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Teleseismic study of Ecuador earthquake using IMS Stations in Africa

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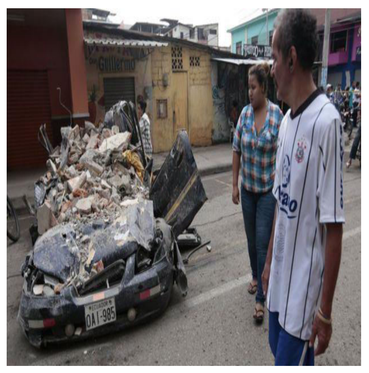
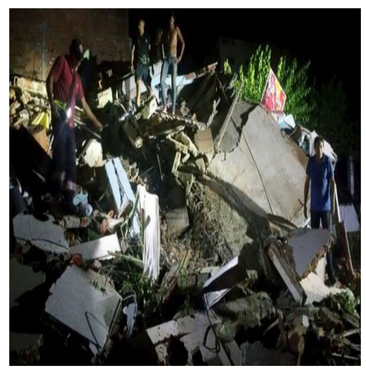
INTRODUCTION

The African region is covered by 17 (primary and auxiliary) IMS seismic stations and 8 infrasound stations. The ability of these stations to be deployed for scientific purposes was assessed using two earthquakes that occurred in Ecuador on 12 August, 2010 and 16 April, 2016. The data from these stations were used to locate both events. Some of the stations recorded data that were used to locate the two events while some did not. This study presents a performance analysis of these stations on the date of the events and an analysis of both events.

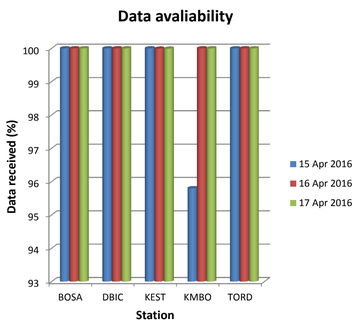
EVENT IMPACT

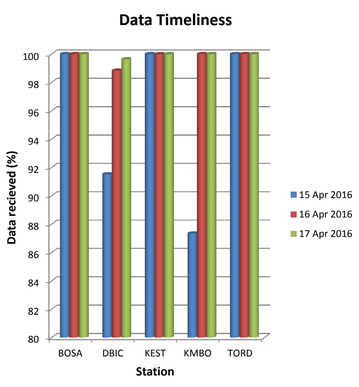




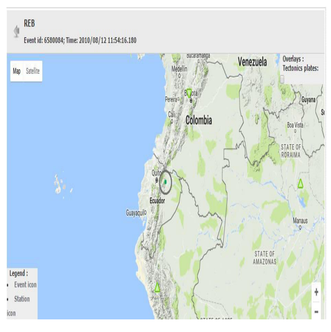
673 people were killed and more than 16,600 others were injured during the earthquake of 16 April, 2016.

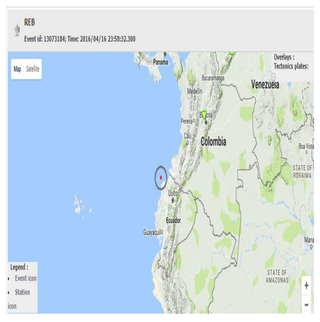
RESULTS AND DISCUSSION





The IDC REB indicated that both events occurred on both dates. The SHI data KPI data availability and timeliness also indicated no values on 12 August, 2010 but more than 98% and 99% respectively for data received percentage on 16 April, 2016 for the stations used in the study.





Station	Type	Distance	Time	Wave signal clarity
I17CI	Infrasound array	72.74	12:05:25	Good
DBIC	Primary 3-C	72.74	12:05:22	Very Good
MDT	Auxiliary 3-C	76.18	12:05:42	Very Good
TORD	Primary Array	79.59	12:06:00	Very Good
KEST	Auxiliary 3-C	89.98	12:06:42	Good
TSUM	Auxiliary 3-C	94.26	12:07:13	Good
BOSA	Primary 3-C	100.48	12:07:39	Good
LBTB	Auxiliary 3-C	101.21	12:07:44	Good

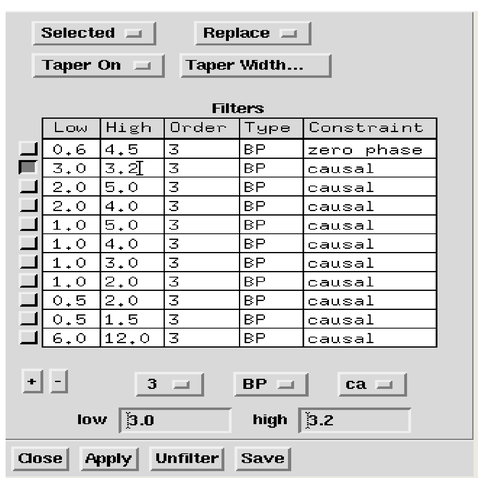
Stations for 12 August, 2010 event

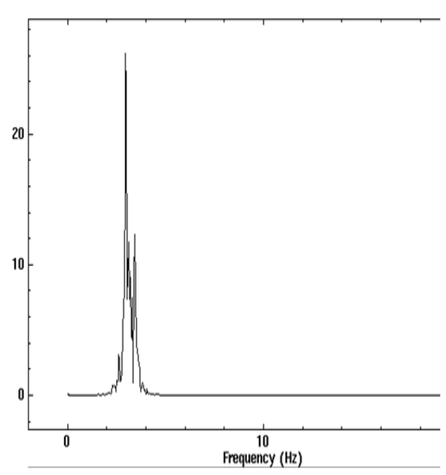
Seismic and infrasound stations within a distance of over 70 degrees but less than 120 degrees from the epicentre of the event were used for analysing both events for good location. Of the two events, I17CI was the only infrasound stations with clear signals on 12 August 2010 that could be used for analysis.

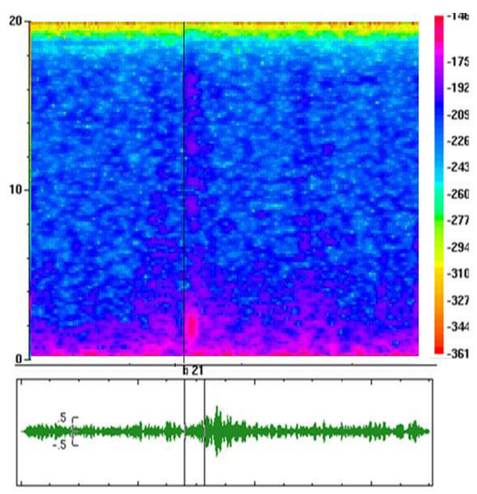
Station	Type	Distance	Time	Wave signal clarity
DBIC	Primary 3-C	75.23	00:10:16	Very Good
TORD	Primary Array	81.86	00:10:53	Very Good
KEST	Auxiliary 3-C	89.28	00:11:30	Good
BOSA	Primary 3-C	103.58	00:12:36	Good
KMBO	Primary 3-C	117.29	00:13:37	Good

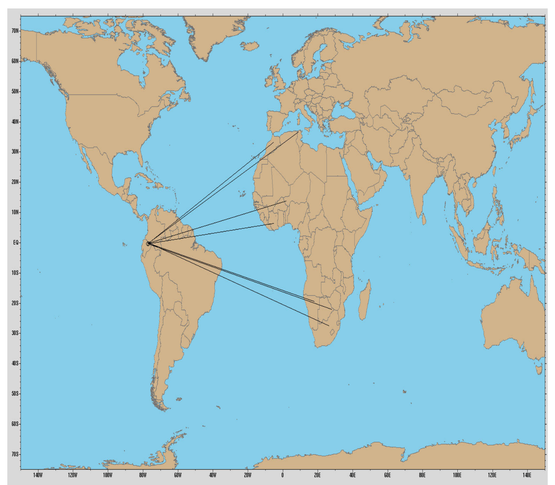
Stations for 16 April, 2016 event

The non availability of data from some of the seismic stations may be due to technical reasons or in compliance of Part I section 8 of the protocol to CTBT. While the non clarity of signals from the infrasound stations could be attributed the noise signal ratio and distance from the epicentre of the event.

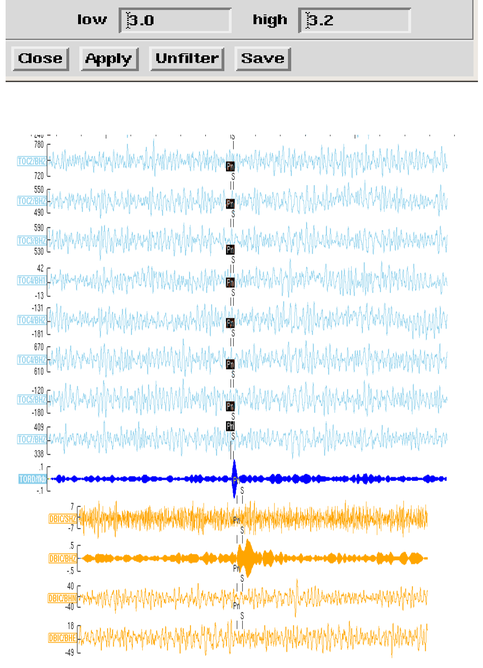




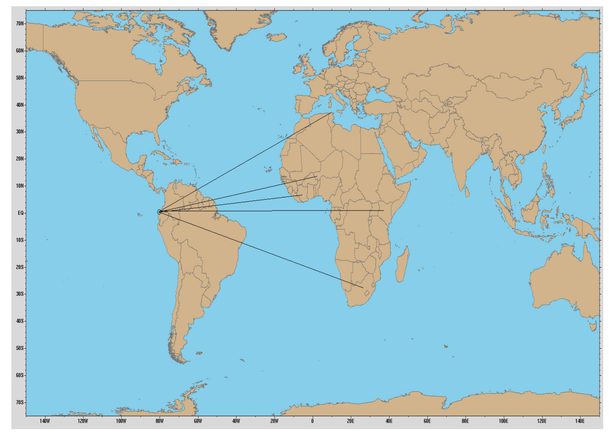




Location of 12 August, 2010 event



Geotool software was used to analyse waveforms from primary and auxiliary 3-Component and array stations for both events. The method used for data interpretation and location of events were cross-correlation technique, waveform analysis, spectrual analysis and cepstrual analysis.



Location of 16 April, 2016 event

CONCLUSION

The result from the study showed teleseismic stations could be used to locate the epicentre of the earthquakes. This study strengthens the concept of deploying CTBT verification technologies for civil and scientific purposes without losing its main objective of monitoring nuclear test by State Parties.