2ND CONFERENCE OF THE ARABIAN JOURNAL OF GEOSCIENCES (CAJG)
25-28 NOVEMBER 2019, SOUSSE, TUNISIA

Springer
SPRINGER NATURE

Presented at UNESCO-IGCP-659 session

Towards an African Seismological Data Center

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Abstract. In recent years, Africa was hit by several severe earthquakes. Although the seismic monitoring in Africa has been evolving during the last decade, there has been no joint effort to collect, archive, and process the data, in order to publish earthquake bulletins at the continental or world level. Scientific projects (e.g., IGCP-601 -659) dedicated to the seismotectonics and seismic hazard assessment of Africa, allowed for the compilation of a database at the continental and regional levels. These research projects have exposed conspicuous aspects of the seismic activity, but also uncovered a severe deficiency of seismic and geophysical equipment and limited capacity throughout the continent.
The newly established African Seismological Commission (established in 2014; https://www.afsc-web.org.za/) has highlighted the importance of having an African Seismological Data Center (Meghraoui et al., 2018) in its first General assembly in Luxor-Egypt and second in Hoceima Morocco. Many scientific, logistic, and financial challenges face this goal. An experiment has been initiated to collect and process data from seismological stations with open access located within Africa, and to provide a platform for supplying a generic seismological bulletin using a SeisComp3 based system. The system is a real-time processing server at the Egyptian National Data Center. This system is currently under alpha testing utilizing internal auditing. The second stage will be in the first quarter of 2020 through beta testing after selecting a closed group to test the system efficiency and stability to be ready for the validation phase and then commissioning.

Keywords: Africa, Seismological Data Center, Earthquakes, AfSC.

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1 Introduction

Earthquakes are natural phonemea which can trigger severe disasters. Losses and causalities from earthquake have been increasing since the beginging of the 20th centurey due to to risk-blind development which has affected many

physical, social, economic, and environmental aspects which in turn increases the susceptibility to the impacts of hazards such as population growth, unplanned-urbanization, under-development/poverty, and climate change; these factors are called vulnerability. These cascading factors could result in increased frequency, complexity, and severity of disasters.

Global econmic statics (Fig. 1) for natural disasters show a trend for a decrease in the ecnomic losses in the last decade. This decrease may be related to the ongoing efforts of integrating and mainstreaming risk reduction into development policies and processes on the heels of the Sendai Framework for Disaster Risk Reduction and the previous Hyogo Framework for Action 2005-2015. Furthermore, the causalities rate are decreasing since the 1920's of 20th century.

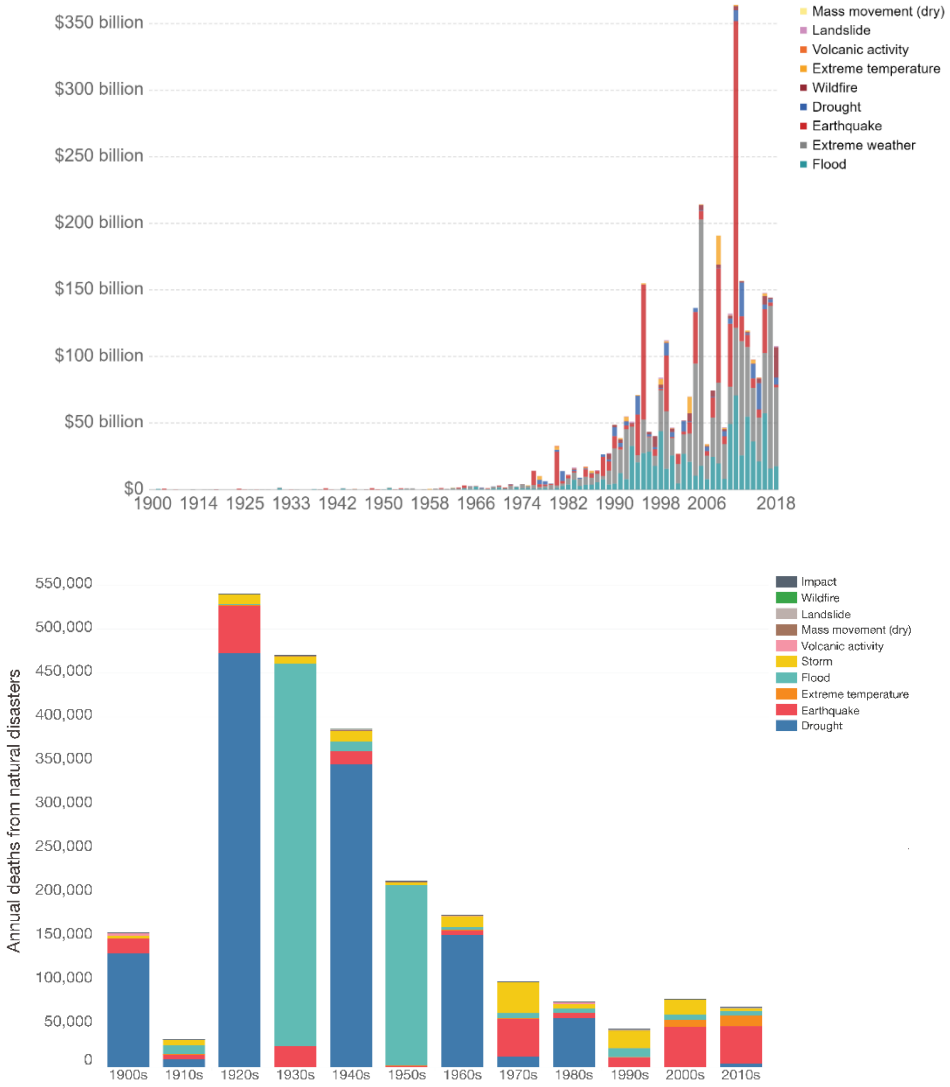

Figure 1 Economic damage by natural Disaster Type, EMDAT 2019.

2 Methodology

Although the casualties from Disasters triggered by Natural hazards globally decreased, African countries still claim the majority of deaths due to environmental causes (Figure 2). In recent years, Africa was vulnerable to several severe earthquakes. Although the seismic monitoring in Africa has been evolving during the last decade, there has been no joint effort to collect, process, and publish earthquake bul-

letins at the continental level. Scientific projects (e.g., IGCP-601 -659) dedicated to the seismotectonics and seismic hazard assessment of Africa, allowed for the compilation of a database at the continental and regional levels. The research projects have exposed conspicuous aspects of the seismic activity, but also uncovered a severe deficiency of seismic and geophysical equipment and limited human capacity throughout the continent.

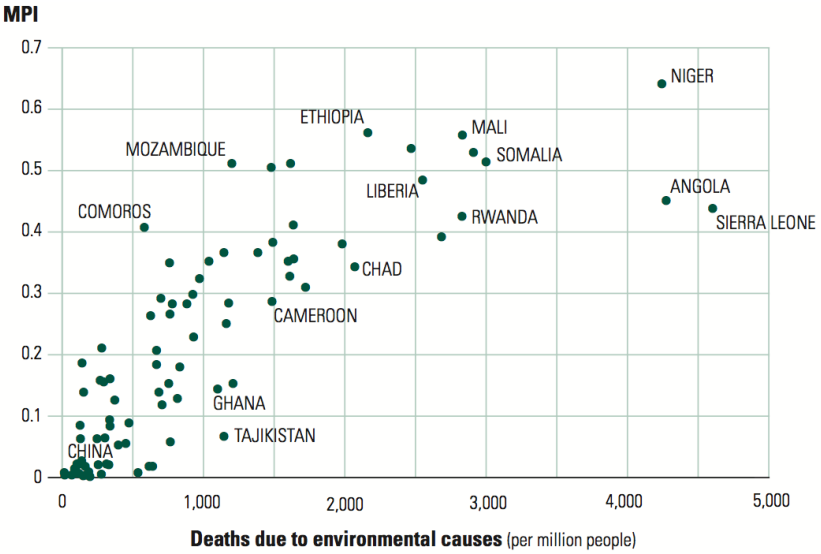

Figure 2 Correlation between multidimensional poverty (MPI) and deaths due to environmental causes (per million people) – Human Development Report (2011)

An experiment has been initiated to collect, process data from seismological stations with open access located within Africa, and to provide a platform for supplying a generic seismological bulletin using a SeisComp3 based system. The system is a real-time processing server at the Egyptian National Data Center. The data is received through seedlink from open access data servers of GFZ Geofone and IRIS (Figure 3). An automatic algorithms analyze the data and automatically detect arrival when several arrivals are coincide they are associated to declare an event. This system is currently under alpha testing utilizing internal auditing.

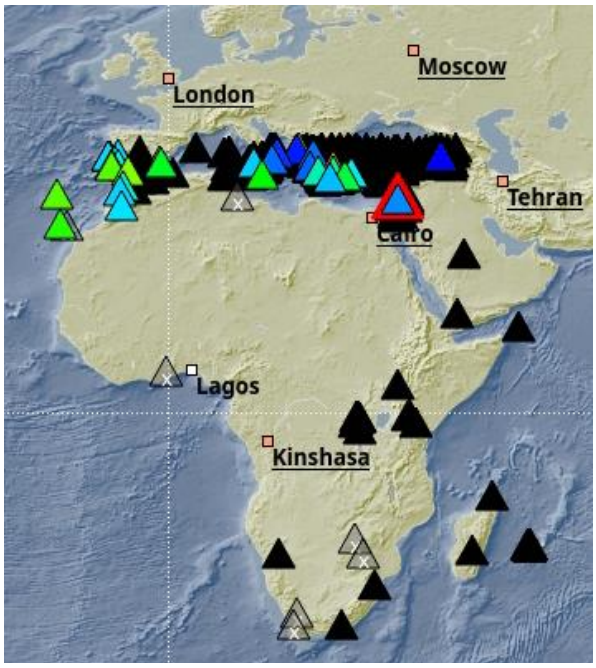

Figure 3 location map showing stations streaming online data to the prototype system

3 Discussion

Several stations were connected successfully to a data server in the Egyptian National Data Center with data flowing in real time. The system is working automatically to detect arrivals and associate events. The system is under testing. The second stage will be in the first quarter of 2020 through beta testing after selecting a closed group to test the system efficiency and stability to be ready for the validation phase and then commissioning.

References

EMDAT . (2019). Number of reported natural disasters. Retrieved from International Disaster Database, Université catholique de Louvain – Brussels – Belgium: http://www.emdat.be/

Global Platform for Disaster Risk Reduction, Mexico. (2017, May 22-26). Retrieved from unisdr: https://www.unisdr.org/conferences/2017/globalplatform/en.

Human Development Report (2011) – Sustainability and Equity - A Better Future for All. United Nations Development Programme (UNDP).

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Monitoring of the Sendai Framework. (2019). Retrieved from preventionweb: https://www.preventionweb.net/drr-framework/sendai-framework-monitor

UNISDR (2015). global assessment report. New York: (United Nations International Strategy for Disaster Reduction.