Announcing the Final Examination of Amirarsalan Rajabi for the degree of Master of Science

Time & Location: March 29, 2018 at 3:00 PM in ENG2 211P
Title: Sinkhole detection and quantification using LiDAR data

The state of Florida is highly prone to sinkhole incident and formation, mainly because of the soluble carbonate bedrock and its susceptibility to dissolution. Numerous sinkholes, particularly Central Florida, have occurred. Florida Subsidence Incident Reports (FSIR) contains verified sinkholes with Global Positioning System (GPS) information. In addition to existing detection methods such as subsurface exploration and geophysical methods, a remote sensing method can be a precise and efficient tool to detect and characterize sinkholes.

By using Light Detection and Ranging (LiDAR) data, the second chapter of this study aims to develop a method to detect sinkholes in Missouri. The GLM model is built in R software and uses morphometrical indices of the study terrain to be trained. In the third chapter of the study, a semi-automated model in ArcMap® was then developed to detect sinkholes and also to determine geometric characteristics of sinkholes (e.g. depth, length, circularity, area, and volume). This remote sensing technique has a potential to detect unreported sinkholes in rural and/or inaccessible areas.

Findings from this study include: 1) The LiDAR-based remote sensing technique can be a potential means to effectively and accurately detect sinkholes, 2) Morphometrical parameters such as TPI (Topographic Position Index), CI (Convergence Index), SI (Slope Index), and DEM (Digital Elevation Model) have a high potential to help detect sinkholes, based on local ground conditions and study area, 3) geometric characteristics of detected sinkholes can be easily quantified by ArGIS tool, 4) Although very effective in detecting and locating sinkholes, a GLM model based on morphometrical parameters is not an accurate means to quantify the geometric characteristics of sinkholes.

Major: Civil Engineering

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Committee in Charge:
BooHyun Nam, Chair, Civil Engineering
Dingbao Wang, Professor
Arvind Singh, Professor

Approved for distribution by BooHyun Nam, Committee Chair, on March 8, 2018.

The public is welcome to attend.