SnT 2021
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

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Towards building a ground motion data base to improve the seismic hazard assessment In Bolivia (Plurinational State of)

G.A. Fernandez[1], M. Nieto[1], W. Arce[1]

P1.2-053

POSTER

1.Fundación Privada de Files Observatorio San Calixto.

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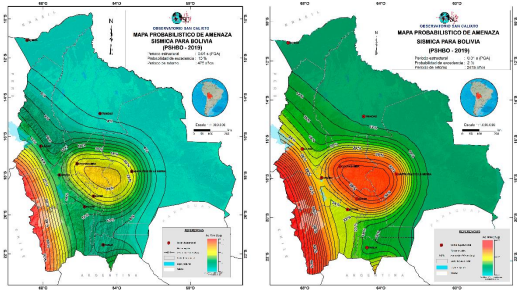
ABSTRACT.

Ground Motion Data Bases are today a key factor to enhance the hazards assessment for all countries. The need to update the existing Seismic Hazard Map for Bolivia is present and need to be fulfilled by analyzing different periods of instrumental data from large seismic sensor deployments, in this aim we present a basic but strategic procedure to build the ground motion database.

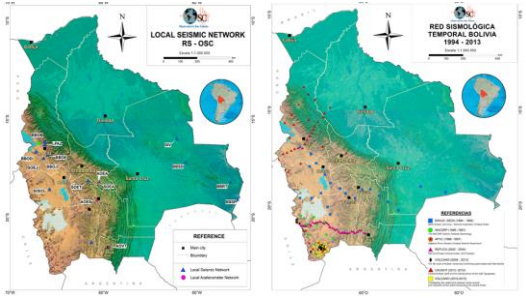
INTRODUCTION.

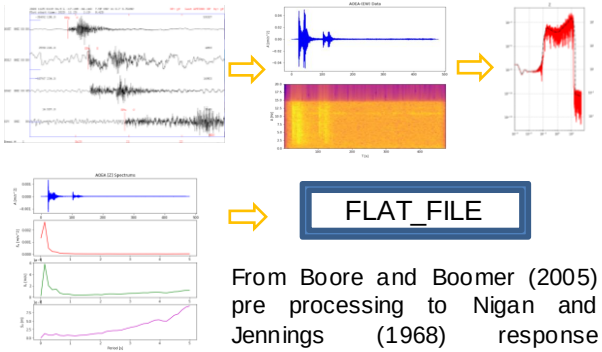
A Probabilistic Seismic Hazard Map was presented on 2019, today with data from different temporally and permanent seismic network we would like to improve the spectrum – response for the building national code.



METHODOLOGY AND RESULTS.

All data (waveform) is a “treasure” to start having real “Time-Series” to compute the response Spectrum





From Boore and Boomer (2005) pre processing to Nigan and Jennings (1968) response spectrum algorithm

DISCUSSION AND CONCLUSIONS

A flat file (a table where we set the hypocentral and strong motion parameters) is becoming to be populated by local earthquakes.

IMS data is valuable such as LPAZ – PS06 and SIV – AS08 because gives high quality waveforms that are needed to compute any spectrum.

Temporally seismic network also supported us to enlarge the database in periods where the appeared to be low.

Our new seismic network installed since 2016 also contributed a lot to know the seismicity.

Our flat file will the key instrument to support the civil engineering to enhance the new building code.

REFERENCES.

- Boore, D.M. and Bommer, J.J., 2005, Processing strong-motion accelerograms: Needs, options and consequences, *Soil Dyn. Earthquake Eng.* **25**, 93–115.
- Fernandez G, Nieto M, Griffiths T, Assumpcao M, Arce W. (2019). Probabilistic Seismic Hazard Map for Bolivia (PSHBO-2019)
- Navin C. Nigam, Paul C. Jennings (1968); Calculation of response spectra from strong-motion earthquake records. *Bulletin of the Seismological Society of America* 1968;; 59 (2): 909–922

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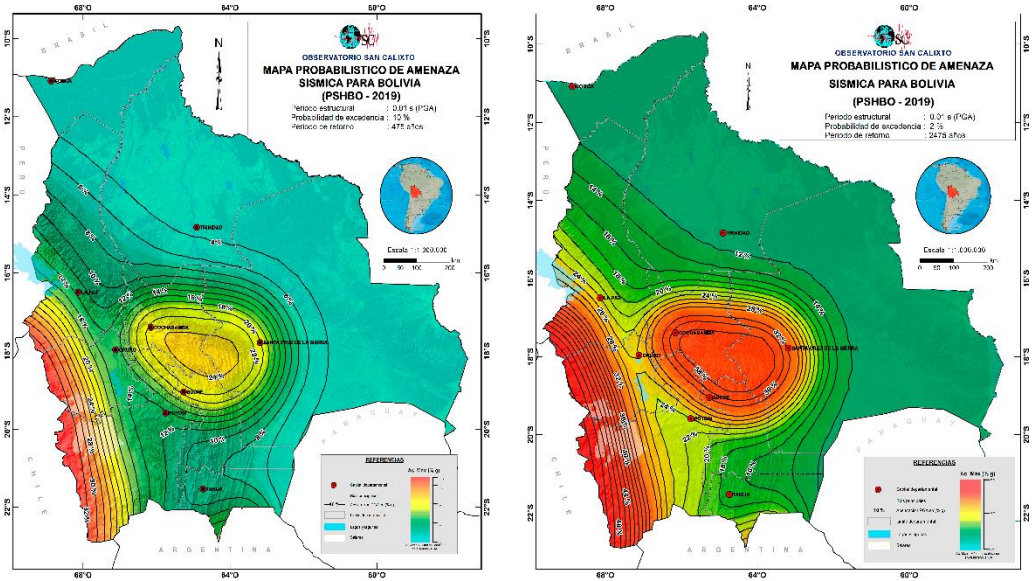
ABSTRACT

Now a days the seismic hazard assessment has become an essential procedure to characterize the seismic sources, to obtain the maximum probable ground acceleration and to collaborate with the society. There is a need to create and spread the knowledge of Ground Motion Databases with local data to enhance the Next Ground Motion Prediction Equations and Hazards / Risks maps.

Probabilistic Seismic Hazard Map for Bolivia (PSHBO-2019).



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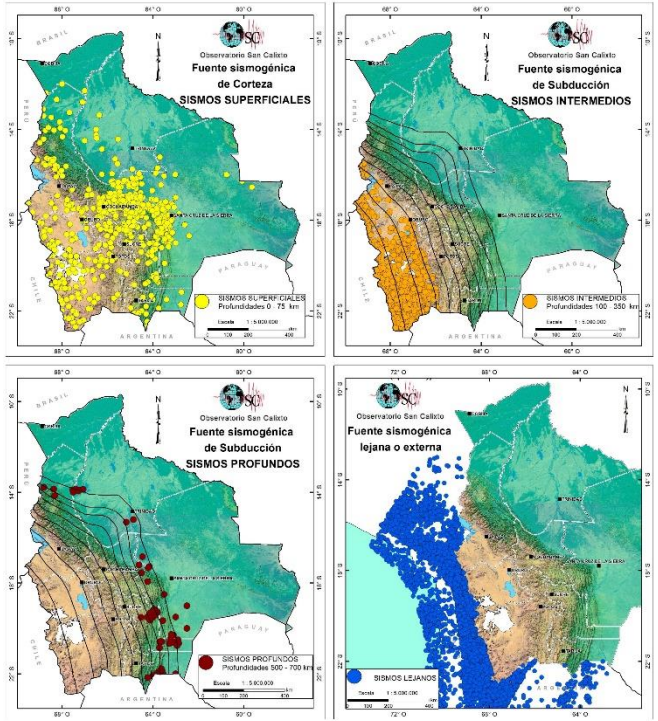

4 seismic sources (shallow, intermediate, deep and far away)

Moderate seismic activity in comparison to Chile and/or Peru

Nevertheless destructive earthquakes happened in our country.

Hazard

- There is the latest seismic hazard map, however only 20 earthquakes were analyzed to create the response spectrum

Instrumentation

- After 2016 we improved our seismic network and open shared data is available.

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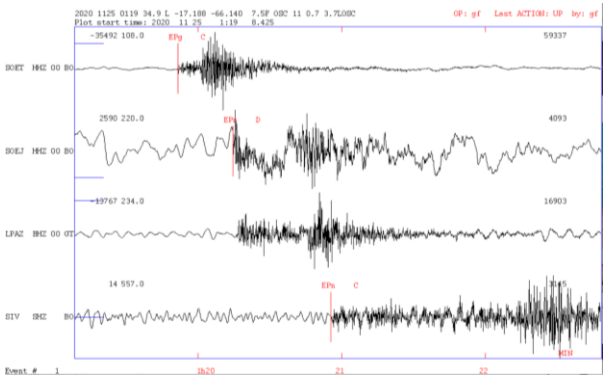
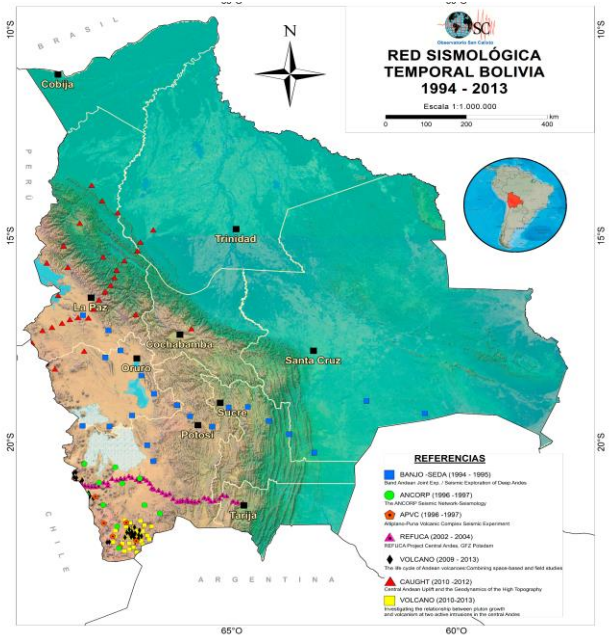


We take advantages of IMS national seismic stations, our new seismic network and temporally deployment broadband sensors.

New Seismic Network

Temporally Seismic Network



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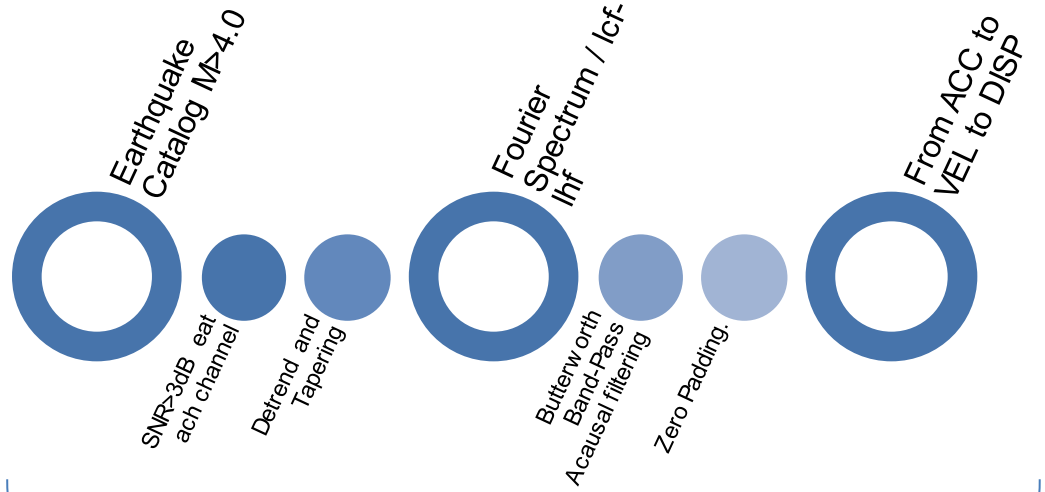
METHODS

Based on Paolucci et al. (2011)

And also with Boore and Boorman (2005)



Nigam and Jennings (1968) to compute the Acceleration Response Spectrum

To be published on our web page for each earthquake M>4.0 or felt by the citizens

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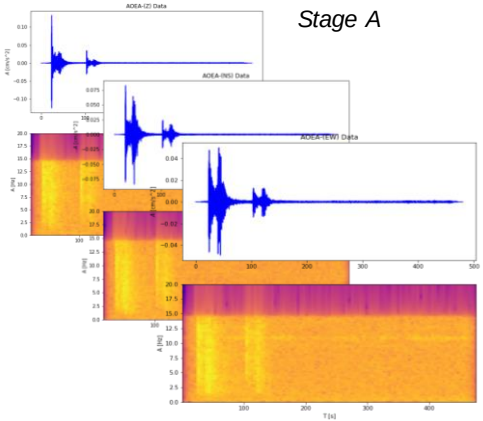
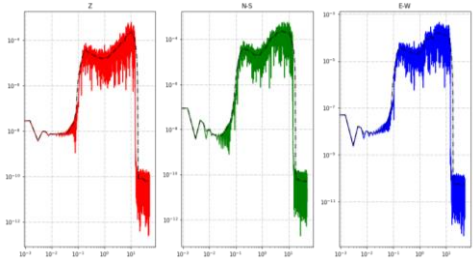
RESULTS

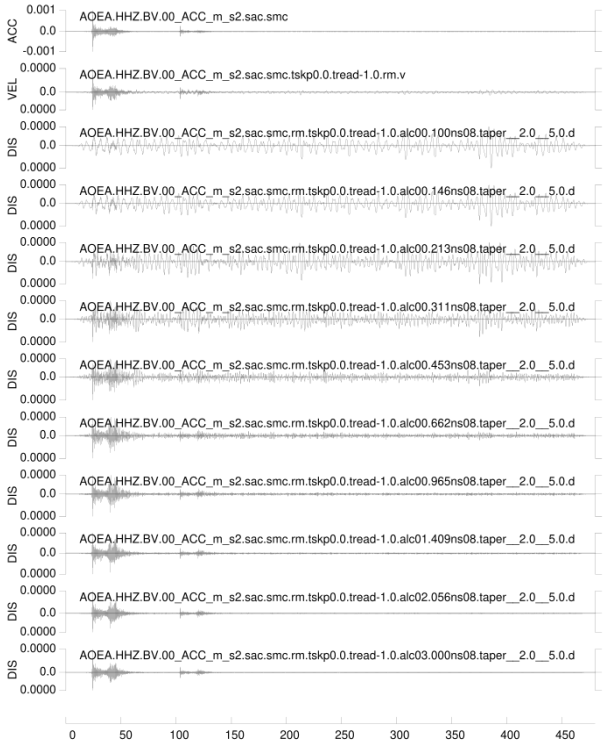
Stage A



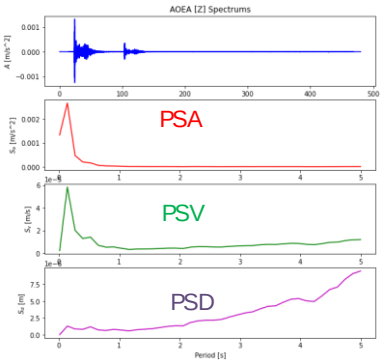
Stage B



Stage C



Stage D



Stage A: Read from the Catalog + remove mean and trend

Stage B: Compute the Fourier Spectrum to select the low and high cut frequency.

Stage C: Prove each low and high cut frequency over the waveforms.

Stage D: Compute the Psuedo Acceleration, Velocity and Displacement spectrums

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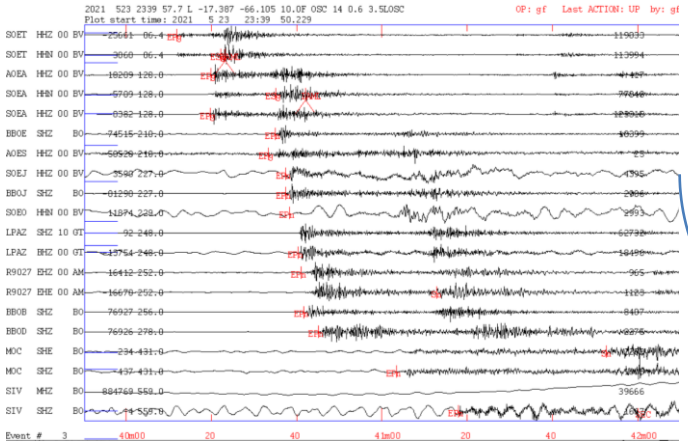
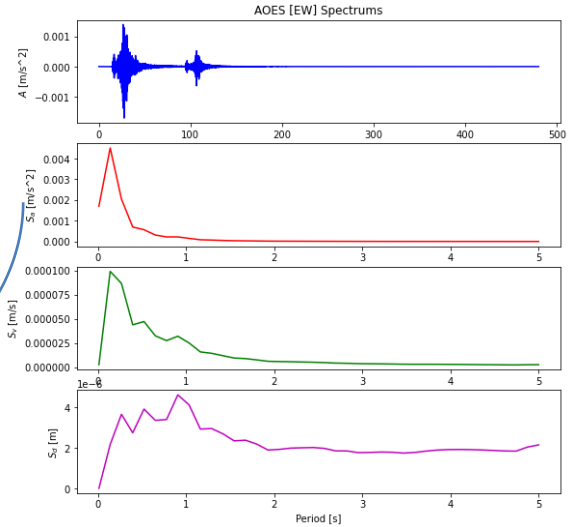
RESULTS

From the Local Bulletin reviewed manually we have the epicentral parameters and sometimes the fault plane solution



From the results showed before we have the PGA, PGV and PGD.



And finally as a result a proposed "flatfile" for each ground motion …

ID	Date	Latitude (°)	Longitude (°)	Depth (Km)	Ml	Mw	Strike (°)	Dip (°)	Rake (°)	Station Code	Epicentral Distance (km)	Horizontal PGA (m/s2)	Horizontal PGV (m/s)	Horizontal PGD (m/s2)	Freq_low_cut (Hz)
1	23-05-2020 11:36:17	-17.378	-66.105	10	3.3	3.2	---	---	---	AOES	127.38	0.004	0.0001	0.000004	0.662

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CONCLUSIONS

SMDB_OSC

There is a need to have our own Strong Motion Data Base.

We must reenforce the PSHBO-2019 map with real earthquakes spectrums

We are compiling information from earthquakes M>4.0 shallow seismic source as candidates to obtain PGA, PGV, PGD.

We must try to compile at least 80 earthquakes to calibrate the Ground Motion Prediction Equations for our region.