

ENVIRONMENTAL SCIENCE

Undergraduate

Title: Extraction And Characterization Of Switch Grass And Alfalfa As Potential Feed Stocks For Biodiesel Production		Presentation ID: A43 – LS
Author: Kemi Animashaun	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Undergraduate	
Co-Authors: Caren Sims and Abdoul Zampaligre	Mentor(s): Dr. Michael Gyamerah	
<p>Abstract</p> <p>Biodiesel derived from renewable feedstock has received increased interest, in recent times, as an alternative to fossil fuels due to declining reserves and the global pressure to reduce greenhouse gas emissions. Renewable feedstocks such as switch grass (<i>Panicum virgatum</i>) and alfalfa (<i>Medicago sativa</i>) have been investigated as feasible feedstocks for bioethanol and bio-oil production by fermentation and fast pyrolysis respectively. However seeds of switchgrass and alfalfa have not been studied as a source of triglycerides for the production of biodiesel. The research conducted compares switch grass and alfalfa for the purpose of ascertaining their potential for biodiesel production through extraction and characterization of their triglycerides. Oil yields from switch grass were 6.6% wt. and alfalfa yields were 9.7 % wt., which shows alfalfa oil yields are 50% greater than that of switch grass. The GC-MS analysis of the triglycerides show that between 99.2-100% of triglycerides in switchgrass and alfalfa are the same as the triglycerides found in edible vegetable oils. The results indicate that triglycerides from seeds of switch grass and alfalfa could serve as substitutes for edible oils in the production of biodiesel.</p>		

Title: Biodiesel Effects On Vehicle Emissions In Houston Studied From Life Cycle Assessment		Presentation ID: A44 – LS
Author: Travis Burrell	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Undergraduate	
Co-Authors: Hongbo Du and Ziaul Huque	Mentor(s): Raghava Kommalapati	
<p>Abstract</p> <p>Rising fuel costs, dependence on imported crude oil, and concerns over global climate change due to greenhouse gas emissions from fossil fuels are increasingly impacting national security strategies, economic development, and environmental planning of many countries. In an effort to decrease the amount of fossil fuels and greenhouse gas emissions from fleet vehicles, biofuels such as bioethanol and biodiesel derived from different biomass resources are being studied. One such fuel, soy-based biodiesel, has provided compelling evidence in lowering emissions. Volatile organic chemicals (VOC), carbon monoxide (CO), nitrous oxides (NO_x), particulate matter (PM), sulfur oxides (SO_x), methane (CH₄), and carbon dioxide (CO₂) are being released as a result of diesel combustion. The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model is used for simulation of diesel vehicles utilizing different biodiesel blends and for evaluating impacts of criteria pollutants emitted from the vehicles. The fuels examined are blends of B0, B5, B20, B50, B80 and B100 where the numbers indicate the percent biodiesel. The energy use and emissions from vehicles fueled with the biodiesel blends are investigated for different classes of vehicles such as passenger cars, light duty trucks, and heavy duty trucks. It is concluded that vehicles utilizing the biodiesel blends reduce the pollutants as the volumetric concentration of biodiesel in the blends increases, with the exception of NO_x. The NO_x levels follow the opposite trend, increasing in their emissions as the biodiesel percent in the blend increases.</p>		

Title: The Effect Of Relative Abundance Or Relative Size Of Vegetation Of Microhabitat Use On The Scorpion <i>Centruroides Vittatus</i> .		Presentation ID: A45 – LS
Author: Ariana Cervants	Discipline: Environmental Science	
Campus: Texas A&M University International	Student Level: Undergraduate	
Co-Authors: Natalee Arredondo	Mentor(s): Dr. Neal McCreynolds	
<p>Abstract</p> <p>Our study was on the effect of relative density and size of vegetation on microhabitat use of the scorpion <i>Centruroides vittatus</i>. Habitats at TAMIU and La Union Ranch, San Ygnacio are in the same biotic province but, differ in density, abundance and diversity of vegetation. This study was comparing the observed activity of scorpions on vegetation versus the expected activity based on relative density or size. The comparison was done for four habitats with two at TAMIU and two at La Union Ranch. The plant species for each habitat were described using the point quarter method for sites within an 8 m radius. The G goodness of fit tests of the observed scorpions on vegetation were significantly different from the expected activity based on relative density or size for seven of eight comparisons. Only TAMIU – BG comparison for relative density was not significant. The results showed that in both habitats at TAMIU the scorpions show preference for cacti, and in the La Union – AG habitat the preference was for leather stem and golden weed and La Union – M habitat for golden weed and lime prickly.</p>		

Title: Diversity In The Microbial Community Structure Of Soil Irrigated With Triclosan-Contaminated Water		Presentation ID: A46 – LS
Author: Anacristina Chapa	Discipline: Environmental Science	
Campus: Texas A&M University International	Student Level: Undergraduate	
Co-Authors:	Mentor(s): Monica O. Mendez	
<p>Abstract</p> <p>Recycled water used for irrigation can potentially transport contaminants into soil, thereby affecting both crop plants and microbes. This study examined the effect of triclosan-contaminated irrigation water on tomato plant growth and its associated soil microbial community. A greenhouse study was conducted using four irrigation treatments: 0, 0.015 µg/L, 0.15 µg/L, and 1.5 µg/L triclosan. Tomatoes were grown in a 9:1 ratio of a native silt loam to potting soil and irrigated with triclosan treatment three times a week. At the end of the study, plant biomass was determined and soils were serially diluted onto R2A medium and R2A amended with triclosan (1.5 µg/l) to compare the total and triclosan-resistant populations. Community DNA was extracted from each soil sample and the 16S rRNA gene was amplified for cloning. Triclosan significantly reduced root mass ($p < 0.01$) but did not have an effect on shoot. Soil bacterial counts in the control treatment were slightly higher than triclosan-tolerant bacterial counts. Data suggests that soil bacteria with no previous exposure to triclosan may be tolerant to triclosan and may be more predominant at the higher triclosan irrigation treatments. Additionally, soil microbial diversity is expected to decrease with triclosan exposure.</p>		

Title: The Effect Of Triclosan On The Growth Of A Plant Growth Promoting Rhizobacterium		Presentation ID: A47 – LS
Author: Martha Chapa	Discipline: Environmental Science	
Campus: Texas A&M University International	Student Level: Undergraduate	
Co-Authors: Ashley M. Garcia and Monica O. Mendez	Mentor(s): Monica O. Mendez	
<p>Abstract</p> <p>Triclosan is a biocide found in common pharmaceutical and personal care products that prevents fatty acid biosynthesis via the <i>fabI</i> gene. The impact of triclosan on gene expression of soil microbial communities and subsequent effects on associated crops is a concern when chronically exposed through contaminated irrigation waters, especially for plant growth-promoting rhizobacteria (PGPRs). This study aims to determine the effect of triclosan on growth and gene expression of a triclosan-resistant PGPR, <i>Peaenibacillus polymyxa</i> OT2-17. Growth of OT2-17 in R2B amended with 1.5µg/l triclosan was compared to a control every six hours during a 36-hour period. Cells were washed prior to dilution plating on the respective agar medium. During mid-log phase, determined to be at 15 hours, OT2-17 was collected for RNA extraction using TRIzol Max Bacterial RNA Isolation Kit followed by Illumina sequencing. OT2-17 growth was unaffected by the presence of triclosan with a mean count of 1.67 x 10⁷ CFU/ml at mid-log phase. Preliminary data suggests that expression of the <i>fabI</i> gene will be unaffected in OT2-17, which may be similar in other triclosan-resistant soil bacteria. Further analysis will allow for defining genes of PGPRs affected by triclosan and the potential consequences to PGPR activities in situ.</p>		

Title: Dynamics Of Populations Of Total And Triclosan-Tolerant Heterotrophic Bacterial Populations In Soils Irrigated With Triclosan.		Presentation ID: A48 – LS
Author: Dario Delgado	Discipline: Environmental Science	
Campus: Texas A&M University International	Student Level: Undergraduate	
Co-Authors: Miguel Zuniga, Priscilla Carlo, Ashley M. Garcia, Brittan A. Wilson and Monica O. Mendez	Mentor(s): Monica O. Mendez	
<p>Abstract</p> <p>Triclosan, an antimicrobial, is found in freshwater streams and is present in recycled waters used for irrigation. Effects of triclosan on soil microbial communities and the plant-microbe interactions in the presence of triclosan have not been well-defined, especially with plant growth-promoting rhizobacteria (PGPRs). The objective of this experiment was to determine the number of total heterotrophic bacteria present in soil samples irrigated with triclosan and inoculated with triclosan-resistant PGPRs. In a greenhouse study, soil mesocosms were irrigated with either 0.0 or 1.5 µg/l of triclosan with five inoculation treatments using triclosan-resistant PGPRs (including a control with no inoculum added). Soil was irrigated every other day with the corresponding triclosan concentration for a total of 33 days, and samples were collected every three days. Soil samples were serially diluted for enumeration of the heterotrophic community, specifically total bacteria and triclosan-tolerant bacteria by plating onto R2A and R2AT (R2A amended with 1.5 µg/l triclosan), respectively. Data suggests that there is an overall decrease of total and triclosan-tolerant populations in inoculated treatments; however, inoculation with <i>Peaenibacillus polymyxa</i> with triclosan increased numbers of triclosan-tolerant population. Further examination will identify the effects of the PGPR inocula on the prevalence of triclosan-tolerant bacteria over time.</p>		

Title: Nearshore Current Measurements, Predictions And Spatial Analysis For The Coastal Bend		Presentation ID: A49 – LS
Author: Larry Dell	Discipline: Environmental Science	
Campus: Texas A&M University – Corpus Christi	Student Level: Undergraduate	
Co-Authors:	Mentor(s): Philippe Tissot	
<p>Abstract</p> <p>Two current profilers were installed during spring 2014 on Bob Hall Pier, Corpus Christi, Texas. The sensors provide near real-time measurements of nearshore conditions including significant wave height, typical wave period, and along/across shore current profiles. The new data set provides an opportunity to compare measurements with predictions from the recently updated Northern Gulf of Mexico Operational Forecast System, or NGOFS, run by NOAA. The presentation will compare measured longshore currents for Bob Hall Pier and an offshore buoy (TABS D) with nowcasts from three hydrodynamic models: NGOFS, GLO/ROMS, and HYCOM. Results show the newer NGOFS predictions to be at least as accurate as other models and with higher resolution. A spatial clustering algorithm was applied to NGOFS current nowcasts to investigate nearshore current patterns. Results suggest the presence of a coastal jet during high wind events. The current feature is about 2.4 mi wide along the coastline with currents about 30% larger than the further offshore currents. Broadly available and accurate current predictions from such operational models are invaluable for the prediction of oil movement and the deployment of protection measures in case of oil spill as well model sediment transport along the coast and search and rescue situations.</p>		

Title: Comparison Of Potential Evapotranspiration Estimation Methods For Drought Evaluation		Presentation ID: A50 – LS
Author: Caleb Frandsen	Discipline: Environmental Science	
Campus: Tarleton State University	Student Level: Undergraduate	
Co-Authors: Madisyn Nelson	Mentor(s): Kartik Venkataraman	
<p>Abstract</p> <p>Due to the projected rise in temperature and the increase in water demand due to population growth, water is projected to become scarce over the next several years. For future water resource planning, many turn to climate change models. In this study, we project future trends in temperature and water availability within select locations across Texas using a downscaled Coupled Modeling Intercomparison Project phase 5 (CMIP5) multi model dataset that has been Bias-Corrected and Spatially Disaggregated (BCSD). We then narrowed down these climate change models by determining which are the most accurate. With this dataset we have calculated potential evapotranspiration (PET) to determine future water availability. The “gold-standard” method when calculating PET is the Penman-Monteith, however this method requires additional datasets including wind speed and vapor pressure which are rarely available for most locations. Within our research, we are trying to determine the reliability of other methods for calculating PET that only require temperature data which is readily available for nearly all locations.</p>		

Title: Microcontroller Based Single - Axis Solar Tracking System		Presentation ID: A51 – LS
Author: Matthew Garberding	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Undergraduate	
Co-Authors: Prasad Murugesu	Mentor(s): Dr. Selahattin Ozcelik	
<p>Abstract Fixed solar panels do not receive enough irradiation in a direction of angles to generate maximum current in the form of power throughout the day, due to the movement of the sun. In order to increase the power efficiency of a solar panel on a large scale, a dynamic model of a single-axis which rotates along angles of elevation is studied and developed. Based on historical data and the sun’s movement, a control system was designed to track the sun’s position so that solar panels can receive sun rays in a perpendicular direction. This will allow the current to be generated at its maximum potential, hence increasing the efficiency. A prototype of a solar panel that can track the sun has been designed and tested. Keywords: single-axis, solar tracking; power efficiency; renewable energy.</p>		

Title: A Service Accessibility Analysis; Geographic Accessibility To Down Syndrome And Special Needs Services In The Brazos Valley Region, Texas, USA		Presentation ID: A52 – LS
Author: Tiffany Hertzler	Discipline: Environmental Science	
Campus: Texas A&M University	Student Level: Undergraduate	
Co-Authors: Jacqueline Clay and Aida Guhlin	Mentor(s): Dr. Erik Prout	
<p>Abstract Down Syndrome is a genetic condition that affects nearly 1 in 700 newborns each year. These individuals require additional care and specialized education in order to develop into self-sufficient adults. According to birth rate statistics for the United States, there are approximately 500 people living with Down Syndrome in the Brazos Valley. However, there are only 18 support organizations currently providing services for this population. Worse, these organizations are confined mostly to the Bryan–College Station metropolitan area. The Down Syndrome Association of Brazos Valley (DSABV) in Bryan, Texas is the focal point of the Down Syndrome community in the region. Based on its central importance we measured the Euclidean distance between the DSABV and cities in this region. In order to do this we used the Near Distance tool in ArcMap. Our results showed that on average there is a distance of 34.72 miles between cities and the DSABV. This can translate to a 30 minute to an hour long commute to access these services. This displays that there is a lack of access to necessary services for a significant number of people with Down Syndrome in the Brazos Valley region.</p>		

Title: Fermentation Of Simulated Lignocellulosic Hydrolysates Using Mixtures Of Authentic Pentose And Hexose Sugars		Presentation ID: A53 – LS
Author: Jaycelyn Jefferson	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Undergraduate	
Co-Authors: Abdoul Zampaligre, Mercy Ampaw-Asiedu, Jaron Mackey and Michael Gymerah	Mentor(s): Michael Gymerah	
<p>Abstract Renewable biofuels are gaining increased attention as an alternative to fossil fuels as a result of rising crude oil prices, depletion of resources and the potential for CO2 neutral production in abating global warming. Among these alternative renewable energy sources is the production of bioethanol to increase biofuel availability. The objectives of the study were to quantify cell growth and the optimal media for recombinant Zymomonas mobilis</p>		

AX101 that coferments glucose, xylose, and arabinose in batch fermentation using simulated lignocellulosic hydrolysates for production of fuel ethanol. The first phase of the study quantified the cell dry weight of *Z. mobilis* during cell growth. Cell dry weight was found to correlate linearly with optical density (OD) from 0 to 0.7 at a wavelength of at 600 nm. The second phase of the study examined the ethanol production capabilities of engineered *Zymomonas mobilis* in variable media composition over 48 hours using Ion Chromatography.

Title: An Innovative Approach To Determine The Effects Of The Epicuticular Waxes On Extracellular Flux In Palm Leaves		Presentation ID: A54 – LS
Author: Kierra Jones	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Undergraduate	
Co-Authors:	Mentor(s): Dr. Youngblood	
<p>Abstract</p> <p>The Arecaceae are a botanical family of perennial lianas, shrubs, and trees commonly known as palm trees. <i>Sabal minor</i> and <i>Sabal mexicana</i> are the only two types of palms that are naturally grown in the state of Texas. The state of Florida has many palms that grow naturally in that state, for this research in particular it looks closer at <i>Sabal palmetto</i> and <i>Sabal Minor</i>. Foliar epicuticular wax structure/pattern can provide useful taxonomic character epicuticular wax layer of palm leaves allowed qualitative wax feature to be readily characterized. Use of the scanning electron microscope to view the set of chemical process helps an individual or an organism to respond to their surroundings. Respiratory measurement in plants is one of the commonly used techniques to assess metabolic activity and in vivo redox state of plant mitochondria. In this research project, adaptations to micro-respiratory technologies are used to study tissues of special interest to plant biologists: leaf sections in this model plant species preformed by the Seahorse XF96 Extracellular Flux Analyzer which is one of the recently developed commercial platforms for metabolic assays using cell culture and tissue samples. This assay opens up new possibilities to screen and study mutants and to identify differences in ecotypes or populations of plants. The objective of this study was to determine the morphological and physiological data for <i>Sabal minor</i> and <i>Sabal palmetto</i>. It was hypothesized there are measureable differences in Morphological and physiological data of <i>Sabal minor</i> and <i>Sabal palmetto</i>.</p>		

Title: Effects Of A Pesticide Grazer Inhibitor On Epiphyte Grazer Abundance In Seagrass Beds		Presentation ID: A55 – LS
Author: Ariana Kavandi	Discipline: Environmental Science	
Campus: Texas A&M University – Corpus Christi	Student Level: Undergraduate	
Co-Authors: Lauren Alejandro, Ariana Kavandi and Kirk Cammarata	Mentor(s): Kirk Cammarata	
<p>Abstract</p> <p>We characterized seagrass epiphyte grazer communities in response to top-down inhibition by pesticide, bottom-up forcing through nutrients, and a combination of both. The larger context is to understand the balance between top-down and bottom-up controls of epiphyte coverage of <i>Halodule wrightii</i> seagrasses in Texas. Ten blocks were each comprised of 4 plots: Untreated Control, Fertilizer (18-6-12 Osmocote™ slow-release), Grazer Inhibitor (0.038 % Carbaryl™ in plaster blocks), and combined Fertilizer + Grazer Inhibitor. Following 4 weeks of treatment, grazers were collected, sorted, identified, and compared as 7 major groups: fish, shrimp, crabs, gastropods + bivalves, polychaetes, amphipods and isopods. To date, 3 complete blocks have been analyzed. The pesticide Carbaryl significantly reduced populations of both shrimp and amphipods, regardless of fertilization, but had no significant effect on the other groups. Fertilization increased amphipod, shrimp, gastropod + bivalve, and total grazer levels, but these effects were not significant. Normalization of grazer numbers to seagrass biomass of each plot had no effect. We conclude that the grazer inhibitor treatments significantly reduced populations of</p>		

shrimp and amphipod grazers, which will subsequently allow us to use this system as a model of predation effects on top-down control of seagrass epiphyte accumulation.

Title: Tar Tracking In The Gulf Of Mexico		Presentation ID: A56 – LS
Author: Bradley Koskowich	Discipline: Environmental Science	
Campus: Texas A&M University – Corpus Christi	Student Level: Undergraduate	
Co-Authors: Gabby Picarazzi and Lary Dell	Mentor(s): Dr. Phillippe Tissot	
<p>Abstract When tar washes up on a beach, the question is always asked: where did it come from? The National Oceanic and Atmospheric Administration (NOAA) recently made operational their Northern Gulf Of Mexico Operational Forecast System (NGOFS). The system includes a 3D, high resolution hydrodynamic model that provides nowcasts and predictions of surface currents. Our model and tool, the Tar App, was designed and implemented to take advantage of this information and retrace the likely path of tar balls reaching the beach. The underlying mechanics of the process use web technologies including Javascript, Node.js, and the D3 data visualization library combined with ESRI's ArcPy Python module. The method allows to create large datasets in parallel dramatically increasing computational efficiency. Including the principles of data masking and distributed processing results in a lightweight application that can run on smartphones with a computational performance of O(1) for database lookup times. The methods can be generalized to other tracking applications in large geographic areas. Benefits of such application include being able to quickly estimate potential sources from the beach itself where tar balls are found and help determine whether the source of the discovered tar is naturally occurring or the product of a spill.</p>		

Title: Do Adult Royal Tern Displaying Nonbreeding Plumage Exhibit Breeding Behaviors During Summer In South Texas?		Presentation ID: A57 – LS
Author: Janelle Lopez	Discipline: Environmental Science	
Campus: Texas A&M University – Corpus Christi	Student Level: Undergraduate	
Co-Authors:	Mentor(s): Dr. Kim Withers	
<p>Abstract There are differences between the breeding and nonbreeding plumages of royal tern (<i>Thalasseus maximus</i>). Adult royal terns (≥ 4 years old) display a black cap indicating that they are sexually mature. In winter, adult royal terns have a white cap indicating that the breeding season is over. However, along the southern Texas coastline, adult royal terns in nonbreeding plumage are exhibiting breeding behaviors during the summer when most adults are on the breeding grounds in New England. Observations of adult royal terns in breeding and nonbreeding plumages were made along Corpus Christi Bay and Aransas Bay shorelines to determine if the behaviors they displayed were similar to behaviors displayed by breeding adults. Using ethograms to organize the behaviors of summering adult terns in both breeding and non-breeding plumages, individuals in both plumages mostly engaged in nonbreeding behaviors such as resting and preening. However, some terns in non-breeding plumage exhibited breeding behaviors such as head bowing, food offering, circular strut, straight posture appearance, territoriality, and even nesting. The data also show that adult royal tern in breeding plumage did not exhibit any breeding behaviors and were often chased off by aggressive individuals in nonbreeding plumage. The reasons why breeding behaviors are being exhibited by some birds in nonbreeding plumage while those in breeding plumage are not exhibiting similar behaviors is currently unknown. Further research, including hormonal analyses and identification of individuals using bands or other means may provide data to answer this question.</p>		

Title: Identifying And Comparing Antimony-Tolerant Bacteria Discovered From Slag-Contaminated Soil		Presentation ID: A58 – LS
Author: Jessica Lozano	Discipline: Environmental Science	
Campus: Texas A&M University International	Student Level: Undergraduate	
Co-Authors: Ashley M. Garcia and Martha Chapa	Mentor(s): Alfred Addo-Mensah and Monica O. Mendez	
<p>Abstract Antimony smelter waste was used as a trail building material throughout the Chacon Creek hiking trail in Laredo, Texas. A previous study discovered that the trail material contained a higher proportion of antimony-tolerant bacteria than uncontaminated soil samples. Furthermore, a higher proportion of antimony-tolerant bacteria were found in the trail material and along the creek bank. The aim of this study was to identify the antimony-tolerant bacteria found at the Chacon Creek site by amplification of the 16S rRNA gene. Bacteria were first isolated on R2A amended with 10 mM of antimony. An approximately 1500-bp sequence of the 16S rRNA gene was amplified from isolate DNA using primers 27F and 1492R. PCR products were then used for sequencing and identification using the NCBI-BLAST database. A predominant amount of bacteria from, but not limited to, the <i>Stenotrophomonas</i> genus were identified and classified as being antimony tolerant. Further identification of antimony-tolerant bacteria in the trail material will contribute to understanding the impact of mine waste on bacterial communities that may contribute to plant metal bioavailability. Further, these bacteria may be used as biomarkers in evaluating a remediation strategy.</p>		

Title: Identification Of Arsenic Tolerant Bacteria From Slag-Contaminated Soil Along Chacon Creek In Laredo, Texas		Presentation ID: A59 – LS
Author: Barbara Montoya	Discipline: Environmental Science	
Campus: Texas A&M University International	Student Level: Undergraduate	
Co-Authors: Jessica Y. Lozano and Ashley Garcia	Mentor(s): Monica O. Mendez	
<p>Abstract ABSTRACT: A hiking trail along Chacon Creek, located in Laredo, Texas, was constructed using antimony smelter waste (slag). Contaminated soil samples contained the metalloids arsenic (28-59 ppm) and antimony (28-59 ppm) with a higher proportion of arsenic tolerant bacteria in the trail material than uncontaminated samples. The objective of this study was to identify the arsenic tolerant bacteria isolated from the cultured sample and compare the populations identified from the trail material, mesquite canopy, and creekside at the Chacon Creek site by amplifying a 1,500 bp sequence of the 16S rRNA gene. Bacteria were isolated from R2A agar plates amended with 10 mM of arsenic (AsIII and AsV). Based on the NCBI-BLAST matches, a predominant amount of bacteria were identified as <i>Arthrobacter</i> sp. and <i>Bacillus</i> sp. amongst all samples. The identification of these arsenic tolerant bacteria will contribute to understanding bacterial community changes when soils are contaminated with antimony slag and the role that these bacteria may play in arsenic availability. Along the creek bank and in the trail material, a high amount of arsenic and antimony tolerant bacteria populations could influence the metal chemistry within the slag-contaminated soil.</p>		

Title: Comparison of Potential Evapotranspiration Estimation Methods for Drought Evaluation		Presentation ID: A60 – LS
Author: Madisyn Nelson	Discipline: Environmental Science	
Campus: Tarleton State University	Student Level: Undergraduate	
Co-Authors: Caleb Frandsen	Mentor(s): Kartik Venkataraman	
<p>Abstract</p> <p>Due to the projected rise in temperature and the increase in water demand due to population growth, water is projected to become scarce over the next several years. For future water resource planning, many turn to climate change models. In this study, we project future trends in temperature and water availability within select locations across Texas using a downscaled Coupled Modeling Intercomparison Project phase 5 (CMIP5) multi model dataset that has been Bias-Corrected and Spatially Disaggregated (BCSD). We then narrowed down these climate change models by determining which are the most accurate. With this dataset we have calculated potential evapotranspiration (PET) to determine future water availability. The “gold-standard” method when calculating PET is the Penman-Monteith, however this method requires additional datasets including wind speed and vapor pressure which are rarely available for most locations. Within our research, we are trying to determine the reliability of other methods for calculating PET that only require temperature data which is readily available for nearly all locations.</p>		

Title: Plant Derived Non-Toxic Polysaccharides As Efficient Treatment Agents In Removal Of Solids From Municipal And Food Waste Water		Presentation ID: A61 – AN
Author: Tanner Roberson	Discipline: Environmental Science	
Campus: Tarleton State University	Student Level: Undergraduate	
Co-Authors: Rajani Srinivasan	Mentor(s): Rajani Srinivasan	
<p>Abstract</p> <p>Water and wastewater treatment uses a combination of biological and chemical methods to remove solids from contaminated waters. The process is expensive in terms of time, energy, and resources. Materials which are faster, more efficient, cost effective, and eco-friendly are highly desirable. Recently, numerous approaches have been studied for the development of cheaper and more effective adsorbents for water treatment. Adsorbents containing polysaccharides deserve particular attention. Plant derived polysaccharides are renewable materials, widely available, and possess biological and chemical properties including non-toxicity, biocompatibility, biodegradability, and poly-functionality. Present research focused on extraction of polysaccharides from plant parts, their characterization using spectrophotometric methods and their use as adsorbents for removal of solid wastes from municipal and food wastewater. Polymer concentration and contact time were varied to achieve maximum efficiency. Their solid removal efficiency were compared with recently used synthetic polymer used in wastewater treatment plants. Live water samples were collected from Portland, Dallas, Fort Worth and Stephenville wastewater treatment plants for lab scale experiments. To achieve maximum removal efficiency in short contact times centrifuge was used. Results showed that maximum removal efficiency was found to be ~ 90 % with 0.5g/L of polymer dose within 5 minutes of contact time. These materials when compared with synthetic counterparts were found to be an eco-friendly, non-toxic, cost effective and efficient alternative for water and wastewater treatment.</p>		

Title: Fine Particulate Matter Exposure Levels In A University Of South Texas		Presentation ID: A62 – AN
Author: Christina Saldivar	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Undergraduate	
Co-Authors: Josie Rios	Mentor(s): Saritha Karnae	
<p>Abstract Numerous of studies have confirmed acute and severe health effects in specific to sensitive groups including elementary school children, elderly and adults on exposure to PM2.5. Texas A&M University-Kingsville is a public institution of higher learning with a diverse student body located in Kingsville, Texas. Considering the diverse student population, increase in enrollment and geographical location of King Ranch and Mexico, the primary purpose to this study was to measure the PM2.5 exposure levels of students on campus. Preliminary field PM2.5 monitoring was conducted during summer, 2015 (June 1 through August 1) using DustTrak 8520 at eight locations selected around the campus. At each site data was collected from 7:30 AM through 6:00 PM over week days and well as weekends to assess the contribution of mobile vehicles used by student’s on-campus. The data analysis concluded highest concentrations of 0.37 mg. m-3 and lowest concentrations of 0.0018 mg. m-3. Diurnal analysis indicated high concentrations during early mornings from 7:30 through 9:00; lunch time 11:30 through 1:30 PM and late evening 4:00 to 5:30 PM. Such behavior can be attributed to the beginning of class and office hours.</p>		

Title: Study Of New-Designed Inverter For Solar Power System		Presentation ID: B43 – LS
Author: Somchai Sombatnun	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Undergraduate	
Co-Authors:	Mentor(s): Ismet Sahin	
<p>Abstract Inverters are an important component in photovoltaic (PV) power system because they invert the direct current (DC) from the solar panels to the alternate current (AC), which is used in household appliances. Two main inverters in today’s PV technology are central (string) inverters and microinverters. The major disadvantage of the central inverters is; it draws average amount power from the whole solar panels rather than the power available in each module. This may lower the system performance when some modules are in shade or heavily cover by dust. The microinverters decentralized central inverters system by having an inverter for each individual solar panel. The drawbacks of the microinverters are the difficulty of installation, cost, and multiple points of maintenance. This study focuses on the integration of the central inverter and microinverter technology into one inverter using MATLAB program simulation with multiple digital signal inputs from each PV module and one output. The result from the simulation will establish that new inverter can draw the power from individual solar panel within one single inverter.</p>		

Title: Reproduction Condition Of Aestivating Siren Intermedia In South Texas.		Presentation ID: B44 – LS
Author: Ayssa Trevino	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Undergraduate	
Co-Authors:	Mentor(s): Randy Powell, Ashton Crocker and M. Andres Soto	
<p>Abstract A large aggregation of seventy-three aestivating lesser sirens (<i>Siren intermedia</i>) was recovered from an excavation near a road, adjacent to a culvert in Kleberg County, TX (27.541669°N, 97.880272°W; WGS 84) on 18 November 2011. The size ranges, sex ratio, and reproductive condition of these sirens are reported. The mean snout to vent length of complete individuals ranged from 30 – 65 cm. There was a direct relationship between snout to vent length and specimen weight (g). Primary sex organs were recovered from deceased specimens. The mean GSI estimates for males was 0.28, and for females was 2.72. In general, females had a higher GSI index estimate than males. The number of eggs in females ranged from 2,246 to 8,078. The number of eggs reported is much higher than any previous report.</p>		

Title: Phylogenetic Analysis Of Triclosan-Sensitive And Triclosan-Tolerant Onion Rhizobacteria		Presentation ID: B45 – LS
Author: Karen Vallejo	Discipline: Environmental Science	
Campus: Texas A&M University International	Student Level: Undergraduate	
Co-Authors: Ashley Garcia	Mentor(s): Monica O. Mendez	
<p>Abstract Triclosan, is a polychloro-phenoxy phenol used in many personal care products (PCP) due to its antibacterial properties. Most of these PCPs are disposed into residential drains thus resulting in triclosan becoming a pollutant in water entering agricultural lands. It is important to understand the impact of the exposure of triclosan on rhizobacteria that may lead to resistance. This study focuses on analyzing the distribution of rhizobacteria determined to be sensitive and tolerant to triclosan based on pre-exposure to triclosan-contaminated irrigation waters (0.00, 0.015, 0.15, and 1.5 µg/l triclosan). Rhizobacteria were determined to be sensitive or tolerant by a disk diffusion assay at 15000 µg/l. A 1,500 bp sequence of the 16S rRNA gene was amplified for identification. Proteobacteria and actinobacteria were the only phyla classified as sensitive among all triclosan exposed groups, whereas actinobacteria, bacterodetes, firmicutes and proteobacteria were tolerant within the pre-exposed range. Identification of triclosan tolerant rhizobacteria may be beneficial to agricultural ecosystems exposed to triclosan-contaminated irrigation waters.</p>		

Master's

Title: Pore Scale Modeling And Transport Of Fluids In Porous Media		Presentation ID: B46 – LS
Author: Prashant Badgajar	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Shreesh Kulkarni	Mentor(s): Dr. Patrick L. Mills	
Abstract Methodologies for generating a 3-D pore-scale model from scanning electron microscope (SEM) images of porous materials and using the resulting data for modeling of fluid and species in the porous media are described. The particular porous media of interest include shale rocks, sandstones and heterogeneous catalysts. Data from a SEM are first used to capture 2-D images of the samples using slices taken at different cross sections. Typical data from the SEM is a high resolution greyscale image that shows the surface morphology of the porous medium. In the case of shale rock, constituents such as organic matter, solid minerals, and pores can be clearly identified in the image. The greyscale images are then imported into COMSOL Multiphysics™, which is an advanced software tool with a numerical engine for solving the microscopic forms of the conservation laws for fluid transport in porous media. A 3-D finite element mesh is then generated from the 2-D images through a volume rendering technique. Realistic predictions for fluid and species transport in the porous medium are obtained, which provides more accurate predictions for engineering performance analysis of macroscale system counterparts, such as shale gas and crude oil reservoirs or heterogeneous catalysts.		

Title: Bubble Column Slurry Reactor Model For Clean Transportation Fuels From Natural Gas		Presentation ID: B47 – LS
Author: Kabita Barman	Discipline: Environmental Science	
Campus: Texas A&M University-Kingsville	Student Level: Master's	
Co-Authors: Sravanthi Mothupally and Archana Sonejee	Mentor(s): Patrick L. Mills	
Abstract A chemical engineering model for a slurry bubble column reactor is described for the hydrogenation of synthesis gas ($\text{CO} + \text{H}_2$) according to the Fischer-Tropsch (FT) synthesis. This reactor resembles a vertical single-pass shell and tube large heat exchanger with nozzles so gas, liquid and a powdered catalyst can be introduced and removed in a continuous fashion. The FT synthesis reaction, which was first discovered in 1925 by Franz Fischer and Hans Tropsch at the Kaiser-Wilhelm-Institut für Kohlenforschung in Germany, has commercial relevance since it is a key component of gas-to-liquids (GTL) technology for the conversion of natural gas to clean synthetic liquid transportation fuels, lubricants and chemicals. The mathematical model for the reactor consist of a coupled set of nonlinear, parabolic partial differential equations that describe the temporal and spatial variation of the gas, liquid and powdered catalyst by accounting for the various transport-kinetics interactions between these various fluid phases. The combined effects of gas and liquid feed composition, gas and liquid flow rates, catalyst loading, pressure, and temperature on syngas conversion and space-time yields of the various hydrocarbon products are examined. The model is particularly useful for the design either new reactors or analysis of existing reactor systems.		

Title: Numerical Simulation On Hydrodynamic Parameters Of Carbon Dioxide -Water System In Microchannel		Presentation ID: B48 – LS
Author: Hariganesh Bheema	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Dr..Chongwei Xiao	
<p>Abstract</p> <p>Gas-liquid two-phase flow in microchannel has been the subject of increased research interest in the past few years as the microchannel reactors have high surface to volume ratio, which greatly increases gas-liquid mass transfer as well as ensures thermal homogeneity across the reactor and rapid heat transfer between the reactant. It has encountered in many important applications, such as miniature heat exchangers, micro scale process units, research nuclear reactors. The development and application of micro reactors technology provides a new reaction pathways and finding economical and environmentally benign solutions to chemical manufacturing</p> <p>An Eulerian –Volume of Fluid (VOF) based numerical model was applied to simulate multiphase flow in a microchannel using Ansys Fluent/CFD. The flow process of carbon dioxide (CO₂)-water in a microchannel with hydraulic diameter of 0.5 mm were simulated. , The flow regimes with flow transition from slug flow, slug-annular flow, to annular flow were obtained at various gas-liquid velocity. The hydrodynamic parameters, including pressure drop, bubble length, bubble velocity, and void fraction were analyzed under various gas-water velocity. The pressure drops simulated are in a good agreement with published experimental data. Theoretic analysis of hydrodynamic parameters provides a theoretic support for the design of new CO₂ absorption processes</p>		

Title: Active Disassembly By Using Shape Memory Polymers		Presentation ID: B49 – LS
Author: Jingfan Chen	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Hua Li	
<p>Abstract</p> <p>With the increasing amount and diversity of electric products and the need for recycling and remanufacturing products, a generic, efficient disassembly method becomes necessary. The previous researches about shape memory polymers (SMP) used in active disassembly show the difficulty of reusing those SMP fasteners. And almost all of SMP fasteners were manufactured by molding from the original shape and were used to just retrofit products, which restricted the design and application of active disassembly using shape memory polymers (ADSMP). In this project, the author aims to improve the reliability and reusability of a kind of SMP snap-fit. By using a 3D printer, more complex designs can be achieved which will free the ADSMP element design. The factors analysis is used to figure out the significant effect of the design parameters. These conclusion and methods provide a reference for further ADSMP research</p>		

Title: Aero-Acoustic Noise Simulation Of Vehicle Considering The Ground Interaction		Presentation ID: B50 – LS
Author: Tanzila Choudhury	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Kyoungsoo Lee, Ziaul Huque, Nazia Murnir and Sadia Shormin	Mentor(s): Ziaul Huque	
<p>Abstract</p> <p>This paper aims at predicting the sound noise generation of moving vehicle using hybrid Ffowcs-Williams & Hawkings (Fw-H) integral method considering mid-field region. Far-field noise propagation is one of challenging area in aero-acoustic field, and performing using integral method (IM) because of its efficient and accuracy. The mid-field region is usually omitted in far-field noise propagation in vehicle design because of main objective of vehicle design process. And they will affect to the far-field noise propagation. In this study, the impermeable surfaces were defined into two types which are corresponding to the including the road ground surface or not. And the sound pressure level (SPL) was evaluated at the far-field receivers both of dipole and quadropole noise terms for impermeable surfaces. Finally, the effects of road ground surface in mid-field will discussed for far-field noise propagation.</p>		

Title: Aircraft Impact Simulation On The National Critical Infrastructure Using Missile Target Analysis Method		Presentation ID: B51 – LS
Author: Mahmood Sabria Chowdhury	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Kyoungsoo Lee, Ziaul Huque, Raghava Kommalapati, Shrabanti Roy and Chao Sui	Mentor(s): Ziaul Huque	
<p>Abstract</p> <p>The article contains the research work on the nonlinear dynamic fracture and collapse of critical national infrastructures, under extreme load condition. Impact of commercial airlines B747 is considered for the extreme load condition. A commercial hydro-code AUTODYN is used for the impact test of rigid wall, and the impact force exerted by the aircraft is verified by comparing with the time dependent force by OECE-NEA (2002), calculation is based on the "Reira approach". Additionally, two approaches are considered for the realistic analysis method, one is "Riera equation" (Riera 1968, 1980) for aircraft impact time history graph and another is FE analysis method using detailed FE mesh model of aircraft which is later known as missile target interaction analysis method (NEI 2009). The rigid wall impact test shows that the finite element model of a B747 is appropriate for the aircraft crash analysis exposed to the external hazard of Beyond Design Basis Events (BDBE) defined by U.S. Nuclear Regulatory Commission (NRC). Finally, the applicability of this methodology is discussed by performing large-scale aircraft impact and blast simulations on critical infrastructures like nuclear power plants, tall buildings and bridges, which will be helpful to design safer infrastructure.</p>		

Title: Ecosystem Response To Freshwater Inflow: Determining A Link Between Freshwater Pumping Regimes, Salinity, And Benthic Macrofauna		Presentation ID: B52 – LS
Author: Elizabeth Del Rosario	Discipline: Environmental Science	
Campus: Texas A&M University – Corpus Christi	Student Level: Master's	
Co-Authors: Evan Turner, Paul Montagna and Rick Kalke	Mentor(s): Paul Montagna	
<p>Abstract</p> <p>The demands of freshwater worldwide have roughly tripled since 1950 and the allocation of environmental flows for bays and estuaries has become an emerging issue for water resource management. Freshwater inflow serves a variety of important functions such as creating and preserving low-salinity nurseries; transporting sediments, nutrients, and organic matter downstream; and affecting estuarine species movements and reproductive timing. The amount of freshwater reaching Rincon Bayou, Texas, located in the Nueces Estuary of the Gulf of Mexico, has been reduced by 99% due to the construction of dams on the Nueces and Frio Rivers. This has led to reverse estuary conditions and decreased ecosystem function. A pumping system has been installed by the City of Corpus Christi to meet Texas Environmental Flow requirements for bays and estuaries, and is the primary freshwater source to the bayou. Analyses of benthic macrofauna and physical parameters have found a strong relationship between indicator species to salinity during pumping events. The effects of salinity changes can be related to pumping regime by modeling. Results of this study can be used in the facilitation of adaptive management for dam reoperation in providing a basis for freshwater release regimes needed to maintain optimal environmental conditions.</p>		

Title: Thermal Swing Adsorption Of Multicomponent Volatile Organic Vapors: A Pilot Scale Study		Presentation ID: B53 – LS
Author: Kaveh Farhadi Hikoei	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Dr. David Ramirez	
<p>Abstract</p> <p>Volatile organic compounds (VOCs) emitted from the oil and gas industry can impair the air quality and have the potential to impact human health and the environment. Examples of VOCs emissions that are also hazardous air pollutant include benzene, toluene, ethyl benzene and xylenes (BTEX). A promising technology to control and recover industrial BTEX emissions is the thermal-swing adsorption (TSA) process. This research focus on a pilot scale study (TSA system) that uses to control and recover VOC emissions mainly from condensate and crude oil storage tanks. The pilot scale TSA experimental set up comprised of a gas generation system, mixing chamber, adsorption column, recovery system and data acquisition system. A gaseous mixture of BTEX is passed through an adsorption column containing coconut based granular activated carbon. The adsorbed BTEX vapor can be recovered in liquid form by heating the adsorption column at temperatures between 80& deg;C – 90°C. the pilot scale TSA system was designed to achieve 10% of breakthrough after six hours adsorption time. The methodology and operational parameters used to scale up the TSA system from the bench to a pilot scale will be presented.</p>		

Title: Triclosan Degradation By Triclosan Resistant Onion Rhizobacteria		Presentation ID: B54 – LS
Author: Ashley Garcia	Discipline: Environmental Science	
Campus: Texas A&M University International	Student Level: Master's	
Co-Authors: Martha Cavazos, Monica Mendez and Brittan Wilson	Mentor(s): Monica O. Mendez	
<p>Abstract Triclosan, a common antimicrobial found in household products such as shampoo, toothpaste, and cosmetics, can also be found in freshwater systems that are used for crop irrigation. Therefore, this compound may accumulate over time in soils, potentially affecting the microbial community, including plant growth-promoting rhizobacteria (PGPRs). In a joint study, seven triclosan-resistant PGPRs were identified and determined to be able to use triclosan as a carbon source. This study will analyze the degradation of triclosan by four isolates characterized as triclosan-degrading PGPRs from the aforementioned study. Rhizobacteria (OT1-09, OT1-11C2, OT2-03A, and OT2-17) were inoculated into a soil mesocosm individually and in a microbial consortium of all selected isolates (OT-MIX). Soil mesocosms were arranged in a 2 x 5 factorial randomized block design and irrigated with two treatments (0 and 1.50 µg/L triclosan). Soils were sub-sampled every three days during the course of a 30 day period for heterotrophic bacteria counts. Remaining soil samples were dried at 50°C for 7-10 days and ground to a fine powder. Soils were then extracted for triclosan and its by-products followed by GCMS analysis. This study will allow us to comprehend the fate and accumulation of triclosan in irrigated soils including degradation activities of PGPRs.</p>		

Title: Dynamics Of Nutrient Reserves And Digestive Tract Of Female Northern Pintails Wintering Along The Texas Coast		Presentation ID: B55 – LS
Author: Matthew Garrick	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Bart M. Ballard	
<p>Abstract Unlike other dabbling ducks in North America, abundance of the northern pintail (<i>Anas acuta</i>) has remained below long-term average population levels and well below population objectives established by the North American Waterfowl Management Plan. A large proportion of pintails in the Central flyway winter along the Texas Coast where changes in land use over the last few decades have greatly changed the capacity of the region to support wintering pintail populations. Our objectives are to investigate several aspects of nutrition and energetics of pintails during winter. We collected pintails along the Texas coast from mid-October to mid-March during 2012-15. We estimated molt intensity using a grab sampling technique from 9 major plumage regions composed of 29 feather tracts. Specimens were plucked and necropsied to determine digestive-organ and muscle mass dynamics. Following necropsies, we dried carcasses and ground them into a fine powder to estimate fat content with ether extraction, and estimate protein content by ashing in a muffle furnace. Preliminary analysis on about 40% of our sample suggests that female pintails maintain protein reserves and catabolize 25% ($P < 0.001$) of their somatic fat reserves across winter. Digestive track mass declined by 18% ($P < 0.001$), primarily as a result of atrophy of the gizzard. Further analyses on molt intensity, blood metabolites, and the remainder of our sample will help reveal patterns in nutrient reserves of female pintails across winter.</p>		

Title: Binational Water Quality Monitoring In The Lower Rio Grande/Rio Bravo		Presentation ID: B57 – LS
Author: Rohan Jayasuriya	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Lucy Camacho, Lee Clapp, Jungseok Ho, Hudson De Yoe and Elizabeth Heise	Mentor(s): Lee Clapp	
<p>Abstract</p> <p>Among the water quality concerns associated with the Rio Grande/Río Bravo are high levels of ammonia, low levels of dissolved oxygen, high mercury levels in fish, excessive algal growth and increasing salinity levels. In 2013, realizing the need to address water quality concerns in the Rio Grande/Río Bravo in an integrated fashion, the governments of the U.S. and Mexico created a binational forum for cooperation and information exchange under the auspices of the International Boundary and Water Commission (IBWC/CILA). The effort, the Lower Rio Grande/Río Bravo Water Quality Initiative (LRGWQI), is a pilot project designed to establish binational mechanisms to protect water quality in the river. The Initiative is focusing its initial efforts on the portion of the river between Falcon Dam and the Gulf of Mexico. In 2014, the LRGWQI partners enlisted the help of local universities including the University of Texas Pan American; Texas A&M Kingsville; and University of Texas at Brownsville to monitor sixteen sites on the river, several wastewater outfalls and tributaries.</p>		

Title: Application Of Symbolic Computation In Chemical Engineering		Presentation ID: B58 – LS
Author: Sravanthi Mothupally	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Archana Sonejee and Kabita Barman	Mentor(s): Dr. Patrick L. Mills	
<p>Abstract</p> <p>Mathematical models for engineering systems are often described by either linear or nonlinear algebraic, differential, differential-algebraic, or partial differential equations that describe one or more conservation laws, such as conservation of mass, linear or angular momentum, energy, electric charge, or species. The approach that is often followed to generate solutions for the dependent variables, such as fluid velocities, temperature, or species concentrations, involves either analytical techniques or numerical methods that are implemented using mathematical software, such as MATLAB™. Symbolic computation has made considerable advances, which provides a more efficient approach for investigation of scientific and engineering phenomena versus laborious manual or numerical computation. This poster will summarize recent efforts on the use of symbolic computation in the analysis of chemical engineering systems using MAPLE™. It is shown through various examples that MAPLE™ can be used to facilitate the various steps involved in engineering analysis, such as derivation of the governing conservation laws, performing various mathematical operations, and developing solutions to the model equations, thereby allowing better insight into the underlying physico-chemical phenomena. Examples are taken from chemical engineering thermodynamics, reaction kinetics and chemical reaction engineering to illustrate how MAPLE™ has been used for both teaching and research purposes.</p>		

Title: The Aero-Dynamic Acoustic Analysis Of High Speed Vehicle Using Broadband Noise Source Model		Presentation ID: B59 – LS
Author: Nazia Munir	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Kyoungsoo Lee, Ziaul Huque, Raghava Kommalapati, Shrabanti Roy and Sadia Shormin	Mentor(s): Ziaul Huque	
<p>Abstract</p> <p>The purpose of the current paper is to predict the noise generated by high speed moving vehicle. For this purpose, the steady state Curle surface integral broadband noise source (BNS) has been considered for road ground surface. The model evaluates the far field noise emitted by turbulent boundary layer flow over a solid body at low Mach number. The shear stress transport (SST) turbulent model is used to find the turbulence quantities in steady state Reynolds Averaged Navier Stokes (RANS) equation. The steady and unsteady computational fluid dynamic (CFD) simulation are performed for Curle BNS and unsteady pressure fluctuations for the SST turbulent RANS and Large Eddy Simulation (LES) respectively. The commercial CFD software STAR-CCM+ is used for the simulation of this study. The approximate Curle surface sound pressure levels (db) are obtained. The obtained result is compared with the acoustic intensity in frequency spectral range. After evaluating the Curle surface integral the applicability and accuracy of it is also discussed.</p>		

Title: GIS Mapping And Maxent Niche Modeling For East African Scorpion Fauna		Presentation ID: B60 – LS
Author: Samuel Mwangi	Discipline: Environmental Science	
Campus: West Texas A&M University	Student Level: Master's	
Co-Authors: David W Sissom PhD	Mentor(s): David W Sissom PhD	
<p>Abstract</p> <p>Introduction</p> <p>Due to increased and continuous human activities, the diversity of East African scorpions is threatened by habitat destruction and harvesting for the souvenir and exotic pet trades (Prendini et al. 2003). Scorpions comprise a major group of predatory arthropods in arid and semi-arid ecosystems. Their disappearance signals habitat degradation and they represent charismatic ‘flagship’ species for programs aimed at conserving terrestrial biodiversity. It is imperative to make collections, identify, record other museum collection data, digitize, map and make predictions of scorpion species distribution using maxent niche models and GIS mapping using ArcMap 10.1. It is believed that this exercise would yield new scorpion species which would add more knowledge to arachnological studies.</p> <p>Assumptions</p> <p>There are many unstudied localities in the World where many unknown scorpion species can be discovered.</p> <p>Objectives</p> <p>GIS mapping and MaxEnt niche modeling of scorpion species distribution patterns</p> <p>Materials and Methods (Data sources)</p> <p>Specimens from major museums, personal collections excel spreadsheet were converted into comma separated values. Their decimal degrees that are compatible with maxent model calculated. Environmental values, Raster data and bioclim from worldclim (ascii.files) data for the entire world were extracted from CliMond website https://www.climond.org/BioclimData.aspx. The data was loaded into the maxent species projection model and run with the subject species.</p> <p>Results</p> <p>The maps bellow represents various unvisited localities of East Africa regions portrayed by the Maxent niche modeling. These sections showed localities where <i>Pandinus viatoris</i></p>		

Title: Modeling Of A SO ₂ Oxidation Reaction In A Microreactor For Scale-Up Of Commercial Catalyst Particles		Presentation ID: B61 – AN
Author: Sravya Nandam	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Anuradha Nagaraj	Mentor(s): Patrick L. Mills	
<p>Abstract</p> <p>Microreactors are gaining momentum for studying the kinetics of highly exothermic, heterogeneous catalyzed reactions due to their excellent heat and mass transfer characteristics when compared to larger, conventional laboratory reactors. Despite various breakthroughs in microreactor technology, their usage in applications where a heterogeneous catalyst must be contacted with a gas or gas-liquid reaction mixture contains various unsolved challenges and is an ongoing area of research. The catalytic oxidation of SO₂ to SO₃ for the manufacture of sulfuric acid is a reaction that not only has significant commercial relevance, but is also of increasing concern from an environmental perspective since stack gas emissions of unconverted SO₂ must be reduced to meet future anticipated regulations. Consequently, commercial catalyst manufacturers continue to work toward identifying catalysts having higher activity that reduce emissions from operating processes. Microreactors provide an alternative approach for developing new catalytic materials owing to their process intensification. This poster examines issues that occur when performance data for a powdered catalyst collected in a microreactor is compared to performance data for a commercial-scale catalyst particle from a larger, conventional reactor. The utility of using of microreactors as a possible replacement for larger, conventional laboratory scale reactors for catalyst testing is discussed.</p>		

Title: 3D Simulation Of Fracture Propagation Stimulated By Dense Carbon Dioxide Foam In Unconventional Reservoirs		Presentation ID: B62 – AN
Author: Fatick Nath	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(S): Chongwei Xiao, Phd	
<p>Abstract</p> <p>Conventional fracking fluids, water-based or oil-based, are associated with problems of high-volume of water, formation damage, fluid loss, etc. Dense CO₂ foam pumped in super critical status has been recently studied as a fracturing fluid to improved fracture conductivity.</p> <p>In this study, a three-dimensional simulation model was built using commercial simulator. Typical in-situ stresses and geomechanical properties were assigned to the model. Planar finite difference grid is applied to numerically solve fluid flow. The dense CO₂ foam was injected to promote fracturing. The effects of shear rates, elastic response of porous media, proper proppant distribution, leak-off, and secondary shear fractures on the fracture propagation was investigated. The in-situ stress and pore-pressure distribution around the cracks were analyzed. The obtained relationship of fluid injection pressure with elastic moduli, viscosity, and injection rate was observed as a proportional. Study suggests that dense CO₂ can enter into the micro-cracks and transmit the pressure to the end and recommend that the rheology of fracking fluid influences the propagation of hydraulic fractures.</p> <p>This study provides theoretical support for optimizing the fracture treatments design by dense CO₂ foam application through numerical simulations, which is crucial for exploitation from unconventional reservoirs.</p>		

Title: Effect Of Raised Vs. Flat Beds On Soil Properties And Phytophthora Nicotianae Propagule Counts In Citrus		Presentation ID: C46 – LS
Author: Ana Olivares	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Simpson C. R., Kusakabe A., Setamou M., Nelson S.D. and Ancona V	Mentor(s): Shad Nelson	
<p>Abstract</p> <p>The Lower Rio Grande Valley (LRGV) of South Texas is the citrus producing region of the state. Foot and root rot diseases, caused by Phytophthora nicotianae, are widespread in citrus groves in the region, causing important economic losses. This oomycete infects the roots and trunk of the tree leading to low yield, low fruit quality, tree decline and eventually tree death. P. nicotianae infections prosper in water saturated soil, a condition found in the LRGV as citrus groves are flood irrigated. We hypothesize that planting trees on raised beds rather than flat beds would result in a lower count of P. nicotianae propagules in the soil. We measured the soil gravimetric water content, bulk density, soil and ambient temperature under flat-covered, flat-uncovered, raised-covered, raised-uncovered beds, and quantified P. nicotianae propagules during the summer. There were no differences in water content and bulk density in the flat and raised beds under mulch condition. However there was a higher trend of P. nicotianae propagules under uncovered condition compared to cover but the differences were not significant. The implementations of new planting design that minimizes tree trunk contact with irrigation water could decrease P. nicotianae infection and disease incidence in citrus.</p>		

Title: Competitive Adsorption Of N-Hexane, Methanol, And Water Vapor On Super Activated Carbon Nanoparticles		Presentation ID: C47 – LS
Author: Jesus Prado	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Dr. David Ramirez	
<p>Abstract</p> <p>Recent times have seen a significant rise in the utilization of engineered nanomaterials (ENMs). Consequently, from fabrication to disposal, ENMs will inevitably be released into our environment – exposing humans to potentially dangerous ENMs that have undergone atmospheric transformations when interacting with hazardous air pollutants (HAPs). While previous studies have been performed on the adsorption of HAPs onto common adsorbents, little is known about their adsorption onto engineered nanoparticles. This study investigates the single and multi-component gas-phase adsorption of n-hexane, methanol, and water vapor on super activated carbon nanoparticles (SACNPs) with a bench-scale adsorption system. Breakthrough curves, adsorption capacities, and removal efficiencies will be calculated to assess the adsorption behavior of SACNPs. Preliminary results show high removal efficiencies (>98%) for n-hexane and methanol. Equilibrium adsorption capacities of 127.7 mg/g at 100 ppm and 256.0 mg/g at 250 ppm n-hexane and 22.8 mg/g at 100 ppm methanol were calculated from experimental data. Water vapors at 40% and 80% relative humidity (RH) had adsorption capacities of 0 and 1319 mg/g. Furthermore, adsorption capacities of n-hexane were reduced by 8.5% and 28.0% with the inclusion of water vapors at 80% RH. Equilibrium adsorption isotherm and kinetics modeling will also be developed.</p>		

Title: Monitoring Of Perkinsosis, Or Dermo, In The Eastern Oyster Crassostrea Virginica Throughout The Aransas-Copano Estuarine System In South Texas		Presentation ID: C48 – LS
Author: Maria Rodriguez	Discipline: Environmental Science	
Campus: Texas A&M University – Corpus Christi	Student Level: Master's	
Co-Authors:	Mentor(s): Dr. Jennifer Pollack	
<p>Abstract Perkinsosis, also known as Dermo, is caused by a protozoan parasite Perkinsus marinus, and is a major cause of mortality in eastern oysters (Crassostrea virginica). Oyster and parasite are used as bio-indicators to assess the health and freshwater resources of bays and estuaries along the eastern and gulf coasts of the United States. Increasing temperatures and salinities allows for greater prevalence and intensity of Dermo. Dr. Sammy Ray, a world renowned marine biologist, studied this disease for more than half a century. He formulated the Ray’s Fluid Thioglycollate Medium (RFTM) Technique, which is used as a diagnostic method to detect Dermo in oyster tissue. Dr. Ray monitored the Aransas-Copano estuarine system from 2006 to 2013. This study is a continuation of Dr. Ray’s work. On a quarterly basis, 10 market and 10 sub-market sized oysters are collected from 7 stations located throughout the Aransas-Copano estuarine system, and the RFTM technique is used to determine distribution and severity of the Dermo in this system. Dr. Ray’s data, along with data collected throughout the Gulf of Mexico, can be found on www.oystersentinel.org.</p>		

Title: Aero-Acoustic Characteristics Of 3D Wind Turbine Using CAA		Presentation ID: C49 – LS
Author: Shrabanti Roy	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Kyoungsoo Lee, Ziaul Huque, Raghava Kommalapati, Chao Sui and Nazia Munir	Mentor(s): Ziaul Huque	
<p>Abstract The present work is on the aero-acoustic characteristic of horizontal axis wind turbine which is obtained by using computational aero-acoustic (CAA). The aim of this study is to predict the sound noise emitted by the rotating wind turbine using unstructured mesh. The blade configuration of National Renewable Energy Laboratory (NREL) was considered for current study. The Large Eddy Simulation (LES) was used in unsteady transient simulations with hybrid FW-F technique for simulation of mid to far-field aero-acoustic sound noise. To estimate the rotor blade rotating effect, a volumetric quadropole noise source was considered. The simulation is in low Mach number. Rigid body motion was imposed on blade surface to perform the numerical simulation and to get the noise characteristic of rotating blade. The surface total noise term of reference and rotating frame motion cases are obtained which includes the surface noise, thickness and volumetric quad ratic terms. Discrepancy of volume and total sound noise level in between the reference and rotating motion cases was found in the result. So this process is capable of finding the unsteady rotating characteristic of wind blade along with the emission of sound noise.</p>		

Title: Preparation And Characterization Of Magnetorheological Fluids		Presentation ID: C50 – LS
Author: Purushothkumar Santhanamahalingam	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Dr. Chongwei Xiao	
<p>Abstract Magnetorheological fluids (MRFs) are smart fluids in which viscosity increases due to application of magnetic field. The attractive characteristics of this fluid is the property to transform from liquid to semi solid state with controllable yield stress in milliseconds. However, the application and rheological behaviors of MRFs are still undergoing exploration. This study prepared MRFs with different composition of oil-based fluid and micro carbonyl iron particles. Various additives were added to increase the stability of MRFs. The particle size, structure, and stability of MRFs were characterized by Scanning Electron Microscope (SEM). The viscosity of MRFs was measured using a viscometer under an applied magnetic field. The rheological properties of MRFs, including shear stress and shear rate under variable external magnetic fields, were analyzed. It has been observed that stability of MRFs has been improved by adding additives to formulation. Upon the completion of characterization, the application of MRFs to oil fields will be investigated. This study presented the cutting-edge research on the MRFs fluids.</p>		

Title: Life Cycle Assessment Of Bio-Diesel Fuel Emissions		Presentation ID: C51 – LS
Author: Sumal Shah	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Hongbo Du and Ziaul Huque	Mentor(s): Raghava Kommalapati	
<p>Abstract Life cycle assessment is a process used to study the effect of all the stages of a product's life such as extracting, processing, manufacturing, distributing, use etc. on the environment. A study is carried out to assess the emissions from the life cycle of bio-diesel produced from soybean used for automobiles. The emissions examined include greenhouse gases, volatile organic compounds (VOC), sulfur oxide, carbon monoxide, nitrous oxide and particulate matter with sizes less than 10 and 2.5 (PM 10 & PM 2.5). Several blends of bio-diesel from soybean and diesel are investigated to study the effects of bio-diesel fuel blends on the criteria emissions. The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model is used to simulate the different types of automobile technologies and transportation fuels. Two pathways of emissions are analyzed; well-to-pump and pump-to-vehicle. Compression ignition direct injection (CIDI) vehicles including passenger cars (PC) and light-duty trucks are taken into account for this study. The anticipated results are that the higher the blend of bio-diesel is, the lower the various emissions would be and hence better for the environment.</p>		

Title: Analyzing Weekday And Weekend Ozone Concentrations In Houston-Galveston-Brazoria Area During 2012 Summer Episode Using Camx		Presentation ID: C53 – LS
Author: Md Tarkik Shahriar	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Dr. Akhil Kadiyala and Dr. Ziaul Huque	Mentor(s): Dr. Raghava R. Kommalapati	
<p>Abstract Houston-Galveston-Brazoria (HGB) region has been designated as “Moderate Non-attainment” area according to the 2008 ground-level ozone (O3) standards implemented by the United States Environmental Protection Agency (USEPA). This study aims at understanding the variations in weekday and weekend O3 concentrations in HGB area. Comprehensive Air Quality Model with Extensions (CAMx) v.6.11 has been used to perform the air quality simulation for 2012 summer episode (16th May-30th June) utilizing chemistry-bond mechanism 6 (CB6). The meteorological files, emission files (point source, area source, biogenic source, mobile source, and non-road source), boundary condition and other input files which are required to perform the CAMx simulation were obtained from the Texas Commission on Environmental Quality. The results in this poster are based on the first 15 days of CAMx simulation of 2012 summer episode. No exceedance of O3 concentrations were observed during this period. The averaged maximum O3 concentration during the weekends was approximately 7% higher than those during the weekdays. Simulation of other days in 2012 summer episode is currently under progress.</p>		

Title: Quantification Of Flash, Working And Breathing Losses Of Hazardous Air Pollutants Emitted From Condensate Storage Tanks		Presentation ID: C54 – LS
Author: Nida Shaikh	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Dr. David Ramirez	
<p>Abstract The main objective of this project involved the design, set up and testing of a bench scale emission chamber system for the quantification of Hazardous Air Pollutants (HAPs) emitted from condensate storage tanks. HAPs of interest include Benzene, Toluene, Ethylbenzene and Xylene Isomers (BTEX). The different components of the emission chamber system include the condensate tanks, pipeline system for condensate flow, gas detection system (i.e. the gas chromatogram with flame ionization detector) and the data acquisition system. The bench scale emission chamber system was used to monitor and quantify the three types of HAP emission losses: flash, working and breathing losses, along with altering different physical conditions (such as temperature and pressure). Flash loss occurs when the pressure of the liquid or condensate entering the tank decreases suddenly. Working loss is the increase in evaporation as a result of the agitation of liquid from activities such as filling the condensate tank. Breathing loss is the normal evaporation of the liquid in the tank. Computer models such as USEPA Tanks4.09d and Promax will be used to simulate the emission losses from condensate storage tanks.</p>		

Title: Microscale Algal Pigment Patterns In Salt Marsh Communities		Presentation ID: C55 – LS
Author: Susan Shanks	Discipline: Environmental Science	
Campus: Texas A&M University – Corpus Christi	Student Level: Master's	
Co-Authors:	Mentor(s): Dr Philippe Tissot, Dr Paul V. Zimba and Dr Ruby Mehrubeoglu	
<p>Abstract Salt marsh algae play a vital role in the primary productivity of intercoastal habitats. In addition to providing a</p>		

food source for various meiofauna, including copepods, nematodes, polychaetes, and amphipods, as well as larval fishes, benthic algae can also limit the distribution of herbivores. Conversely, grazing pressures can limit microalgal biomass and distribution. While algal distributions have been studied in open ocean for decades algal distributions on a microscale, as found in salt marsh systems, have not been well studied.

Both hyperspectral analysis and high performance liquid chromatography (HPLC) have been used to determine biomass based on pigment. Hyperspectral analysis has generally been used at macroscales (meter-kilometer) and there is a high cost associated with HPLC. Using hyperspectral analysis at a microscale would allow for a relatively fast, cheap, and nondestructive method to estimate biomass. Hence, the goals of this study are twofold: to determine the presence and size of microscale algal patches and to determine the efficacy of hyperspectral in microscale measurements by using HPLC as ground truthing.

Initial hyperspectral measurements coupled with HPLC analysis suggest the possible presence of microalgal patches of 3-4cm diameters at 3cm intervals.

Title: Enhancing Transport Phenomena Educational Process In Chemical Engineering Using Multiphysics Software		Presentation ID: C56 – LS
Author: Pranav Sharma	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Mikhail Vasilev	Mentor(s): Patrick L. Mills	
Abstract		
<p>Use of simulation software for solving realistic engineering problems has grown significantly in recent years due to availability of less expensive but more powerful computers and development of user-friendly yet robust codes. Students in STEM disciplines can now solve complex problems in a relatively short period of time, which provides new opportunities for strengthening their knowledge of fundamentals, gaining better insight into the interactions between realistic design geometries, problem parameters, and the role of various multiphysics. One key result is acceleration of their development as technologists, which allows them to ultimately provide greater business impact and leadership in their chosen career. In chemical engineering, teaching of transport phenomena, which is a subject of fundamental importance to the discipline, is often restricted to cases where analytical solutions can be developed, such as a single space dimension and time. COMSOL Multiphysics™ provides a powerful platform for enhancing student knowledge by first confirming the analytical solutions using numerical techniques, and then extending the problem to multi-dimensions with the addition of multiphysics. The objective of this poster is to illustrate how COMSOL Multiphysics™ has been used for enhancing teaching transport phenomena, and to outline techniques used to incorporate it into the course material.</p>		

Title: Characterization Of Heterogeneous Catalyst Morphology Using A Mathematical Pore Network Model And Surface Area Analyzer		Presentation ID: C57 – LS
Author: Yatish Sharma	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Shreesh Kulkarni	Mentor(s): Patrick L. Mills	
Abstract		
<p>Effective catalyst characterization techniques are of paramount importance with the increasing demand for development of catalysts with enhanced efficiency and atom economy. BET surface area analysis is a widely employed technique to study the pore network structure and pore size distribution. A square network model as proposed by G.P Androustopoulos and R.Mann, has been generated in this work. This model has been used to study the pore size distribution by interpreting the nitrogen adsorption and desorption in a surface area analyzer. Kelvin equation along with the statistical thickness t equation predicts the movement of nitrogen as a function of increasing pressure (adsorption) and decreasing pressure (desorption) in the postulated pore network model. The</p>		

results of this model have been compared with BET analysis of a commercial V2O5 catalyst using a Quantachrome surface area analyzer and also a more advanced characterization technique of scanning electron microscopy coupled with image processing algorithms. This work has been extended to study the pore size distribution of regenerated catalysts using the square network model and scanning electron microscopy.

Title: The Pitch-Angle Optimization Of 3D Wind Turbine Using CFD/FSI		Presentation ID: C59 – LS
Author: Sadia Shormin	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Kyoungsoo Lee, Ziaul Huque, Raghava Kommalapati and Nazia Munir	Mentor(s): Ziaul Huque	
<p>Abstract</p> <p>In this study, to find the optimized pitch angle of a full scale 3D wind turbine blade, numerical CFD and FSI analyses have been performed. To this end, parameterized 3D CAD wind blade model and Commercial ANSYS were used. The SST-Gamma theta turbulent model was adopted for the turbulent model in CFD analysis for fluid domain. As the pitch angle changes, an integrated torque also can be affected. The power generating torque is highly dependent to the pitch angle in wind blade. To get optimized power coefficient, the optimum pitch angle should be predicted. This torque is generated by the tangential component of lift force and the torque created by the drag force. This integrated torque creates a coupling effect about the primary axis. After simulating the CFD analysis to get the aerodynamic characteristics of it, the Fluid structure interaction (FSI) analysis were performed to get the imported surface pressure load information for structure an alysis. The evaluated aerodynamic force from FSI demonstrates the optimized pitch angle for wind turbine blade.</p>		

Title: Analysis Of Fluid Motion Between Rotating Concentric Cylinders Using COMSOL Multiphysics™		Presentation ID: C60 – LS
Author: Archana Sonejee	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Kabita Barman and Sravanthi Mothupally	Mentor(s): Dr. Patrick L. Mills	
<p>Abstract</p> <p>Fluid-flow patterns where a fluid is contained between the annular gap of concentric rotating cylinders have received notable attention in the field of engineering fluid mechanics. Examples of engineering applications where this occurs include fluid viscometers, production of natural gas and crude oil from reservoirs, and mechanical seal technology. The primary objective of this study is use COMSOL Multiphysics™ to determine the non-ideal fluid velocity and pressure profiles in a fluid viscometer design for the case where the inner cylinder is rotating and the outer cylinder is stationary. When end effects are neglected, an analytical solution for the torque exerted by the fluid on the cylinder wall can be derived from which fluid viscosity data can be determined from measurements of fluid torque versus rotational speed. COMSOL Multiphysics™ allows a more rigorous model for the fluid flow patterns to be developed so that the errors incurred in the torque predicted by the simplified one-dimensional model can be assessed. By varying viscometer design parameters, such as the cylinder radii, and operational parameters, such as the rotational speed of the inner cylinder, it is shown that the simplified model for interpretation of viscometer data results in errors of less than 5%.</p>		

Title: Carbon Capture With A Novel Solid Absorbent Of Polyethyleneimine Impregnated Titanate Nanotubes		Presentation ID: C61 – AN
Author: Melisa Stewart	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Hongbo Du	Mentor(s): Raghava Kommalapati, PhD.	
<p>Abstract</p> <p>It is becoming increasingly clear that there is an increase in greenhouse gas emissions in the earth's atmosphere, particularly due to various human activities. This increase has caused a growing concern on the effects of these gases, particularly carbon dioxide (CO₂) and its contribution to global climate change. Many studies are currently underway to identify methods to reduce the amount of CO₂ emissions through carbon capture at one of the three stages; pre-combustion, oxyfuel process and post-combustion. This paper discusses available technologies for post combustion capture of CO₂ with different solvent and solid absorbents. Of the many available technologies of solid absorptions, polyethyleneimine (PEI) is considered to be the most promising. In our ongoing DOE project, PEI polymers impregnated on protonated titanate nanotubes (PTNTs) are being investigated as a possible means of carbon capture from the flue gas after coal combustion. The temperature effects on synthesis of PTNTs and the CO₂ absorbance capacity will be discovered based on the examinations of inner and surface characterization of PTNTs through XRD, SEM and TEM.</p>		

Title: The Advanced Fluid Structure Interaction Analysis Of 3D Wind Turbine		Presentation ID: C62 – AN
Author: Chao Sui	Discipline: Environmental Science	
Campus: Prairie View A&M University	Student Level: Master's	
Co-Authors: Kyoungsoo Lee, Ziaul Huque, Raghava Kommalapati, Shrabanti Roy and Mahmood Sabria Chowdhury	Mentor(s): Ziaul Huque	
<p>Abstract</p> <p>In this paper, using 7 m/s wind speed as a study case, the steady and transient CFD analyses with k-w SST turbulence model were performed for 1-way static and 2-way time dependent transient interaction to investigate the 3D-flow aerodynamic load effects on wind turbine blade. To achieve this, firstly, the pressure coefficient and integrated 2D sectional forces (normal, lift, thrust and torque) about local and global axes were calculated and verified by comparing with NREL experimental data, which were in excellent agreement. Then, the aerodynamic loads were applied to the wind blade structural model. The effective structural stiffness was derived from the frequency based eigen-value analysis, which was developed approximately according to the reported structural information. During this process, the structural response from wind blade were transformed to the ground support through other parts. So only the interaction of wind blade surface was considered. From the 1-way and 2-way FSI simulations, by comparing with the results of conventional approach, it was found that the structural displacement and surface pressure responses could be transferred accurately.</p>		

Title: Competitive Adsorption Of Benzene, Toluene And Water Vapor On Super Activated Carbon Nanomaterial		Presentation ID: C63 – AN
Author: Sharon Tazanu	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Dr. David Ramirez	
<p>Abstract</p> <p>Nano-sized particles exist in nature and they can be formed from various products, which could be carbon or</p>		

minerals like silver. Nanomaterials are required to have at least one dimension which is supposed to be less than approximately 100 nanometers. Engineered nanoparticles possess the ability to improve the quality of life and have an outstanding influence on industrial competitiveness. However, there are rising concerns about the effects of these materials on human health and the environment. These effects or risks and the extent to which they can be dealt with have not been explored extensively by researchers.

This research aims at quantifying and comparing the various adsorption capacities and dynamics of benzene, toluene and relative humidity on super activated carbon nanoparticles (SACN) using a bench scale adsorption system. In order to evaluate the possible adsorption behavior of SACNS with water vapor, benzene and toluene, the various adsorption capacities, breakthrough curves, removal efficiencies, throughput ratios were determined. The single component adsorption schemes were also tested and compared with the adsorption mixtures of benzene, toluene and relative humidity. This research focuses on the interactions of HAPs with relative humidity. The average adsorption capacities and removal efficiencies for the single compounds and the mixtures will be calculated and compared respectively. Adsorption kinetics will be analyzed for all the adsorption tests on SACNs using the time series plots. The kinetic rate constant values for benzene, toluene and water vapor on SACN will be compared.

Title: Experimental Studies Of Catalytic & Non-Catalytic Organic Reactions		Presentation ID: C64 – AN
Author: Anoop Uchagawkar	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Vilas Gaikar, Vivek Ranade and Sunil Joshi	Mentor(s): Patrick L. Mills	
<p>Abstract</p> <p>Part 1. Synthesis of Tri-n-butyl Phosphate (TBP) in a Semi-Batch Reactor The kinetics of the exothermic series-parallel irreversible reaction between phosphorus oxychloride (POCl₃) and n-butanol (n-BuOH) has been studied in a lab-scale reaction calorimeter operated using both batch and semi-batch modes. Experimental parameters investigated included the addition rate of the limiting reagent (POCl₃), reaction temperature, and initial concentration of reagents. Optimum reaction conditions to maximize the TBP synthesis were obtained. The dynamic behavior for the semi-batch reactor was described by a set of differential equations based upon macroscopic mass and energy balances. Kinetic parameters obtained by this approach are useful for process scale-up.</p> <p>Part 2. Developing Batch to Modular, Agile, Intensified and Continuous (MAGIC) Process for Morpholine Synthesis The specialty chemical industry is a key underpinning of the industrial and agricultural development. The Indus MAGIC project identifies new ways of designing process equipment and their integration with process chemistry to realize atom efficient, environmentally benign and globally competitive processes. It has the potential to obtain higher purity and yield of the desired products by perturbing rates of relevant transport processes to optimize process performance. It is shown that this will result in higher throughput, reduced energy consumption, emissions, waste and safer operations.</p>		

Title: Hydrodynamic Modeling Of A Rotating Cone Pump Using COMSOL Multiphysics		Presentation ID: C65 – AN
Author: Mikhail Vasilev	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors: Anoop Uchagawkar	Mentor(s): Patrick L. Mills	
<p>Abstract</p> <p>Velocity profiles in liquid films flowing over rotating conical surfaces are of considerable interest in industry. Conical pumps offer simple alternatives to conventional pumps yet the analysis of pump performance has received minimal attention in the literature. The emphasis of this work is to develop a realistic model for fluid transport based on the 3-D transient Navier-Stokes equations for an assumed geometry using COMSOL Multiphysics™.</p> <p>Numerical simulations have been performed to determine velocity and pressure profiles throughout the system for various process parameters. The combined effects of angular rotational speed (Ω), semi-cone angle (α) and the aspect ratio (κ) on the volumetric flowrate (Q) have been systematically studied. Initial simulation results acquired from laminar flow model revealed an excessive transport and pumping capacity of the rotating cone, even with small cone sizes. For increasing values of Ω, the volumetric flowrate was found to be increasing proportionally and was independent of height of the cone (H) and the aspect ratio (κ). Fluctuations in volumetric flowrate were more evident at higher rotational speeds, but were less significant upon increase in cone height. Comparison for different flow regimes has been carried out and results for the same will be presented.</p>		

Title: Lionfish: Survey Data And A Predator (Human) – Prey (Lionfish) Model For Controlling Their Numbers		Presentation ID: D1 – LS
Author: Raven Walker	Discipline: Environmental Science	
Campus: Texas A&M University – Galveston	Student Level: Master's	
Co-Authors:	Mentor(s): Glenn A. Jones	
<p>Abstract</p> <p>The 1980's introduction of lionfish, <i>Pterois volatilis</i> and <i>P. miles</i>, into the Atlantic has made them the first well-established marine invasive species in the US and among the top fifteen global threats. Atlantic lionfish populations lack local predators, allowing them to remove up to 94% of small and juvenile reef fish in many areas of the SW North Atlantic, Caribbean and Gulf of Mexico. Once established, a marine invasive mesopredator, such as lionfish, cannot be eradicated; rather their numbers must be controlled. Here we present the first predator (human) – prey (lionfish) model for such a control. In 2014, consumers, fishermen and tourists on the island of Aruba were surveyed to determine community awareness and their willingness to utilize lionfish as a food resource. In addition, 734 lionfish were harvested to obtain the weight-length relationship and a subset was reserved for aging via otolith analysis. An additional 317 specimens were obtained from the Flower Garden Banks Marine Sanctuary in September 2015. The model determines the “sustainable fishery harvest” needed to support both a viable seafood market and allow the healthy rebound of local reef fish populations. Preliminary results suggest that 20 full-time lionfish hunters can be supported in Aruba.</p>		

Title: Evaluation Of An Avian Radar System To Differentiate Bird Targets		Presentation ID: D2 – LS
Author: Taylor Yerrick	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Master's	
Co-Authors:	Mentor(s): Dr. Bart Ballard	
<p>Abstract</p> <p>The use of radar technology to research bird migration has increased in recent years. Radars collect copious amounts of data, however their accuracy in differentiating bird targets is unknown unless combined with ground-truthing procedures. Tracking released birds with avian radar allows for validation by correlating known and radar-estimated size metrics. We released five bird species (n = 222) ranging in size from house sparrows (<i>Passer domesticus</i>) to rock doves (<i>Columbia livia</i>) through the radar coverage while the radar recorded 60 parameters for each target. Prior to release, we measured mass and a series of body dimensions to determine body volume and a surface area index of each individual. Correlation of known-size measurements and radar size estimates can be a reliable method for radar differentiation of bird targets. Of the 20 explanatory variables tested, only 6 were significant in explaining variation (13-29%) in size metrics for released birds. Because radar size metrics can vary with target orientation and distance from the radar, we devised and substantiated a calibration procedure to estimate the “true” size of radar targets. The resolution of collected data can be improved by understanding how target position in the radar coverage influences its detection characteristics.</p>		

Doctoral

Title: Authigenic Carbonate Formation On The Peru Margin; New Insights From IODP Site 1230		Presentation ID: D3 – LS
Author: Sajjad Abdullajintakam	Discipline: Environmental Science	
Campus: Texas A&M University – Corpus Christi	Student Level: Doctoral	
Co-Authors: Thomas Naehr	Mentor(s): Thomas Naehr	
<p>Abstract Fluid seepage of reduced organic compounds such as methane impacts the geology and biology of the seabed by inducing complex, microbially mediated biogeochemical processes. Authigenic carbonates serve as one of the few permanent records of these dynamic biogeochemical interactions that involve methanogenesis, methanotrophy, sulfate reduction and carbonate precipitation. Previous studies have discovered dolomite precipitation occurs in association with organic carbon-rich continental margin sediments. Geochemical and petrographic studies indicated episodic dolomite precipitation at a dynamic sulfate methane transition zone. Our study aims to better understand the biogeochemical processes associated with authigenic carbonate precipitation in this dynamic deep-sea setting. We focused our efforts on IODP Site 1230, which is a gas-hydrate-bearing site that shows sulphate consumption within the uppermost 10 m below the seafloor as well as high methane production. Using a multi proxy approach, we combined X-ray diffraction, stable isotope geochemistry, and trace metal analysis of authigenic carbonates to elucidate conditions for their formation. Results from Site 1230 are compared to Sites 1227 and 1229, which lacks gas hydrates and is characterized by high pore water sulfate and low methane concentrations. This study contributes to a more comprehensive understanding of authigenic carbonate formation and associated biogeochemical processes in continental margin sediments.</p>		

Title: Effects Of Climate And Land Use Changes On Water Quality In The Nueces River Basin		Presentation ID: D4 – LS
Author: Fayruj Ahmed	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Tushar Sinha	
<p>Abstract Nitrogen and phosphorus are essential nutrients for plant and animal growth, but excessive nutrients loading due to fertilizer and pesticide applications in agricultural fields can deteriorate water quality in streams and lakes. Such changes can contribute to eutrophication, which effects productivity of aquatic ecosystems. Several studies have shown that increase in impervious area results in increased runoff peaks, runoff volume, and impact water quality. For instance, Texas Commission on Environmental Quality (TCEQ) recommended the need of significant reduction in nitrogen and phosphorus loadings in the Upper Nueces River basin. Furthermore, changes in climate and frequency of extreme events can impact nutrient loadings and balance, particularly during extreme events. Therefore, the goal of this study is to develop best management practices that can minimize nutrient loadings under climate and land use changes. We will calibrate and validate the Soil and Water Assessment Tool (SWAT) model for multiple sites with the Nueces River basin. We will use several years of data to calibrate and recent data to validate our model. Our ultimate goal is to simulate and develop strategies to minimize nutrient loading for the Nueces River over the next 20-30 years</p>		

Title: Evaluation Of The Current Voltage Relationship And Factors Affecting Electrodialysis Metathesis Desalination Rate Using Factorial Design		Presentation ID: D5 – LS
Author: Johnson Ajedegba	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Lucy Camacho, PhD	
<p>Abstract</p> <p>Electrodialysis Metathesis (EDM) is a novel modification of the electrodialysis (ED) cell consisting of quads as the repeating unit cell to allow double decomposition reaction between the cations and anions in a feed and sacrificing solution for desalination of high salinity water with precipitate and scale formers. The current voltage curve for EDM configuration and evaluation of suitable sacrificing solution was carried out. Evaluation of factors that control EDM desalination efficiency such as voltage, flow rate, types of ion exchange membrane and feed water was carried out using a full factorial design. Current voltage curves for EDM have similar trend as that of ED. Increasing number of EDM quads leads to lower current density due to ionic flux across an increased surface area consequently resulting in faster desalination rate. NaCl showed greater ionic mobility and conductance in a current density voltage curve than K₂SO₄ and MgSO₄ and therefore a better sacrificing EDM solution. Factorial analysis showed that voltage has the most significant effect in EDM desalination. A faster desalination rate was attained with Tokuyama membranes than Mega membranes particularly at low voltage and flow rates. Operating at high voltage, feed water with high initial concentration and high flow rate enhanced desalination rate. The normal and Pareto plots showed that all the four factors considered have significant effect at 95% confidence level. There exists a positive interaction effect between voltage and flow rate, which suggests an optimum EDM desalination rate from combination of low voltage and high flow rate</p>		

Title: Developing Ambient Ozone Air Quality Mitigation Strategies For Neighboring Cities Of The Marcellus Shale Plays In The Northeast United States		Presentation ID: D6 – LS
Author: Chihyuan Chang	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Dr. Kuo-Jen Liao	
<p>Abstract</p> <p>Significant increases in oil and gas production from the Marcellus Shale plays in the Northeast United States (U.S.) began in 2010. With projected increases in oil and gas production from the Marcellus Shale, emissions of air pollutant precursors (e.g., nitrogen oxides (NO_x) and volatile organic compounds (VOC)) from shale oil and gas-related activities would have the potential to affect ambient ozone air quality in adjacent cities of shale plays. Understanding ambient ozone formation regimes is essential to develop air pollution mitigation strategies for cities violating the air quality standards. This work leverages: (1) satellite-retrieved column densities of ozone precursors; (2) photochemical air quality modeling and sensitivity analysis; and (3) ratios of satellite-retrieved air pollutant column ratios to investigate ambient ozone formation regimes in neighboring cities of shale plays in the Northeast U.S. from 2007 to 2014. Our results show that controls of NO_x emissions, including those from local sources and upwind areas, would mitigate ozone air pollution from 2007 to 2014 in Boston, Philadelphia, Pittsburgh and Washington, D.C. In New York City, controls of VOC emissions from local sources and upwind areas would reduce ambient ozone formation in 2007-2009 and 2014.</p>		

Title: Assessment Of The Down-Hole Scaling Potential Associated With Using Desalination Concentrate Of Brackish Groundwater As Hydraulic Fracturing Fluid		Presentation ID: D7 – LS
Author: Nima Ghahremani	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Dr. Lee Clapp	
<p>Abstract</p> <p>The main purpose of this study is to evaluate the feasibility of using concentrate streams from brackish groundwater desalination plants located within the Eagle Ford Shale region as hydraulic fracturing fluid. As part of this study, a time-series water quality analysis has been carried out on concentrate samples from the City of Kenedy, Texas brackish groundwater desalination plant. The results have shown low concentrations of total dissolved solids (TDS) and problematic multivalent ions over a year of monitoring. In addition, geochemical modeling analyses are being performed to assess the down-hole potential associated with using the concentrate water as hydraulic fracturing fluid. This geochemical modeling is being performed using the PHREEQC geochemical software package and using the results of the concentrate chemical characterization studies along with the in-situ temperature and pressure. The down-hole scaling potential associated with different blend ratios of flowback water and desalination concentrate are also being simulated in the model. The results of this study will provide a framework for identifying opportunities and obstacles for using brackish groundwater desalination concentrate for hydraulic fracturing operations. Lessons learned can be applied to other brackish water sources, including cooling tower blowdown from refineries and power stations. The concentrate characterization and geochemical modeling studies will also complement ongoing flowback water treatment research.</p>		

Title: Flare Gas Control And Recovery Technologies: A Review		Presentation ID: D8 – LS
Author: Jalil Ghobadi	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Dr. David Ramirez	
<p>Abstract</p> <p>Gas flaring is defined as controlled burning of excess natural gas in industrial plants such as petroleum refineries, natural gas processing and chemical plants. Gas flaring emissions are considered as one of the sources for environmental contamination and global warming. In the oil and gas industry, incomplete combustion of flare gas systems can produce volatile organic compounds and inorganic contaminants. Human health risk, social and economic issues and environmental contamination are some of the main problems associated with gas flaring. Solving these problems requires avoiding or at least using flare gas recovery systems that can reduce normal gas flaring to almost 100%, decrease greenhouse gas emissions, and limit flare operations to emergency release. Flare gas recovery systems can be an environmentally friendly and cost-effective alternative for the control, treatment and recovery of chemical vapor emissions from gas flaring. In this study, current methods for flare gas recovery technologies such as gas-to-liquid, gas turbine for electricity production, and compression and injection into refinery pipelines are reviewed.</p>		

Title: Assessment Of Down-Hole Membrane-Diffused Hydrogen For Stimulating Uranium Reduction And Immobilization		Presentation ID: D9 – LS
Author: Lewis Haynes IV	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors: Wei Yang	Mentor(s): Lee Clapp	
<p>Abstract</p> <p>The most common technology currently used for restoring groundwater at In-Situ Recovery (ISR) uranium mining sites is Reverse Osmosis (RO) and reinjection of the permeate. However, this practice does not restore the formation to its original reduced state, and in many cases groundwater uranium concentrations are not restored to pre-mining baseline levels. This study was performed to evaluate the effectiveness of introducing dissolved hydrogen into a post-mined formation at an ISR mining site to stimulate reduction and immobilization of residual soluble uranium. The main objectives of this research project were: 1) to develop and optimize a system for minimizing air entrainment during water injection when employing a membrane gas-transfer device for down-hole hydrogen infusion; 2) to assess whether injecting dissolved hydrogen using the membrane gas-transfer device can promote immobilization of dissolved uranium in groundwater to near or below pre-mining concentrations. Approximately 30,000 gallons of groundwater were pumped to the surface and then re-injected into the subsurface while being supplied with dissolved hydrogen using the down-hole membrane gas infusion device. The groundwater was pumped back to the surface after several months to evaluate the extent to which dissolved uranium had been removed. Initial results indicate an approximately 80% reduction in soluble uranium concentration was achieved. Microbial analyses indicated a significant increase in iron-reducing bacteria, but less significant increases in sulfate-reducing bacteria.</p>		

Title: Effects Of Climate Change On Hydrology Of The Nueces River Basin		Presentation ID: D10 – LS
Author: Jae-Hyung Ji	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Tushar Sinha	
<p>Abstract</p> <p>The primary surface water sources in the Nueces River Basin (NRB) are Choke Canyon Reservoir and Lake Corpus Christi. The freshwater inflows have decreased from the Nueces River into the estuarine system due to the dam construction and changes in climate. Appropriate freshwater inflows are needed to maintain the water quality (e.g. salinity levels) in the Nueces Bay, which provides habitat to several key estuarine species, thus maintaining rich biodiversity. In this study, we use a semi-distributed Variable Infiltration Capacity (VIC) hydrological model at 1/8 degree spatial resolution (about 12 km) to estimate the effects of climate change on hydrology of the NRB. We utilize historical simulations (1981-2005) from multiple General Circulation Models (GCMs) to implement the VIC model to understand how well we could have used the coarse scale climate information in improving water resources management in the NRB by comparing the results to the overlapping observations. First, we will calibrate and validate the VIC model using observed climate data by Maurer et al., (2002). Then we will force the VIC model with statistically downscaled and bias-corrected projected changes in climate (during 1955-2005) from four different GCMs under the RCP4.5 (medium emission) scenario: CNRM, CCSM, INCM4, and MPI. Hydroclimatic projections will be analyzed by comparing the changes in mean and variance of different hydrologic variables between 1981-2005 and 1955-1980 to the changes in observed variables such as air temperature, total runoff, evapotranspiration, and soil moisture. Information on changes in inflows and soil moisture will be useful improving water resources management.</p>		

Title: New Insights Into Heterogeneous Catalytic Surfaces Using Scanning Electron Microscopy		Presentation ID: D11 – LS
Author: Shreesh Kulkarni	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors: Dr. Patrick L. Mills	Mentor(s): Dr. Patrick L. Mills	
<p>Abstract</p> <p>With the increasing demand for sustainable energy and sustainable processes, there is a need for development of new catalysts having higher activity and improved atom economy. Past research on catalytic materials has provided valuable insights on catalyst composition and catalyst structure. However, synthesis of next-generation catalysts for sustainable processes requires a more fundamental understanding of the material multi-scale structure, such as the nanoscale active sites and catalytic surfaces, micro-scale to macro-scale pore size distribution, and the 3-D connectivity of the catalyst pore network. The combined use of nondestructive Scanning Electron Microscopy (SEM) for 3D nanoscale characterization along with BET Surface Area Analysis provides important data needed to evaluate catalyst support morphology and the pore size distribution. These techniques have been applied in this approach to study the heterogeneous V₂O₅ catalyst surface and to develop a 3D pore network model. This catalyst finds applications in various processes. The data from 3D image reconstruction has been used to simulate transport effects in 2-D and 3-D catalyst pore network models using COMSOL Multiphysics. The results provide useful insights into transport-kinetic interactions that occur in practical catalysts and provide the basis for generation of new ideas for synthesis of improved catalysts for next-generation processes.</p>		

Title: Mathematical Modeling Of Competitive Adsorption Of Toxic Vapor Mixtures In An Activated Carbon Fixed Bed		Presentation ID: D12 – LS
Author: Kailas Malwade	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): David Ramirez	
<p>Abstract</p> <p>A mathematical model for the competitive adsorption of benzene, toluene, ethylbenzene and xylenes (BTEX) vapors were developed using a fixed bed of mesquite derived activated carbon (MDAC). A comprehensive model for the adsorption process consists of a model for the analysis of dynamic adsorption equations of mass, energy and momentum balance coupled to a model of equilibrium adsorption isotherm equations, to simulate the adsorption of mixtures of toxic vapors like BTEX onto MDAC. The model illustrated the breakthrough curves for the competitive adsorption of BTEX onto MDAC. It was observed in competitive adsorption that a component with stronger affinity to the adsorbent preferentially adsorbed and reduced the adsorbed phase concentration of the component with weaker affinity. The outlet concentration of the component with weaker affinity increased above inlet concentration as it displaced by the adsorbed component with stronger affinity.</p>		

Title: Novel Approach For Teaching Microchemical Systems Analysis To Chemical Engineering Students Using Interactive Graphical User Interfaces		Presentation ID: D13 – LS
Author: Anuradha Nagaraj	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Patrick L. Mills	
<p>Abstract</p> <p>Next generation technologies must be developed that potentially change the chemical plants and process engineering giving rise to safe, compact, flexible, eco-friendly, energy efficient processes. Hence, there is a need for the students to be exposed to these new emerging technologies. Microchemical systems are one such key emerging technology with applications ranging from discovery research through commercial processes. To introduce this technology to students the Department of Chemical Engineering at TAMUK developed learning module called Interlinked Curriculum Component (ICC) on Microchemical Systems as a part of the Undergraduate curriculum reform funded by NSF in 20081.</p> <p>The ICC module enables students to work through a series of exercises that start from basic principles and concepts to more complex situations where opportunities exist for both critical thinking and creativity. This approach allows them to focus on developing better insight and understanding of the system physics, which helps to reinforce the fundamentals that are taught in required courses on fluid mechanics, heat transfer, and mass transfer.</p> <p>COMSOL Multiphysics was used as the numerical engine to simulate various microprocess system components involving various transport phenomena. A library of several models was also created so that students can readily explore the effect of various model parameters on the physical system without worrying about numerical solution details.</p> <p>This poster will discuss utilizing user interfaces of various models that allows user to study the effect of critical design parameters on system performance.</p>		

Title: Comparison Of Diffusion Flux Models For Fe-Based Fischer-Tropsch Synthesis Using Micro-Kinetic Rate Expressions		Presentation ID: D14 – LS
Author: Arvind Nanduri	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Dr. Patrick L Mills	
<p>Abstract</p> <p>The Fischer-Tropsch Synthesis (FTS) is a highly exothermic condensation polymerization reaction of syngas (CO+H₂) in the presence of Fe/Co/Ru-based catalysts to produce a wide range of paraffins, olefins and oxygenates, the latter of which is often called syncrude. Multi-Tubular Fixed Bed Reactors (MTFBR) and Slurry Bubble Column reactors (SBCR) are widely employed for FTS processes. The FTS reaction network produces hydrocarbons with carbon numbers typically ranging from 1 to 100, so the catalyst pores in this process can be potentially filled with liquid wax (C₂₀+) leading to high diffusional limitations [1]. Temperature based correlations for diffusivities of FT products in wax are widely used and a comparison of diffusion flux models (Wilke, Wilke-Bosanquet, Maxwell-Stefan, and Dusty Gas) to describe species transport-kinetic interactions for FTS has not been reported in literature. A Fe-based micro-kinetic olefin re-adsorption model developed by Wang et al. (2008) was coupled with the Soave-Redlich-Kwong (SRK) equation of state to describe the particle-scale transport-kinetic interactions and phase behaviour for the gas-phase FTS [2]. This work describes the initial results obtained from such an effort using COMSOL Multiphysics™ as the numerical engine for solving the model equations.</p>		

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Title: Control Of Hazardous Air Pollutant Emissions From Crude Oil And Condensate Storage Tanks Using Thermal-Swing Adsorption		Presentation ID: D16 – LS
Author: Oluwatosin Oyelakin	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): David Ramirez	
<p>Abstract This study focuses on the design, set up and testing of a bench scale thermal-swing adsorption (TSA) technology to capture and recover hazardous air pollutants emitted from crude oil and condensate storage tanks. Benzene, toluene, ethylbenzene, and xylene isomers (BTEX) are examples of hazardous air pollutants emitted from storage tanks and are selected for this study. Commercially available granular activated carbon is used as the adsorbent. The operation of the bench scale TSA unit occurs in four steps including 1) offline to enable the generation of the BTEX mixture at steady state conditions; 2) online when the BTEX gas stream is sent to the adsorption vessel; 3) regeneration, in which N₂ is passed through the adsorber to purge O₂ to ensure safe desorption conditions; and 4) liquid recovery of BTEX through cooling and condensation. Experimental and adsorption model results were used to explain the effects of gas flow rate and BTEX concentration on the adsorption and desorption processes and to assess the efficiency of the bench scale TSA system. Overall, BTEX removal efficiencies were over 92% for gas flow rates ranging from 1 to 6 sLpm at 77°F. Desorption and liquid recoveries of the condensate were 98% and 30-35%, respectively. Competitive adsorption among the BTEX components was more apparent between benzene and toluene. Toluene and benzene vapors were more easily adsorbed on the granular activated carbon than ethylbenzene and xylene probably due to a combination of the highest gas concentration, molecular weights and boiling points for benzene and toluene.</p>		

Title: Geochemical Model To Evaluate The Effectiveness Of Dithionite For Stimulating Uranium Reduction And Immobilization At ISR Mining Sites		Presentation ID: D15 – LS
Author: Nebechi Osia	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Lee Clapp and Dorina Murgulet	
<p>Abstract The in-situ recovery (ISR) mining process involves injecting dissolved oxygen into groundwater aquifers with uranium-bearing ore formations. This oxidizes insoluble U(IV) mineral phases to soluble uranyl U(VI) species, which can be easily removed when groundwater is pumped to the surface. One promising approach for restoring groundwater at ISR mining sites is to inject dissolved hydrogen to reduce the residual solubilized U(VI) back to the original insoluble U(IV) form. A study recently conducted near Kingsville injected 100,000 standard cubic feet of hydrogen into a post-leached ISR mining formation. The hydrogen injection decreased soluble uranium near the injection well by 99%; however, the zone of influence was limited due to hydrogen reacting with sulfate in the groundwater. The objective of this follow-up research is to predict the effectiveness of adding sodium dithionite as an alternative reductant for stimulating microbial reduction and immobilization of U(VI). It is</p>		

hypothesized that injection of dithionite will theoretically yield a larger zone where U(VI) is reduced to U(IV) because dithionite will not be consumed in sulfate reduction reactions. The modeling will be performed using the PHREEQC geochemical software package.

Title: The Renewable Energy Revolution: Population And Economic Development In The 21st Century		Presentation ID: D17 – LS
Author: Kevin Warner	Discipline: Environmental Science	
Campus: Texas A&M University – Galveston	Student Level: Doctoral	
Co-Authors:	Mentor(s): Dr. Glenn A Jones	
<p>Abstract The current world population (7.2 billion) is projected to reach 8.4 billion by 2030 and 10.9 billion by 2100. Approximately 1.2 billion people worldwide currently lack access to electricity, and the World Bank’s Sustainable Energy for All initiative seeks to ensure global access by the year 2030. However, overall population growth and increasing energy access in the 21st century are incongruous with forecasts of declining non-renewable energy production and climate concerns over the continued use of fossil fuels. Today, the global energy mix is derived from 91% non-renewable and only 9% renewable sources. Here we use a nine region global model to find that significant restructuring of the current energy mix will be necessary to support the UN population projections for the 21st century. We find that 83% of overall global energy demand in 2100 will need to come from renewable sources, with each of the nine regions facing unique energy-po pulation challenges. Regional demographic transitions and shifts to >50% renewable energy will begin at different times in each region throughout the coming century. Regions of population growth and growing per capita energy consumption (i.e. South Asia and Sub-Saharan Africa) will find it most difficult to make these transitions.</p>		

Title: Wireless Sensor Network For Continuous Voc Monitoring At Oil & Gas Production Sites Bn		Presentation ID: D18 – LS
Author: Ruiqiang Zong	Discipline: Environmental Science	
Campus: Texas A&M University – Kingsville	Student Level: Doctoral	
Co-Authors:	Mentor(s): Lee Clapp	
<p>Abstract This research project is evaluating the potential for deploying a wireless sensor network (WSN) as a means of continuously monitoring total non-methane hydrocarbon (TNMH) concentrations in ambient air at remote oil and gas production sites. A wireless sensor network has been set up using photoionization detectors (PIDs). The PIDs measure TNMH levels by ionizing the compounds with a UV light and quantifying the ions produced with an electric field and an amplifying circuit. The system is powered by two photovoltaic solar panels and a battery system. A solar-powered wind speed and direction sensor is also incorporated into the system. The sensor signals are relayed wirelessly to a central industrial computer equipped with real-time sensor monitoring software. The computer is equipped with a USB wireless modem that allows researchers to access the continuous real-time monitoring data using a cell phone network. To data, the system has been deployed at four different field sites. The PID sensors recorded TNMH readings as high as 32 ppm when deployed downwind of an unlit flare. The system is currently being set up for long-term continuous operation near an oil and gas production site.</p>		