Vancouver Geotechnical Society
A Local Section of the Canadian Geotechnical Society

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NOTICE OF UPCOMING TECHNICAL PRESENTATION
Wednesday, 10 February 2021

TOPIC: **Bio-cementation Soil Improvement for the Mitigation of Earthquake-induced Soil Liquefaction**

SPEAKER: **Michael G. Gomez, PhD. – Assistant Professor, University of Washington, Seattle**
Mike Gomez is an Assistant Professor in the department of Civil and Environmental Engineering at the University of Washington. Mike joined UW in March 2017 after completing his Ph.D. at the University of California, Davis. His research focuses on leveraging natural chemical and biological processes in soils to develop sustainable bio-mediated geotechnical ground improvement technologies. In particular, Mike's research has focused on the strengthening of loose and weak granular soils through a bio-mediated calcite precipitation process known as Microbially Induced Calcite Precipitation (MICP). Mike's additional research interests include advanced laboratory and in-situ testing, naturally cemented and aged geomaterials, reactive transport modeling, clay surface chemistry, and non-destructive measurements for site characterization and subsurface reaction monitoring, among other topics.

CONTENT: Recent advances in bio-mediated soil improvement technologies have highlighted the potential of natural biological/chemical reactions in the soil subsurface to enable mitigation of infrastructure damage resulting from natural hazards such as earthquakes. Bio-mediated geotechnical solutions leverage the capabilities of microorganisms already existing in the geotechnical subsurface to generate a diverse range of "products", which can dramatically improve the engineering behavior of soils. One such technology, Microbially Induced Calcite Precipitation (MICP), is an environmentally conscious soil improvement technique that can improve the geotechnical properties of granular soils through the precipitation of calcite. The biogeochemical process offers an environmentally-conscious alternative to traditional brute-force mechanical and Portland cement based ground improvement methods, by utilizing natural microbial enzymatic activity to induce calcite precipitation on soil particle surfaces and at particle contacts. The resulting bio-cementation affords improvements in soil shear strength, initial shear stiffness, and liquefaction resistance, while reducing soil hydraulic conductivity and porosity. Although MICP has been demonstrated extensively at the laboratory scale, critical gaps remain in our understanding of this technology with respect to up-scaling the process to field-scale, understanding the engineering behavior of (bio-)cemented geomaterials, and evaluating material permanence. This presentation will provide a brief introduction to MICP and highlight results from several recent experiments completed at centimeter- and meter- scales aimed at: (1) developing the MICP process for field-scale deployment including techniques for the stimulation of indigenous microorganisms, management of ammonium by-products, and improvement of cementation spatial uniformity and extent, (2) characterizing the liquefaction resistance of bio-cemented geomaterials including triggering and post-triggering responses, and (3) systematically exploring the effect of treatment conditions and environmental factors on resulting material mineralogy and long-term permanence.

DETAILS: **Technical Presentation:** **5:30 pm – 6:30 pm**
Link: https://attendee.gotowebinar.com/register/830183368805328909