



Franco Montalto Travels to Italy for 2016 World Water Development Report and to Lead the UNESCO World Water Assessment Program

From June 8-16, 2016, Civil and Environmental Engineering Associate Professor **Franco Montalto, PhD, P.E.**, brought a group of 13 students to Venice, Italy as part of his “Sustainable Water Resource Engineering” class. The theme of this year’s class was *Water and Jobs*, the name also given to the *2016 World Water Development Report* produced by the *World Water Assessment Program (WWAP)*. Since it is estimated that three out of four global jobs are water dependent, new approaches to water management can help to foster new forms of sustainable development. The group explored this theme with a focus on historical and contemporary water management strategies in Venice, a city of water.



Dr. Montalto's students in Venice

After an introductory presentation by Dr. Angela Origara from WWAP, the trip began with a tour of the controversial “Venice MOSE Storm Surge Barrier Project,” followed immediately by technical presentations by some of its most vocal, local critics. The students then joined researchers from the University of Padua who are exploring strategies for engaging unemployed fishermen, refugees, and others in wetland restoration and river corridor restoration projects as part of the EU’s “LIFE Vimine Project.” The students collected water quality samples at the inlet and outlet of a tidal wetland in the Northern Venice lagoon in an effort to quantify its potential for improving water quality. Other excursions included a visit to *Lazzaretto Nuovo*, the city’s historical quarantine, to traditional fish farms in the Po Delta region, and to one of the region’s most historical flood control districts, *Il Consorzio di Bonifica Delta Po Adige*.

The project capstone was independent research conducted by the Drexel team on how various nature-based water management strategies could be incorporated into regional climate change adaptation planning in and around Venice. This work was presented to students and researchers at the IUAV University in Venice, an institution with which Drexel has an Erasmus + agreement to promote academic exchange on climate exchange.



From July 11-15, 2016, Dr. Montalto was a trainer at the UNESCO World Water Assessment Program (WWAP) headquarters in Colombella, Italy. This particular training, entitled “Capacity Development on Water and Sustainable Development,” was a follow up to the WWAP’s 2015 report *Water for a Sustainable World*, and was attended by 20 water professionals from 14 different African countries (pictured left). Dr. Montalto kicked off the program with a group role play exercise inspired by Garrett Hardin’s seminal 1968 *Science* article, *Tragedy of the Commons*. The goal of the exercise was to explore the challenges associated with implementing the UN’s recent sustainable development goals through a “fishing game.” Dr. Montalto also taught the portion of the training that focused on urban water planning and management.

Kurt Sjoblom receives NSF Grant

Civil Engineering Assistant Professor **Kurt Sjoblom, PhD** (pictured right), has been awarded an NSF grant entitled “Collaborative Research: Investigation of Thixotropy in Soft Clays.” The project aims to fill the knowledge gap in geotechnical engineering with respect to the fundamental mechanisms involved in the thixotropic behavior of clays. While these behaviors have been identified for many years, no particle scale evidence of the mechanisms that lead to thixotropic hardening have ever been provided. To achieve this goal, a congruent and comprehensive research program consisting of three primary thrusts is designed with synergistic collaboration among the three investigators from the University of Massachusetts - Amherst and Drexel University with complementary expertise in macroscale mechanical testing, microscale fabric imaging, quantitative characterization of particle orientations, and coarse-grained molecular dynamics (CGMD) simulations. Dr. Sjoblom will perform the CGMD simulations and fabric analyses using Drexel’s Proteus HPC facility.



Recent Books from the CAEE Department



Architectural Engineering Professor **Ahmed Hamid, PhD** (pictured left), in collaboration with Mohammad Bolhassani, recently released the e-book *Introduction to Design of Building Structures*. This e-book presents an introduction to structural design to architectural and civil engineering undergraduates. It covers the concepts of structural design, gravity, and lateral load calculations (according to ASCE 7) and load distribution. Introduction to design of reinforced concrete beams and columns (according to ACI 318), design of reinforced concrete masonry walls (according to TMS 402) and design of steel members (according to AISC) are also covered. Dr. Hamid’s e-book can be found on the Amazon Kindle and Barnes and Noble.

Department Promotions



As of September 1, 2016, **Jin Wen, PhD** (pictured right), was promoted to Professor of Architectural Engineering. Dr. Wen’s research focuses on building energy efficiency, intelligent building, net-zero building and indoor environment quality.



As of September 1, 2016, **Ivan Bartoli, Ph.D.** (pictured left), was promoted to Associate Professor of Civil Engineering. His research investigates nondestructive evaluation and structural health monitoring, dynamic identification, and stress wave propagation modeling.

James Lo receives two NSF awards in building modeling research

Architectural Engineering Assistant Professor **James Lo, PhD** (pictured right), recently received two awards from the National Science Foundation (NSF). The first award is from the NSF's Civil, Mechanical and Manufacturing Innovation Division (CMMI) titled "Living Building Information Model (BIM): A Layered Approach for Automatic and Continuous Built Environment Model Update" with co-PI, Professor **Ko Nishino, PhD**, from Drexel's Computer Science Department. This project will utilize advances in computer vision and machine learning to automatically survey and detect changes in construction sites and update the BIM database accordingly for accurate record keeping. This up-to-date building data model could then be used for planning and maintenance purposes throughout a building's life cycle.



The second award is from the NSF's Chemical, Bioengineering, Environmental, and Transport Systems Division titled "Variability of Wind Effects on Natural Ventilation and Pollutant Transport in Buildings" with co-PI, Architectural Engineering Associate Professor **Michael Waring, PhD**. This project will leverage high resolution historical NOAA weather data to statistically determine the wind effect on a given building or cluster of buildings, drastically improving the method in estimating wind-driven ventilation and infiltration rate. This new method can also incorporate natural ventilation designs in buildings by modeling a realistic ventilation scenario in these buildings, hence improving buildings' comfort and performance.

Pete DeCarlo's Research: Dirty, Clean and In-Between

Research in Environmental Engineering Assistant Professor **Peter DeCarlo, PhD's** group is focused on understanding the gases and particles in the atmosphere. Specifically, they are very interested in the chemical composition and size of tiny atmospheric particles called aerosols. Their work takes them all over the world to measure these aerosols, and attempt to understand the underlying sources of these particles (man-made or natural) and chemical processing that occurs in the atmosphere. DeCarlo's team has received funding from the National Science Foundation (NSF), the Electric Power Research Institute (EPRI), and other institutions on a variety of projects. Fundamental to all of this work is the ability to accurately measure aerosol particles and gases with high time resolution and chemical specificity. They use a variety of extremely sensitive instrumentation to measure particles and gases in the laboratory and field.

Dirty

Through a NSF grant, DeCarlo's team traveled to Nepal and Katmandu Valley to measure particles and gases in the valley and to understand the sources of these particles. This project is in collaboration with colleagues from the University of Montana, the University of Iowa, Emory University, and partners in Nepal. South Asia is a large source of soot particles containing black carbon to the global atmosphere.



DeCarlo's Group at the Zig Zag Kiln in Nepal (Photo credit: Doug Goetz)

While in Nepal, the project had two main tasks. The first was to characterize the emissions from various sources which are not well understood in comparison to sources in the U.S. and Europe. The second task was to take measurements of air quality in the valley with goals of identifying and quantifying the major emission sources that impact the air quality in the region. This information can be used to make policy decisions leading to emission reductions and air quality improvements.



Clean

On the other side of the spectrum is a NSF project aimed at understanding the natural aerosol in the relatively pristine environment of Antarctica. This grant is a collaborative project with Dr. Lars Kalnajs at the University of Colorado. In 2014, DeCarlo and two members of his group traveled to Antarctica to establish the first high time resolution measurements of aerosol size and composition using an aerosol mass spectrometer in the most southern of continents. The area is one of the cleanest on Earth and gave the group a chance to measure almost exclusively, natural particles and gases as the total darkness of polar winter transitioned to the Antarctic spring and summer. The measurements in Antarctica were the first measurements made with this degree of chemical detail and time resolution is key to understanding pristine environments and natural processes.

In-Between

Closer to home, DeCarlo's group has ongoing projects studying particles and gases in the Philadelphia and Pennsylvania regions. One project funded by the EPRI examined how hydraulic fracturing and natural gas development in the Marcellus Shale impacts the air quality and background pollutant concentrations in these regions of Pennsylvania. The group analyzed one second measurements taken while driving through those areas in the northeastern and southeastern parts of the state. They continue to make measurements in these regions as an effort to determine the impacts of natural gas production and transport to answer questions about air quality and climate impact from these activities.

Even closer to home, DeCarlo and co-PI, Architectural Engineering Associate Professor **Michael Waring, PhD**, have been examining the changes to aerosol particle composition as outdoor air is brought into the indoor environment through mechanical ventilation. This collaborative research is very important since we spend the majority of our time indoors from the outside environment. While being transported to the indoor environment, the outdoor air is conditioned (warmed in the winter, cooled in the summer), and this conditioning will modify the concentration of different particle components. In addition, this project has also identified several unexpected sources of indoor air pollution from the indoor environment.