Northeastern

Department of Civil and Environmental Engineering Distinguished Seminar Series

Quantification of pore water hydrodynamics in beaches: Impact of tide, waves, evaporation, and buoyancy

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The New Jersey Institute of Technology

Monday, October 16, 2017 12:00 pm-1:00pm
135 Shillman Hall

Abstract

Coastal aquifers are the locus of bio-geochemical transformations that regulate the chemical fluxes between the sea and inland aquifers. Our research group has quantified pore water hydrodynamics in coastal aquifers using both experimental and numerical approaches. We found that waves not only enhance the exchange between seawater and pore water, but also alter solute transport pathways; they could magnify the seaward horizontal transport of solutes. We developed a new approach for upscaling wave effects on pore water flow that accounts for the properties of the waves and beach. In addition, our recent investigation revealed that evaporation could result in porewater salinity in the intertidal zone that exceeds 100 g/L. Such a high salinity reveals a higher level of resilience on beaches than previously thought. Climate change scenarios revealed that increasing global temperature not only shifts the shoreline inland, but also alters the salinity zonation landward of the shoreline. Results from our investigation on the impact of Hurricane Sandy would be also presented.

Biographical Sketch

Dr. Michel Boufadel is Professor of Environmental Engineering and Director of the Center for Natural Resources Development and Protection at the New Jersey Institute of Technology. He is a Professional Engineer in Pennsylvania and New Jersey, and a Board Certified Environmental Engineer in the USA. He is also a Professional Hydrologist as accredited by the American Institute of Hydrology, and a Fellow of the American Society of Civil Engineers, and Diplomate of Water Resources Engineering. Dr. Boufadel served recently on four National Research Council (National Academies) committees and one Royal Society of Canada committee in relation to oil and the environment. He also served on the Environmental Protection Agency (EPA) Science Advisory Board on natural gas extraction from shale formations (2011-2012).

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NEW JERSEY INSTITUTE OF TECHNOLOGY

Education

- **PhD in Environmental Engineering, *UNIVERSITY OF CINCINNATI*, 1998**
- **MBA in Engineering Management, *UNIVERSITY OF CINCINNATI*, 1992**
- **B.S. in Civil Engineering, *JESUIT UNIVERSITY AT BERUIT*, 1988**

Research Interests

- **Offshore and onshore oil spills**
- **Fate and transport of pollutants in multimedia at multiscales**
- **Water flow and solute transport in coastal systems (open water and subsurfaces)**

Selected Service and Awards

- **Fellow, American Society of Civil Engineers**
- **ASCE AAWRE Diplomate of Water Resources Engineering**
- **Committee member, National Research Council(s) and the Royal Society of Canada**
- **EPA Science Advisory Board, natural gas extraction**