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Earthquake registration databases

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The retrieval and storage of information from historical earthquake records are very important for the study of seismic activity and the prevention of the danger that earthquakes represent in areas with intense seismic activity. This is possible due to modern techniques and methods of processing, converting old data into digital data and storing them on online databases. This paper presents some important web-based database that provides tools for searching, selecting and downloading ground motion data.

Keywords*: earthquake signals, ground motion database, digitization*

1. Introduction

Earthquakes occur when is a relative shift along fractures in the crust of the Earth and consisting of vibrations on a large surface around the epicenter of the earthquake that is propagated in the form of waves through the rocks. The consequences of earthquakes are varied: damage and demolition of buildings, economic losses, thousands of people injured and even deaths. In Romania are some regions which present a high risk because of the seismic activity [1]-[3]. Over time, several solutions have been developed to reduce the effect of ground motion [4]-[6]. A popular solution is an insertion between the ground and the protected structure of devices based on elastomeric elements [7]-[10] for sliding bearings [11]-[14].

The historical view related to earthquakes is an important concern for seismic risk evaluation. The knowledge about the evolution of earthquakes over a long time period is very important and the original recordings of seismograms are kept in most observatories around the world. Due to the availability of historical earthquake records the earthquake databases can be expanded over the decades.

For our future research, we need digital signals from web-based databases that are showing different earthquake movements, which will be used as an input for dynamic simulation with SolidWorks software.

The aim of this paper is to present some important web-based databases that provide tools for searching, selecting and downloading ground motion data.

2. Online earthquake databases

2.1. PEER Ground Motion Database

The web-based PEER Ground Motion Database (Pacific Earthquake Engineering Research Center) contains many archives of seismograms and tools that allow the user to search, select and download ground motion data from historical earthquakes [15]. The web-based database is accessible on the website: https://ngawest2.berkeley.edu.

Figure 1. PEER Ground Motion Database Home Page

After we registered online at the PEER database, we were able to search and download the data that we needed (Figure 2).

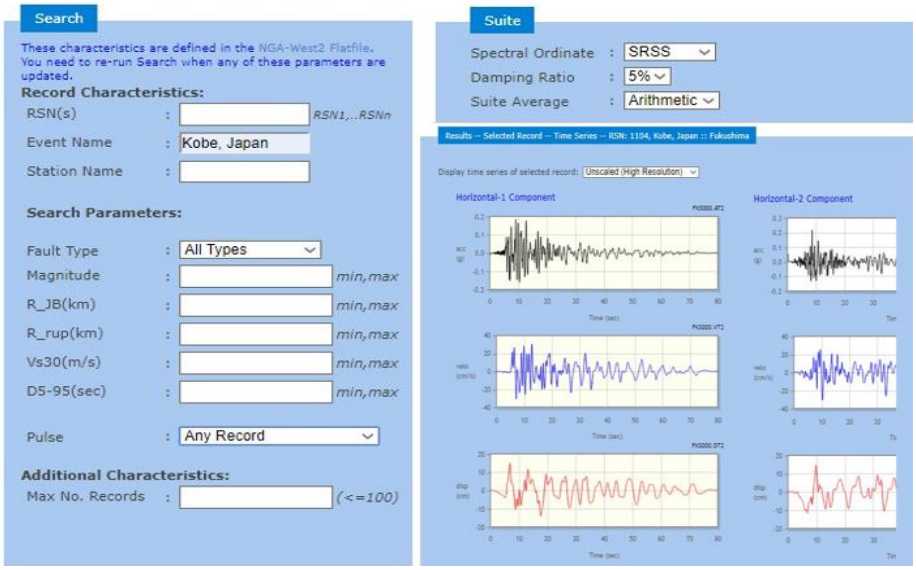

Figure 2. Kobe Earthquake, Japan,1994 (https://ngawest2.berkeley.edu.)

2.2. Center for Engineering Strong-Motion Data (CESMD)

The USGS (U.S. Geological Survey) and CGS (California Geological Survey) have developed the CESMD (Center for Engineering Strong Motion Data) as a unified database to provide earthquake strong-motion data for engineering applications [16]. The CESMD database is accessible on the website: https://www.strongmotioncenter.org.

Figure 3. CESMD Database Home Page

In the CSMD database, the earthquake records are searchable in many ways, depending on the user's interests. The search parameters can be a combination of earthquakes name, station, and record parameters.

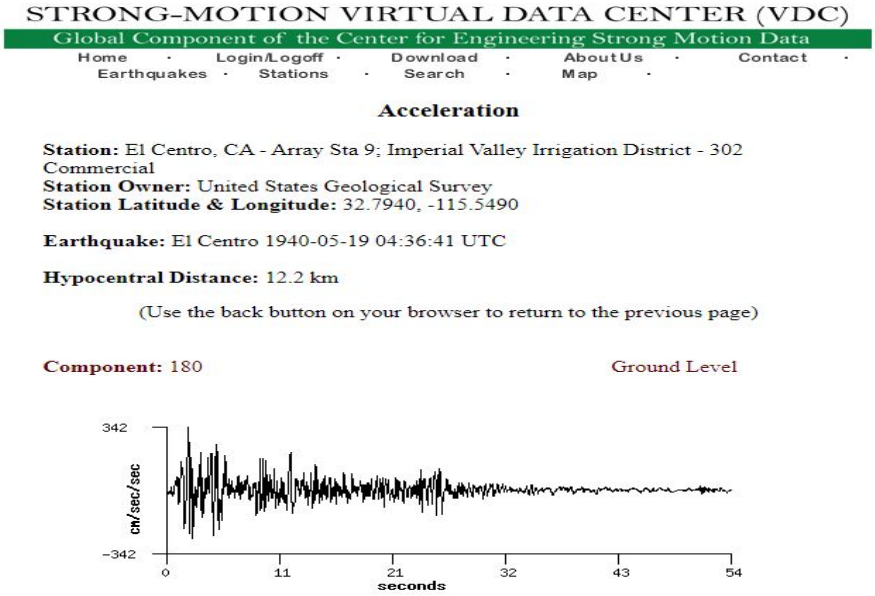

Figure 4. El Centro Earthquake,1940 (https://www.strongmotioncenter.org)

2.3. Strong-Motion Seismograph Networks K-NET and KiK-net

Kyoshin network (K-NET) and Kiban Kyoshin network (KiK-net) are two Japanese strong-motion seismograph databases, which consists of more than 1700 observation stations that uniformly cover the entire country. K-NET and KiK-net are operated by the NIED (National Research Institute for Earth Science and Disaster Resilience). The strong-motion data recorded by both networks are immediately transmitted to the NIED and the data is widely available to the public through the internet from this website: http://www.kyoshin.bosai.go.jp [17].

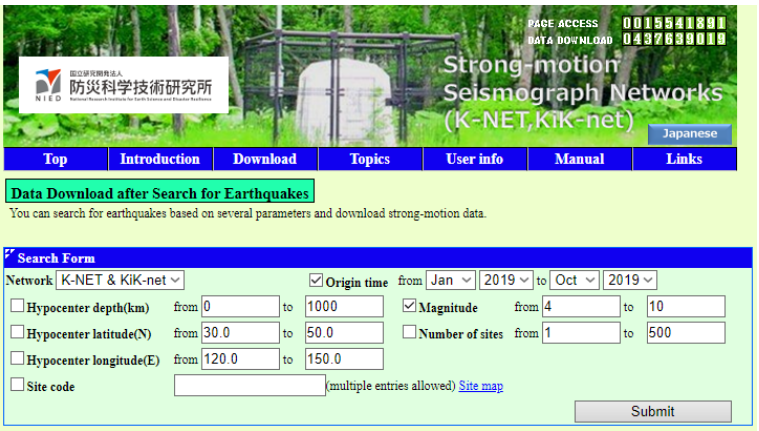

Figure 5. K-NET and KiK-net Database

In the K-NET and KiK-net database, the earthquake records are searchable based on several parameters (Figure 5) and allow the user's to download the strong-motion data (Figure 6).

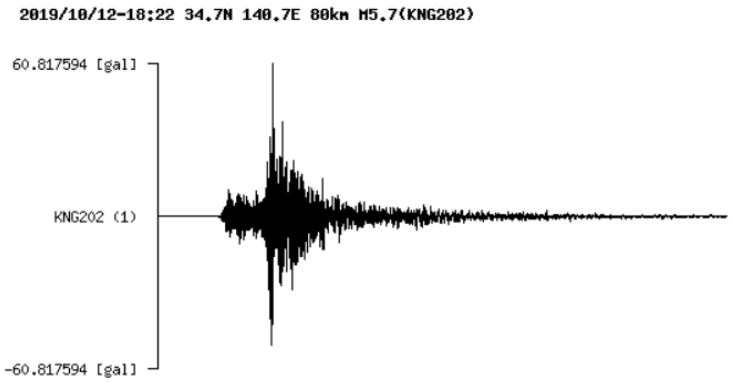

Figure 6. Strong-motion data, Japan, 2019 (http://www.kyoshin.bosai.go.jp)

3. Conclusion

The old earthquake recordings are very important from the scientific point of view. The paper presents some important web-based database that provides tools for searching, selecting and downloading ground motion data.

The earthquake databases presented in this paper will allow us to re-analyze the past and the present earthquakes and to use digital data as input for dynamic simulations, made for base-isolated structures, with the help of SolidWorks software.

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