Geophysical Research Abstracts
Vol. 18, EGU2016-14897, 2016
EGU General Assembly 2016

Quantifying Urban Texture in Nairobi, Kenya and its Implications for Understanding Natural Hazard Impact

Faith E. Taylor, Bruce D. Malamud, and James D. A. Millington

Environmental Dynamics Research Group, Department of Geography, King's College London, Strand, London, WC2R 2LS United Kingdom (faith.taylor@kcl.ac.uk)

The configuration of infrastructure networks such as roads, drainage and power lines can both affect and be affected by natural hazards such as earthquakes, intense rain, wildfires and extreme temperatures. In this paper, we present and compare two methods to quantify urban topology on approximate scales of 0.0005 km^2 to 10 km^2 and create classifications of different 'urban textures' that relate to risk of natural hazard impact in an area. The methods we use focus on applicability in urban developing country settings, where access to high resolution and high quality data may be difficult. We use the city of Nairobi, Kenya to trial these methods. Nairobi has a population >3 million, and is a mix of informal settlements, residential and commercial development. The city and its immediate surroundings are subject to a variety of natural hazards such as floods, landslides, fires, drought, hail, heavy wind and extreme temperatures; all of these hazards can occur singly, but also have the potential for one to trigger another, thus providing a 'cascade' of hazards, or for two of the hazards to occur spatially and temporally near each other and interact. We use two measures of urban texture: (i) Street block textures, (ii) Google Earth land cover textures. Street block textures builds on the methodology of Louf and Barthelemy (2014) and uses Open Street Map data to analyse the shape, size, complexity and pattern of individual blocks of land created by fully enclosed loops of the major and minor road network of Nairobi. We find >4000 of these blocks ranging in size from approximately 0.0005 km^2 to 10 km^2, with approximately 5 classifications of urban texture. Google Earth land cover texture is a visual classification of homogeneous parcels of land performed in Google Earth using high-resolution airborne imagery and a qualitative criteria for each land cover type. Using the Google Earth land cover texture method, we identify >40 'urban textures' based on visual characteristics such as colour, texture, shadow and setting and have created a clear criteria for classifying an area based on its visual characteristics. These two methods for classifying urban texture in Nairobi are compared in a GIS and in the field to investigate whether there is a link between the visual appearance of an area and its network topology. From these urban textures, we may start to identify areas where (a) urban texture types may indicate a relative propensity to certain hazards and their interactions and (b) urban texture types that may increase or decrease the impact of a hazard that occurs in that area.