SOM eco

Sound Meteorological Environmental Correlation

Technical information

ICR

Ingeniería para el Control del Ruido

SOME-ECO

SOME-ECO (Sound Meterological Environmental Correlation) is a groundbreaking research project headed up by ICR, Ingeniería para el Control del Ruido, in collaboration with AEMET, the spanish meteorological agency, that stems from the need to solve the current problem of evaluating external background noise. The objective is to correlate external background noise with meteorological variables and improve its short and long-term characterisation.

Its main aims are:

- To reformulate the methods used for measuring background noise and providing new data to ensure more representative noise measurement.
- Unlike current regulatory frameworks, SOME-ECO takes into consideration in all of its calculations and results the meteorological variables that contribute to background noise at different times of the year and in different places. The goal is to ensure better evaluation of the background noise. To do this, ICR has fixed various measuring points with different characteristics in order to calculate the effect of climatic variables on external background noise.
- SOME-ECO also seeks to carry out long-term acoustic predictions and save time and money in relation to noise problems resulting from short-term

Background

The evaluation of background noise is often a very complicated task with extremely high costs. In practice, most current acoustic studies lack a long-term background noise prediction and it is virtually impossible to define it accurately.

How is background noise nowadays defined?

External background noise often experiences significant variations depending on the past of time and climatic variables. Current background noise measurement regulations however do not comprehensively take into consideration the effect of these factors.

One of the most frequent solutions to date has been to define large safety margins in the prediction of background noise to account for possible variations over time. However, this methodology is often ineffective and prevents the optimisation of the financial return on the initial investment.

The problem is compounded when carrying out long-term noise predictions because current regulations do not specify the duration of the measurements in order to characterise the background noise. As a result, short-term measurements are usually carried out over short periods of time between 2 and 7 days and prove to be insufficient and inaccurate for the background noise prediction.

The objective of SOME-ECO is to correlate external background noise with meteorological variables and enhance knowledge about the dependence of background noise measurements in the short and long-term

Objective and metodology

This study has two objectives:

- To correlate background noise with meteorological variables
- To quantify the correlation of background noise measured in the short-term with its long-term value

Urban area of measurement

A good characterisation of background noise is an excellent financial investment because it enables to do accurate predictions of background noise

Correlating background noise with meteorological variables

The first objective of SOME-ECO is to correlate background noise with the climatic variables that are specific to a particular place for a period of 1 year. Its purpose is to provide accurate and representative data on the contribution of meteorological variable to external background noise at different times of the year and in places with different characteristics.

To do so, ICR will analyse the behaviour of atmospheric pressure, temperature, wind speed and direction, humidity and temperature gradient with altitude in 5 different areas of measurement (2 urban areas and 3 rural areas).

This work procedure will make it possible to learn about seperately the evolution of every meteorological variable over time and to jointly study how they contribute to background noise in a place with certain characteristics.

Considering the measurements that have been used to date, they do not take seriously into account the dependence relationship existing between climatic variables and background noise. However, SOME-ECO intents to correct this providing representive data of this relationship at different times of the year, on different days and at different times of the day depending on the climatic conditions of a particular place.

The aim is to determine the direct relationship between the meteorological variables of a certain place and background noise.

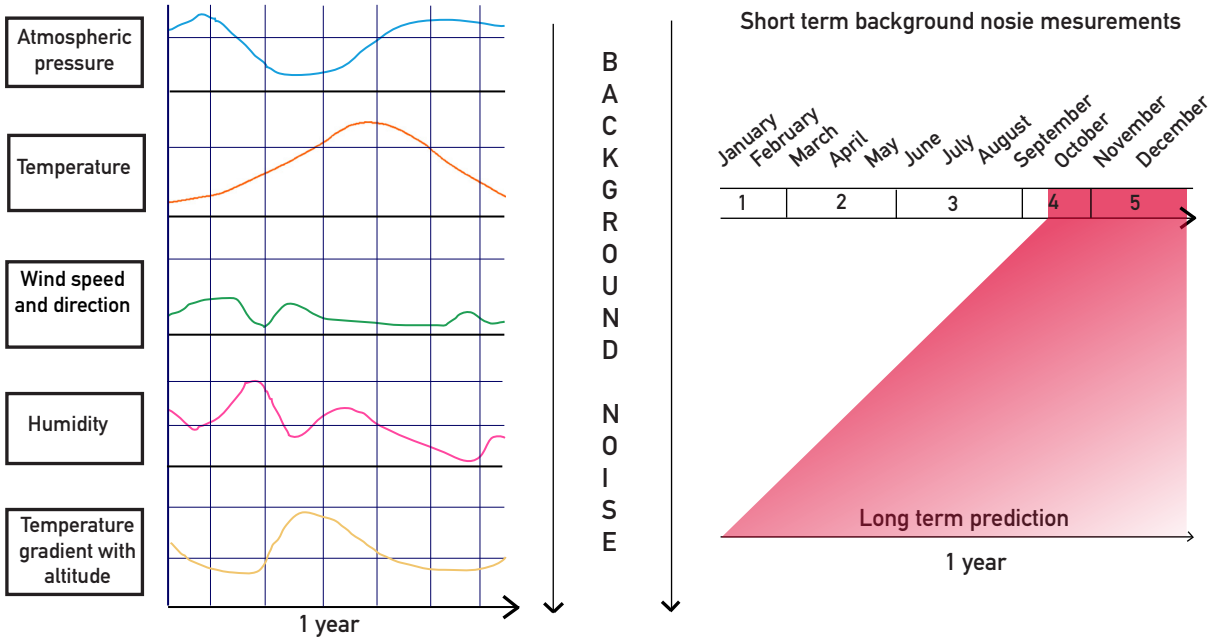
The purpose of this phase of the study is:

- Providing a statistical analysis of the correlation between the equivalent level of background noise at one point and the meteorological conditions (atmospheric pressure, temperature, wind speed and direction, humidity and temperature gradient with altitude).
- Further exploring the factors that contribute to the generation of background noise.
- Correlating meteorological variables with background noise at different times of the year and at different times of the day.

What does SOME-ECO analyze?

The correlation of background noise with meteorological variables

The correlation of background noise measured in the short-term with its long-term value



Quantifying the correlation of background noise measured in the short term with its long-term value

The current standards that regulates the measurement of background noise do not clearly specify the period of time that should be used. This lack of precision makes it virtually impossible to obtein the necessary representive data to carry out long-term background noise predictions. To overcome this lack of rigour, the condition of low noise is usually activated in a wind turbine and large safety margins are established in the noise prediction to prevent these estimation errors.

SOME-ECO seeks to correct this inaccuracy in long-term prediction by correlating external background noise measured in the short-term with its equivalent value in the long-term. By doing so, SOME-ECO aims to carry out long-term background noise predictions based on values obtained from shorter-time measurement campaigns for 1 year.

The goal is to enable long-term predictions which were impossible to carry out to date. These predictions will be based on the data resultig of studying the relationship between noise mesured in short term and its equivaleng long-term value.

The objective of SOME-ECO is to perform long-term predictions by correlating background noise measured in the short-term with its long-term value

Aplication

SOME-ECO is aimed at:

- Construction companies and wind farm operators
- Wind turbine manufacturers and wind farm owners

SOME-ECO studies can be very useful at various stages of a wind farm project, such as the site search phase or during the operational phase after the sources of noise have been installed (wind turbines).

Site search phase

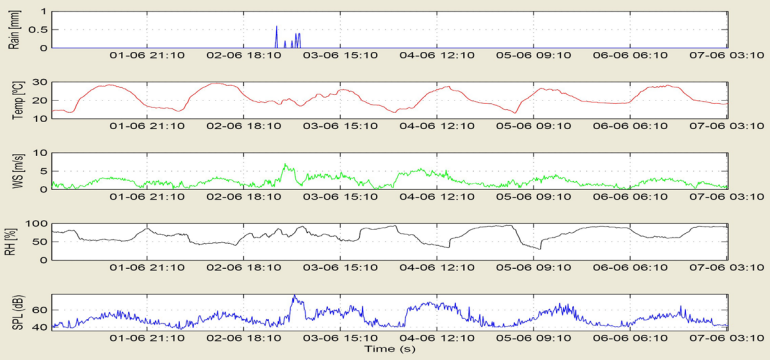
During the wind farm site search phase, SOME-ECO can be very useful for assessing the feasibility of a site on the basis of the long-term background noise predicted by SOME-ECO.

The purpose of SOME-ECO at this stage is to provide a background noise prediction much more accurate than current prediction methods. This enables the client to weigh up the feasibility of a specific urban or rural site and its particular characteristics.

Microphone installed on rural area

Operational phase

During the operational phase, SOME-ECO seeks to prevent from the need of periodic noise studies resulting from inaccurate noise predictions. ICR's goal is to provide representative data that reveals the behaviour of background noise. This will enable to avoid prediction errors caused by noise variations and provide the client with an accurete noise long-term prediction.



Software designed for processing data of SOME-ECO

Benefits

What can SOME-ECO provide?

- An understanding of the effect of meteorological variables on external background noise in order to obtain a correct definition of background noise at different times of the year and in different climatic conditions.
- A correct characterisation of background noise measured in the short and long term.
- A background noise prediction prior to the construction of the wind farm.
- The elimination of the large safety margins that have been applied to date by having a background noise measurement methodology and accurate data.
- The optimisation of the financial return on the initial investment by regulating the installed power and operating strategies of the wind farm.
- Savings of time and money on acoustic studies and in the implementation of solutions after acoustic studies have been carried out.

Background noise characterisation

Current measurements	SOMe eco Sound Meteorological Environmental Correlation
• Short term measurement (indefinite duration)	• Year-long measurements
• Meteorological variables not comprehensively taken into consideration	• Correlating background noise with meteorological variables
• Short-term measurements without long-term prediction	• Correlating background noise in the short-term with its long-term value
• Large safety margins to account for inaccuracies	• Accurate data to prevent the need for safety margins
• Short and long-term financial costs	• Optimisation of investment and wind farm operating strategies

A project headed up by:

Ingeniería para el Control del Ruido

With participation of:

Agencia Estatal de Meteorología

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