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UF/IFAS
Soil and Water Sciences Department

2181 McCarty Hall A
PO Box 110290
Gainesville, FL 32611-0290
352-294-3151
352-392-3399 Fax

Soil and Water Sciences Department
Graduate Student Exit Seminar

Speaker: **Laibin Huang**
Ph.D. Degree Candidate

Advisor: Dr. Andrew Ogram

Title: **Microbial Community Structures Related to Nitrogen Cycling in Subterranean Estuaries**

Date: Monday, June 5, 2017

Time: 3:00 pm – 4:00 pm

Location: McCarty Hall A, Room G186

Abstract: The activities of microbial communities in groundwater control much of the geochemical cycling that impacts water quality associated with submarine groundwater discharge (SGD). An understanding of those communities should yield insight into the controls on biogeochemical cycles in these environments. The objectives of this study were to characterize microbial communities, particularly those groups associated with nitrogen cycling in samples collected from two locations **(1)** Channelized and hydrologic connected system in the Yucatan, Mexico and **(2)** Diffuse seepage faces in Indian River Lagoon, USA. Total microbial community structures were determined by 16S rRNA amplicon sequencing, and concentrations of a set of nitrogen cycling genes were determined via quantitative PCR (qPCR). In Yucatan, the microbial communities were dominant by the phylum Proteobacteria; all the water samples collected from groundwater and offshore spring clustered together, respectively, and showed a greater spatial variation from groundwater to offshore spring when compared with temporal variation, and the interactions between the microbial communities changed along the environmental gradients with more negative connections at high salinity zones. Seasonal variations in DIN and N functional genes were observed with AOA dominant as a nitrifier, which weekly coupled with dentirifiers in the groundwater C7B, and tidal variations in flow occurred with AOB dominant as a nitrifier which strongly coupled with dentirifiers at spring Pargos. In Inidan River Lagoon, the physiochemical properties varied with distance along the seepage face from the shoreline to offshore. In the field, a consistent pattern of whole N functional genes was presented with higher copies of NH_4^+ producer (nifH and nrfA), lower copies of nitrifiers (AOA and AOB), and higher copies of denitrifiers (nirK, nirS and nosZ). For the lab water flow through column experiments, we confirmed that salt water intrusion has no significant effects on the first layer of sandy sediments, but a significant effects on the second layer of silty sediments with a prominent suppression of denitrification processes.

For our off-campus students, off-campus faculty, and on-campus students who cannot attend, this seminar can be viewed via live or watched at a later date via this link: Laibin Huang. In addition, all seminars are archived for viewing on our SWSD Seminar Page.