



Evaluation of the L_{Aeq} levels during the COVID-19 lockdown period using static wireless acoustic sensor levels in the city of Girona

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Sons al balcó: Soundscape map of the Confinement in Catalonia



- This evaluation of the Laeq levels in the city of Girona has been conducted in the framework of ‘Sons al Balcó’ project.
- GTM – La Salle and ISGlobal Joint Research Project.
- **Technical Goals:**
 - Draw the soundscape map of the Confinement in Catalonia, by means of
 - Collecting objective data (short videos) and subjective data (questionnaires).
- **Social impact of the project:** dynamic collaboration with citizens and other stakeholders to
 - create social and environmental impact, and
 - to widen awareness and design tools to improve citizenship development and empowerment, in order to
 - support several Sustainable Development Goals from the UN.

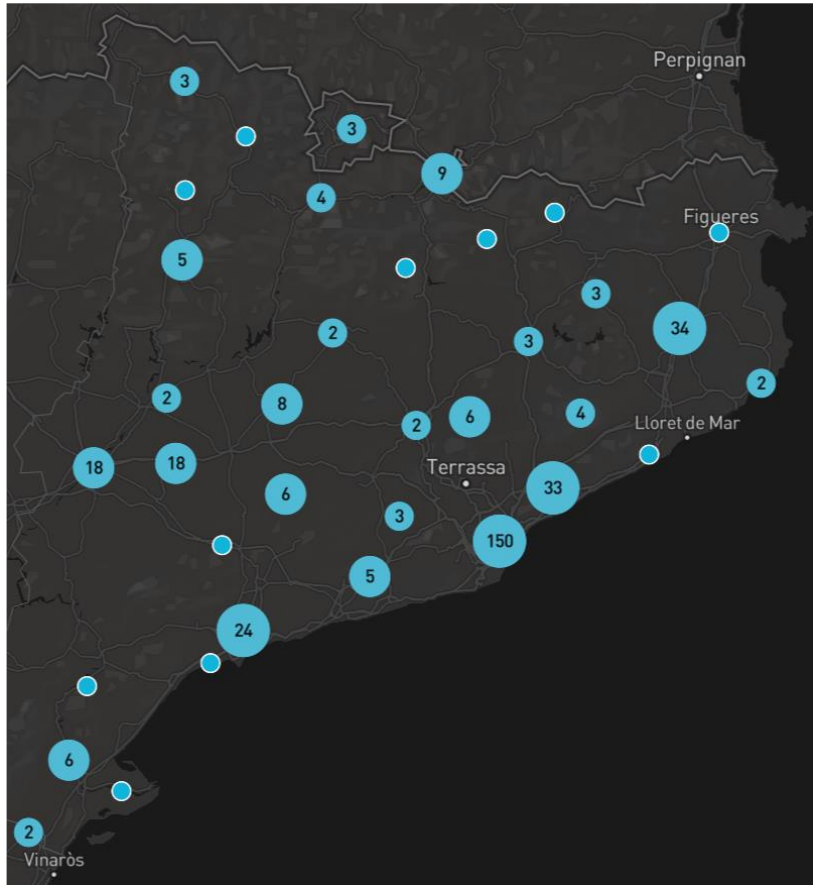
Sons al balcó: Soundscape map of the Confinement in Catalonia



- We designed a socio-acoustic survey implemented in LimeSurvey and distributed using social media (Twitter, LinkedIn)
 - It included socio-demographics, quality of residential soundscape and the individual perception.
 - Participants could upload short videos of their soundscapes at home and characterize several types of sounds.



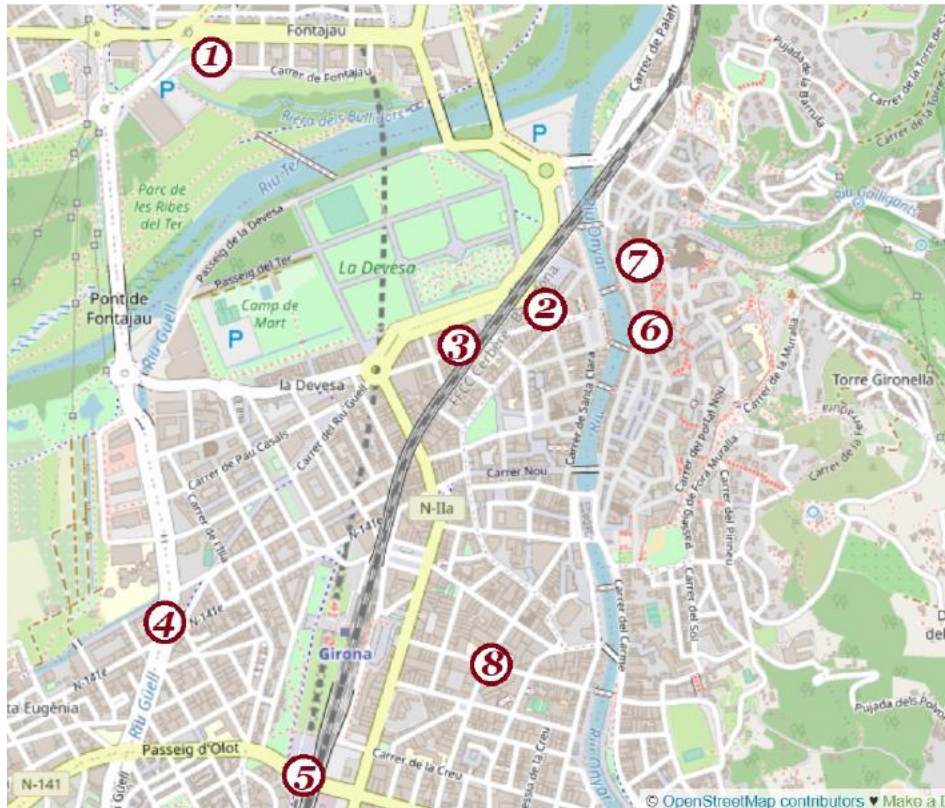
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- At the end of the first campaign:
 - **366** short videos and questionnaires
- **Homogeneous distribution of data** in the Catalan territory
- Samples collected in both urban and rural environments.

	<500	501-2000	2001-5000	5001-10000	10001-50000	>50000	Total
Number of locations	17	21	18	24	34	18	132
Number of recorded videos	20	26	26	34	61	198	365

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- Girona – 100.000 inhabitants
- 8 acoustic sensors distributed in the city:
 1. Xavier Cugat
 2. Ramon Folch
 3. Figuerola
 4. Güell
 5. Passeig d'Olot
 6. Pujada de Sant Feliu
 7. Plaça de Sant Feliu
 8. Joan Maragall

Evaluation of the L_{Aeq} levels during the COVID-19 lockdown



- The lockdown análisis has been divided into 6 stages:
 - Stage 1: 12/03/2020-13/03/2020 - School suspended and telework suggested.
 - Stage 2: 14/03/2020-28/03/2020 - School, non-essential shops and any events closed, no walking outdoors, telework unless justified.
 - Stage 3: 29/03/2020-12/04/2020 - School, non-essential shops and any events closed, no walking outdoors, telework unless justified. Non essential movement banned.
 - Stage 4 (similar to Stage 2): 13/04/2020-26/04/2020 - School, non-essential shops and any events closed, no walking outdoors, telework unless justified.
 - Stage 5: 27/04/2020-24/05/2020 - School and any events closed, telework unless justified. Walks allowed (major restrictions).
 - Stage 6: 25/05/2020-07/06/2020 - School and any events closed, telework unless justified. Walks allowed (minor restrictions).

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- Values of sensor #2 Ramon Folch from Jan-Jun 2020
- Values of $L_{Aeq,60min}$ and L_{den} decrease substantially during the confinement (all the stages)
- There is a clear difference between the values during the week and during the weekend.

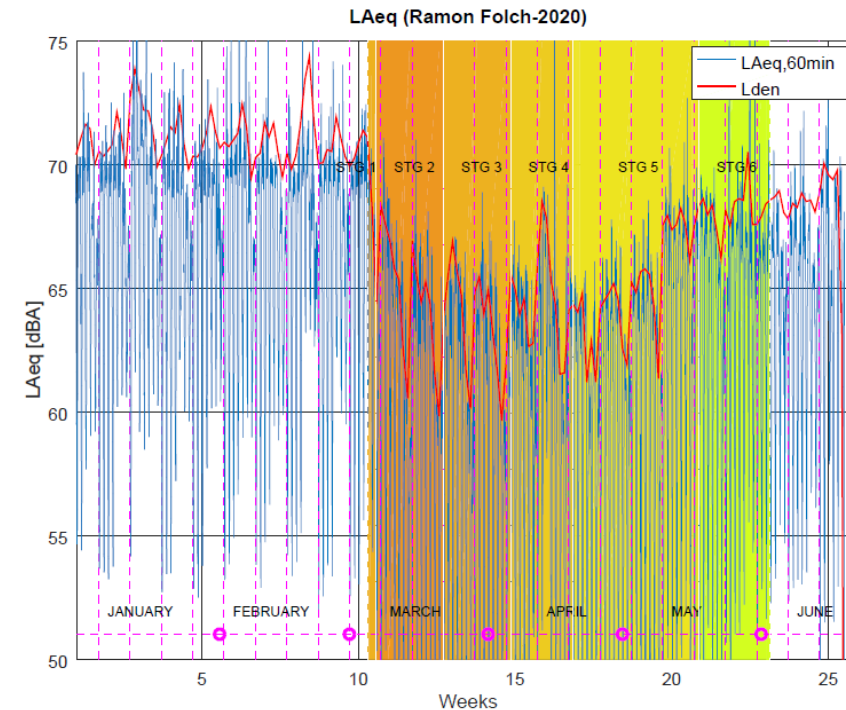


Figure 2. $L_{Aeq,60min}$ (in blue) and L_{den} values (in red) for Ramon Folch sensor (#2) for Jan-Jun 2020.

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- Boxplots of $L_{Aeq,60min}$ in sensor #2 (Ramon Folch) and in sensor #4 (Güell) for Jan-May period
- The difference is done for each day and hour, for the 2020 value minus the mean of the values collected during 2019-2018-2017
- The difference before the lockdown is nearly negligible.
- Sensor #2 during the lockdown presents very lower values during the night.
- Sensor #4 presents lower values during the night and also in the rush hours.

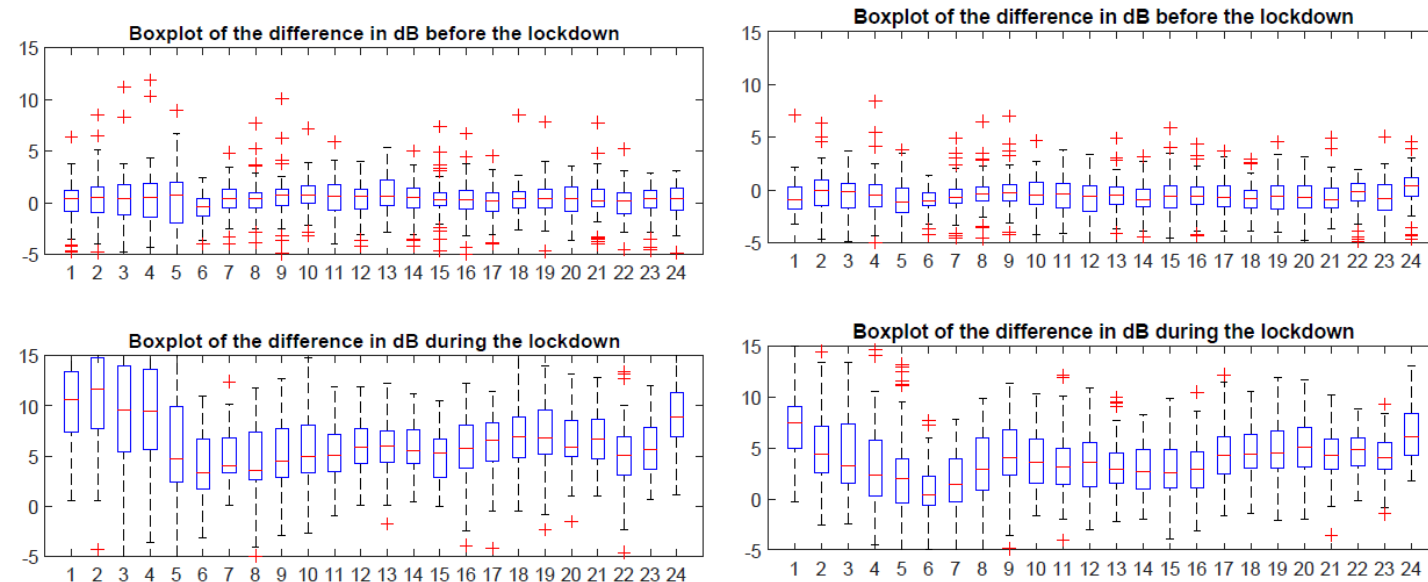


Figure 3. Boxplots of the differences of $L_{Aeq,60min}$ throughout 24 hours Ramon Folch sensor (#2) - left- and Güell sensor (#4) - right- for January-May period (out of lockdown - Stage 5 of lockdown), comparing the average values of 2017-2018-2019 against 2020 $L_{Aeq,60min}$ values.

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- *Next steps*:
 - Detailed analysis of the answers of the questionnaires taking into account socio-demography
 - Acoustic and image processing of all the samples collected, and its relation with the questionnaires
 - Comparison of the results of the video analysis with the L_{Aeq} values from the WASNs deployed in several cities in Catalonia (Girona, Barcelona)
 - Analysis of the social networks feedback during the confinement to complement the questionnaires
 - Future collecting campaign during the so called 'New Normal'

