Remote Reconnaissance Mission to the 14th August 2021 Haiti Earthquake; remote sensing and building damage assessments

Michael Whitworth[1], Giorgia Giardina[2], Camilla Penney[3], Luigi Di Sarno[4], Keith Adams[5], Tracy Kijewski-Correa[6], Josh Macabuag[7], Fatemeh Foroughnia[2], Valentina Macchiarulo[2], Mobin Ojaghi[8], Alessandra Orfeo[9], Francesco Pugliese[4], Kökcan Dönmez[10], Jacob Black[11], and Yasemin d Aktas[12]

[1]AECOM
[2]Delft University of Technology
[3]University of Cambridge
[4]University of Liverpool
[5]Brunel University
[6]University of Notre Dame
[7]World Bank / Independent
[8]Independent Professional
[9]University of Strathclyde
[10]Boğaziçi University
[11]akt II
[12]University College London

Post-earthquake reconnaissance missions are critical to understand the event characteristics, identify building and infrastructure vulnerabilities, and improve future construction practice. However, in-field missions can present logistic and safety challenges that do not make them viable in every post-disaster scenario. Remote sensing technique can be used to rapidly collect a large amount information that can be used to enrich the post-event learning process. While the possibility to deploy teams in the field remain a valuable asset for an integrated understanding of technical and socio-economic factors, a mix of remote and in-field reconnaissance activities can be a way forward in post-disaster management.

This work presents the results of a hybrid mission mobilised by the Earthquake Engineering Field Investigation Team (EEFIT) after the 2021 Haiti earthquake. On 14 August 2021, a 7.2 magnitude earthquake struck the Tiburon Peninsula in the Caribbean nation of Haiti, approximately 150km east of the capital Port au Prince. The event was followed by numerous aftershocks up to magnitude 5.7, and tiggered over 1000 landslides. Over 2000 people lost their lives, with over 15,000 injured and over 137,000 houses damaged or destroyed. The estimated economic impact is of the order of US$1.6 billion. Due the complex political and security situation in Haiti, coupled with the global pandemic, a full in field mission was not considered feasible, so a hybrid mission was designed instead.

First, open-source information was collected and used to characterise the seismic event, analyse

the strong ground motion and compare to established national and international earthquake codes and standard. Second, remote sensing techniques including Interferometric Synthetic Aperture Radar (InSAR) and Optical/Multispectral imagery were used to understand the earthquake mechanism, the ground displacement distribution and the possibility to detect landslide on a regional scale. The general applicability of remote sensing technique in the context of post disaster assessment was also evaluated. Finally, the earthquake impact on different building typologies in Haiti was investigated through the damage assessment of over 2000 buildings comprising schools, hospitals, churches and housing. This was done in collaboration with the Structural Extreme Events Reconnaissance (StEER) team, who mobilised a team of local non-experts to rapidly record building damage.

This talk summarises the mission setup and findings, and discusses the benefits of and difficulties encountered during this hybrid reconnaissance.