



Interactive comment on “The effect of confinement due to COVID-19 on seismic noise in Mexico” by Xyoli Pérez-Campos et al.

Xyoli Pérez-Campos et al.

xyoli@igeofisica.unam.mx

Received and published: 21 April 2021

Response to comments by Thomas Lecocq are in red. Comments from the pdf version of the manuscript have been added to the comments from the reviewer.

I reviewed your manuscript with interest. Please excuse me for the delay, finding reviewers was really difficult. The presentation of the results from the Mexican networks is interesting as it sheds light on the importance to take the difference of cultural/setting of cities, with links to the cities' development, organisation of the infrastructure, road system and shopping/work life.

Following this, the analysis on Figure 1 is particularly interesting, and this figure should

Printer-friendly version

Discussion paper

be reorganised to make the maps larger, with clearer (bigger) symbols. Panel c) is great, as it suggests that stations installed in locations with less than 10.000 inhabitants show no weekly cycles, i.e. effectively "away" from anthropogenic vibrations. Yes, some stations in that area do show weekly cycles, and a drop. It would be interesting to exemplify those in the results/discussion (maybe number them/label them) and try to explain the reason why they stand out (local roads, schools, industry?).

We have split Figure 1 in two. Now they correspond to Figure 1 and Figure 2. The only station with a clear weakly cycle but with less than 10,000 inhabitants is located at a university campus, therefore, it reflects the school activity. We have added the corresponding text in the manuscript.

Figure 3: the graphs should be made clearer (remove the X for scatter points, e.g.) and the colour described. This figure allows "believing" the noise level is anti correlated with traffic light colour, and this analysis should be complemented with example scatter plots of "RMS drop" vs "cases", coloured by the TL colour. An analysis of the time lag between the two series, or the lag between a TL change & the seismic response would be really interesting in supporting the authors' claims on the signature of TL on seismic data.

Now it corresponds to Figure 4. We have removed the X for the scatter points. Correlation is hard given many of the stations have incomplete RMS drop data. However, we indicate with triangles at the top of each panel where a two-week delay can be observed between an RMS increase and the number of cases increase.

Figure 4: are there enough events to conduct a completeness magnitude estimation before & during measures were enforced?

Now it corresponds to Figure 5. Figure 4 is based in the national catalog. The low magnitudes are reported in regions with a denser station distribution or where events have happened close to a station. Those are the cases for Mexico City and for the seismicity reported in Zacatecas, respectively. The observed low magnitudes during

confinement are for the latter case, for which there are not enough events to conduct a completeness magnitude estimation analysis as suggested.

Figure 5: please highlight in a) the position/timespan of the events presented in b)

Now it corresponds to Figure 5. The time for the events in b) has been highlighted in a).

Regarding the "Sentiste un sismo": could the author provide some details on what kind of reports were made by citizens? does it include small/weak motions, mentions of sound, etc?

We have added the following text: In the four events, obtained macroseismic intensities vary from II to V in the Mercalli Modified Intensity (MMI) scale, only for the 13 February 2017 earthquake, two values of VI in MMI were reported. The distribution of the macroseismic intensities values shows that during the 06 April 2020 earthquake, user reports were considerably more in central Mexico, located approximately 250 km from the epicenter, compared to other earthquakes that occurred previously to the COVID-19 lockdown. The ground-shaking experienced by citizens was mainly weak (values of II - III in MMI), however, the number of felts reports of intensity values of II and III were, respectively, approximately 2.5 and 2.9 times greater during the lockdown than for previous events. We conclude that the increase in the surveys received in "¿Sintió un Sismo?" is the result of the seismic noise reduction mainly in urban centers.

I agree with the other reviewer that your article should include a discussion of the changes in Mexico in the perspective of some other results published since last summer, including cases in cities, rural areas and increased detectability.

We have added some extra lines to include such a discussion.

I hope you will address those comments to make this "network"-wide contribution even more interesting for other network operators & countries.

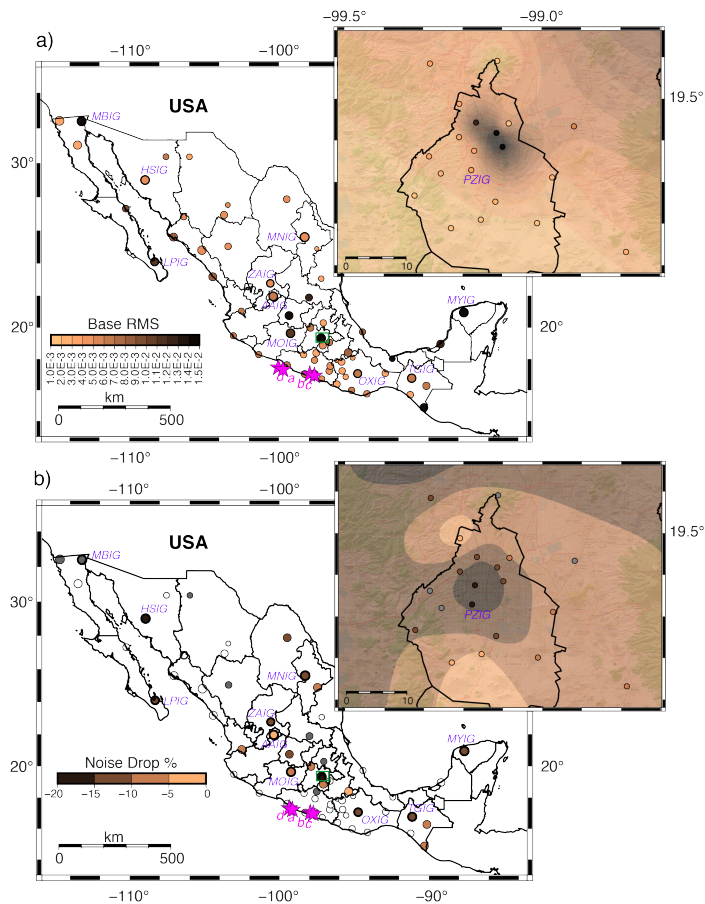


Fig. 1. Figure 1: a) Noise RMS level and b) drop at seismic stations in Mexico. The pink stars indicate the location of the (a) 2020, M5.0, (b) 2019, M4.9, (c) 2017, M4.9, and (d) 2016, M5.0 earthquakes. The

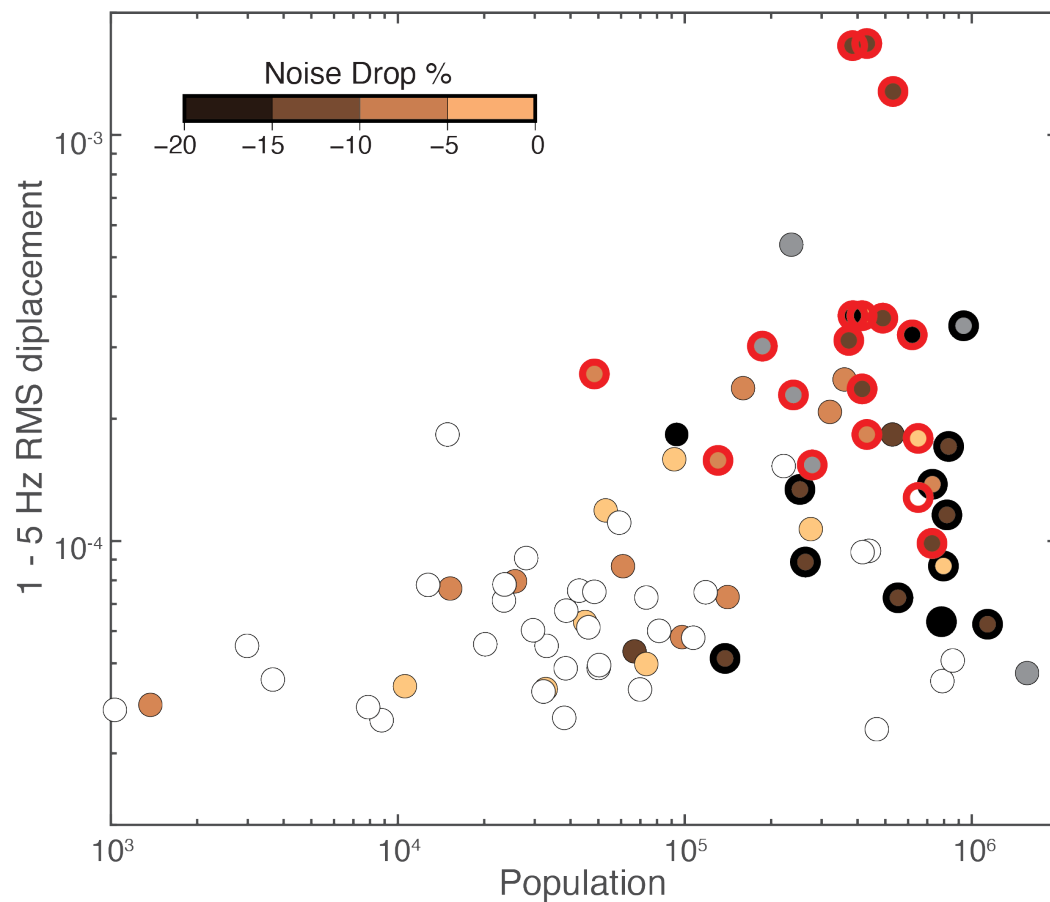


Fig. 2. Figure 2. Noise RMS level and drop with respect to population. The outline symbols denote stations located in capital cities; the ones in red are in Mexico City. The white circles correspond to statio

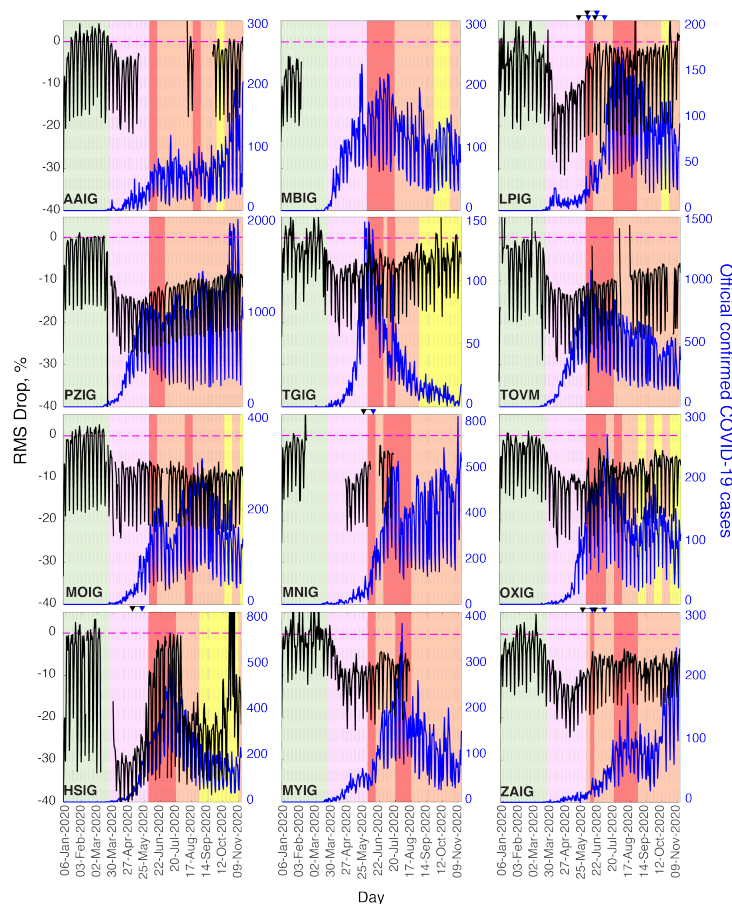


Fig. 3. Figure 4: RMS noise for frequencies 1 to 5 Hz (left axis, black lines) at stations located in capital cities. The right axis (blue line) indicates the number of official confirmed COVID-19 cases. Tria

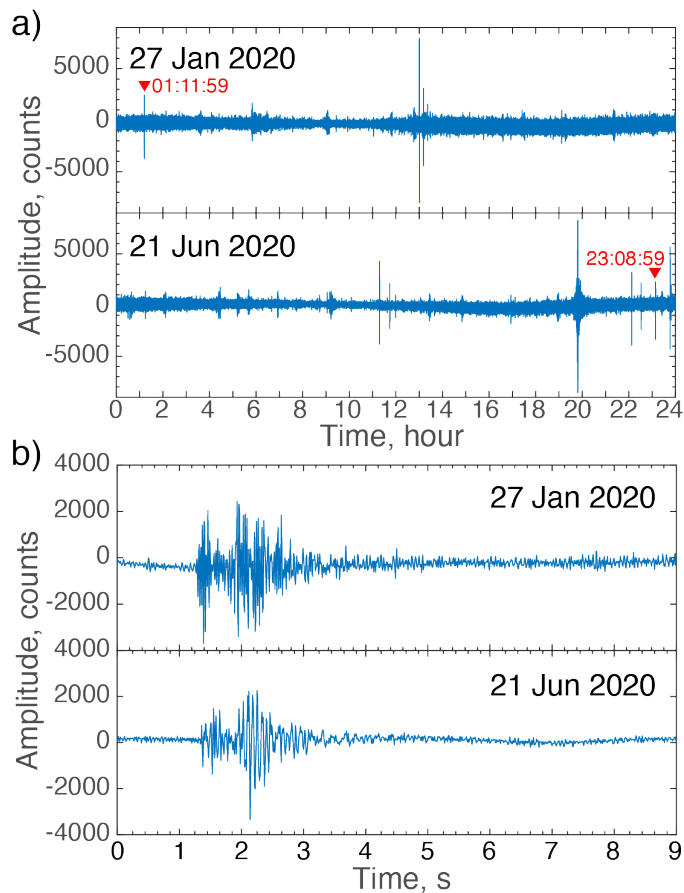


Fig. 4. Figure 6: Record comparison for a day with the usual (top panels, 2020-01-27) and a reduced (lower panel, 2020-06-21) seismic noise at station ZAIG. a) 24-hour record. b) Event window. Both events are