



The significance of National Data Centres established in West Africa

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Introduction

The Ghana National Data Centre (NDC) was established in 2010 with the support of the Preparatory Commission for the Comprehensive Nuclear Test-Ban Treaty Organisation (CTBTO). The main aim of the CTBTO is to monitor the testing of nuclear explosions. The Data Centre has technical expertise in the monitoring and verification technologies of the CTBTO and provides technical advice and support on issues pertaining to the verification of the Treaty. The centre uses the earthquake data it receives from the International Data Centre (IDC) and the International Monitoring System (IMS) to monitor the seismic activity in the country and its neighbouring West African countries.



A training session for NDC staff, Ghana

Students visit the NDC in Ghana

Earthquake occurrences in West Africa

The West African region has experienced some devastating earthquakes in historical times, this includes, the December 22, 1983, $M_w=6.3$, Guinea earthquake which killed 275 people, injured more than 1000, and left 18,000 people homeless (ICISU,2017), the June 22, 1939 earthquake $M=6.5$ that occurred in Ghana. 17 lives were lost and many structures were destroyed (Ambraseys and Adams,1986). Meanwhile, seismic hazard assessment in this region is very difficult due to the lack of monitoring equipment.

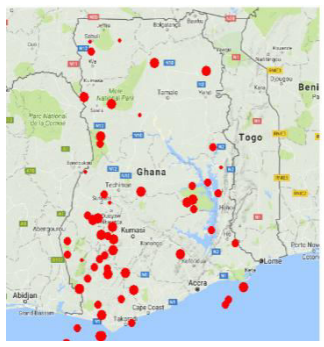


Fig.1 Map showing earthquake locations in Ghana

Cataloging of seismic data by the NDC in Ghana

In Ghana, the NDC on daily basis receives and catalogues seismic data from the IDC for its earthquake hazard studies. Some of the variables in the data it receives includes, azimuth, arrival time, and magnitude. The data is sorted and events which occurred in Africa are entered into an excel spread sheet. Three text colors are used to distinguish the various regions where the events occurred. Table 1 shows a sample of the earthquake catalogue prepared by the NDC in the first 6 days in April, 2016. From the catalogue, events of magnitude as low as 2.0 are recorded which depicts the efficiency of the systems installed by the CTBTO. Fig 1.shows a seismic events map of Ghana

Potential use of the seismicity map

- Safe building requirements for contractors in seismically active regions.
- Contribute to seismic hazard assessment in site evaluation for nuclear power plant installation .
- Public awareness of seismically active zones in the country .
- Public awareness of earthquake events and what to do before and after an earthquake .

Sample of Catalogue of Earthquakes in Africa from IMS Data (Table 1)

MM	DD	Hr	Min	Sec	Lat	Lon	H	Mb	Ml	Az	Location	Nearest Location
APR	1	0	50	2.52	22.9437	-8.253	0.0F	3.8	3.5	78	NORTHWEST AFRICA	Fdenik, Mauritania
APR	1	13	5	12.57	17.6861	5.5844	0.0F	3.8	3.4	127	NORTHWEST AFRICA	Tchirozine, Niger
											REPUBLIC OF SOUTH AFRICA	Kemherby, South Africa
APR	1	22	26	7.27	-28.9866	24.703	0.0F	4.3				133
											REPUBLIC OF SOUTH AFRICA	Benede, South Africa
APR	2	10	38	25.08	-27.859	21.4564	0.0F	4		19		
APR	2	11	55	11.71	4.1783	-3.6721	0.0F	3.8	3.1	111	NORTHWEST AFRICA	Near Coast of Cote D'Ivoire
											REPUBLIC OF SOUTH AFRICA	Trompsburg, South Africa
APR	2	13	39	29.16	-29.7705	26.2066	0.0F	4.6		60		
											REPUBLIC OF SOUTH AFRICA	Bloemfontein, South Africa
APR	2	16	26	49.83	-28.869	25.938	0.0F	4.2		120		
APR	2	17	17	48.87	20.1957	2.3751	0.0F	4		129		
											REPUBLIC OF SOUTH AFRICA	Tlissouine, Algeria
APR	2	17	53	51.91	-29.4048	25.5207	0.0F	4.5		77		
APR	3	8	43	55.11	16.54	24.1763	0.0F	3.8		141	SUDAN	Kutum, Sudan
APR	3	8	48	33.3	-2.4164	13.6564	0.0F	4.3		175	CONGO	Bambama, Congo
											REPUBLIC OF SOUTH AFRICA	Near Coast of Durban, South Africa
APR	3	12	4	2.55	-28.4925	32.7903	0.0F	3.9	2.2	80		
APR	3	12	34	45.45	-6.6166	35.4272	0.0F	3.4	3.6	97	TANZANIA	Dodoma, Tanzania
APR	3	15	11	54.07	-1.7927	38.4921	0.0F	5.3		40	KENYA	Kitui, Kenya
APR	3	23	24	17.51	6.9069	-5.4237	0.0F	4.2		36	NORTHWEST AFRICA	Yamoussoukro, Cote D'Ivoire
APR	4	11	4	9.9	29.6823	1.0054	0.0F	4		96	NORTHERN ALGERIA	Adrar, Algeria
											REPUBLIC OF SOUTH AFRICA	Groblersdal, South Africa
APR	4	13	26	51.94	-25.0126	29.8643	0.0F			137		
											MOZAMBIQUE CHANNEL	Near Coast of Angoche Island, Mozambique Channel
APR	4	14	3	51.84	-17.002	40.52	0.0F	4.4	4	69		
											REPUBLIC OF SOUTH AFRICA	Trompsburg, South Africa
APR	4	14	29	39.17	-29.6591	25.9692	0.0F	4		63		
APR	5	0	16	12.3	23.9171	-12.7232	0.0F	3.4		167	NORTHWEST AFRICA	Milek, Western Sahara, Morocco
											REPUBLIC OF SOUTH AFRICA	Fochville, Merarong City Local Municipality, South Africa
APR	5	16	28	7.2	-26.5153	27.4321	0.0F	4.3	2.2	145		
APR	5	22	16	58.21	0.062	37.8547	0.0F	4.4		98	KENYA	Metsi, Kenya
											NORTHWEST AFRICA	Wasa Amenfi West, Near Diaso, Ashanti Region, Ghana
APR	5	23	52	14.8	6.0067	-2.1648	0.0F		2.6	161		
APR	6	11	48	15.49	36.0321	9.3302	0.0F		4	146	TUNISIA	Siliana Sud, Tunisia

Conclusion

A continuous access and cataloging of earthquake data for seismic hazard assessment for the African region is laudable. The efficiency of the installed CTBTO systems make data from the IDC very reliable for civil and scientific applications. This makes it necessary for member states to access the data and products for environmental hazard assessment and other purposes.

References

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