: From linguistic insecurity to contextual pedagogic tools.

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Since 2011, the organization of linguistic education for foreigners has changed in France. Now, the FLI concept controls the integration of foreigners in the french society by a transmission of french language and republican values. Our paper is about the questions coming from the West Indies context, specifically in Guadeloupe, and it is looking at the educational matters closed to Haitians natives' people. We are asking questions about the code switching phenomena and are trying to find, out of the blue, how some contextual specific experiments can help the students in being proud of their culture and in changing their vision of scholar and learning system. Feedback from those oral original sessions are aimed at offering solutions to establish a suitable teaching method named FLR.

Keywords: Standard Language and Variations, French language, self confidence, vernacular language, lingua franca, educational tools, contextualisée didactics, educational remédiation, reinsurance, diglossia.

26. Bilingualism and Science Education in Guadeloupe

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This experiment is the evaluation of teaching science with one or two languages with a student population at the university. The aim is to measure the impact of a unilingual or bilingual education on learning of a scientific concept. Quantitatively, the statistical analysis of the results showed no effect of the language used and moments of evaluation on the performance of different groups (French, Creole, alternating). Thus the fact of using one language or another, or both had no effect in this experiment, the test performance, and all students regardless of the group grew. It may be noted that the group receiving bilingual education obtained at post-test performance slightly better than the monolingual group. These results call for the establishment of other experiments to test this medium-term benefit of bilingual education compared to monolingual education.

Key words: bilingualism, science, teaching, university

SESSION: PHYSICS OF THE ATHMOSPHERE

27. Infrared Desert Dust Index over the tropical rainforest of French Guyana

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Africa is the most important continent in term of desert dust emission. It is well know that a great part of African desert dust come from the Bodele depression. Transported over the Atlantic Ocean in a westward flux, it reach the Latin American coast before to sow the Amazon rain forest. A Recent study shows the amount of desert particle arriving over the rain forest and participate to the preservation of this earth ecology spot. IDDI is a dust index, calculated from IR METEOSAT imagery and mainly used over desert land, to follow dust plume. In our work, we changed the process by using GOES IR imagery and applying it on a uniform wet land: the rain forest.

To evaluate our IDDI calculation in moist atmosphere, we compared the variation of the obtained index to the dust concentration measured by the air quality network for the same area. First we used the algorithm of Coakley and Breethon on the IR images of the study area to mask the cloud presence before the determination of the reference temperature image constituted with the maximum observed pixel temperature on two weeks. All the satellite images have to be taken at the same time around midday. The difference between the reference image and the studied image both without clouds, give us the IDDI.

We compared mean IDDI for a small area centered on Cayenne urban zone and PM10 measured for the town at the same time. We observed a correlation for the intense dust events but not for the weak one.

We have identified two way to improve our IDDI for moist region: the first one is a stronger process of cloud and atmospheric water pixel elimination and the other way concern the choice of the PM10 area for the correlation because an urban zone is not uniform in term of temperature.

28. Dust event intensity statistics related to air masses trajectories climatology over Guadeloupe

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Effects of air pollution on human health were now well established. One of the most important pollutants is the mass concentration of particle matter with diameter less than 10 µm (PM_{10}). Desert dust is the major pollutant affected the air quality of the Caribbean region. North Africa is the world's largest and most persistently active dust source, accounting for 70% of global emissions. A large fraction of these emissions is carried westward across the Atlantic in a "plume" that can be clearly seen in satellite products.A climatological study of dust events with mean daily PM10 higher than 35 µg m-3 over Guadeloupe have been analyzed between 2005 and 2015. We pay a special attention on the origin and the path of the air masses bringing desert dust over the island, using back trajectories and AOT satellite imagery study.

We identified two classic types of trajectory bringing desert dust in Guadeloupe, North West Africa (NWA) with dusty air masses lifted in a region situated at the intersection of Mauritania, Mali and South Algeria, and South West Africa (SWA) with dusty air masses lifted over the Bodele basin to the northeast coast of South America. We identified also two other cases: Mixed air masses North South West Africa (NSWA) with the both previous trajectories arriving over Guadeloupe at different altitudes between 1500m and 3000 m, North East Atlantic Dust (NEAD) with air masses trajectories come from the Atlantic Ocean, crossing in the vicinity of African coast but not over the continent.

We found for the 242 small dust events (35 µg m-3<PM10<50 µg m-3):

NWA	SWA	NSWA	NEAD
38%	18%	27%	11%

Fort the 140 strong dust events (50 µg m-3<PM10<70 µg m-3), we noted:

NWA	SWA	NSWA	NEAD
47%	18%	21%	6%

The 50 huge dust events (PM10 >70 µg m-3) presented types of trajectory:

NWA	SWA	NSWA	NEAD
38%	22%	34%	2%

In conclusion, we try in this first stage to obtain a dust event intensity forecast using the origin of the air masses, because model can give us very good forecasting for air masses trajectories but not yet for dust transport.

29. Air Pollution Biomonitoring with Bees of Guadeloupe: Experiments and first outcomes

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The air quality is one of the biggest problematic of these last decades, due to increase of air pollution in the world. Pollutants are usually generated from human activities or natural sources. For a long time, air quality evaluation was based on punctual and automatic measurements of pollutants, which provide local physical and chemical data without considering the global impact on biota. Nowadays, numerous new tools are applicable for air quality evaluation. In this context, biomonitoring methods have received increasing interest while providing very promising results. This is especially relevant for the most part, as they present simple implementations and low cost. Indeed, this represents a new way to perform air pollution evaluation.

In this study, bees are used as sampling tool because they fly within a large area of 3 km of radius during the nectar and pollen collection. Their body is covered of hairs, which makes them particularly suitable to keep many substances when these latter come into contact. They are thus very sensitive to environmental pollutants.

Bees of Guadeloupe have been used to detect the presence of PAHs, PCBs, metal pollutants PM10, PM2.5, which is typically found in atmospheric compartment. Several analytical techniques were used such as Fluorescence detection by X and the X-ray scanning electron microscope for the identification of heavy metals. Gas chromatography / mass spectrometry (GC / MS) was used to analyze the PCBs. We will present the difficulties encountered during the use of the different analytical processes and the first results obtained.

30. Comparison between biogas concentrations emitted by two open landfills: Truitier (Haiti) and Gabarre (Guadeloupe)

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Household and related wastes management are become a real problem in modern society. The waste increasing amount led to use more and more waste incinerator and the landfill. . In underdeveloped countries most of the collected garbage are left in uncontrolled open landfills. The open landfill, with flying plastic and biogas emission, creates nuisance for the neighboring environment and population. The main gases produced by waste decomposition are VOCS (Volatile Organic Compounds) and hydrogen sulphide (H_2S). In our study located in Haiti and Guadeloupe, we used hydrogen sulphide as a tracer gas to determine the impact on the environment, human health. Our both measurement campaign was held in Haiti and Guadeloupe. In he controlled garbage dump of Gabarre (Guadeloupe), a portion is completely replanted, and the other part receives all types of waste. The biogas from the garbage dump Gabarre is channeled into pipes, which will be burned by flare. The uncontrolled garbage dump of Truitier (Haiti) is only controlled by the scavengers. They put in fire the waste, and all the site is under a smoke plume. To evaluate the emission of gas, we have to identify the center of the landfill and the measurement point locations. The points have been selected downwind of the landfill taking in account the average local wind direction, in order to observe the gas evolution of the garbage dump. We observed from the performed concentration of H_2S, a same belt behavior for both sites with low concentration soon in the morning, a maximum raised around midday, followed by a decrease during the afternoon. This observed behavior suggest an influence of sun energy on the emission rate. With the concentration maximum, the intensity and the direction of the wind, we calculated the emissivity reported to a central point. We compare their emissivity taking in account the daily amount of waste, the total surface of the landfill and the waste composition ratio.

With this first results we evaluate and compare the concentration of the biogas and their impact on neighboring populations in Port au Prince and Guadeloupe.

Keywords: landfill, garbage, biogas, H_2S emission

31. Determining the variability of electromagnetic signals as affected by land use in a tropical savanna

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Electromagnetic induction (EMI) variability of soil has been well documented for various soil types, however, little is still known about the impact of changing land use gradients on soil variability. A sparse knowledge base exists in savanna ecosystems which are subjected to regular land use change and no research has been conducted in tropical savannas with regard to soil electromagnetic variability signals in different land use to determine the consequences of land use change. In addition to the variable nature of tropical soils, indiscriminate land use presents a substantial problem in soil sampling and characterization. Consequently, evaluating the variability of soil patterns and properties at the plot-scale is of great value in understanding the magnitude of resource depletion due to land use. Hitherto, traditional methods which are invasive, labour, cost and time intensive have been employed to understand soil variability, but they do not adequately assess within field variability. Using geophysical techniques which are non-invasive, time and cost efficient, we determined the potential of EMI technique to assess the spatial variability of soil properties in a changing land use gradient from pristine to anthropogenic conditions in a tropical natural savanna. EMI-based apparent electrical conductivity (ECa) measurements were obtained at two (2) different depths (shallow=0-0.75m and deep=0.75-1.5m). Geostatistics were used to examine the underlying spatial structure of the data as a function of land use and soil depth. Our findings showed that ECa shallow (ECa_s) was generally more variable than ECa deep (ECa_d) across different land uses. Natural land uses of forest (ECa_d range= 23.9-27.7 mS/m) and grasslands (ECa_d range=66.1-67.1 mS/m) generally had a higher range of ECa_d values than anthropogenic land uses. Anthropogenic land uses, however, had higher ECa_s values (agriculture ECa_s range = 5.0-11.3 mS/m, quarry ECa_s range= 22.8-30.5 mS/m, residential ECa_s range = 39.2-60.0 mS/m) than natural land uses. The spatial structure of all land uses at both depths was described by Gaussian, spherical and exponential semivariogram models. The subsequent kriged maps using the semi-variogram models showed greater variability in the anthropogenic than natural land uses suggesting that deleterious human activities which decrease soil cover and increase soil compaction degrades soil quality in tropical savannas.

Keywords: Electromagnetic Induction, tropical natural savanna, geophysical techniques, land use, tropical soils

32. Forecasting of irradiance using Multiscale Methods

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In Guadeloupe Island, the development and utilization of the PV suffer from limitations. To increase the integration of solar energy into electricity grid, a good knowledge of a global solar radiation variations and more accurate solar forecasts are needed. We propose a hybrid AR (Autoregressive) and NN (Neural Network) model combined with a multiscale decomposition approach to predict solar radiation under the tropical climate. We investigated this with several techniques of multiscale decompositions such as Empirical Mode Decomposition (EMD), Ensemble Empirical Mode Decomposition (EEMD) and Wavelet Decomposition (WD). The predictive performances of the hybrid model are presented and compared with the classic forecast model (AR, NN and persistence). This study highlights the significant accuracy of solar forecasting using the proposed hybrid model particularly with the wavelet decomposition.

Keywords: Global Solar radiation forecasting, Multiscale decomposition, Hybrid Model.

33. FLEXPART and CALPUFF intercomparison. Guadeloupe study case.

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Air quality management requires previous knowledge of atmospheric processes, and air quality modelling is an important tool to achieve it.

Guadeloupe, located in the middle of theLesser Antilles arc has an urban center with 200,000 people, near a main diesel power plant and road network.The air quality of this urban area may be compromised and requires study for management.

CALPUFF and FLEXPART, are two of the most versatile and applied Lagrangian models in recent years. The first one, modelof puffs dispersion, and the second one, model mathematical particle dispersion, both can simulate the effects of time and space, of weather conditions in the transport, transformation and deposition of pollutants in the atmosphere. FLEXPART model has recently been used to study the dispersion of pollutants in Guadeloupe. CALPUFF model could be too useful for evaluatingemission control strategies, for establishing plans for immediate intervention in the control of episodes of high pollution, and for identifying responsibilities in ground level concentrations episodes in this region.

In this workFLEXPART and CALPUFF model for local dispersion of NO_x from one point source in Guadeloupe were used and intercompared, finding that both models can describe the dispersion of NO_x in this region.

Keywords: modeling, dispersion, intercomparison, FLEXPART, CALPUFF, Guadeloupe

34. Use of modeling tools to predict Methane Emission from a rehabilitated waste dome in tropical insular climate

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In the Caribbean, most of the waste is stored in open landfills without biogas collection systems. Methane emission from landfills is a major contributor to Greenhouse effect. Several models projecting methane emissions from landfills have been proposed in the literature. Most of the studies using these models were principally conducted in the United States or in Europe. Few studies have made use of them in tropical areas. Caribbean islands are characterized by significant rainfall and high humidity throughout the year. The Landfill Gas Emissions (LandGEM) and the Afvalzorg models are among the conventional models allowing to take into account, though roughly, the climate environment In the literature there is very little data available on methane generation constant (k) and potential methane generation capacity (L_0) for Caribbean landfills. Generally, default values are used to estimate these two parameters. In this study, we apply LandGEM and Afvalzorg models to La Gabarre, the main open landfill of Guadeloupe archipelago in the Lesser Antilles, with specific values for k and L_0. By comparing model results to field measurements, we observe that the model biogas production is greater than recovered biogas collected to be flared by a factor of 1.94 to 3,80. However, accounting for numerous error factors such as a recovery efficiency of the collection system which is necessarily lower than 100%, waste coverage type or the fact that LandGEM and Ecuador models assume that all waste is household waste, this bias can be explained.

Keywords: Landfill; waste dome; methane emission model; tropical area, biogas flare system

35. Solar spatio-temporal forecasting in order to increase the integration of solar energy

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The integration of massive solar energy supply in the grids requires an accurate forecast of the solar resource. In insular context such as West Indies islands, solar resource presents particularly a high variability in time and space dimension and solar forecasting becomes very challenging. Numerous researchers demonstrated the improvement of solar forecast quality by multivariate models techniques, particularly by including spatio-temporal data. This study introduces a spatio-temporal analysis of solar data and a new approach for the forecasting of solar radiation. The proposed model is a spatio temporal vector autoregressive (VAR) model specifically designed for the analysis of spatiotemporal data. The spatio-temporal VAR model incorporates a linear combination of lagged times series of n interesting neighboring locations plus an error or innovations term. To select the interesting predictors (neighbouring locations) we built an algorithmic strategy combining methodologies based on Bayesian Information criterion. The predictive performance of proposed model has been compared by relative metrics to other models from the literature, such as naive model (scaled persistence), autoregressive process (AR model), machine learning (Neural Network model). Apply our model to profusion of PV production is a perspective. The ultimate goal is to push the limits of the integration of this intermittent energy in West Indies.

Keywords: solar forecasting, spatio-temporal correlation, Auto-regressive spatio temporal model

SESSION: MEDICAL SCIENCES

36. Assessing the quality of data available for inclusion in a national antimicrobial resistance surveillance system.

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Combating antimicrobial resistance is a global problem involving a multidisciplinary team to effect change through national policies such as Antimicrobial Stewardship Programmes. Developing countries such as Trinidad and Tobago must be proactive in this global initiative. It is well established that a "one health" approach, i.e., monitoring the data from the perspective of veterinary/human medicine, environment and industry is necessary in order to determine the status of antimicrobial resistance patterns in the community initially and ultimately on a national scale. Epidemiological and molecular studies on human isolates have been conducted in the Caribbean region on drug resistant isolates of *Enterococci spp.*, *Escherichia coli, Klebsiella pneumoniae*, *Staphylococcus aureus*, *Mycobacterium* ***tuberculosis and Pseudomonas aeruginosa***. Similar studies have been conducted in animal isolates of *Salmonella spp.* and *E. coli*. However, there is no formal reporting system whereby data may be collated and made available to practitioners who can then make informed decisions regarding the selection of antimicrobial agents or to those involved in developing national policy. Antimicrobial surveillance programmes focus on human pathogens and food borne commensals from a variety of sources with minimal focus on animal pathogens. This gap must be addressed in Trinidad and Tobago and the wider **Caribbean Community**. Although there have been reports of antimicrobial resistance of microorganisms isolated from human and veterinary sources, the overall impact of antimicrobial resistance on morbidity, mortality, efficacy of antimicrobial agents and healthcare costs are unknown for the Caribbean region. The objective of the Antimicrobial Working Group of Trinidad and Tobago is to facilitate the development of a national antimicrobial resistance programme in Trinidad and Tobago, and the wider Caribbean Community by providing information which decision-makers can use to develop and implement legislation targeted at stemming the emergence and spread of antimicrobial resistant bacteria, and policies to control and preserve the efficacy of antimicrobial agents.

Keywords: Antimicrobial, resistance, susceptibility, antimicrobial agents, microorganisms, stewardship, Antibiogram, Gram positive organisms, Gram negative organisms.

37. The Challenge to Interpret Antimicrobial Susceptibility at a Small Community Hospital.

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Objective: We aimed to determine the prevailing resistance rates at a local community hospital for a select group of gram-positive and gram-negative microorganisms for the period 2008-2012.

Methods: Aerobic and facultative anaerobic culture isolates representing blood, urine and wounds specimens from all wards were tested at the Microbiology Laboratory, using the MicroScan AutoScan4, to determine antimicrobial susceptibility at the local community hospital.

Results: The findings allude to the prevalence of resistance at the institution for the period under review.

Conclusion: Resistance trends are speculative at best without the inclusion of molecular characterization of resistance and consumption data from the pharmacy department. Pharmacists should play a greater role in the determination of resistance by providing the microbiologist with consumption or utilization data, such as the daily defined dose. The inclusion of the daily defined dose in the estimation of resistance would allow clinicians to determine if selective pressure may have contributed to the prevailing resistance rates.

Keywords: Antimicrobial resistance, Antimicrobial susceptibility, Antimicrobial stewardship, Antibiogram, gram positive organisms, gram negative organisms, antimicrobial agents

38. Building a network of Biological Resources Centers for research purposes in the Caribbean: a shared vision for a common goal

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The Biological Resource Centers (BRCs) and the molecular biological platforms associated are the key of the development of clinical research by allowing the use of dedicated Human Biological samples collections. Theses collections can help identify biomarkers, improve knowledge on the pathophysiology with the ultimate goal of improving patients' care. In France, these structures covered by the Ministry of Higher Education and Research, have a charter and a standard (NFS 96900) based on ISO 9001. These guidelines applied since March 2014, describe the activities of preparation, collections' settings and biological resources transfer.

The BRC of the University Hospital of Guadeloupe call for the implementation of a Caribbean network between BRCs and Biobank-type structures in the Caribbean within the following areas: cancers, infectious and emerging diseases, hematological and cardio-metabolic diseases. This Caribbean Network of Biological Resources Centers (CNBRC) aim to become a specific proposal force in research topics, by bringing together biological materials from Caribbean populations with similar health problems.

Such a network will facilitate academic and/or industrial partnerships, promote exchanges of know-how through dedicated platforms and linked research teams through Communication tools. Furthermore, collaborations with plants and animals BRC will allow preclinical studies on Caribbean fauna and flora and their impact on human health. Sharing expertise and process and ensuring reliable delivery system for quality biological samples, will be the core of the network functioning.

Therefore, the setup of a CNBRC is a unique opportunity to expand the scale and quality of clinical research in the Caribbean: -first by bringing together data from populations who share geographic, environmental and ethnic similarities and who alone may not have the sample size for the required power, second by giving local scientists the tools to develop their expertise of their own communities.

Keywords: Biological resources centers, network, Caribbean, human samples, research

39. Polymorphisms of genes related to oestrogen metabolism and the risk of prostate cancer in two populations of African descent.

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Introduction: Some polymorphisms of genes coding for enzymes involved in oestrogen metabolism are risk factors for prostate cancer. However, few studies have been conducted on populations of African origin, which are known to have a high risk of prostate cancer.

Objective: We studied the functional polymorphisms of CYP17, CYP19, CYP1B1, COMT and UGT1A1 and risk of prostate cancer in two different populations of African descent.

Patients and method: In Guadeloupe (French West Indies), we compared 498 patients with prostate cancer and 565 control subjects. In Kinshasa (DRC), 162 patients with prostate cancer were compared with 144 controls. Genetic polymorphisms have been determined by the technique of SNaPshot PCR and for repeat nucleotides.

Logistic regression was used to estimate the odds ratio (OR) and 95% confidence intervals (CI).

Results: The AA genotype and allele A of rs4680 (COMT) appear to be inversely associated with risk of prostate cancer in models adjusted for African men (OR: 0.26 (95% CI 0.08 to 0.83), p = 0.003) and Afro-Caribbean (OR: 0.53 (95% CI 0.32 to 0.86), p = 0.04). For the A allele, a significant inverse association was observed among the cases of low-grade Gleason scores and localized clinical stage, in both populations. The long repetitions (TA) n (n> 6) rs8175347 (UGT1A1) were significantly associated with high grades (OR: 1.41 (95% CI 1.00 to 2.00)) and advanced clinical stage cancer prostate (OR: 1.56 (95% CI 1.02 to 2.37)) in Afro-Caribbean men.

Conclusion: Our results support the hypothesis that polymorphisms of genes encoding enzymes involved in the metabolism of oestrogen to modulate the risk of prostate cancer in populations of African origin.

Keywords: Prostate cancer, genes, oestrogens

40. PSA density is a predictor of aggressive tumors after radical prostatectomy in Caribbean patients initially under active surveillance

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Patients from Africa descent initially eligible to active surveillance (AS) seem to have more aggressive prostate cancers (PCa). The aim of this study was to assess Caribbean patients leaving AS in order to identify predictors of aggressive PCa after radical prostatectomy.

Between 2005 and 2016, a monocentric prospective cohort study was conducted in Guadeloupe (French West Indies), including patients with low-risk PCa (prostate-specific antigen [PSA] ≤10 ng/ml; Gleason ≤6) or favorable intermediate-risk PCa (PSA, 10-20 ng/ml; Gleason ≤7 (3+4); life expectancy <10 years) in AS. Treatment was recommended in case of histological progression, increase in tumor volume, PSA doubling time <36 months or patient's wish. Outcomes were the rate of histologic progression and the risk of biochemical recurrence (BCR) after surgery (using CAPRA-S score) in patients undergoing radical prostatectomy after initial AS. Multivariate analysis was conducted using logistic regression to identify predictors of BCR after prostatectomy.

A total of 234 patients (median age 64 yr) were enrolled in the study. Eighty-three patients were treated. Seventy-three patients underwent radical prostatectomy. Among them, a histological reclassification occurred in 38 patients (52.0%) compared to initial biopsies. After evaluation of the CAPRA-S score, 32 patients (43.8%) had intermediate (n=30) or high-risk (n=2) of BCR after prostatectomy. Age (odds ratio [OR], 1.15 per additional year; 95% confidence interval [CI], 1.04-1.28) and PSA density (OR, 5.02 per additional 0.1; 95% CI, 2.19-14.82) were independent predictors of BCR after prostatectomy (CAPRA-S ≥ 3).

Caribbean patients undergoing radical prostatectomy after initial AS for PCa suffer from aggressive cancers in terms of risk of histological progression and BCR. PSA density could help to better select patients eligible to AS.

Keywords : Active Surveillance, African Caribbean, Prostate Cancer, Prostate-Specific Antigen

41. Prostate cancer: Tropical plant extract shows anticancer potential.

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Prostate cancer is the third leading cause of cancer death among men worldwide and is the leading cause of cancer mortality in males greater than 60 years in Trinidad and Tobago. Although there are some treatment options for the metastatic disease, the impact on overall survival rate has not improved in the last two decades. In particular, the mortality rate from prostate cancer is high among men of African descent in Trinidad and Tobago and the Americas. These groups manifest aggressive cancers that are often less responsive to available therapies. Already, some tropical plants e.g. periwinkle and Pacific yew, have been a source of anti-cancer therapies. We hypothesize that phytochemical screening of tropical plants, coupled to cell culture studies would identify other potential treatments for prostate cancer.

The roots of one plant (Plant *A*) that is indigenous to the Caribbean was dried, crushed and suspended in 100% methanol. The categories of chemical compounds present in the extract were determined by Thin Layer chromatography (TLC). Next the ability of the extract to halt the growth of or kill PC-3 and LNCaP-Luc prostate cancer cells was assessed by trypan blue and MTT assays. Cell cycle studies were performed to determine probable mechanism of action of Plant *A*.

The TLC analysis confirmed that the total methanol Plant *A* extract contains polyphenols, flavonoids, alkaloids, saponins and coumarins. Results from the trypan blue and MTT assays showed that compared to the control cells (treated with buffer only), treatment with the Plant *A* extract significantly ($p<0.05$) inhibited the growth of the cancer cells; decreases as large as 91% were observed. On the other hand, the Plant *A* extract had a limited or delayed effect on the "normal" PNT1A cells. Results from the cell cycle assay demonstrated that the Plant *A* total methanol extract at 25µg/ml caused an arrest of G1/S phase of PC-3 cells i.e. leading to an increase in the number of cells that remained in the growth phase. This suggests that Plant *A* has potential for use as an anticancer drug. We suspect that the extract is somehow interfering with the checkpoint mechanism that allows the cell cycle to progress from G1 phase to the S phase.

42. Utilizing 20Hz Flash Stimulation to Effect Consistent EEG Changes.

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The multiplicity of inputs that contribute to the electroencephalogram (EEG) can make it difficult to associate specific contributory factors with observed EEG patterns. This paper examines the effectiveness of 20Hz photic stimulation in producing consistent changes in the resting EEG for a group of 33 normal subjects, 22 male and 11 female, of ages ranging from 18 to 49 years. EEG recordings were made with a Cadwell Central Lab machine (Indicate Type) using the 10-20 system of electrode placement system at the O_1 electrode position. The photic stimulation was presented to the right eye of subjects via the provided goggles. All subjects provided written consent to participate in this study. Wavelet 9th level power estimates and 20Hz power spectral estimates were used to characterize 20 seconds of artifact- free resting EEG obtained without and with the photic stimulation for each subject. One way ANOVA tests at a significance level of <0.05 were used to determine whether there were any significant differences between the 9th level wavelet power estimates as well as the 20 Hz power spectral estimates without and with the photic stimulation. The results for the 9th level wavelet estimates indicated that 28 of the subjects demonstrated significant increases in the wavelet power during photic stimulation compared with the normal resting state. In the case of the power spectral estimates 32 subjects showed significant increases during the photic stimulation. These results indicate that 20 Hz photic stimulation can produce consistent EEG changes using these analytical techniques. Further investigations are necessary to determine the efficacy of photic stimulation in improving the diagnostic value of the resting EEG for different patient groups.

Keywords: Resting EEG; Flash stimulation; Wavelet analysis; Spectral analysis.

This work was supported by the Inter American Development Bank / U.W.I. Research Fund.

43. Pelvimetrics measures as predictives factors of positives surgical margins after robot-assisted laparoscopic prostatectomy.

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Anthropometric data report that basins of African subjects are narrower and the pelvic cavity is deeper. The incidence of prostate cancer in Guadeloupe is the most elevated in the world and the population is composed of African descent.

The aim of the study was to evaluate the influence of pelvic dimensions (PD) on PSM rate in Afro-Caribbean population after robot-assisted laparoscopic prostatectomy (RALP).

This is a retrospective single-center study in which we analyzed the results of 178 patients who underwent RALP. All Patients included had achieved a preoperative pelvic MRI available for analysis.

The apical depth (AD) and the height of the upper edge of the prostate (HP) by the upper edge of the pubic symphysis were measured in sagittal section. In cross-section was measured the distance between the ischial spines (ISD). Apical depth index, prostatic volume index (PVI), prostate depth ratio and prostatic depth index (PDI) are respectively defined by the DIP/ PA, DIP/VP, HP/PA and ((AP / HP) / DIP)).

Results were expressed as median and percentage. Univariate and multivariate analysis was performed.

361 patients underwent a RALP between January 2013 and December 2015. PD of 178 patients were analyzed.
In univariate analysis, all PD were associated with a higher rate of PSM whenever PD were predictive of a narrow pelvis and/or deep prostate, except PVI ($p = 0.241$).

In multivariate analysis, the PDI was associated with an higher rate of PSM

(OR = 1.01. IC95= 1-1.02)

The PDI is associated with higher rate of PSM at RALP. This index is useful to define the therapeutic pattern of Afro-Caribbean patients with prostate cancer.

Keywords : - robot-assisted laparoscopic prostatectomy, Pelvimetry, Positives surgical margins, Pelvic MRI

44. Diabetes ketoacidosis in Afro-Caribbean subjects: characteristics and predictive factors

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Introduction: Diabetes ketoacidosis (DKA) results in an impairment of insulin secretion or action, responsible for hyperglycemia, increased lipolysis, ketogenesis and metabolic acidosis. DKA is the first acute metabolic complication of type 1 diabetes (T1D) but it can also occur in type 2 diabetes (T2D), particularly in subjects with African or Hispanic descent. **Objective**: To describe the clinical and biological profile of patients with this complication in Guadeloupe and identify its predictive factors. **Patients and Methods**: A retrospective study was performed in adult subjects hospitalized for DKA over 1 year. **Results:** 201 subjects were included (72.63% with T2D, age: 53.5 ± 17 years, 50.75% men). Frequency of DKA was 15%. Diabetes was inaugural in 38.3%. Mean duration of diabetes was 4.33 ± 7.26 years. Cardiometabolic profile of the subjects was: obesity in 35.45%, high blood pressure in 47.26%, dyslipidemia in 61.19%. In 26.4%, there was any identifiable precipitating causes. Among the predictive factors of DKA in subjects with T2D, only the duration of diabetes (OR = 1.16) was associated with the occurrence of ketoacidosis after adjusting for sex and age. In patients with T1D, duration of diabetes (OR = 0.84), history of ketoacidosis (OR = 0.13) and history of dyslipidemia (OR = 8.16) were associated with ketoacidosis after adjustment to sex and age. **Conclusion:** DKA is an important mode of initial presentation of T2D. Predictive factors of DKA remain difficult to identify. Nevertheless, our results confirm the need for early information and health education tools to improve follow-up care and decrease the frequency of this acute metabolic complications that is still poorly known by the population.

Keywords: Diabetes ketoacidosis, type 1 diabetes, type 2 diabetes, predictive factors.

45. Screening of Deltamethrin, Malathion and Temephos resistance mechanisms in *Aedes aegypti* mosquitoes from Guadeloupe and Saint-Martin islands (French West Indies)

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In Guadeloupe and Saint-Martin islands, *Aedes aegypti* mosquitoes are the only recognized vectors of dengue, chikungunya and zika viruses. During about 40 years, Malathion was used as mosquito adulticide and Temephos as larvicide. Since 2010, Deltamethrin and *Bacillus thuringiensis var israelensis* are the remaining adulticide and larvicide respectively used. In order to improve the vector control strategies locally, we have investigated *Ae. aegypti* sensibility/resistance levels to Deltamethrin, Malathion, Temephos and the associated mechanisms. *Ae. aegypti* mosquitoes were collected from six localities of Guadeloupe and Saint-Martin islands. Larvae were used for Malathion and Temephos bioassays and adults for Deltamethrin bioassays, following the WHO recommendations. *Kdr* genotyping for the V1016I and F1534C mutations and expression levels of eight enzymes involved in detoxification mechanisms were examined by real-time PCR. Resistance ratios calculated for *Ae. aegypti* larvae show high resistance levels to Temephos (from 8.9 to 33.1-fold) and low resistance levels to Malathion (from 1.7 to 4.4-fold). Adult females display moderate resistance levels to Deltamethrin regarding Knock-down resistance ratios (from 8.0 to 28.1-fold). *Ae. aegypti* populations from Guadeloupe and Saint-Martin islands therefore exhibit multiple resistance to organophosphates (Temephos and Malathion) and pyrethroids (Deltamethrin). Molecular screening on adults showed high resistant allele frequencies for V1016I and F1534C (from 85% to 96% and from 90% to 98% respectively) mutations, and over-expression of the glutathione-S-transferase GSTE2, the carboxyl-esterase CCEAE3A, and cytochromes genes 014614, CYP6BB2, CYP6M11, CYP9J23. These results will form the baseline for a deeper understanding of *Ae. aegypti* resistance mechanisms and will allow to improve vector control strategies currently undertaken in Guadeloupe and Saint-Martin islands.

Keywords: *Aedes aegypti*; Guadeloupe; Resistance; Insecticide; detoxification; *Kdr*

46. PSA density is a predictor of aggressive tumors after radical prostatectomy in Caribbean patients initially under active surveillance

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Patients from Africa descent initially eligible to active surveillance (AS) seem to have more aggressive prostate cancers (PCa). The aim of this study was to assess Caribbean patients leaving AS in order to identify predictors of aggressive PCa after radical prostatectomy.

Between 2005 and 2016, a monocentric prospective cohort study was conducted in Guadeloupe (French West Indies), including patients with low-risk PCa (prostate-specific antigen [PSA] ≤10 ng/ml; Gleason ≤6) or favorable intermediate-risk PCa (PSA, 10-20 ng/ml; Gleason ≤7 (3+4); life expectancy <10 years) in AS. Treatment was recommended in case of histological progression, increase in tumor volume, PSA doubling time <36 months or patient's wish. Outcomes were the rate of histologic progression and the risk of biochemical recurrence (BCR) after surgery (using CAPRA-S score) in patients undergoing radical prostatectomy after initial AS. Multivariate analysis was conducted using logistic regression to identify predictors of BCR after prostatectomy.

A total of 234 patients (median age 64 yr) were enrolled in the study. Eighty-three patients were treated. Seventy-three patients underwent radical prostatectomy. Among them, a histological reclassification occurred in 38 patients (52.0%) compared to initial biopsies. After evaluation of the CAPRA-S score, 32 patients (43.8%) had intermediate (n=30) or high-risk (n=2) of BCR after prostatectomy. Age (odds ratio [OR], 1.15 per additional year; 95% confidence interval [CI], 1.04-1.28) and PSA density (OR, 5.02 per additional 0.1; 95% CI, 2.19-14.82) were independent predictors of BCR after prostatectomy (CAPRA-S ≥ 3).

Caribbean patients undergoing radical prostatectomy after initial AS for PCa suffer from aggressive cancers in terms of risk of histological progression and BCR. PSA density could help to better select patients eligible to AS.

Keywords : Active Surveillance, African Caribbean, Prostate Cancer, Prostate-Specific Antigen

47. Somatostatin receptor scintigraphy

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Introduction: Somatostatin receptor scintigraphy with (111) In-pentetreotide (SRS) is a functional imaging, classically used to detect metastatic neuroendocrine tumors (NET) that express somatostatin receptors. However, the sensitivity and specificity of SRS are known to be unsatisfactory. Newer PET radiotracers such as (68) Ga-labeled somatostatin analogs and (18) F-DOPA are used in positron emission tomography/computed tomography and help to better detect NET. However, 111In-Pentetreotide SPECT/CT (Single-Photon Emission Computed Tomography) remains the most easily available imaging in Guadeloupe that helps to detect metastatic lesions of NET. **Case report:** A 49-year-old men was referred to our hospital for abdominal pains. He underwent an intestinal NET resection 8 years ago. The computed tomography revealed multiple liver metastases. Hepatic biopsies confirmed the diagnosis of metastases of a grade 2 NET with a MIB-1 of 4%. Biological analysis found increased levels of 5-HIAA excretion in 24-h urine samples. Because carcinoid heart disease is a classical complication of carcinoid tumors, we performed an echocardiography that did not find tricuspid valve disease but revealed a global heart hypokinesia. After intravenous injection of 140 MBq (111) In-pentetreotide, SPECT/CT identified liver metastases and a suspect cardiac uptake. A cardiac magnetic resonance imaging was performed and revealed a thickening of the bottom wall of the heart, measuring 24 mm compatible with a cardiac metastasis of the NET. SMS analogs were started but failed to improve cardiopulmonary function. **Conclusion:** 111In-Pentetreotide SPECT/CT remains a good functional imaging compared to conventional somatostatin receptor scintigraphy (SRS) to precise anatomical localization of NET metastases and could help to select the best morphological imaging to complete the staging of metastatic NET. Cardiac metastasis of NET is rare and worsens the prognosis even in case of G2 NET.

SESSION: INTERFACE AND MATERIAL PHYSICS – NATURAL RISKS

48. Strain Accumulation on Active faults in the Caribbean Plate.

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Subduction faults are known for producing the largest earthquakes on Earth. While historically we did not observe very large earthquakes in the eastern Caribbean subduction, the seismic potential of this long geological structure still requires our attention. Here we use most of the available campaign and continuous GPS measurements in the Caribbean to derive a regional velocity field expressed in a consistent reference frame. We use this velocity field as input to a kinematic model where surface velocities result from the rotation of rigid blocks bounded by locked intra-plate faults accumulating interseismic strain, while allowing for partial locking along the Lesser Antilles, Puerto Rico, and Hispaniola subduction. We developed numerous block geometries, guided by previous regional kinematic models and geological information on active faults. We tested every model geometry by comparing the associated calculated surface velocities to the observed GPS velocity field and by accounting for geological constraints on known faults. Our findings refine a number of previously established results, in particular slip rates on the strike-slip faults systems bounding the Caribbean plate to the north and south, and the kinematics of the Gonave microplate. Our much-improved GPS velocity field in the Lesser Antilles compared to previous studies does not require the existence of a distinct Northern Lesser Antilles block and excludes more than 3 mm/yr of strain accumulation on the Lesser Antilles-Puerto Rico subduction plate interface, which appears essentially uncoupled. The transition from a coupled to an uncoupled subduction coincides with a transition in the long-term geological behavior of the Caribbean plate margin from compressional (Hispaniola) to extensional (Puerto Rico and Lesser Antilles), a characteristics shared with several other subduction systems.

Keywords: Subduction, Caribbean Plate, kinematic model, Strain Accumulation, fault coupling.

49. Lessons learned from the collaborative program TSUNAHOULE (INTERREG CARIBBEAN): from storm surge and tsunami hazard assessment to risk management in Guadeloupe.

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The Caribbean region is prone to numerous natural hazards such as earthquakes, landslides, storm surges, tsunamis, coastal erosion or hurricanes.

All these threats may cause great human and economic losses and are thus of prime interest for applied research. One of the main challenges for the scientific community is to conduct state-of-the-art research to assess hazards and share the results with coastal planners and decision makers so that they can regulate land use and develop mitigation strategies.

We present here the results of a scientific collaborative project between Guadeloupe and Porto Rico which aimed at bringing a decision-making support to the authorities regarding tsunami and storm surge hazards. This project led us to build a database of potential extreme events, and to study their impacts on Guadeloupe to investigate storm surge and tsunami hazards. The results were used by local authorities to develop safeguarding and mitigation measures in coastal areas.

This project is thus a good example to demonstrate the benefit of inter Caribbean scientific collaboration for natural risks management.

Keywords: Coastal hazards, storm surges, tsunamis, mitigation strategies, risks management

50. Experimental evaluation using MASW and H/V - noise in the estimation of site effects lithological of Damien's site (Haiti).

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The objective of this paper is to evaluate the results obtained during the campaigns of seismic testing by MASW method and H/V - noise technique, made in the Damien's site (Port-au-Prince, Haiti). Both methods use the propagation of waves in the surface layers and identify the interfaces between the layers with impedance contrasts and/or important speeds. These contrasts are often the source site effects lithological. A connection between the frequency content of the wave indicated by H/V method and the shear-wave velocity indicated by MASW method is made according to the thickness of the layers. The comparison of these two types of results in the Damien's site (fundamental frequencies and shear - wave velocity) helps to improve the choice of estimation techniques site effects lithological, depending on the geophysical characteristics of the soil.

Keywords: Site effects, shear-wave velocity, H/V, MASW.

51. A rheological approach to the mechanical behavior of some marls samples in Haiti

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Rheology is known as the science of the study of the flow of viscoelastic materials, which have intermediate behavior between elastic solids and Newtonian fluids, submitted to external stresses. This science has lot of applications in the plastic or rubber industry for example.

In geotechnics, mechanical properties of soils are determined by triaxial, direct shear and oedometer tests. Soils consist of solid, liquid and gaseous phases and the interpretation of the results of those classical tests does not take into account the forces between particles and between particles and fluids at the microscopic scale. In addition, they are static. For a country like Haiti where the seismic hazard is important, it is very useful to know the values of mechanical parameters under dynamic loading which will help to understand the mechanism of soil stability. The objective of this poster is to present the principals of this technique (rheology) and the way it was used to determine mechanical properties of some Haitian marl samples.

Two different marl samples (taken from the "Morne Delmas" geological formation) were used in order to determine the effects of mineralogy, vibration frequency, clay/carbonates percentage and water content on the rheological properties. A small amount, 5 or 10 g depending on the water content (20% for solid consistency or 40% for plastic consistency) of soil samples, is needed for the tests. The under 53µm diameter particles are used in this study because the rheological behavior depends on this portion of the soil.

A cone-cone rheometer RPA2000 (Rubber Process Analyzer 2000) has been used to perform the oscillatory tests. A storage modulus (G') and a loss modulus (G") were measured for strain going from 0 to 100% and at three different frequencies (0,5 Hz, 1Hz and 10Hz). The ratio G"/G' gives the linear viscoelastic deformation and its limit value : G"/G'=1 (break point) reflects a disintegration of the material and leading to a liquid behavior. The maximum length of the test is 20 minutes. Thus, the strain value at the break point is lower for the soils with swelling mineral at three working frequencies. The more the soil is rich in $CaCO_3$, the more the strain at the break point is high. The strain at the break point goes higher with increasing frequencies. Increasing the water content of the soil reduces the strain value at the break point.

Keywords: Rheology, swelling soils, viscoelastic behavior, Morne Delmas, Haiti

52. Results of IODP Leg 340 in the West Indies

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Analyses of cores from Expedition 340 in the Caribbean Sea were completed by scientists from Europe, Japan, USA, UK, Germany, New Zealand, India and China.

Site U1393 is located near Soufrière Hills Volcano on Montserrat. Cores contain 1 lithostratigraphic unit derived from the eruption in 1995 with mud clasts in a sandy unit overlying volcaniclastic sand with andesite grains. Benthic foraminifera are typical of reefs above 30m.

Site U1394 lies 24 km from the SE tip of Montserrat. Cores retrieved 6 lithostratigraphic units comprising hemipelagic mud with calcareous and siliciclastic grains, turbiditic sand and mud with lava, pumice, corals and shells, basaltic turbidites and basal tephra. Calcareous nannofossils and planktonic and benthic foraminifera indicate a Late Pleistocene age and bathyal depth.

Site U1395 between Montserrat and Guadeloupe was investigated to characterize sedimentation in the Bouillante-Montserrat half graben. 9 lithographic units contain hemipelagic mud, turbiditic sand and mud and tephra. Nannofossils and planktonic foraminifera indicate a Pleistocene age. Bathyal benthic foraminifera, pteropods and heteropods were observed.

Site U1396 objective is to extend knowledge of volcanism from 2.6 Ma to the birth of the islandof Montserrat. Nannofossils and foraminifera indicate a Pliocene-Pleistocene age for deposits of hemipelagic calcareous sediment, tephra layers and volcaniclastic sand in 5 units.

West of Martinique, Site U1397 is surrounded by canyons. The objective was to study Mount Pelee volcano. Cores contain 8 lithostratigraphic units, with hemipelagic mud, volcaniclastic and bioclastic turbidites and tephra. Late Pleistocene nannofossils and planktonic foraminifera are associated with reworked Miocene-Pliocene assemblages. Site U1398 explored the backarc Grenada Basin. Volcaniclastic turbidites overlie hemipelagic sediment, turbidites and tephra with reworked fossils and Late Pleistocene nannofossils and foraminifera. Site U1399 had 8 lithostratigraphic units with hemipelagic mud, tephra and turbidites and Late Pleistocene nannofossils and foraminifera. Site U1400 is dominated by hemipelagic mud with tephra, volcaniclastic turbidites and deformed sediment. Nannofossils and foraminifera are of Late Pliocene - Pleistocene age. Site U1401 contains hemipelagic mud, tephra and turbidites with Late Pleistocene nannofossils and foraminifera.

Keywords : Montserrat, Ocean Drilling Program, Expedition 340, Caribbean Sea , volcanism.

53. How nanotribological investigations can help the understanding of macrofriction behaviors

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Previous studies revealed that friction properties of lamellar compounds are significantly improved in the presence of liquid during macrotriboligical tests. In this work, the nanofriction properties of the macrotribofilms formed from graphite powder are investigated at the nanoscale. The tribofilms surfaces are characterized using an atomic force microscope (AFM) coupled with a friction force microscope (FFM). Mechanical properties of the surface have been investigated by means of Modulation Force Microscopy (MFM) and nanoindentation technics. Bulk investigations are performed using TEM analysis. AFM images reveal a heterogeneous surface constituted of smooth platelets surrounded by granular areas. A statistical analysis of the platelets distribution indicates a surface coverage of 8 %. TEM analyses revealed a higher density of c-axis oriented graphite particles compared to the film surfaces. FFM measurements allow us to quantitatively determine the carbon/carbon shear strength of the different areas. A model is then proposed to calculate the expected macroscopic friction using the nanofriction data. We demonstrate that the friction reduction process is not associated to the nanostructuration of the surface but it is related to the platelets density in the bulk tribofilms, indicating that sliding interfaces are located into the film volume.

Keywords: Graphite, AFM, friction.

54. Use of nanoindention techniques as a flash test to predict polymer composite ageing under tropical environment

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Carbon fibers are commonly used as reinforcement in polymers. It is well known that the high Young's modulus and mechanical strength of the carbon fiber confer to the polymer superior mechanical properties that are important for many applications. However, the overall performance of the composite structure depends greatly on the properties of the fiber-matrix interphase which is usually not larger than a few hundred of nanometers. Therefore, characterization of this interphase requires experimental tools that probe nanoscale level properties.

In this work, we use three different techniques with high spatial resolution to characterize the mechanical properties of a fiber reinforced epoxy vinyl ester composites nanoindentation, AFM – nanoindentation and AFM-Modulation force mode. The data obtained from the three techniques are different indicating a strong influence of the surrounding . Here we provide an analysis of such influence in order to extract the true mechanical parameters of the probed areas. Such results lead to the elaboration of an original characterization technique of the fiber/matrix interphase allowing us to measure the early stage of the mechanical degradation. This could be a powerful tool to predict the durability of composite polymer under tropical environment.

Keywords: AFM, nanoindentation, composite fiber, ageing.

55. Nanomanipulation in SEM

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The examinations of micro or nano-objects in the scanning electron microscope need sometimes nano-manipulations to separate the objects, to modify their orientation under the beam or to eliminate some particles disturbing the acquisition of accurate images and analyses. Moreover, it can also be interesting to apply some well-known strain onto the micro or nano-samples to study their mechanical behaviour and properties at nano-scale. The present work shows the use of a nano-manipulator build at C[3]MAG in order to answer to these requirements. In situ nano-manipulations are carried out in the scanning electron microscope on polymer nano-spheres prepared by high-pressure hydrothermal synthesis from sugar cane solution. The nano-manipulating tools are glass micro-needles hand prepared at C[3]MAG. Their stiffness is characterized in the SEM by recording simultaneously the applied force using specific nano-transducers (Femtotools) and scanning secondary electron images to measure the elastic deformation. Example of in situ manipulation and force and deformation of nano-spheres are presented.

Keywords: Nanomanipulation, in situ, SEM

56. Tribological, chemical and structural study of tribofilms generated during friction of nanoparticles of lamellar compounds in the presence of low viscosity bases.

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The tribological properties of dispersions of various nanoparticles of lamellar compounds (graphite, molybdenum disulphide and boron nitride) are studied. During the friction test, carried out using a reciprocal sphere (AISI 52100 steel) on plane (AISI 52100 steel) tribometer, a tribofilm is formed leading to a drastic improvement of the friction coefficient down to 0.05. At the end of the test, the friction surfaces are first studied by means of scanning electron microscopy to evaluate the size and the roughness of the wear scars. Then the tribofilms are extracted from the wear tracks, using the polymer extractive replica method, and their nature and structure are investigated by means of analytical transmission electron microscopy. It is clearly demonstrated that during friction, tribofilms of some hundreds nm are formed. These ones are constituted of the nanoparticles, present in the dispersions, which are partially damaged (amorphization) due to the high shear stresses they undergone in the sliding interface. Electron diffraction patterns and high resolution electron micrographs, recorded on the various tribofilms, allow us to point out that the nanoparticles are mainly oriented with their basal layers parallel to the friction surfaces inducing that the improvement of the friction properties recorded during the test are mainly due to this last structural characteristic.

Keywords: Lamellar compounds, nanoparticles, tribology

SESSION: INTERFACE AND MATERIAL PHYSICS – NATURAL RISKS - POSTERS

57. Forecasting of irradiance using Multiscale Methods.

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In Guadeloupe Island, the development and utilization of the PV suffer from limitations. To increase the integration of solar energy into electricity grid, a good knowledge of a global solar radiation variations and more accurate solar forecasts are needed. We propose a hybrid AR (Autoregressive) and NN (Neural Network) model combined with a multiscale decomposition approach to predict solar radiation under the tropical climate. We investigated this with several techniques of multiscale decompositions such as Empirical Mode Decomposition (EMD), Ensemble Empirical Mode Decomposition (EEMD) and Wavelet Decomposition (WD). The predictive performances of the hybrid model are presented and compared with the classic forecast model (AR, NN and persistence). This study highlights the significant accuracy of solar forecasting using the proposed hybrid model particularly with the wavelet decomposition.

Keywords: Global Solar radiation forecasting, Multiscale decomposition, Hybrid Model.

58. Study of the effect of oxobiodegradable additives on the degradability of polyethylene under various ageing conditions by infrared spectroscopy

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Plastic consumption continuously increases and they usually remain in the nature for several decades after their service life. Therefore, the processing of their waste and the negative impact they can have on the economic and the environment are crucial. In order to control the lifetime of plastics packaging, oxo-biodegradables additives have been used to accelerate the kinetics of degradation of polyethylene in the presence of the oxygen and UV irradiation and/or heat. The aim of this study is to characterize the influence of the additives on the ageing mechanism of polyethylene samples. This was done by analyzing data supplied by SEVN compagny, a natural ageing station located at Bandol (FRANCE). Several samples of polyethylene were examined under various conditions of ageing: Phto-thermal (Artacc, Bandol) and pure thermal (temperature chamber, storage). InfraRed spectroscopy was used to measure the carbonyl groups concentration formed after polymer oxydation. The kinetics of degradation were then characterized by measuring the evolution of carbonyl index as a function of the exposure time. During this work, we first analyzed the data from the SEVN and found the relevant parameters to characterize the effectiveness of the additive on the kinetics of degradation of polyethylene samples of different formulations. For all the samples studied, the fastest ageing occurs under Artacc with a factor of acceleration up to 50 times higher than the one obtained from natural aging in the Bandol.. The effect of oxo-biodegradable additives seems more efficient in the case of a purely thermal ageing, indicating that in the case of the photothermal ageing, degradation phenomena related to combined UV and temperature effects is sufficient to reduce or inhibit the effect of oxo-biodegradable additives.

Key words : oxo-biodegradable, lifetime, photoageing, induction time of oxidation, thermal

59. In situ Raman and fluorescence micro-spectrometry investigations of contact lubrication in the presence of nanoparticles in dispersion in low viscosity lubricant bases

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Friction tests, carried out in air using a reciprocal sphere (AISI 52100 steel) on plane (AISI 52100 steel) tribometer, using pure nanoparticles of lamellar compounds as lubricant, lead after some tens of cycles to stabilized friction coefficients raising in the range of 0.1 - 0.4. The addition of pentane or dodecane (low viscosity aliphatic compounds) to the powders produces a drastic friction decrease down to 0.03-0.05. The present work is concerned with the elucidation of the mechanisms responsible of this friction improvement in the case of graphite nanoparticles in dispersion in dodecane. For this purpose, in situ video recording of the lubricated dynamic contact combined to spatially resolved Raman micro-spectrometry and spatially and time resolved fluorescence micro-spectrometry analyses carried out in the sliding lubricated interface are used. The results allowed us to demonstrate that the friction reduction mechanism consists of two main components. The first one is the constitution, by graphite nanoparticles, of a smooth and conformal contact between the ball and the plane which induces a change of lubrication regime from boundary (high friction) to elastohydrodynamic (low friction) regime. This last transition constitutes the second component of the friction reduction mechanism.

Keywords: in situ Raman, in situ fluorescence, graphite, nanoparticle, tribology

60. Development of new nanoadditives for lubricants : friction performances of fluorinated carbon blacks

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Since 20 years, new lubrication strategies consist in the use of solid nanoparticles in dispersion in lubricating oils and greases. The great interest of such nano-additives is due to the formation of a protective tribofilm on the rubbing surfaces without any chemical reaction with the substrates. Previous studies pointed out the promising friction reduction properties of 2D (nanodiscs) and 1D (nanofibres) fluorinated carbon nanophases associated both to fluorination and lamellar structure of the particles. We showed that the structure of the associated tribofilms depends on the initial shape of the fluorinated particles, inducing different friction reduction mechanisms. In the present work, the friction behaviour of 0D (nanospheres) fluorinated carbons is investigated. For this purpose, graphitized carbon blacks are fluorinated under F_2 atmosphere or using TbF_4 as fluorinating agent in controlled conditions in order to obtain atomic F/C ratios ranging from 0 to 1. The tribologic properties of the resulting compounds are investigated as a function of the fluorination rate. Special attention is paid to the determination of the structural parameters of the initial particles and associated tribofilms (Raman spectroscopy, scanning and transmission electron microscopy experiments). The tribologic properties are correlated to the structure of the initial nanoparticles and resulting tribofilms in order to identify their respective role in the friction reduction processes.

Keywords: Fluorocarbons, Tribologic properties, nanoparticles

61. Selection of textile nets as mosquito-proof shield adapted to tropical environment

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This study is part of a project issued by the ARS (Agence Regional de la Santé) in Guadeloupe to fight against the spread of the mosquito Aedes aegypti in the past years. These mosquitoes are responsible for several major tropical diseases outbreaks such as the dengue fever, Chikungkunya and more recently Zika. The finality of this project is to design and manufacture a mosquito-proof shield product to prevent mosquito's larvae to develop in rain recuperation reservoir and thus reduce the mosquito population and the infection risk. Such screening needs to be mechanically resistant and durable under our tropical environment.

In this work, we investigate two polyethylene nets named PEB (Black color polyethylene) and PEG (Green color polyethylene) and 1 polypropylene nets named PEW (White color polypropylene). These materials offer a high flexibility, are water permeable and have meshes small enough to prevent mosquitoes to reach the water contained in the reservoir.

Ageing of the material was realized using an accelerated UV aging chamber, the ARTACC. The chemical degradation of the polymer has characterized by IRTF spectroscopy by following the evolution of the carbonyl ratio and oxidative index at at the wavelength of 1715 cm^{-1}. The mechanical properties have been measured by means of an universal traction testing machine.

We found that the mechanical properties of the PEW dropped by 60% after 15 days of accelerated aging. The IRTF analysis showed that the PEW material underwent a high physicochemical degradation that all antioxidant stabilizers were totally consumed. For the PEG material, we found a progressive chemical degradation during the aging process. The mechanical strength of the PEG dropped by 80% at 32 days of aging. In the case of the PEB, the black color l is due to the presence of carbon black additives. These latter are responsible of the high absorption rate in the infrared spectrum and prevented us to determine the carbonyl ratio and the oxidative index for this material. However, the traction tests showed no mechanical loss after 62 days of aging indicating a good chemical stability for this material.

These results clearly indicate that PEB is the best net candidate for the mosquito-proof shield. Very interestingly, a critical oxidative index value of 10^{-3} has also been evidenced in this work. Above such value the mechanical properties of polyethylene drops drastically. The results show that mechanical properties can then be estimated by means of the IRTF technique which is an easier technique in terms of sample preparation and set-up than traction tests.

SESSION: RADIOCHEMISTRY AND NUCLEAR MEDICINE AND BIOMOLECULES

62. Novel carbon-11 chemistry for *in vivo* molecular imaging

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Molecules labelled with cyclotron- or generator-produced short-lived positron-emitting radionuclides (e.g. carbon-11, fluorine-18 and gallium-68; radioactive half-lives 20.4 min, 110 min and 68 min, respectively) are increasingly being used to advance our basic knowledge of *in vivo* normo- and pathophysiology, clinical diagnosis, monitoring of disease progression and in the discovery and development of new drug treatments. The *in vivo* biodistribution and kinetics of these radiolabelled endogenous and exogenous compounds can be non-invasively quantified in humans using the medical imaging technique positron emission tomography (PET or TEP).

Given the short radioactive half-lives of these radionuclides, the success of the PET technique relies on the development and implementation of rapid and high-yielding synthetic radiochemistry techniques to enable the radiolabelled target molecules to be produced in sufficient quantities for imaging applications. As carbon is ubiquitous in organic molecules, labelling molecules with carbon-11 is particularly attractive. Cyclotron-produced carbon-11 is primarily obtained in the form of carbon dioxide. Traditionally this has been converted into [^{11}C]methyl iodide via CO_2 reduction and subsequent halogenation to allow alkylation of nitrogen oxygen and sulphur heteroatoms within 15-25 mins from $^{11}CO_2$ production. Whilst successful, the number of labelled chemotypes accessible through this chemistry are limited.

More recently we have been expanding the scope of alternative labelling synthons that not only make new radiolabelled chemotypes accessible, but also can be performed much more rapidly – enabling the potential for higher yielding processes and making possible the availability of hitherto inacessible radiotracers. The novel approach allows the production of carbon-11 labelled carbonyl compounds directly from [^{11}C]carbon dioxide or [^{11}C]carbon monoxide in excellent yields with minimal processing times. These advances will be discussed in addition to their application to a new generation of *in vivo* PET imaging probes.

Keywords: positron emission tomography, PET, TEP, radiochemistry, carbon-11, cyclotron, *in vivo* imaging

63. Computational modeling in the study of Tc and Re DMSA radiopharmaceuticals

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Meso-2,3-dimercaptosuccinic acid (DMSA) is used in nuclear medicine as ligand for preparation of radiopharmaceuticals for diagnostic and therapy. DMSA has been the subject of numerous investigations during the past three decades and new and significant information of the chemistry and pharmacology of DMSA complexes have emerged. In comparison to other ligands, the structure of some DMSA complexes is unclear up today. The structures and applications of DMSA complexes are strictly dependent on the chemical conditions of their preparation, especially pH and the ratio of components. A computational study of M-DMSA (M = Tc, Re) complexes has been performed using density functional theory. Different isomers for M(V) and M(III) complexes were study. The pH influence over ligand structures was taken into account and the solvent effect was evaluated using an implicit solvation model. The fully optimized complex *syn-endo* $Re^{(V)}$-DMSA shows a geometry similar to the X-ray data and was used to validate the methodology. Moreover, new alternative structures for the renal agent $^{99m}Tc^{(III)}$-DMSA were proposed and computationally studied. For two complex structures, a larger stability respect to that proposed in the literature was obtained. Furthermore, $Tc^{(V)}$-DMSA complexes are more stable than the $Tc^{(III)}$-DMSA proposed structures. In general, Re complexes are more stables than the corresponding Tc ones.

Keywords: DMSA complexes, Tc, Re, DFT

64. IMolNu-Caraibes: a platform for nuclear medicine and research on cancer

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Cancer is one of the leading causes of death worldwide. For just one example, in Guadeloupe and Cuba it is the second leading cause of death, after cardiovascular diseases, with a rate of 205 deaths per 100 000 inhabitants in Guadeloupe and 215/100 000 inhabitants for Cuba in 2015. Among the strategies to reduce mortality due to cancer is the introduction of high-technology equipment and the development of nuclear medicine. In this context, in 2017 it is expected to start the operation of two molecular imaging centers, equipped with cyclotron and PET/CT scan in two Caribbean countries: Guadeloupe and Cuba. In this work, the content of an INTERREG project, for the harmonization of the operation of nuclear medicine services, the implementation of quality systems, the preparation of human resources and the development of scientific research in our geographic area, is presented. The perspectives of IMolNu-Caraibes project as a platform for the introduction and development of new radiopharmaceuticals for diagnosis and staging of cancer are analyzed. In addition, the prospects for the use of nuclear medicine in the fight against other cardiovascular, neurological and endocrine diseases are also evaluated.

Keywords: PET, cancer, nuclear medicine, research

65. First detection of bioactive glycerolipids extracted from bacterial gill-endosymbionts colonizing the marine bivalve *Codakia orbicularis* (Lucinidae)

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The tropical bivalve *Codakia orbicularis* belongs to the family Lucinidae. This bivalve harbors endosymbiotic sulfur-oxidizing bacteria located in its gill filaments. Flow cytometric analysis has shown that theses endosymbionts maintain the duplication of their genome in bivalve's gills without cellular division (each bacterial cell harbors up to seven copies of their genomes) suggesting the existence of molecules able to control bacterial cell division (Caro et *al*., 2007). Gills of bivalves were dissected and macerated in ethyl acetate during 48 hours, then the filtrate was evaporated under reduced pressure followed by an evaporation under nitrogen current. The extract was chromatographed on a silica gel column using eluents ranging from hexane (Hex)-ethyl acetate (AcOEt) to AcOEt-methanol (MeOH). It yielded several fractions numbered from 1 to 18. Bacteriostatic activities of these eighteen fractions were evaluated on solid cultures of Gram negative and positive bacteria cultivated at 37°C. From the fractions that showed antibacterial activities, the active fraction numbered 13 (F13 eluted with AcOEt : MeOH/ 90:10) was analyzed by an High performance liquid chromatography coupled to a Diode Array detector and a Evaporative *light* scattering *detectors* (ELSDs) to control its purity. It appeared that F13 contains two major peaks isolated by semi-preparative chromatography. Nuclear Magnetic Resonance (NMR) and High Resolution Mass Spectrometry (HR-MS) led to two monoglycerolipids (MAG1) and (MAG2). Bacteriostatic activity of these compounds was evaluated on solid cultures of Gram negative and positive bacteria. An inhibition halo with a diameter of 2 mm appeared around the discs containing each of these molecules. To finalize the structure of the monounsaturated glycerolipids, further investigations will allow to obtain their fragmentations in tandem mass spectrometry and to locate the double bonds of each one on its fatty chains.

Keywords: bacteriostatic activity, sulfur-oxidizing bacteria, endosymbiosis, bivalve, HPLC, NMR, HR-MS, silica gel column.

66. Chlordecone exposure and prostate cancer: Interactions with genes encoding the oestrogen.

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Objective: To study the interactions between exposure to chlordecone, an insecticide with hormonal estrogenic properties and functional polymorphisms of the genes encoding the oestrogen and the risk of prostate cancer.

Methods: It's a case - control study in the general population, including 498 incident cases of prostate cancer and 565 controls. Exposure to chlordecone was evaluated by its determination in blood. Five gene polymorphisms involved in oestrogen metabolism, CYP17 (rs743572) CYP19 (rs60271534), COMT (rs4680), CYP1B1 (rs1056836) and UGT1A1 (* 28) were characterized according to SNaPshot method (for SNPs) or by analysis of the size of the PCR products (for STRs). Subjects were classified by quartiles of exposure to chlordecone according to the distribution in the controls. The interactions were estimated by logistic regression, adjusted for confounding factors, stratifying according to the alleles.

Results: The subjects in the 4th quartile classified exhibition and carrying a number of repetitions (TTTA) n> 7 CYP19 have a significantly increased risk of prostate cancer (odds ratio (OR): 3.2; confidence interval 95% (95% CI): 1.5 to 6.9), while the holders of a number of repetitions <7 show no increased risk (OR: 1.2; 95% CI: 0,8- 1 7).

Conclusion: The association between exposure to chlordecone and the risk of prostate cancer occurrence appears modulated by the presence of the functional variant rs60271534 gene encoding aromatase. This variant, characterized by a high number of repetitions, gives an increased catalytic activity. These findings support the role of environmental oestrogen interaction with endogenous, in the occurrence of prostate cancer.

Keywords: Prostate cancer, oestrogen, chlordecone

67. Physical activity patterns in a population of health workers: primary study

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The health benefits of regular physical activity are well described. Physical activity behaviors and their association with present and future health status has been studied on different subgroup of the population. However, very few is known on the physical activity behaviors of health care providers, who represent a large employee group very likely to influence the physical activity believes, knowledge and habits. They are key health promoter in particular with impaired or injured patients. The aim of this study is to evaluate level of physical activity of health workers in comparison with international recommendations of physical activity. We enrolled 46 health workers in a rehabilitation center and in the nursing school (Academic Hospital, Pointe-à-pitre, Guadeloupe). The volunteers were aged 32.1 ± 9.0 years and they had a BMI 23.2 ± 3.7 $kg.m^{-2}$. They were invited to wear an RT3 accelerometer and they filled a questionnaire with specific questions of their physical activity at work and at home. The accelerometer had to be worn during their shift at work, during leisure time at home and during their days off. We focused on their physical activity during at least 4 days. In this study, 87% of participants (no significant effect of gender, nor health care occupation) reached the first level of the World Health Organization recommendations when the total duration of practice with a sufficient intensity was considered. Only 6 persons had insufficient level of physical activity with a sedentary lifestyle. Interestingly, a strict use of the recommandations definition completely changed the profile with 45.7% of the participants who do not have any 10-minutes bout of moderate intensity physical activity in the week. In conclusion, this sample of health workers cannot be considered as physically inactive as they accumulate sufficient duration of practice. However, the physical activity behavior of the majority of them is not compatible with maintaining their own health. They appear as a major target for physical interventions in a global health promotion process.

Keywords: Physical activity, recommendations, health workers, accelerometer.

SESSION: INTERDISCIPLINARY ORAL SESSION

68. A data-oriented approach for flash flood prediction in the Caribbean area

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In this paper, we address the critical problem of flash flood prediction in Caribbean watersheds for which current hydrological systems are not well suited. Caribbean basins have indeed small surface areas with steep slopes due to their volcanic origin, and they are subject to tropical rainfall conditions such as massive and localized precipitations.

In this paper, we present a data-oriented solution which main originality is two-fold: (1) the predictive model is defined as a set of aggregate variables that act as classifiers, (2) a genetic algorithm is implemented in order to find the best sets of such classifiers. The design of this solution was guided by three main objectives: precision, readability and flexibility. A flood forecasting solution should indeed not only provide good accuracy, but it should also give clear explanations about how and why an alert is launched or not. Moreover it should be easily adaptable on similar catchments. The concept of aggregate variables allows to reach the objective of readability by using simple rules based on threshold over-passing of aggregated values, while the data-driven nature of the solution and the use of combinations of aggregate variables allow to reach the objective of flexibility. The results obtained on the case study of a typical Caribbean river, for which runoff data are available at three locations, demonstrate the efficiency of the solution.

Keywords : Flash floods, predictive models, aggregate variables, evolutionary algorithms

69. Context related evolution of conception of students during professional traineeship in Guadeloupe

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We focus on some French BTS (Brevet de Technicien Supérieur / Advanced Technician Certificate), namely *tourism* and *assistant manager*, which are two important diplomas for the local development and in which microeconomic and management sciences plays a great part. The French BTS is a short Vocational Diplomaprepared in two years after the "baccalauréat", with national programs and evaluation criteria.The successful candidates are supposed to be immediately employable, especially in their local geographical environment. Thus, there exists a paradox between the national definition of the diploma and the local contexts of teaching and (supposed) professional integration. However, the professional traineeship plays a great part in this diploma. For this reason, it seems interesting to investigate how the conception of students evolve, with respect to the aforementioned paradox, during and after professional traineeship. For this purpose, questionnaire surveys have been carried out at various moment of the scholar during two years (two cohorts).

The main results can be summarized as follows. The professional traineeship is positively perceived by the students at the beginning of the training. They consider it as very important for the development of professional skills. Over time, this positive representation progresses homogeneously. The students are convinced ofthe efficiency of professional traineeship: their professional project strengthened but, they also realize that their professional future will not necessarily be in Guadeloupe. This is probably linked with a better representation of the economic situation of Guadeloupe and shows, as excepted, that the context of the professional traineeship modifies the representation of students. For the BTS assistant manager, we specially note a degradation of the representation of the profession of assistant manager, whereas this training's choice was realized with conviction.

Keywords: contextualization, representations, professional traineeship, cluster analysis

70. Precision Agriculture in the Carribean Area and Big Data Techniques : Review and Perpectives

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Big data or Data Science is a large field that has emerged recently and is at the crossroads of various domains such as statistics, machine learning and artificial intelligence. It consists mainly of extracting knowledge - that is expected as new, helpful and informative in order to use them afterwards in different ways - from massive data sets. Decision-making is a common example of process that generally takes advantage of Big data techniques. The availability of massive data sets collected through multiple sources (internet, sensors, field surveys...) that are not easily processed by classical approaches has led to use big data techniques and data mining tools.

In this paper, we focus on the area of precision agriculture that provides farmers with various tools in order to optimize their practices regarding criteria such as their ecological footprint or their productivity. In the Caribbean region, the climate change impact increasing rainfall especially during the dry season which facilitates the development of pathogens. We propose a review of existing implementation with sensors and techniques in data analysis and big data processing specifically dedicated to collect agricultural and environmental data and to extract knowledge from them. For this purpose, we identified 4 main axes among which we can classify these approaches: (1) design and implementation (2) practice optimization (3) pesticide reduction (4) productivity increase. We then discuss how these axes are complementary and we show how they can be used to improve the agricultural situation in the Caribbean region. Finally, we detail different perspective directions to propose efficient online tools for local farmers adapted to their requests and local specific issues such as reducing pesticide and water consumption.

Keywords: Precision agriculture, Data mining, Big data techniques, Wireless sensors network

71. The Entrepreneurial Motivations of Engineering Students: Case from the SIDS of the Caribbean

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Recent research on entrepreneurial behaviours of students has considered factors such as parents' occupations, business ownership by parents or relatives, sex and ethnicity. This paper presents the findings of a recent study that was conducted and involved 239 engineering students and graduates who were citizens of the Small Island Developing States (SIDS) of the Caribbean. The study was focused on the entrepreneurial motivations of engineering students, to gauge whether these traditional factors outweigh entrepreneurial aspirations inspired by 'pull' factors such as taking advantage of market opportunities, the desire for control and independence and desire for a challenge in the Caribbean.

A comprehensive self-reporting questionnaire tool was developed and electronically distributed. Results were then coded and analysed using descriptive statistics, correlations and crosstabs in the IBM SPSS Statistics 22 software. It was found that respondents primarily displayed higher order 'pull' motivators for being entrepreneurs with 137 of the 174 who participated in this section identifying controlling their future or taking advantage of opportunities as major motivators. Only 13 of the 174 cited 'push' factors such as starting a business because of a dismal job market or getting laid off. There was a single participant who was not interested in ever starting a business.

The study revealed no significant correlation between entrepreneurial motivation of the participants and ethnicity, sex, or parents' occupations inclusive of entrepreneurship. Entrepreneurial motivation was, however, significantly correlated with birth order and experience running or assisting in managing a business. Strangely, study subjects who were parented by at least entrepreneur/self employed individual were only slightly more likely to have actual business experience and the difference was not statistically significant in this study. Also, participants with less business experience were more likely to claim greater levels of entrepreneurial knowledge while those with actual exposure to running or assisting in managing a business rated their knowledge on entrepreneurship lower. A further longitudinal study would be useful to define the archetypes for Caribbean engineering entrepreneurs. Furthermore, since the study seems to suggest that entrepreneurial engineers are not born, but 'made', and are highly motivated, this knowledge may be useful in supporting graduates of the regional engineering programme.

Keywords: Entrepreneurship, motivation, engineering students, SIDS

72. Enhancing the Value-Added Output of Manufacturing Sector through Innovation Practices: A Case of the Caribbean

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Caribbean economies are characterised by a dependence on endowed natural resources and mass commodity trade. Current global dynamics dictate the need for greater value-added activities within the region's manufacturing sector. A comparative analysis of the Caribbean manufacturing sector and the global manufacturing leaders suggests that the Small Island Developing States (SIDS) of the Caribbean is at a competitive disadvantage based on the relative economies of scale and production cost. Adoption of appropriate innovation practices would lead to the development of niche products and markets thereby serving to differentiate the Caribbean-manufactured goods from mass-manufactured goods. This paper focuses on identifying potential opportunities within the SIDS in the Caribbean which could be exploited by its manufacturing sector toward sustainable development. It also proposes an innovation management strategy to be employed, so as to stimulate outputs with value-added manufacturing activities with particular reference to Trinidad and Tobago. It is expected that this paper can be of benefit to researchers and practitioners with interest in innovation practices, and the findings would serve as a springboard for further studies into innovation management and strategy formulation in the Caribbean region.

Keyword: Innovation practices, Manufacturing, Sustainable development, SIDS

73. Developing Integrated Disease Management systems for vegetable crops of the Southern Caribbean region

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Enhancing the production of vegetables is very essential for food and nutritional security of the Caribbean region as highlighted by the CARICOM's regional food and nutritional security policy. Vegetable production, which plays an important role in global diets, could particularly be at risk due to increased disease and pest pressures on crops and global climate change. As of now many of the Caribbean member states import vegetables from the Americas to meet the local demand. This huge spending on import of vegetables is unnecessary should the vegetable production systems made efficient. The increased prevalence of disease and pests in vegetable crops is one of the chief constraints of the lowered productivity. Vegetable production in this region is characterized by labour intensive operations and high fungicide/pesticide use. Chemical abuse leads to high level of chemical residue accumulation in crops and the environment. Therefore, there is an immediate necessity to evolve sustainable crop disease management methods which can completely minimize the indiscriminate usage of chemical pesticides but utilize all the available practices in combination to develop an Integrated Disease Management (IDM) system. Through a four-year research project sponsored by ACP-EU, we have extensively surveyed the Southern Caribbean region to assess the important diseases affecting the major vegetable crops including tomato, cow pea and pumpkin. We have developed precise diagnostic tests for diseases and pathogens. We have optimized integrated disease management (IDM) methods involving minimum and need-based use of chemicals. Implementation of the developed IDM methods have achieved effective disease control and improved the productivity of vegetables in a more environmentally sustainable manner.

74. Degradation of three pharmaceutical compounds, pollutant of superficial waters, by gamma radiation

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Nowadays, one of the priorities for all research scientists is looking for new technologies for the treatment of polluted waters with persistent organic pollutants such as pharmaceuticals. Among the advanced oxidation processes, gamma radiation is a promising technique for the degradation contaminants in water. The objective of this work is to evaluate gamma radiation and its combination with oxidative reagent as an alternative for the treatment of wastewater polluted with paracetamol, sulfadiazine and ciprofloxacin. Gamma irradiation was performed with a high-activity ^{60}Co source. The influence of initial concentration, initial pH and absorbed doses in degradation and mineralization s were studied. Sulfadiazine's elimination by radiolysis was better than for ciprofloxacin and paracetamol. Gamma-H_2O_2 improved the degradation of the pharmaceuticals and enhanced its mineralization. Gamma-Fenton allowed the complete degradation of the pharmaceuticals and enhanced its mineralization in a 38 %. Gamma-Fenton was the best process concerning energetic efficiency and it was better than other advanced oxidation processes such as ultrasonic and ultraviolet radiation for total consumption of time and energy.

Keywords: paracetamol, sulfadiazine, ciprofloxacin, gamma radiation, wastewater treatment

SESSION: BIOLOGY

75. Are tropical dry forest seedlings equally drought resistant than adult trees? A case study in a Caribbean island.

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Tropical dry forests are the most threatened tropical terrestrial ecosystems worldwide. In the Caribbean, the predicted climate change may impact the ecological functioning of dry forests through increased drought risk. Even if recent results talk about the drought response of trees at seedlings and adult stage in neotropical dry forests, the changes of this response through ontogeny remains poorly known. In this study, we tested the hypothesis that ontogeny may affect hydric behavior in tropical dry forest.

We selected 3 typical tree species from dry forests of Guadeloupe: *Citharexylum spinosum*, *Guapira fragrans* and *Guaiacum officinale*. We applied an original method integrating different scales (cell to organ) and physiological processes as the leaf cell resistance to water loss during drought or the plant resistance to cavitation in xylem vessels, which increases with drought and blocks the circulation of sap. We measured several functional leaf traits (anatomy, morphology, leaf cell turgor loss point, stomatal conductance) and stem traits (resistance to cavitation, wood density, stem water content).

Our results highlighted differences in water management and drought response between the two ontogenic stages. The seedlings developed different morphological and physiological leaf traits than adults, characterized by lower water use (i.e. smaller leaves, lower stomatal conductance and higher stomatal sensitivity to drought). In contrast, the leaf cell abilities to keep water during a drought period remained unchanged between both stages with similar leaf cell turgor loss point. The resistance to cavitation presented variable patterns, depending on species. Interspecific differences also appeared. Thus, *G. officinale* has shown the highest leaf cell resistance at leaf scale for both stages and *C. spinosum* adults had the highest resistance to cavitation.

This study is the first to provide evidences that the hydric behavior and drought response of dry forest seedling can't be transposed to adults and reciprocally. Thus, studies aiming to anticipate the impacts of climate change on the structure and composition of tropical dry forests should consider different ontogenic stages to provide reliable results.

Keywords: Ontogeny; cavitation, turgor loss point, functional trait

76. Forest management: Forest fragmentation and biodiversity corridor function of riparian forest in Lesser Antilles.

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This case study is a part of a thesis we lead a botanical and ecological synthesis of Lesser-Antilles riparian forests by studying the forest connectivity in riparian area. The study employed geographic information system processing methods for assessing the integrity of riparian forest and the importance of this corridor function on the rainforest.

The corridor function analysis is based on the structural fragmentation and the potential connectivity of the watershed patch forest. The principle of potential connectivity is constructed on the probability of a direct dispersion of floral and animal species between forest patch which is life habitat.

This method allowed connectivity indices based on distance calculation between forest patches. The results order habitat patches by their significant weight in the connectivity graph. The question arises as to whether the riparian forest patch is a key habitat to maintain the connectivity quality of the watershed. Do they play their biological function of the corridor in lesser Antilles of Guadeloupe and Martinique?

Keywords: Forest fragmentation, Riparian forest, Lesser Antilles, Corridor function, GIS

77. Estimation of the number of tree species in French Guiana by extrapolation of permanent plots richness

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The biodiversity of tropical rainforest is difficult to assess. Yet, its estimation is necessary for conservation purposes, to evaluate our level of knowledge and the risks faced by the forest in relation to global change. Our contribution is to estimate the regional richness of tree species from local but widely spread inventories. Guyadiv is a network of forest plots installed over the whole territory of French Guiana, where trees over 10~cm DBH are identified. We use its information (1180 species censused in 76 one-hectare plots) to estimate the exponent of the species-area relationship, assuming Arrhenius's power law. We can then extrapolate the number of species from a local, wide inventory (62.5 ha in Paracou research station).

Keywords: Tropical rainforest, richness, diversity estimation, French Guiana.

78. Investigating the 'dry gets drier and wet gets wetter' paradigm in Trinidad and Tobago.

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The amount and timing of rainfall have far-reaching hydrologic, economic, societal, and environmental consequences that directly impact water resources management, agriculture, forestry, tourism, sports, recreation, the construction industry, and ecological systems. In recent times, there have been numerous reports in the peer-reviewed literature that the hydrological cycle has intensified over the last several decades caused by global warming resulting in the so-called "dry gets drier and wet gets wetter" (DGDWGW) paradigm. According to this paradigm, dry seasons and wet seasons become drier and wetter respectively leading to an increase in the range between wet-season and dry-season rainfall as well as an increase in the frequency of droughts and floods. The validity of this paradigm in Trinidad and Tobago was investigated using the sample autocorrelation function and ordinary least squares regression to analyse two seasonal rainfall data series (Piarco, Trinidad, 1946-2015; Crown Point, Tobago, 1973-2015).

In Trinidad, it was found that the trends in dry-season and wet-season rainfall were not statistically significant ($P > 0.05$). These results suggest that the dry season and wet seasons are not getting drier and wetter respectively. Similarly, the trend in the range between wet-season and dry-season rainfall was not statistically insignificant ($P > 0.05$). In Tobago, however, there was a statistically significant ($P < 0.05$) increasing trend in the dry-season rainfall. In contrast, the trend in the wet-season rainfall was not statistically significant ($P > 0.05$). Interestingly, the trend in the range between wet-season and dry-season rainfall was found not to be statistically significant ($P > 0.05$). These results are all inconsistent with what is expected under the DGDWGW paradigm. It is therefore concluded that the DGDWGW paradigm is not valid in Trinidad and Tobago. This finding has practical implications for the planning and implementation of appropriate operational strategies in the rainfall-sensitive sectors of the country.

Keywords: global warming, dry gets drier, wet gets wetter, dry-season rainfall, wet-season rainfall, Trinidad and Tobago

79. *Scleroderma bermudense* pantropical dissemination *via* seeds of its host plant *Coccoloba uvifera.*

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Coccoloba uvifera (also named seagrape) is a *Polygonaceae* tree native to tropical America, where it forms ectomycorrhizae (ECM) with a diversity of fungal species, including *Scleroderma bermudense*. This fungus improves growth, mineral nutrition and salt tolerance of *C. uvifera* seedlings planted as ornamental and seashore windbreak species along Caribbean beaches and roadsides. *C. uvifera* is introduced into several tropical regions including Senegal where it only associated with *S. bermudense*. To verify if this plant is associated with the same species in other introduction regions, we sequenced ITS of sporocarps and ECM from regions of origin (Guadeloupe, Martinique and Puerto Rico), and of introduction (French Guyana, Senegal, Reunion, Japan, Brazil and Malaysia). Subsequently, sporocarps and ECMs identified to *S. bermudense* were genotyped with 6 microsatellite markers to verify if *S. bermudense* is co-introduced with *C. uvifera* or native everywhere. *S. bermudense* identified with *C. uvifera* in original regions is identical to that found as exclusive associate of *C. uvifera* in French Guiana, Senegal and Reunion. However, in Porto Rico, another species of *Scleroderma* (*Scleroderma* sp.) is associated with *C. uvifera* in addition to the *S. bermudense*. This *Scleroderma* sp. is the exclusive associate of *C. uvifera* in Japan, Malaysia and Brazil. *Coccoloba uvifera* would therefore have preference for *Scleroderma* spp. in all its introduction regions. Low genetic isolation by distance was observed in *S. bermudense* between populations of origin and introduction regions, where a low founder effect suggested recent introduction. However, high gene flow was noted within each regions suggesting large spore dispersal in *S. bermudense*. Marked genetic differentiation (Fst = 0.27) between populations of *S. bermudense* in Senegal and those in Reunion supports independent introductions of this fungus in these two regions. Genets of *S. bermudense* identified in introduction regions were probably co-introduced with *C. uvifera* seeds. Finally, germination in sterile soil and scanning electron microscopy suggest that dried fruits of *C. uvifera* collected *in situ* agglomerate (probably before drying) spores identified in *S. bermudense*. Thus, dried fruits may have been involved in the co-introduction of this fungus with *C. uvifera*.

Keywords: Co-introduction, ITS sequencing, microsatellite, gene flow, founder effect, reforestation

80. Year round at-sea distribution of Audubon's shearwater *Puffinus l. lherminieri*, from the Lesser Antilles (Martinique Is.).

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Seabird conservation has much focused on protection of breeding site rather than protection of marine habitats although the at-sea conditions are most determinant for their survival. First informations on the marine habitat are needed as well as during breeding season than non-breeding season. In Caribbean region, such studies on foraging ecology of seabird are needed in this hotspot for seabird where almost half of seabirds are threatened. Identify key foraging areas is urgent as we know risk of mortality caused by direct or indirect impact of fisheries, pollution, and global warming climate are real, even not quantified. In our study, we are focused on the description of key areas used by the Audubon's shearwater *Puffinus l. lherminieri*, a tropical pelagic seabird from Martinique during breeding, non-breeding and pre-breeding periods. We analysed 24 tracking of birds between April 2015 to February 2015.We also assessed potential suitable marine habitat for the specie and compare its distribution with Bahamas population distribution. Whatever the season, Audubon's shearwaters distribution was rather close to the Lesser Antilles region as well as off the coast of South America. This relative sedentarity may be explained by the highly productive area all around the year. The foraging niche of the seabird was highly influenced by the diffusion of Amazon and Orinoco rivers in the region, shaping the marine environment with high SST and low salinity waters. We also found a very strong spatial segregation between the two populations from Martinique and Bahamas, with virtually no overlap at all, except for the Sargassum sea, likely underlying some form of spatial niche partitioning. Management of marine habitat of the various populations species had to take into account the complexity of several territories with different policies in seabird management in the Caribbean region.

Keywords : foraging ecology, Audubon's shearwater, Puffinus lherminieri, suitable, description, sedentary.

81. Wind turbines and Pelecanidae: recommendations based on a 6 years study of *Pelecanus occidentalis* in a wind farm in Puerto Rico.

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Pelecanus occidentalis is mainly a coastal bird. Its range covers the Americas, and thus is present in all the Caribbean islands. Regarding requirements to install wind turbines, the coastal zone constitutes one of those places with highest wind potential.

Based on a 6 years study of *P. occidentalis* within a coastal wind farm in Puerto Rico, we identified that this bird is an indicator of changes in the environment. By example a study of *P. occidentalis* in a small island of the archipelago of Guadeloupe related to tourism, showed a pattern of displacement for nesting (Priam, 2016, North American Ornithological Conference, Washington D.C.). This study provides the results of a long term research done in the Caribbean region regarding wind farms and birds' behaviour. Some recommendations are discussed, to cope with future wind farms within the Caribbean Region.

Keywords: Wind farms, birds, Caribbean, *Pelecanus occidentalis*.

82. How dams & waterworks impact Caribbean freshwater species biodiversity?

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Amphidromy is the prevailing migratory pattern of the Caribbean indigenous freshwater fish and crustacean species. As all diadromous migration between freshwater and seawater, amphidromous species have to complete three mandatory movements during their life cycle: (1) freshwater downstream migration after hatching; (2) marine larval dispersion; (3) upstream migration into freshwater habitats after an estuarine recruitment. The achievement of these migrations is fundamental to maintain the population of fish and crustacean, constituting the essential of the Caribbean rivers macrofauna. In the French West Indies, anthropogenic pressures occur along rivers, among which waterworks and dams for water intake. These structures represent physical barriers to ecological continuity and therefore disrupt the biological cycles of the indigenous species. As many life history traits of these species remain poorly known and these acquisitions of ecological knowledge are essential to build and apply management tools suited to indigenous migratory species features. A study was conducted on the Beaugendre river (Basse-Terre, Guadeloupe Island, FWI), where fish and crustacean species suffer variable threats according to their trophic position and their morphology. The endpoints of the study were the habitats use and the spatio-temporal evolution of the demographic structure of the populations. The results highlight that carnivorous species, as Eleotridae, living in downstream habitats with high interspecific competition, are less exposed to modification in their population structure caused by dams. Conversely, herbivorous species as Sicydinae or Atyidae, living mostly in upstream habitats, are more affected. A balance between species preservation and human population requirements needs to be made to consider Caribbean aquatic biodiversity conservation and sustainable development.

Keywords: Amphidromy, freshwater species, population dynamic, river management, biodiversity conservation.

83. Description of a new filamentous tropical marine cyanobacteria (*Oscillatoriaceae*) in prokaryotic mat colonizing Guadeloupe shallow-water environments.

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Prokaryotic mats have a central role in primary production and oxygenation of water column in ecosystems such as mangrove swamps and shallow marine environments. In this study, we described the characterisation of a new species of cyanobacteria from a mat located in the lagoon of the "Grand-Cul-Sac-Marin" in Guadeloupe (F.W.I). Light Microscopy was used in order to identify the morphological characteristics of such organism constituting the mat. Bacterial identification of this filamentous organism has been performed according to 16S rDNA phylogenetic analysis and ultrastructural investigations using Scanning and Transmission Electron Microscopy. This morphotype has been isolated from the "orange" mat. The light and SEM micrographs show narrow trichomes with disc-shaped cells (16.5 µm wide) which are finely sheathed. Phylogeny suggests that filaments of the mat belong to the genus *Plankthotricoides* and should represent a new species. In this study, ultrastructural analysis confirmed phylogenetical results due to the particular position of the thylakoids within cells, that is one of characteristics of the *Oscillatoriales*. In a previous study, two toxic species of *Plankthotricoides* have been described in mats located close to the roots of mangrove. This investigation represents the first step of a larger scale study to better know the structure and potential toxic impacts of this mat of cyanobacteria in the lagoon environement of the Grand Cul de Sac Marin.

Keywords: *Oscillatoriales*, tropical marine cyanobacteria, ultrastructure, phylogeny, Scanning Electron (SEM), Transmission Electron Microscopy (TEM)

84. The drought resistance of the tree species in the Caribbean forests

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The global climate models predict more frequent drought periods in the next decades, as assumed by bioclimatic model fitted over the Caribbean. The sustainability of the current forests is thus clearly challenged, and forest managers do not know if current species will acclimate to drier conditions.

Drought stress creates trapped gas emboli in the xylem water flux (vessel cavitation), which reduces photosynthesis, plant growth, and can ultimately result in desiccation and mortality. The xylem cavitation resistance (XCR) is a key physiological trait associated with the capacity of tree species to survive to extreme drought events. So, XCR differs between tree species, more xerophilous species being more resistant to xylem cavitation. Rare studies talk about the ability of woody species to acclimate their XCR in response to local pedo-climatic conditions. The plasticity of XCR is also crucial for the development of more realistic models of forest drought managements.

At the present a large investigation was conducted on the temperate tree species on the thresholds of hydraulic failure, but the tropical ecosystem remains poorly investigated. The Caribbean region with its high ecosystemic and specific biodiversity is a relevant model for drought resistance studies of tropical woody species living under different soil constraints (rainfall and salinity patterns). Extreme rates of annual rainfall (1000mm–6000mm) are present. For example, the tropical dry forest (DF) is characterized by rainfall between 1000-1200 mm/yr with a dry season during 5 months. The mangrove forests (MF) have the same range of rainfall, but the soil salinity induces lower water soil availability (high soil osmotic pressure) than in DF. In contrast, the mountain rain forest (RF) is the moister ecosystem without soil drought episode (rainfall equal to 5000 mm/yr). We hypothesis that the drought resistance could be higher for the species living in the drier ecosystems, as DF or MF compared with RF. For mangrove forests, only monospecific black mangrove of *Avicennia germinans* can survive at the highest soil salinity (>70 g/l), but no XCR measurements exist in literature for this species. So, *A. germinans* could be more resistant to drought induced embolism than has been reported in the literature for red and white mangrove. We hypothesis also that the plasticity of XCR in a single species (intraspecific variability) is related to the adaptability of a species to different habitats.

The species in RF are more drought sensitive than species occurring in drier conditions, MF and DF. Some new studied species (i.e. *Sideroxylum salicifolium*) in Caribbean DF have the highest XCR confront with the other worldwide DF species. As the XCR depends on species in each ecosystems, the climate change may induce a reduction of the woody species number in the Caribbean forests, in which sensitive species could die. Some species show WCR stable in different environments (white mangrove) and other one (black mangrove) are able to modulate their drought resistance to cavitation (i.e. species with high plasticity). The WCR plasticity could contribute to the species survival in the tropical forest.

Keywords: hydraulic cavitation, drought resistance, forest management

85. Raman spectrometry a tool for thiotrophic symbiosis investigations: case study of sulfur-oxidizing bacteria colonizing meiofauna in shallow marine environments.

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Marine mangroves are complex ecosystems occupying a major part of tropical coastlines and are known to offer a variety of habitats for thiotrophic symbioses. In this study, Raman spectrometry was used to identify sulfur S_8 species and to describe its distribution in the two protists *Pseudovorticella* sp. and *Trichochilodon* sp. *Pseudovorticella* sp. is known to live in association with bacterial sulfur-oxidizing ectosymbionts while *Trichochilodon* sp. lives with endosymbiotic bacteria inside its cytoplasm. The white color of *Pseudovorticella* sp. and the white spots in *Trichochilodon* sp. observed under light microscopy suggest the presence of sulfur compounds into these organisms. Analyses carried onto these spots revealed the presence of elemental sulfur S_8 with the detection of the three S_8 characteristic Raman bands at 160 cm^{-1}, 225 cm^{-1} and 480 cm^{-1} whereas no sulfur was detected in the surrounding water. The sulfur mapping realized on the protists showed that sulfur is mainly concentrated in the cell whereas no sulfur was detected on its surface. Ultrastructural analyzes realized using TEM showed that elemental sulfur was mainly localized in the cytoplasm of ectosymbiotic sulfur-oxidizing bacteria of *Pseudovorticella* sp. while in *Trichochilodon* sp., sulfur is stored as a metabolic waste in the cytoplasm in response to the sulfur-rich environment. In conclusion, this technique represents an effective tool due to its possible application to living samples, its non-destructive nature, and its capability to extract chemical species maps or profiles with spatial resolution in the micrometer range.

86. Contamination of food webs by chlordecone in three marine coastal habitats (mangroves, seagrass beds, coral reefs) in Guadeloupe.

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Chlordecone is an organochlorine pesticide used from 1972 to 1993 in the French West Indies on banana plantations that is very stable and persistent in the environment. The contamination of marine ecosystems by chlordecone is a long-term issue with negative consequences on both environment and human health. In the present study, concentrations of chlordecone were measured in food webs in marine coastal habitats in order to study the level of contamination of marine organisms according to their distance from the coast (*i.e.* the source of pollution). For that purpose, concentrations of chlordecone were measured on 205 samples located on two sites in Guadeloupe: Goyave and Petit-Bourg. The samples were chosen to represent different trophic levels (from primary sources to piscivorous fishes) and were collected in mangroves (along the coast), seagrass beds (located between the coast and the reefs) and coral reefs (around 3 km offshore). Concentrations of chlordecone varied from 1 $\mu g.kg^{-1}$ and 1034 $\mu g.kg^{-1}$. All species combined, contaminations of organisms in mangrove were the highest (mean concentration = 201 $\mu g.kg^{-1}$) while organisms from coral reefs showed the lowest levels of contamination (72 $\mu g.kg^{-1}$). In seagrass beds, concentrations were intermediate (96 $\mu g.kg^{-1}$). However, this gradient was not observed for all trophic categories. In this study, a gradient of marine pollution by chlordecone decreasing from the coast to the open sea has been highlighted. The level of bioamplification along the food web is low when compared to other organochlorides. This phenomenon suggests that bath-contamination constitute the main way of pollution of the organisms.

Keywords: chlordecone, tropical marine fauna, Guadeloupe, coastal habitats, gradient coast-open sea

87. Biomass mapping for Caribbean Island rainforests.

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The aboveground biomass density (AGBD) or aboveground carbon density is mapped for the rainforest of the Basse-Terre Island (Guadeloupe, French West Indies). This mapping is the first devoted to the rainforest of the Lesser Antilles. Mapping AGBD needs the successive realization of two steps. At first, AGBD was estimated in studied forest plots where trees were individually measured; secondly these local estimations were spatially extended by using remote sensing LiDAR measurements. Due to the structural specificity of the Caribbean-islands forests, applying general allometry relationship overestimates tree aboveground biomass. To resolve the issue, we take advantage of the available pantropical database but we improve the estimates by adopting a bayesian mixed decision rule.

Despite the reduced canopy height, Caribbean lowland rainforests have a high AGBD, in every respect comparable to that of continental lowland forests. Such peculiarity is achieved through increased tree density that compensate for low canopy height. Yet, above 500m, canopy height and AGBD both decrease as elevation rises. Increasing of tree number is then not enough to offset reduction of tree sizes. The resulting montane rainforest stores less carbon but plays a key role in preventing natural hasards.

Keywords: forest biomass, forest carbon, tropical rain forest, forest-structure plasticity.

88. Biodiversité, alimentation et santé : un potentiel de développement politiquement sous-exploitée

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La plupart des pays de la Caraïbe sont concernés par d'importants problèmes de santé publique qui impactent négativement, et de manière significative, le développement sociétal et économique de nos régions. L'exacerbation de ces problèmes de santé est principalement attribuée à des habitudes alimentaires et à une hygiène de vie dégradées par la standardisation et la mondialisation de notre alimentation.

Notre hypothèse est qu'une plus grande valorisation de la diversité des aliments locaux, dont la valeur nutritionnelle et la richesse en antioxydants sont sous exploitées pourraient réguler plusieurs maladies. A cet effet, cette communication propose trois objectifs :

i) après rappel des hypothèses relatives à la dégradation de la santé de la population guadeloupéenne en lien avec une alimentation « exogène », ii) un focus sera fait sur les bienfaits d'une alimentation caribéenne équilibrée, illustrée par les grands principes du régime Caribéen recommandé par de nombreux spécialistes, qui sera suivi iii) d'une analyse des freins actuels – politiques, institutionnels, organisationnels et techniques – au développement de notre potentiel de valorisation de nos agroressources et des perspectives en la matière, à la lumière d'expériences originales conduites par le Laboratoire Phytobokaz et l'INRA Antilles-Guyane sur la promotion de l'agriculture locale.

Keywords : biodiversité, alimentation, santé, régime caribéen, politiques publiques

89. Occurrence of *Perkinsus* sp. in the wild oyster *Crassostrea rhizophorae* in the Caribbean (French West Indies ; Guadeloupe).

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Protozoan parasites of the genus *Perkinsus* infect marine mollusks throughout the world. The genus includes seven species *P. marinus*, *P. olseni* (=*atlanticus*), *P. qugwadi*, *P. chesapeaki* (= *andrewsi*), *P. mediterraneus*, *P. honshuensis* and *P. Beihaiensis*. Two species (*P. olseni* and *P. marinus*) receive more attention because they can dramatically affect the physiology of their hosts causing significant mortality in affected bivalve population (Choi and Park 2010; Villalba et al. 2004).The mangrove oyster, *Crassostrea rhizophorae* is an important resource of Brazil and Mexique and few studies concern parasitism on this species (Littlewood 2000; Sabry *et al*., 2007, 2009). No studies have been conducted in Caribbean areas and especially in the French West Indies where *C. rhizophorae* is not a commercial aquaculture species. In fact no aquaculture mollusk exists in the region and consequently no commercially exploited bivalve mollusks have been imported in Guadeloupe.

We examined adult oysters (40-80mm) for the presence of *Perkinsus* throught FTM assay and molecular diagnosis (PCR). A total of 70 adult specimens were collected in January- February 2011 at four stations. A macroscopic examination of the tissues was carried out in order to evaluate the presence or signs of parasitism.

In the present study we describe for the first time a parasite of the genus *Perkinsus* infecting the wild mangrove oyster *Crassostrea rhizophorae* from the Guadeloupe coast. Oyster gill, digestive gland and mantle tissues incubated in Ray's Fluid Thioglycollate Medium (RFTM) revealed the presence of spherical hypnospores. Prevalence of this parasite was strong in the four stations studied (50 to 100%). The prevalence (50% to 100%) in Guadeloupe was very strong compared with 17 % in *Crassostrea ariakensis* of china (Moss et al., 2008a) and 7 % in *C. rhizophorae* of Brazil (Sabry et al., 2009).PCR assays specific to the genus *Perkinsus* for the internal transcribed spacer (ITS) region of the ribosomal ribonucleic acid (rRNA) gene complex followed by sequencing confirmed a strong homology (99%) with *P. beihaiensis* infecting Chinese oysters.

Keywords: *Crassostrea rhizophorae*, *Perkinsus,* Caribbean.

90. Ligand Binding at Heme a3 of Cytochrome c Oxidase Induces Conformational Changes in Transmembrane Segments of Subunit-II of the Enzyme.

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Cytochrome c oxidase (COX), complex IV of the electron transport chain, catalyzes the transfer of electrons from its substrate cytochrome c to molecular oxygen which becomes reduced to water. This critical step of oxidative phosphorylation occurs at two vastly different rates that are thought to be linked to different enzyme conformations. We have postulated that the reduction of oxygen at heme a3 of COX reduces the distance and enhances the interaction between the long hydrophobic side chain of this heme and the transmembrane segments of COX subunit-II. Here we used computer modelling to investigate the correctness of this postulation.

We downloaded from the Protein Data Bank, the structures of fully oxidized and CO bound COX, both resolved at 2.8Å. We also obtained the structures of oxidized CN-COX and reduced CN-COX resolved at 2.00 and 2.05 Å respectively. Using the Swiss PDB Viewer each COX structure was manipulated to display only its heme a3 and the two transmembrane portions of subunit-II. Next the distances separating the end of the heme side chain from the residues in the transmembrane segments of COX subunit-II were recorded and compared for the different COX structures. Also the distances from one tip of the heme to the next were recorded for the different forms of COX.

The analysis found that compared to what pertained for the fully oxidized COX, the distances between the end of the heme side chain and the residues of COX subunit-II were smaller for the CO bound COX. The most significant movement involved Ile-34 for which the distance fell by as much as 1.14 Å; the biggest decrease of 1.31 Å, though involved the remote Leu-33. The conformational changes for the reduced CN bound COX were much smaller. We conclude that the reduction of ligands at heme a3 triggers a conformational change that moves the heme side chain closer to the transmembrane sections of COX subunit-II; the two structures then experience enhanced hydrophobic interaction contributing to enhanced rates of ligand reduction.

Keywords: Electron transport chain; Cytochrome c oxidase; cytochrome c; conformational change

91. Conservation of the *Pterocarpus offinalis* swamp forest in the Lesser Antilles: Experimental reforestation of herbaceous swamps and wet meadows

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The *Pterocarpus officinalis* swamp forest is an endangered Caribbean ecosystem. The main anthropogenic threats to this ecosystem result from land reclamation, for agricultural purposes during colonial times and for urban construction during the last century. As a result, the landward edges of remaining patches of the *Pterocarpus officinalis* swamp forest are mostly fringed by various monodominant herbaceous swamps or by periodically flooded meadows. Current models of climate change predict an increasing rise of the sea level and, especially for the central part of the Caribbean, lower annual rainfall amounts. Such conditions are expected to increase salinity level across coastal wetlands and force freshwater communities such as the *Pterocarpus officinalis* swamp forest to move landward, or decline.

Therefore, adaptation strategies to sea level rise along coastal areas include swamp forest restoration and promotion on the landward edges of current wetland areas. In this perspective, field experiments have been conducted in order to assess ecological requirements of *P. officinalis* saplings prior to large-scale reforestation projects. The rate of survival, growth, and physiologic responses of *P. officinalis* saplings have been evaluated in five micro-habitats each of one being characterized by a monodominant facies of vegetation: *Eleocharis mutata* (*Cyperaceae*) swamp (Em), *Echinochloa guadeloupensis* (*Poaceae*) swamp (Eg), *Acrostichum danaefolium* (*Polypodiaceae*) swamp (Ad), *Paspalum vaginatum* (*Poaceae*) meadow (Pv), and *Pterocarpus officinalis* (*Fabaceae*) forest (Po).

Flooding conditions and soil salinity (low: <6g/l) had no significant effect on the growth the *P. officinalis* saplings. Light availability (% of incident sunlight) varied among the five facies according to canopy height and thickness: Pv 100%; Em 90%; Eg 18%; Po 5%; Ad 2%. Shade was the main factor affecting growth among the five treatments. The rate of survival was near of 100% except in Eg and Po. Growth was higher in Pv regarding stem length, stem ramification and leaf number. Leaf traits have shown an acclimation to shade characterized by an increase of the specific leaf area, stomatal density, chlorophyll content, relative water content and osmotic leaf potential. Therefore, while adapted to grow under shady and swampy conditions, *P. officinalis* saplings exhibited higher growth rate in full sunlight and on drier soils (Pv). This can be explained by a high photosynthesis rate in spite of higher air evaporative demand.

This study permitted to highlight the growth performances of *P. officinalis* saplings in various non-forested, freshwater wetland conditions. Our results are expected to improve the success of restoration plans for the conservation of the *P. officinalis* swamp forest in the Caribbean.

Keywords: climate change, forest management, plant ecophysiology, swamp forest, tree growth

SESSION: HYDROLOGY AND HYDRODYNAMICS

92. New developments in electricity generation using wave energy

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The actual energy world consumption, around 13 billions TOE in 2014, is supposed to progress during the next decades. This consumption increase associated to the fossil resources depletion, lead most of the countries to develop alternative solutions for the replacement of fossil fuels which are at the origin of 80% of the energy generation. In the new energy production strategies, renewable energies will occupy an increasing part. Among the renewable energies panel, wave energy conversion, with an estimated production potential of 150 millions TOE is still weakly developed. As far as Caribbean islands present a potential for wave energy conversion, the talk will propose a review of the actual principles and wave-power plants developed to extract energy from waves. Then it will be concerned with recently developed devices, immersed and fixed on the ocean floor. These wave energy converters use the pressure variations generated, under water, by the propagation of the waves at the ocean surface. Associated in great number, these environmentally friendly devices, of few hundreds watts power each, constitute wave-power plants with specific power production of some tens of megawatts per square kilometres. Due to the ideal location of Caribbean islands, wave energy conversion can significantly contribute to the energy independence of lot of Caribbean countries.

Keywords: Renewable energy, wave , Caribbean

93. Prediction of clay and sand content using a chilled-mirror dewpoint technique

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Soil texture is an important factor governing a range of physical, biological and chemical processes in soil. The clay content is particularly important in controlling soil water retention, hydraulic properties, water flow and transport. Modern soil texture analysis techniques such as x-ray attenuation, laser diffraction and particle counting have become more common; however, these methods are very laborious and the cost of instrumentation to carry out these tests is substantial. The recent development of chilled-mirror dewpoint potentiometers allows for the rapid measurement of the permanent wilting point of soil. As the wilting point is strongly dictated by soil texture, we tested the applicability of a dewpoint potentiometer in determining the clay and sand content. Using nine surface and nine subsurface soil samples, we determined the particle size distribution using the hydrometer method and moisture content at wilting point using the dewpoint potentiometer. The r^2 values for the regression equations of soil moisture content at wilting point as a function of clay and sand content were 0.92 and 0.86 respectively. The root mean square error for the modelled clay and sand content was low at 4.6% and 5.1% respectively. The dewpoint potentiometer offers a rapid and cost efficient way to estimate clay and sand content as well as the permanent wilting point in tropical soils.

Keywords: Soil texture, dewpoint potentiometer, permanent wilting point, hydrometer method.

94. Monitoring coastal erosion in the French Caribbean: Regional surveys in Guadeloupe and French Guiana

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The Caribbean coastline is subject to obvious erosion both on its continental fringe and in insular environments. In conjunction with the National Strategy for Integrated Coastline Management, two monitoring approaches have been developed in the French Caribbean territories of Guadeloupe and French Guiana.

Those observatories operated by BRGM aim to survey the coastal morpho-sedimentary dynamics of these very distinctive contexts in relation with mud banks migration in one hand and cyclonic swell and surge on the other hand. A large scale approach is first conducted by diachronic analysis of the evolution of the coastline based on the photo-interpretation of aerial and satellite images since the 1950's. The multi-decadal trends obtained allow to identify the most sensitive sites in terms of retreat where topo-bathymetric *in situ* surveys are performed to characterize the seasonal and interannual variability. For this purpose, photogrammetric surveys by drones are especially implemented.

These works allow to better understand the causes of the erosion and to recommend adapted solutions for remediation. In the case of implementation of management solutions, observations also allow to monitor the effects of the restoration. Sharing and pooling these initiatives with the other Caribbean States is now envisaged.

Keywords: beach, erosion, drone, morpho-sedimentary dynamics, Guadeloupe, French Guyana, monitoring.

95. Quantitative and qualitative monitoring of groundwater in Guadeloupe (FWI): Usefulness and limits

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One of the objectives fixed by the European Water Directive is to achieve the « good state » for groundwater bodies by 2021. For this purpose, EU Members States have to set up a quantitative and qualitative monitoring of groundwater which allows making regular evaluations of the state of groundwater bodies (every six years), following its evolution and estimating if the actions undertaken to respect the fixed objectives are efficient and sufficient.

For all the Guadeloupe islands, six groundwater bodies are defined. A network of twenty-two piezometers has been established for quantitative monitoring. Its aim is to monitoring the fluctuation of the water levels, particularly to plan the drought states and follow the trends of water resources evolution. Data loggers record the water level, temperature and conductivity continuously and the data is daily repatriated at the office and recorded in a database.

For the qualitative monitoring, eleven stations are spread over two networks. It allows to quantify the elements present in groundwater (major and trace elements, pesticides…) and to follow their evolution over time. For that purpose, two analyses campaigns are organized on a year, respectively in period of high water (wet season) and low water (dry season).

The data obtained from the existing networks are used to define the state of groundwater bodies. However, due to the lack of knowledge on certain aspects such as the relationships between wet zones and groundwater or the absence of monitoring stations in strategic sectors, representativeness and relevance of the defined states can be sometimes limited. In 2016, several adaptations have been proposed to improve the quality of monitoring in Guadeloupe basin.

Keywords: Groundwater bodies, monitoring, quality, quantity, network, states, Guadeloupe islands.

96. Modelling river hydrokinetic energy in Large rivers : Maroni river in French Guiana.

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Energy is a critical enabler. In tropical countries, access to modern electricity is vital to reducing poverty and improving health, increasing productivity and promoting economic growth. However, the International Energy Agency reported in 2015 more than 1.2 billion people still did not have access to electricity in 2013, around 80% of them live in developing and tropical countries. Then, the same agency report also in 2016 around 6.5 million premature deaths each year can be attributed to air pollution. Therefore, it is time to support appropriate renewable energy developments, particularly the river hydrokinetic developments seems to be a better solution in tropics because of large and powerful rivers in these areas. In French Guiana, 35% of the inland populations are still not connected to the electrical grid (Région Guyane, 2012). This could be ascribed to the fact that extending grid wires hundreds of kilometers through difficult terrain and thick jungles just to serve a small remote village is economically unviable initiative (Ajan et al., 2003; Anyi et al., 2010). As an alternative, French Guiana and most of the tropical countries resort to diesel-powered generators which requires significant imports of expensive fuel, difficult to bring into remote areas (Région Guyane, 2012).

This works proposes guidelines to estimate river hydrokinetic fluxes in the vicinity of remote communities in tropics. The method is applied to identify and characterise potential sites along an important reach of the Maroni river in French Guiana. First, a novel method to carry out river terrain elevation model is presented and some results about the Maroni river are reported. It begins from how to conduct ADCP survey, which corrections on them should be made and ends up by interpolating bathymetry over curvilinear profiles which handle the flow lines. That approach involves how mutli-source data (sparse ADCP-cross profiles, incomplete LiDAR tiles and hydroligic data) are merged and combined to estimate local cross section shape, maximum water depth and carry out cross profile in ungauged sites. This is followed by a deep characterisation about time-evolution of hydrokinetic fluxes field in the areas of interest by implementation of a full 2D hydrodynamic model (TELEMAC2D) over an important reach of the Maroni river. To optimise computational cost, river sections outside the areas of interest are modelled as a porous media where only the flows variables up and down stream must fulfil the field data.

Keywords : Terrain numerical model, river modelling, Porous media, TELEMAC2D, Hydrokinetic Energy, Maroni river, French Guiana.

97. The Influence of Infiltration and Exfiltration Processes on Maximum Wave Run-up – A Study on Trinidad Beaches

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Wave run-up may be defined as the time-varying position of the landward extent of the water's edge, measured vertically from the mean water level position. The accurate prediction of maximum wave run-up plays a critical role in the study of coastal engineering. The understanding of these processes is necessary for the modeling of sediment transport, beach recovery and the design and maintenance of coastal engineering structures. However, due to the complex nature of the swash zone, there remains a lack of detailed knowledge in this area.

Particularly, there has been found to be insufficient consideration of bed porosity and ultimately infiltration/exfiltration processes, in the development of wave run-up models. Theoretically, there should be an inverse relationship between maximum wave run-up and beach porosity. The greater the rate of infiltration during an event, associated with a larger bed porosity, the lower the magnitude of the maximum wave run-up. Additionally, most models have been developed using data collected on North American or Australian beaches and may have limitations when used for operational forecasting in Trinidad. This paper aims to assess the influence and significance of infiltration and exfiltration processes on wave run-up magnitudes within the swash zone. It also seeks to pay particular attention to how well various empirical formulae can predict maximum run-up on contrasting beaches in Trinidad.

Traditional surveying techniques will be used to collect wave run-up and cross-sectional data. Data from wave gauges and wave models will be used as well as porosity measurements collected using a double ring infiltrometer. The relationship between maximum wave run-up and differing physical parameters will be investigated using correlation analyses. These physical parameters comprise wave and beach characteristics such as wave height, wave direction, period, beach slope, magnitude of wave setup, and beach porosity. Most parameterizations to determine the maximum wave run-up are described using differing parameters and do not always have good predictive capability. This study seeks to improve the formulation of wave run-up by using the aforementioned parameters to generate a formulation with a special focus on the influence of infiltration/exfiltration processes. This will further contribute to the improvement of the prediction of sediment transport, beach recovery and design of coastal engineering structures in Trinidad.

Keywords: Beach Porosity, Empirical Models, Infiltration, Swash, Wave Run-Up.

98. An analysis of the evolution of the time series of rainfall and temperature of Guadeloupe

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Natural disasters have occupied a large proportion of front page titles in the news media around the world in recent years. These disasters which are often manifested in extreme weather events are becoming more correlated with the phenomenon of global warming. In developed countries and many emerging markets, the theoretical issues and practical decisions of public policies to be implemented have definitely occupied the thoughts and discussions of researchers and policy makers. Large countries like China, the United States, Russia, France, India and Pakistan have in recent months shown their limitations in coping with awesome and destructive floods, severe droughts and massive forest fires. Therefore, the impact of natural shocks on small island territories, which by definition appear in the top rankings of the most vulnerable countries in the world, needs to be monitored. We present a discussion on an empirical study of the climate change issues of the French West Indies Island of Guadeloupe. Firstly, we present the essential elements of literature devoted to the identification and consequences of climate change in the French West Indies. Secondly, we apply different approaches of statistical techniques of time series to analyze and model the evolution of two key parameters for monitoring the climate; rainfall and air temperature.

Keywords: *Time series; Climate change; Rainfall; Temperature*

99. Rise in water level of lake Enriquillo, Dominican Republic

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Lake Enriquillo is the largest of the Antilles with a surface area of approximately 265 square kilometers and its water level at approximately 44 meters below sea level. The lake is hypersaline. Its salinity normally fluctuates between 80 and 110 ppt. As of 2004 a continued rise in the level of its water was observed, taking its fastest growth since late November and early December of 2007, when the southwest of the Dominican Republic was affected by the tropical storms Noel and Olga. This caused the salinity of the lake to significantly decrease at 20 ppt in 2013. During its history Lake Enriquillo has experienced fluctuations in its water level, but the concern of this process has been its rapid and continuous growth. By 2012 the surface area of the lake was over 350 square kilometers. Recent satellite images have shown a decrease in the area of the lake. In this study, we use seismic data, geophysical methods, satellite imagery, and meteorological data to investigate the possibilities of neotectonics influences over the water level rise of the lake. A Ground Penetrating Radar was used to monitor the water level around the lake, and seismic data from the region were analyzed and compared with the precipitation of the study site. A flow meter was used to measure the influence to surface water on the rise of the water level of the lake. Preliminary results indicate that neotectonics has not influenced in the water level rise of the lake.

Keywords: Lake Enriquillo, hypersaline, precipitation, neotectonics

100. Hydrogeological functioning and groundwater contamination of two contrasted tropical volcanic basins belonging to the Observatory of Agricultural Pollution in the French West Indies (OPALE)

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The Observatory of Agricultural Pollution in the West Indies (OPALE) focuses on the agronomical and hydrological processes that fit the strength of tropical volcanic settings. Two basins were instrumented in 2015 in Martinique and Guadeloupe, both set up under the "Plan Chlordécone 2". It is run by a consortium of research teams from CIRAD, INRA, IRD and BRGM. The aim of OPALE is to characterize and monitor of the pollution caused by agricultural practices on volcanic island under a tropical climate. The major challenge is to report the complexity of the water contamination in such heterogeneous context. The basins are Galion and Pérou on weathered (10-15 Myr) and un-weathered (<1 Myr) formations, respectively. Before setting-up the observatory, it was first required to have some insights on the contrasted hydrogeological functioning of the basins in order to optimize the groundwater monitoring. A multi-disciplinary approach was used to give a first hydrogeological scheme as well as a first groundwater contamination understanding of the two hydrosystems. Firstly, geological surveys coupled with the interpretation of the resistivity models from airborne electromagnetic surveys had shown a high spatial variability of volcanic deposits. Geological boundaries and the associated aquifers were identified. Secondly, a differentiation of the hydrodynamic properties of the aquifers was achieved using the modelling of long duration pumping tests accounting for vertical and lateral compartmentalization. Thirdly, a hydrochemical and isotopic approach (18O/2D, 87Sr/86Sr), coupled with water age dating tools (CFC, SF6) has allowed better characterize the nature of aquifers, the groundwater residence time and the mixing between groundwater bodies and the surface water. Finally, the compilation of all results helped to defined two contrasted hydrogeological conceptual models of andesitic volcanic environments according to the weathered level of the geological formations: predominant subsurface processes in weathered aquifers vs. predominant deep processes in un-weathered aquifers. This hydrogeological scheme was used to support the representation of the groundwater contamination, and finally for a better understanding of the pesticide fate in groundwater.

Keywords: Environmental Observatory, Experimental sites, Volcanic aquifer, Hydrogeological functioning, Groundwater, Contamination, West Indies.

SESSION: MATERIAL AND ENVIRONMENTAL CHEMISTRY

101. Tuning polyolefin reactor design technology and rheological property for high performing data cable

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Mobile data consumption and demands on 4G networks are increasing at an explosive rate and are expected to grow 13-fold between 2014 and 2019, placing greater demand for higher signal quality in Radio Frequency (RF) communication cables, which in turn drives the need for higher performing materials. RF cables are about 50 meters long cables used in cellular tower to transmitting the signal from the base station to the antenna. As RF cables are used at ever higher frequencies in the gigahertz range, cable electrical losses become extremely important, and minimizing them enables increased area coverage by each cell tower. One way to obtain higher signal quality in communication cable is to lower signal attenuation of the polymer foam insulation. Studies in Dow's R&D laboratories modeled the detrimental impact that various trace adventitious polar functional groups in the polymer insulation can have on the dielectric properties, leading to signal attenuation. Studies were then conducted to understand how to minimize these unwanted functionalities polymerization. The result is a patented (US Patent 8,912,297) reactor design process of a polyolefin having reduced amount of these electrically dissipative species, representing best-in-class in the industry (30% improvement versus the leading non Dow incumbent) for low dielectric loss.

Also, for cellular cable insulations, high and uniform void fraction of foaming is required for improved dielectric loss and high quality signal transmission. Therefore, the rheological attributes of the polyolefin resin system is a critical factor in determining the end-use performance production of the cable. In this work, we present a polyolefin resin system with specific rheological properties for improved cellular structure at the high cable extrusion speed. Specifically, the zero shear rate viscosity for ease of bubble growth, the recovery compliance (or melt strength) for resistance to bubble coalescence, the polymer relaxation spectrum index for the extrusion performance at high speed.

The relationship between the polymerization process and the dielectric property as well as the one between rheological parameters and the polymer cellular structure are discussed. These results presented here will be interesting to those seeking to understand the material science-based explanations for ideal balance of properties to provide high performing cable signal transmission in the gigahertz range.

Keywords: Polar functional groups; polymerization; polyolefin resin; radio frequency communication cable; foam insulation

102. Plastic Recycling with a Caribbean Perspective

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The disposal of Polyethylene Terephthalate (PET) water/soft drink bottles (some 1.5 million per day in Trinidad alone) represents a major environmental challenge to the Caribbean region. A percentage of these bottles are 'recycled' (the rest going to landfill or disposed of indiscriminately in the environment) but even this just amounts to chipping up the bottles and shipping to Asia. The result is that a valuable hydrocarbon resource is lost to the Islands' industries or worse, ends up creating an environmental problem.

A major factor driving the push towards recycling is the threat of legislation. Various countries and regions, in both the developed and the developing world have instituted or are considering the institution of legislation which would have the ultimate effect of reducing the impact of plastic waste on the environment.

This presentation will exam the current status of recycling legislation across the region, examine its effectiveness, and make a contrast with the situation in the developed world.

The alternative approaches available for the recycling of waste PET, including physical, chemical and energy valorization options will be highlighted. The methanolysis of waste PET to produce dimethyl terephthalate (DMT) and ethylene glycol (EG) will be examined in greater detail. This would represent an application of the discipline of Industrial Symbiosis which is focused on the development of techniques to turn apparent waste into industrial feedstocks. Given the fact that Trinidad and Tobago is renowned as a major international player in methanol synthesis it would be an ideal location for the recovery of petrochemical feedstock from waste PET via the process of methanolysis, thereby fitting the technique of valorization to an industry and technology already employed. The product of this process would be able to be introduced into an upstream position in a petrochemical chain (new to Trinidad and Tobago), involving the manufacture of PET resin.

The novel application of utilizing waste PET in the production of polyester polyols via a partial glycolysis process would also be examined. This could lead to the development of an industry producing polyurethane foams and would represent another application of Industrial Symbiosis.

Keywords: polyethylene terephthalate (PET), plastic recycling, Industrial Symbiosis, methanolysis, polyester polyols

103. Electrochimical properties of activated carbon from *Turbinaria turbinata* and *Sargassum fluitans* for use in supercapacitor

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Among energy storage devices, supercapacitors are the most suitable for high-power applications such as: electric vehicles, backup power systems, electronic components and military fields. They can store a large amount of energy and can redistribute it faster than a battery. They are already used for opening of the door of Airbus 380, for starting groups in transport (electrica vehicles, buses). Supercapacitors are intermediate systems between electrochemical batteries that can accumulate high levels of energy and convert them to low power and dielectric capacitors, which then can deliver high levels of power [1,2]

Carbon as an active material for supercapacitor electrodes has been extensively investigated because of its unique combination of chemical and physical properties, which include its high conductivity, high surface area, good corrosion resistance, and relatively low cost. Among precursors used, tropical seaweeds constitute a natural source of carbon that is very accessible and cheap.

In this study, algae from Guadeloupe : seaweeds *Turbinaria turbinata* and *Sargassum fluitans* are used for the preparation of activated carbons by simple pyrolysis [3] at temperature between 600 and 900°C. For example, the textural parameters study showed that AC from *Turbinaria turbinata* are mesoporous materials with surface area limited to 810 m^2/g and AC from *Sargassum fluitans* have surface area reaching 1664 m^2/g. at 800°C for the both.

The carbons obtained were tested as capacitors electrode using aqueous and organic electrolytes. The electrochemical properties of the carbon materials were characterised for their application as supercapacitors using cyclic voltammetry, galvanostatic charge/discharge method and electrochemical impedance spectroscopic analyses.

Our results show the promising capacitive properties of carbon derived from seaweeds and their possible application in electrochemical supercapacitors. For comparison, of ACs derived from theses biomasses, *Sargassum fluitans* AC has a higher surface area but the *Turbinaria turbinata* AC has best electrochemical properties : electrical capacities reach the value of 140 F/g for AC from *Turbinaria turbinata* pyrolysed at 700°C.

Keywords: supercapacitors; tropical seaweeds; electrode carbon; energy storage, *Turbinaria turbinata*, *Sargassum fluitans*

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104. Structural investigation of carbon-based sorbents synthetized from Caribbean biomass for water processing

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Caribbean biomass has the great potential to simultaneously deliver renewable energy, bio-products and also improves water quality, which can obviously lead to a greatest economic development of the area. A pathway toward the realization of these benefits is through the development of valuable chemicals or materials. Pyrolysis is a processing technique involving thermal degradation of the biomass in the absence of oxygen. Among the many components obtained through this process, bio-char forms a very convenient starting point for valorizing lignocellulosic as well as algal biomass feedstocks for the production of activated carbon, carbon fibers or carbon nano-tubes. Depending of the application, such materials become highly desirable because of the stability, low cost, versatile preparation and outstanding adsorption characteristics. Although commercially available carbon materials exist, their generation and regeneration are relatively costly, thus limiting their applications.

In this work, we focused on developing original carbon-based sorbents derived from highly available organic waste, collected in the Caribbean and Guadeloupe Island, including seaweeds (*Sargassum fluitans*, *Turbinaria turbinata*) and terrestrial biomass (*Calophyllum Calaba* and Banana trunk). The resultant carbonaceous materials were then extensively characterized using different techniques, such as nitrogen sorption for textural characterization, as well as X-ray photoelectron spectroscopy, scanning electron microscopy, Fourier transform infrared and RAMAN spectroscopies, to better understand their structures and functionalities. In the production of activated carbon, the preparation conditions are crucial as well as the properties of the precursor used. Therefore the thermal behavior and the effect of the activation temperature and activation agent were systematically investigated using a very simple thermogravimetric method. Experimental results will be given, in tandem with kinetics and thermodynamics data obtained from adsorption of a model molecule on the prepared sorbents, in order to determine their potential application in the market of water purification.

Keywords: Biomass, Activated carbon, Characterization techniques, Water purification

105. Molecular modeling of chlordecone and β-hexachlorocyclohexane interaction with acidic surface groups in an activated carbon model

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Chlordecone (CLD) and β-hexachlorocyclohexane (β-HCH) were extensively used as pesticides in banana crops in the French West Indies: Martinique and Guadeloupe, and has been listed as Persistent Organic Pollutants by the Stockholm Convention. Due to the persistence of CLD and β-HCH in natural environment, drinking water production plants were equipped with activated carbon (AC) filters, in the polluted areas. In the present work, a theoretical study of the influence of AC surface groups (SGs) on CLD and β-HCH adsorption was done in order to understand the adsorption process and to improve the AC selection. Coronene with a functional group in the edge, as a simplified model of AC, was used to evaluate the influence of the acidic SGs (hydroxyl and carboxyl) in the course of adsorption. Multiple Minima Hypersurface semiempirical methodology was employed in order to study the interactions of CLD and β-HCH with SGs under different conditions of pH and hydration. Re-optimization of obtained structures for pesticides-AC complexes using CAM B3LYP Density Functional Theory was done. For the CLD-AC systems, the Quantum Theory of Atoms in Molecules (QTAIM) was used to characterize the interaction types. At acidic pH conditions, a competition between water and pollutant molecules is established, leading a low adsorption of contaminants. Under neutral and basic pH conditions the deprotonated SGs should enhance CLD adsorption compare to β-HCH. QTAIM study showed that the main attractive interactions with SG has electrostatic, dispersive and donor-acceptor nature. It is stronger between the carbonylic C of CLD and the regions of negative charge of SG and H_2O. The occurrence of a chemical sorption should be expected in the adsorption of CLD onto AC containing these SGs.

Keywords: molecular modeling, chlordecone, β-hexachlorocyclohexane, acidic surface groups, activated carbon.

106. Degradation of chlordecone and β-HCH by photolysis, photo-fenton and ozonation processes

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From the 1960s to the 1990s, the large-scale production of banana in the French West Indies involved an intensive use of chlorinated pesticides, such as chlordecone (Kepone) and beta-hexachlorocyclohexane (β-HCH), resulting in the diffuse contamination of soil and surface waters. Due to its strong persistence in natural environments, its high resistance to chemical reactions and microbiological degradations, around 8–9% of the cultivation areas of Guadeloupe contain CLD and β-HCH concentrations higher than 1 mg/kg in topsoil, and some banana fields exhibit content higher than 9 mg/kg. On the other hand, the conventional processes and technologies for water decontamination like adsorption in activated carbon are extensively used, but their utilization do not guarantee the solution for this recalcitrant substances. Moreover the study of the advanced oxidation processes has become a research topic of special interest in the last years and a modern oxidation technology like the photo-Fenton process has been applied for the degradation of several classes of pesticides and refractory compounds. In this work, the degradation of CLD and β-HCH in aqueous solution by photolysis, Fenton, photo-Fenton and ozonation processes was studied. The first hard step compared several analytical approaches to get the CLD and β-HCH concentration profiles in very dilute conditions ($0.1 mg.L^{-1}$). Two techniques gave finally convenient results: the liquid chromatography mass spectrometry (LC MS-MS) and gas chromatography mass spectrometry (GC MS). Fenton oxidation did not yield significant conversion of CLD, and best results were obtained with photolysis, where 100% of the pesticide was removed after 5 hours. Conversion of β-HCH by photolysis reached 100% in 5 hours, but despite Fenton oxidation could also efficiently degrade this molecule, combination of UV irradiation with hydrogen peroxide and ferrous iron did not show any significant improvement.

Keywords: chlordecone, β-HCH, micro-pollutants, advanced oxidation processes, photo-Fenton, photolysis, ozonation

107. BIOACCUMULATION OF CHLORDECONE IN GRASSES

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Chlordecone (CLD) is an organochlorine insecticide used to struggle against banana weevil (*Cosmopolites sordidus*) in the French West Indies. His main driving force uptake by plant is water. Here, we investigate the transfer of CLD in Poaceae with various type of photosynthetic pathway, maize and *Mischantus spe* (as C4 plants), and wheat (as C3 plant), known to their different Water Use Efficiency (WUE). CLD was used as radiolabeled [^{14}C]-CLD (1.375 MBq/µmol), 1mg.L^{-1}, to investigate the CLD uptake. Plants were hydroponically grown on vermiculite/sand substrate mixture in climatic cabinet (16/8 h, 18/22°C day/night). CLD uptake is five higher in wheat than two other plants. That is correlated with the highest rate of evapotranspiration in wheat. Moreover, the transpiration stream coefficient factor, representative of xylem concentration was higher in wheat than for both maize and *Miscanthus spe* with 5.36, 1.97, and 1.20 respectively. These results highlight a differential retention mechanism in uptake between both types of plants. Besides that, the WUE of C3 plants could be correlated to ^{13}C discrimination of carbon metabolism. This parameter differs from wheat variety. So, various wheat varieties were investigated to study the correlation with CLD uptake to use this parameter to select plant with higher accumulation potential for a phytoremediation use or on the contrary to select varieties which have low contamination potential. The CLD uptake in wheat is more efficient because such plant had both a best WUE and a lower root CLD retention. Therefore, CLD risk assessment must be differentiated between C3 and C4 forages. Phytoremediation must also be considered in C3 plant with more attention because of their best efficiency in CLD uptake. The floristic diversity of tropical and Caribbean Territories is a major asset to explore the link between the WUE and the plant capability to absorb organic pollutants such as CLD.

Keywords: Chlordecone, Grasses, Phytoremediation, Risk assessment, Uptake, WUE

108. Determination and removal of phosphorous and chloride in surface and ground waters from the three counties in Guyana

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Phosphorous and chloride levels were determined in surface and ground water samples from the three counties in Guyana by standard methods of analysis, namely spectrophotometric and titremetric methods, respectively. Adsorptive interaction for the removal of the phosphorous anionic contaminant was studied at the different concentrations present in the water samples and at room temperature (30 ± 1˚C) by the use of nickel ferrocyanide as the adsorbent material, a pre-determined dosages of 25 mg used for all samples. Nickel ferrocyanide were shown to have adsorptive properties for the removal of phosphorous in most of the water samples. The interaction of phosphorous with nickel ferrocyanide followed the Langmuir type of adsorption in general. Chloride in the water samples were determined by Mohr's titremetric method. Acidic alumina and nickel ferrocyanide were investigated as potential adsorbents for the removal of chloride contaminants from water samples .Present work discussed the potential use of possible prebiotic minerals nickel ferrocyanide and acidic alumina for the removal of phosphorous and chloride ion from the aquatic environment. The positive surfaces of nickel ferrocyanide and acidic alumina were considered to condense phosphorous and chloride from the contaminated waters.

Keywords: Removal, phosphorous, chloride, adsorption, nickel ferrocyanide, acidic alumina.

SESSION: MEDICAL SCIENCES (2)

109. Biological, cellular and genetic abnormalities associated with alteration of red blood cells filterability from sickle cell trait blood donors.

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For unknown reasons, red blood cells (RBCs) from sickle cell trait (SCT) donors, *i.e.* the heterozygous state of the β^S-globin gene responsible for sickle cell disease, exhibit filtration abnormalities, ranging from filter blocking, residual leucocytes and/or hemolysis. These abnormalities, affecting 30% to 50% of SCT blood donation, are associated with a potential transfusion risk because of the partial leukodepletion. Furthermore, these abnormalities increase blood deficiency in populations with high prevalence of SCT. We hypothesized that polymerization of hemoglobin S (HbS), the abnormal hemoglobin produced in this genetic status, may be one of the molecular event involved in the filtration abnormalities. Moreover, HbS polymerization is known to affect the rheological properties of blood and it has been reported that coexistence of SCT with α-thalassemia could improve blood rheology. In the present study, we determined and compared the hemorheological features and the α-globin gene status of 100 SCT blood donors classified according to their blocking status. Complete blood count was obtained using an automated cell coulter and the percentage of HbS was determined using cation-exchange high performance liquid chromatography. Alpha-globin gene was genotyped by multiplex GAP-PCR. Blood viscosity was measured by a cone-plate viscometer, RBCs deformability by ektacytometry and RBCs aggregation properties by syllectometry. We observed that 33.7% of packed RBCs bags blocked. Regarding the hemorheological factors, we detected no significant difference between blocking and non-blocking packed RBCs bags in terms of blood viscosity (shear rate 225 s^{-1}, p=0.37); RBCs deformability (elongation index at 3 Pa, p=0.42); RBCs aggregation (p=0.85) and disaggregation threshold (p=0.29). No significant difference was found between blocking and non-blocking blood in hemoglobin level (p=0.58). However blocking blood donors exhibited a tendency for higher HbS level than non-blocking blood donors (37.48 ± 2.53% vs. 36.44 ± 2.47%, respectively, p=0.06). There was no significant difference in the prevalence of α-thalassemia for SCT blocking or non-blocking donors (20% vs 28.6% respectively, p=0.45). The observed tendency for blocking blood of SCT donors suggests that a higher level of HbS in AS RBCs could be responsible for the filtration abnormalities. Inclusion of donors is ongoing and will confirm or not these preliminary results. **Keywords:** sickle cell trait – filtration – α-thalassemia.

110. Microparticles of sickle cell patients: modulators of endothelial cell phenotype.

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Sickle cell disease (SCD) is a one of the most common genetic diseases worldwide characterized by hemolysis and abnormal interactions of erythrocytes with other blood cell types and endothelial cells subsequently leading to vaso-occlusive crisis (VOC). SCD patients exhibit higher plasma concentrations of submicrometric (from 0.1 to 1µm) vesicles called "microparticles" (MPs), when compared to healthy persons. MPs are known to predict the severity of several disorders and also to be involved in biological pathways such as coagulation, inflammation and inter-cellular adherence. To better understand the pathophysiological role of MPs in SCD, we tested the hypothesis that MPs may induced a pro-adhesive phenotype of endothelial cells, thereby facilitating the occurrence of VOCs. We incubated TrHBMECs (transformed human bone marrow endothelial cells) with MPs from 19 sickle cell children (10 HbSS and 9 HbSC) at steady state, none of them being under hydroxyurea treatment as well as MPs from healthy children (n=4). Incubation was carried out for 2 to 8 hours and using doses ranging from 1 to 20X (i.e. 7 MPs/cell). After the incubation period, RNA extracted from the cells was submitted to RT-qPCR for relevant genes and proteins levels were assessed by flow cytometry. Gene expression normalization was done using the level of expression observed in the control well, with no MP added. Using two-way ANOVA test, we shown that SCD patients' MPs, in contrast to MPs from healthy persons, entailed dose-dependent increases in expression levels for genes implicated in coagulation (Tissue Factor), inflammation (IL-6 and IL-1β), and adherence (VCAM-1, ICAM-1 and E-selectin). For example, a 10X dose provoked, after 4 hours of incubation, a 4.87-fold increase in expression level of VCAM-1, when compared to the control level, while the 5X dose led to a 2.47-fold increase, ($p=0.008$) and the 1X dose led to a 1.29-fold increase ($p<0.0001$). Importantly, this 10X dose-mediated 4.87-fold increase in VCAM-1 expression level after 4 hours, is significantly higher than the 1.04-fold increase observed using the same dose but with MPs isolated from healthy subjects (p-value =0.014). Moreover, MPs from SCD patients entailed increased MFI (mean fluorescence intensity) and percentage of positive cells for all the tested proteins that are implicated in inter-cellular adherence (VCAM-1, ICAM-1, E- and P-selectine). These results are consistent with a previous observation showing that MPs generated *ex vivo* trigger VOCs in a SCD murine model. Our data also suggest a qualitative difference between the MPs from SCD patients and healthy subjects. Even though functional adherence tests still remain to be carried out, altogether our results suggest that SCD patients' MPs may be involved in the pro-adhesive phenotype of endothelial cells and may be key players in the pathophysiological processes of VOCs in SCD.

Keywords: sickle cell disease, microparticles

111. Testosterone deficiency and cardiovascular profile in Afro Caribbean subjects with type 2 diabetes.

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Introduction: Testosterone deficiency (TD) is associated with an erectile dysfunction in men but also with an increased cardiovascular risk in case of diabetes. **Objective**: To evaluate the frequency of TD and erectile dysfunction in subjects with type 2 diabetes (T2D) in Guadeloupe and the relationships between TD and their cardiometabolic profile. **Patients-Methods**: A prospective study was performed for 3 months. Subjects with severe renal impairment or prostatic disease were excluded. We registered the clinical and classical metabolic data. Plasmatic levels of total testosterone (TT) and SHBG were measured respectively by chemiluminescent and IRMA assays. TD was defined by a TT level <10.4 nmol / L. Erectile dysfunction was evaluated by the International Index of Erectile Function questionnaire after oral consent of the patients. Results are expressed as mean ± standard deviation for quantitative values and percentage for continuous values. Correlations were calculated with the Pearson test. **Results:** 83 subjects were included (mean age 58 ± 13 years, diabetes duration: 122 ± 133 months, body mass index: 27 ± 4 kg/m2, waist circumference: 99.6 ± 13cm, HbA1C 9 ± 2%). Frequency of hypertension was 51.7%, dyslipidemia 43.8%, obesity 24.6%, abdominal obesity 40.7%, smoking 10.7%. Prevalence of TD was 48.2% with a mean of plasma TT of 12.3 ± 6 nmol / l and SHBG 38.8 ± 17.3 nmol / l. Erectile dysfunction was severe in 50%, moderate in 21%, mild in 21%. Regarding the relationships between TT levels and metabolic profile: TD was significantly correlated with abdominal obesity (ß = 1.97, p = 0.008) and dyslipidemia (ß = 1.17, p = 0.043). No relationship was found with hypertension. **Conclusion:** In this study, the frequency of TD and erectile dysfunction is high. TD is correlated with clinical and biological profile integrating into the metabolic syndrome and could increase the cardiovascular risk of Afro Caribbean subjects with T2D.

Keywords: testosterone deficiency, type 2 diabetes, cardiovascular risk,

112. Ethnobotanic study and therapeutic potential of *Solanum triste* Jacq.

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About 10% of the population of industrialized countries, have been treated for urolithiasis meanwhile, no therapeutic treatment has demonstrated a real efficacy till now. Evidences have been collected by the lab showing that people use a plant called “bwa kaka” to treat this pathology in Martinique, but there was no trace in the local literature to confirm it. Traditional use has often guided scientists to the identification of new active molecules for therapeutic treatment. We have decided to focalize our researches on this plant. First, to identify specifically the species, we had to make an ethnobotanical survey. It has shown that many locals use infusions of “bwa kaka” to treat and cure themselves. Very few studies have been published on this species that belongs to a family with a great economic importance worldwide (human and animal feed, pharmaceuticals, crop protection product *etc.*), the *Solanaceae*. This information has provided some tips for the analysis of the phytochemicals. With the traditional popular folk extraction method and the classic laboratory extraction we could identify several families of constituents. Characterization of molecule has implicated the development and use of purification and analysis methods specific to our species. These results and the review of literature should lead us to the identification of molecules that have a potential in therapeutic applications for urolithiasis.

Keywords : traditional knowledge, medicinal plants, phytochemistry.

113. Effect of heat exposure and exercise on food intake regulation and glucose tolerance: a randomized crossover study in young healthy men.

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The effect of physical activity on glucose homeostasis may be moderated by environmental temperature. This has been understudied, although it might concern millions of humans. The aim of this project was to examine the single and combined effects of experimental short-term mild heat exposure and metabolic level on glyco-regulation and food intake regulation. Two experimental randomized crossover studies were conducted. Ten healthy young men participated in study A, which comprises four sessions in a fasting state at two metabolic levels (rest and exercise at 60% of maximal oxygen uptake for 40 min) in two environmental temperatures (warm: 31°C and control: 22°C). Each session ended with an ad libitum meal, resulting in similar energy intake across sessions. In study B, healthy young men underwent two 3 h oral glucose tolerance tests in warm and control environmental temperatures. Venous blood was sampled at several time points. Repeated measure ANOVAs revealed significant decreased in the relative energy intake, whereas plasma PP was increased in the exercise conditions ($p=0.004$ and $p=0.002$, respectively). Exposure to heat induced a decrease in plasma ghrelin ($p=0.031$). Postprandial serum glucose and insulin levels were higher in the sessions in a warm environment, with no evidence of short-term protective effect of exercise. Differences between the warm and control conditions were evidenced up to 90 min after the glucose load (all $P<0.033$). These studies provide evidence that heat exposure 1) modifies the hormonal regulation of food intake, 2) alters short-term glyco-regulation. The implication of this environmental factor in the physiopathology of Type 2 diabetes has yet to be investigated.

Keywords: Exercise, Metabolism, Climate, Physiology, Diabetes, Appetite, Health

114. Effect of cold menthol water immersion on recovery in tropical climat.

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Tropical climate is characterized by both constant temperature (25-26 °C) and high mean relative humidity (80-82 %). In this condition endurance exercise (and especially cyclic exercise) has been demonstrated to be impaired. The aim of this study was to compare two methods of cold water immersion intervention on recovery during cycling : with menthol (CMWI) or without (CWI). Eight heat-acclimatized elite road cyclists (age: 24.1 ± 4.4 years; weight: 65.3 ± 5.2 kg) performed two randomized sessions. Each session contained a 20 min time-trial (TT1) followed by 10 min recovery immersion (CMWI or CWI) and a second 20 min time-trial (TT2). Mean power output (PO) and perceived exertion (RPE) were recorded for both time trials. Rectal and skin temperatures (Tr and Ts) , perceived thermal sensation (TS), comfort (TC) were measured before and immediately after TT1, immersion, and TT2. Whereas performance in TT1 was significantly lower in CMWI (223 W ± 14,7 W) than in CWI (257W ± 14,8W) in relation with higher WBGT index no difference was observed after immersion (257W ± 15,4W and 259W ± 15,2 respectively for CMWI and CWI). We observed a significant decreased for TS after immersion for both conditions. This decrease was significantly more pronounced in CMWI (5,9 ± 1 to 3,6 ± 0,5) than CWI (5,6 ± 0,9 to 4,4 ± 1,2). However there were no difference for TC and RPE in both conditions. This study suggests that menthol allowed to decreased thermal sensation between sessions, leading to improved performance in subsequent cycling session.

Keywords: Exercise, Climate, Physiology, Recovery, Performance

115. Vasculopathy in Sickle Cell Disease.

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Sickle cell disease is the most common genetic disease in the West Indies that affects hemoglobin. The abnormal hemoglobin (sickle hemoglobin or hemoglobin S) leads to loss in red blood cell functionality, which results in blood flow alterations, painful vaso-occlusive crises, tissue damages and chronic organ dysfunction. Because of considerable heterogeneity in clinical outcomes, its complex pathophysiology is still not totally understood. For many decades it was widely assumed that blood disorders were the sole cause of vaso-occlusion. More recently blood vessel dysfunction and abnormal vascular tone also seem to be involved. Our last study with a cohort of Guadeloupean patients, demonstrated that vasomotricity is impaired already in sickle cell children. Diverse biological and physiological analyses revealed that there are many interacting factors, all of which may contribute to vasculopathy: 1) chronic endothelial stress due to elevated blood flow level, 2) decreased vasodilatory capacity as a result of reduced nitric oxide bioavailability (chronic hemolysis and oxidative stress contributes directly to overconsumption of this vasoactive molecule), 3) altered autonomic nervous system activity with increase in vasoconstrictor activity, 4) no compensation (saturated antioxidant activity and limited physical activity, known to improve vascular function). However, in this children cohort, vascular impairments were not associated to clinical severity. An important area for future research lies in learning more about the progress of vascular dysfunction in sickle cell disease. The dysfunctions we evidenced are compatible with later worsening of the clinical severity.

Keywords: Sickle cell, Vascular function, Nitric oxide

116. Arterial stiffness in young patients with sickle cell disease

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Sickle cell disease is associated with severe clinical complications due to vascular dysfunction from childhood to adulthood. Vascular structure and function changes have been observed in adults. These changes can lead to arterial stiffness and a loss of vascular elasticity. Pulse wave velocity is a measure of arterial stiffness, and subsequently is a good marker of these changes. It is unknown yet if the vascular function of children with sickle cell disease is preserved or not. The aim of this study is to evaluate the arterial stiffness, its determinants and its clinical correlates in sickle cell disease children. We enrolled 58 children (18 with the SS form, 18 with the SC form, and 16 healthy children) aged 15.7 ± 2.9 years. There was no significant difference in carotid-femoral pulse wave velocity between groups. It reflects a relative preserved arterial compliance at the central level. Carotid-radial pulse wave velocity was higher in the SS group than in the AA group (6.4 m/s ± 0.9 *vs.* 5.6 m/s ± 0.8, p = 0.035). Diastolic blood pressure, mean blood pressure, physical Activity Expenditure relative to the body mass were significantly different between groups, and their association to arterial stiffness was dependent upon the form of the disease. These data suggest that arterial stiffness might be associated to peripheral vascular alteration. Further studies are required to investigate peripheral arterial stiffness change to explain arterial dysfonction and vascular properties modification caused by disease progression.

Keywords: arterial stiffness, anemia; pulse wave velocity; sickle cell disease; vasculopathy

SYMPOSIUM: FORESTRY

Alain Rousteau

117. Dynamics of Caribbean Island rainforests: first measurements.

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The dynamics of the tropical mountain rainforest of the Basse-Terre island (Guadeloupe) is surveyed since 2009 through a network of 8 squared one-hectare permanents plots. More than 7500 trees (Dbh > 10 cm) are equipped with tape dendrometers and measured every four years. Roughly 90% of the trees are identified and 92% could have been measured twice, resulting in 6881 growth measurements. It places this long-term survey as the first one in the Lesser Antilles reaching such high international standards. Although, solutions have to be found to improve measurements of biggest trees (Dbh>70 cm) since 55% of them still remain un-remeasured. Data show a median growth rate of 0,09 cm/year, ranging from 0.06 to 0.14 cm/year, with lower values for most elevated plots. Growth rates (cm/year) clearly increase with tree diameter and decrease where stand density (N per ha) rises. For species with more than 20 individual measurements, growth rates are not clearly related to species nor to wood density. Overall, our results point the effects of altitude and local crowding on tree growth. As big trees show the highest growth rates and heavily influence forest dynamic, measuring the diameter of every big tree remains a major challenge.

Keywords: forest dynamic, tropical island rainforest, tree growth.

118. Biomass mapping for Caribbean Island rainforests.

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The aboveground biomass density (AGBD) or aboveground carbon density is mapped for the rainforest of the Basse-Terre Island (Guadeloupe, French West Indies). This mapping is the first devoted to the rainforest of the Lesser Antilles. Mapping AGBD needs the successive realization of two steps. At first, AGBD was estimated in studied forest plots where trees were individually measured; secondly these local estimations were spatially extended by using remote sensing LiDAR measurements. Due to the structural specificity of the Caribbean-islands forests, applying general allometry relationship overestimates tree aboveground biomass. To resolve the issue, we take advantage of the available pantropical database but we improve the estimates by adopting a bayesian mixed decision rule.

Despite the reduced canopy height, Caribbean lowland rainforests have a high AGBD, in every respect comparable to that of continental lowland forests. Such peculiarity is achieved through increased tree density that compensate for low canopy height. Yet, above 500m, canopy height and AGBD both decrease as elevation rises. Increasing of tree number is then not enough to offset reduction of tree sizes. The resulting montane rainforest stores less carbon but plays a key role in preventing natural hasards.

Keywords: forest biomass, forest carbon, tropical rain forest, forest-structure plasticity.

SYMPOSIUM: CLIMATE ENGINEERING

Andy Parker

119. Solar geoengineering and the Caribbean: science and governance of research

Andy Parker

This interactive session, building on a workshop with CAS-Jamaica in July, will explore the science and research governance of solar geoengineering (also known as solar radiation management or SRM). SRM is a controversial proposal for reducing some of the risks of climate change. It would involve blocking out a small amount of sunlight – for instance by spraying reflective particles into the upper atmosphere – in order to cool the Earth. If it could be made to work, it would be the only currently known approach that could quickly stop global temperatures from rising. Therefore, it might offer a unique way to reduce some of the climate risks from the greenhouses gases already released. The available evidence indicates that SRM might be able to significantly reduce some of the climate threats faced by the Caribbean region, but it might also bring large risks of its own, and the socio-political implications could prove even harder to manage than the physical dimensions. This session will feature presentations on SRM, but will emphasise participant discussion, working through the potential benefits and drawbacks that SRM might have for the Caribbean region, and exploring the most immediate challenge: how to govern research.

SYMPOSIUM: HAÏTI COLLABORATION

120. Annick Suzor-Weiner

ROUND TABLE: RADIOCHEMISTRY

121. Tony Gee and Ulisses Jaurégui-Haza

ROUND TABLE: SCIENCE AND INDUSTRY FOR THE ENERGETIC TRANSITION IN THE CARIBBEAN

Nathalie Chevon – Synerg'îles

TERANOV

TERANOV provides project management, engineering and studies for high temperature geothermal energy over Latin American and Caribbean areas: prefeasibility studies, geological investigations, geochemical and geophysical interpretation, resources evaluation, geostatistics, characterization, reservoir engineering, drilling engineering and supervision, well services. Offices are located in Guadeloupe (Caribbean), Paris (France), Bogota (Colombia) and Santiago (Chile)

GENERGIES ANTILLES GUYANE

Genergies is a Caribbean company specialized in all-inclusive projects about renewable energy production and energy saving. The company offers a large range of solutions dedicated to both residential and commercial applications: solar water-heater (thermosiphon); on-grid or off-grid battery-powered photovoltaic generator; hybrid generators combining photovoltaics, battery power supply, wind energy and gasoil dedicated to remote production; stand-alone back-up systems with energy storage for uninterruptible power supply

SARA

Société Antillaise de Raffinerie des Antilles

SHIMADZU

Analytical and Measuring Instruments, Bureau of San Juan, Puerto Rico

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