DEVELOPMENT OF SEISMIC HAZARD ASSESSMENT FOR SUDAN

ABUBAKER MOHAMED AHMED OSMAN

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ABSTRACT

Sudan has a long history of earthquakes. It is known to seismologists as areas of low moderate seismic activity, because it is located within interpolates regions. These interpolate earthquakes can be found on nearly every continent; therefore Sudan is not free from earthquake activities. The seismic hazard for Sudan, following the deterministic approach is done in this report. The input for computations is represented by source catalogue. Seismic sources are parameterized using the knowledge about past seismicity and from United States Geological Survey (USGS). In this study there are two attenuation equations McGuire, 1976 and K. W. Campbell 2002, 2003 that are used to calculate the peak ground acceleration (PGA). The earthquake with maximum PGA is the maximum credible earthquake. The results shows that the minimum value of PGA is 0.000094 and locate in South-Western Sudan and the maximum value of PGA IS 0.0014 and locate in northern Sudan so large parts of Sudan lies within zone zero according to Uniform Building Code (UBC) where the PGA between 0.0 to 0.05g. Therefore the seismicity of Sudan is low to moderate. Finally, the map of deterministic seismic hazard is drawn using all pervious results.

ABSTRAK

Sudan mempunyai sejarah yang panjang gempa bumi. Ia dikenali sebagai seismologi kawasan aktiviti seismik sederhana rendah, kerana ia terletak di dalam interpolates wilayah. Ini gempa bumi menyisipkan boleh didapati di hampir setiap benua, oleh itu Sudan tidak bebas daripada aktiviti-aktiviti gempa bumi. Bahaya seismik bagi Sudan, berikutan pendekatan berketentuan dilakukan dalam laporan ini. Input untuk pengiraan diwakili oleh sumber katalog. Sumber Seismik adalah parameterized menggunakan pengetahuan mengenai seismik lalu dan daripada United States Geological Survey (USGS). Dalam kajian ini terdapat dua wartawan persamaan McGuire, 1976 dan KW Campbell 2002, 2003 yang digunakan untuk mengira pecutan bumi puncak (PGA). Gempa bumi dengan maksimum PGA adalah gempa bumi yang boleh dipercayai maksimum. Keputusan menunjukkan bahawa sebahagian besar Sudan terletak dalam zon sifar mengikut Kod Bangunan Seragam (UBC) jika PGA antara 0.0 hingga 0.05g. Oleh itu, seismik Sudan adalah rendah hingga sederhana. Akhirnya, peta bahaya seismik berketentuan diambil menggunakan semua keputusan yg dpt tembus.

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CHAPTER 1

INTRODUCTION

1.1 General Introduction

Earthquakes are broad-banded vibratory ground motions, resulting from a number of causes including tectonic ground motions, volcanism, landslides, rock burst, and man-made explosions. Of these, naturally occurring tectonic-related earthquakes are the largest and most important. These are caused by a fracture and sliding of rock along faults within the earth's crust. The study of strong earthquake ground motions and associated seismic hazard and risk plays an important role for the sustainable development of societies in earthquake prone areas. Using the hazard estimates, risk analysis yields probabilistic, estimates of the expected losses of property and lives from earthquakes hazard estimation and vulnerability of structures, facilities, and people distributed over the site.

This research aims to conduct a seismic hazard analysis that covers all of Sudan. The methodology adopted to achieve this was a deterministic approach

1.2 Problem statements

Sudan has a long history of earthquakes. It is known to seismologists as an area of low to moderate seismic activity because it is located within intraplate regions. These intraplate earthquakes can he found on nearly every continent, so Sudan is not free from earthquake activities. There are six major rift systems passing through Sudan. All these rifts are - considered to be potential for earthquake energy. However, recent medium to large earthquakes struck different portions of the Sudan, e.g., :the May 20, 1990 earthquake of magnitude 7.4 in southern Sudan (the largest earthquake in Africa), the August 1, 1993 and November 15, 1993, earthquake in Northern Kordofan State with magnitudes 5.5 and 4.3, and the earthquake that struck the population of Khartoum State in August, 1993.

1.3 Objectives of Study

The aim of this research is to obtain the maximum credible earthquake for the region in North Africa through the following objectives:

1 To identify seismic source zone
2 To derive seismic hazard assessment based on deterministic seismic hazard assessment approach (DSHA).
3 To draw the map of peak ground acceleration (PGA) for Sudan based on deterministic approach.

1.4 Scope of study

The scope of this study is summarized in:

1. identification and characterization of all sources
2. Selection of source-site distance parameter
3. Selection of “controlling earthquake”.
4. Definition of hazard using controlling earthquake.

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