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Application of satellite remote sensing for a preliminary forensic investigation of landfill elevated internal temperatures

Rouzbeh Nazari
Rowan University, USA

Subsurface fires and smoldering events at landfills can present a serious health hazard and threat to the environment. These fires are much more expensive and difficult to extinguish than open fires at the landfill surface. Initiation of a subsurface fire may go unnoticed for a long time period. Undetected fires may spread over a large area. Unfortunately, not all landfills keep or publish heat elevation data and some do not have a gas extraction system to control subsurface temperatures. The timely and cost effective identification of subsurface fires is an important and pressing issue. In this work, we describe a method for using satellite thermal infrared imagery at moderate spatial resolution to identify the location of subsurface fires and monitor their migration within the landfill. The focus of the study is on the Bridgeton Sanitary Landfill in Bridgeton, MO where a subsurface fire was first identified in 2010 and is still extant. Observations from Landsat satellite for the last seventeen years were examined for surface temperature anomalies (or hot spots) that may be associated with subsurface fires. It is shown that the location of hot spots identified in satellite imagery matches the known location of subsurface fires. Changes in the hot spot location with time correspond to the subsurface fire spreading routes determined from *in situ* measurements. The results of the study demonstrate that the proposed approach based on satellite observations can be used as a tool for landfill subsurface fire identification and thus may be used by landfill owners/operators to monitor landfills and minimize expenses associated with extinguishing landfill fires.

Biography

Rouzbeh Nazari is an Assistant Professor of Civil and Environmental Engineering at Rowan University. His primary research interests are: application of remote sensing in water technologies and environment, resiliency and flood mitigation, impact assessment of climate change and extreme weather events on cities. He has worked with NASA, NOAA, consortium on climate risk in the Urban Northeast, New York and New Jersey resiliency planning issues with the focus of climate issues affecting the urban corridor encompassing the US Northeast. His work has been funded by Federal, state agencies as well as industry partners. He has published several book chapters, journal papers and has presented his work in national and international conferences.

Nazari@Rowan.ed

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