

# ***Interactive comment on “Seismic noise variability as an indicator of urban mobility during COVID-19 pandemic in Santiago Metropolitan Region, Chile” by Javier Ojeda and Sergio Ruiz***

## **Anonymous Referee #1**

Received and published: 15 January 2021

### Summary

This paper looks at the links between seismic ambient noise (ASN) recorded in Chile and the implementation and reduction of mobility restrictions imposed due to the Covid-19 pandemic. The work looks at both temporal variations and differences within Chile. An interesting link between the ASN and the “R” value is suggested; it will be interesting to understand how this association may be manifested in other countries with different working/commuting patterns. The strength of this link may be over-stated in this pre-print, but it is worth pursuing, as the authors point out. I raise only queries and technical points for the authors to address, and look forward to them making the needed minor

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adjustments.

Queries raised

You link ASN and Re. For the readers who are unused to looking at Re, could you indicate whether the Re timeseries you plot are thought to be a lagging indicator (ie does the value calculated refer to infection on a particular date, or does it refer to detection on a particular date and therefore lag when infection actually took place.)

Following on from the previous point: a little more description of the Re calculations would be helpful. For example, does the Re cover all of the MR, or a district of the MR containing seismic station MT14. This kind of information would be useful to consider in the context of the limited reach of ASN noted in line (line 46) and the mention of small-area lockdown in line 230.

You plot changes in ASN and mobility in figure A4. What are these changes relative to? (ie what is 100%?).

Figure 4 shows the MT18 data. Why does it end in August when you have data up to October?

Lines 108-112 are results, not methods. Consider moving them to the appropriate section.

Was lockdown 2 ever lifted? What are phases 2 and 3? it might be good to have a brief paragraph explaining these (somewhere before the results section would seem to be appropriate). Some of this material is already present in lines 176-184.

You report a “strong correlation” (line 167) between Re and ASN at station MT14. Correlation is often used in a mathematical sense. Do you have a mathematical relationship in mind here, or are you looking more at matching patterns?

The link between Re and ASN is stronger before ‘phase 2’ than after it. Is there any reason for this? Might there be some ASN generating activities which are not linked to

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changes in  $Re$ ? (I am not an epidemiologist, and this is not an epidemiological paper, but at least acknowledging that the relationship between  $Re$  and ASN changes seems to be appropriate).

The paper already mentioned other work in other countries, but I would appreciate a brief paragraph which let me know if the links between ASN and other observables are comparable to, or stronger or weaker than, other metropolitan areas. Does the MR look like Barcelona or Mexico City or Rio de Janeiro or Auckland (this may be beyond the scope of the paper and in that case the authors should feel free to ignore this comment).

#### Technical corrections

Many of these are linguistic suggestions, and the authors may choose to ignore the suggestions – they're not required changes.

\* The first sentence (line 34-35) would benefit from a reference from the scientific policy literature.

\* Line 40 –  $km^2 \rightarrow km^2$

\* Line 46 – anthropic  $\rightarrow$  anthropogenic (we're making the noise).

\* Line 92 – to better understand the effects of the chosen corner frequency?

\* Lines 108-110 – be clearer about the time windows over which the 'gradual' reduction happens, and when the changes cease.

\* Line 112 – the noise doesn't go back after lockdown 1 lifts – can you comment on this?

\* Line 124 – "Related to mobility data, we analysed"  $\rightarrow$  "the mobility data we analysed is"

\* Line 125 – What actually is

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- \* Line 128 – could you explain what a mobility card is?
  - \* Line 158 – do you know if the local activity is more likely to be anthropogenic or seismogenic, or is it hard to tell from the data available?
  - \*Line 167 – different to what? (a range of different responses?)
  - \* Line 194 – might benefit from a reference to oceanic seismic noise for the interested reader?
  - \* Line 280 – which network code is appropriate? And is there a doi for the seismic network which could be cited here (this will help the network operators if they are looking to see which papers use their data).
  - \* Line 322 – is there a volume + page range for Caicedo-Ochoa et al?
  - \* Line 331 – doi or link missing for Cuadrado et al
  - \* Line 367 – add the rest of the author list? Not sure what SE editorial policy is.
  - \* Line 415 – square → squares
  - \* Line 428 – you have an otherwise un-defined term in the key (H\*Z). I assume it's because you've got two different components used at this location, but it's not explained anywhere. Consider relabelling/explaining.
  - \* Line 435 – the icons for the school closures, and lockdowns 1 & 2 are really hard to distinguish between. Maybe color more of the icons? Also, is the after-lockdown 1 clock plot (b) for this whole time window, or just until the end of lockdown 1? Please clarify.
  - \* Line 446 – not sure what ratio means here?
- Lines 76, 78 + others + 471 – localized (or localised) → located
- \* Line 24-25 – “Finally, we suggest to consider monitoring in real time the changes in ASN amplitudes to be included in the public policies” think about changing to something like “Finally, we suggest that real-time monitoring of changes in ASN amplitudes should

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be considered as part of public health monitoring”.

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Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-200>, 2020.

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