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Detection of Liquefaction Phenomenon from the 2015 Nuweiba Earthquake Using Remote Sensing Data

Hrik Chaudhury[1], Abhishek Kumar[1], Rishikesh Bharti[1]

[1]Department of Civil Engineering, IIT Guwahati, Guwahati, 781039, India

Abstract

Egypt is a country situated in the northeastern part of the African continent. It has great historical importance, making this country's economy depend on tourism. Egypt faced significant earthquakes throughout history. One of the major earthquakes occurred in 1995, with a magnitude of 7.8. It left its marks on Nuweiba city, located at the banks of the gulf of Aqaba, in the form of liquefaction. This disaster called for much economic loss in the country. Hence, it is essential to know that the area is still undergoing liquefaction. The estimation of liquefaction related damages is possible using conventional field investigation approaches. However, conducting field research is difficult due to several factors, including cost, tool limitations, and accessibility issues. In this study, an attempt is made to detect water content changes which is a manifestation of soil liquefaction, using the 2015 Nuweiba earthquake of moment magnitude 5.5 in the vicinity of the epicenter. Band ratios and a statistical technique have been used to analyse pre- and post-earthquake optical satellite imageries to identify changes in water content. The algorithm has shown a change throughout the area of the study. Moreover, all the techniques produce a similar pattern for the immediate vicinity of Nuweiba city, proving the need for detailed geotechnical discussion.

Keywords: Liquefaction, Nuweiba Earthquake, Remote Sensing