INITIAL STUDY OF THE BACKGROUND NOISE LEVEL VARIATION AT THE SHORE MEDITERRANEAN SEA

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Abstract- The aim of the paper is shows the variation of the background noise level located in the shore Mediterranean Sea using the data acquired by the OBSEA's hydrophone during a period of time of 4 months, from April 2015 to June 2015.

Keywords- Hydrophone, background noise level, OBSEA

INTRODUCTION

Actually more surveys are been made in the seawater because the state of the sea can to induce a change in the atmospheric state. Some parameters measured are temperature, salinity, acidify, among others, but this paper measure the background noise level at shore in the Mediterranean Sea. After to continue with the details, some concepts should be clear such the noise level inside the water, because the calculation process is the same that in the air, but the minimum pressure in the seawater is 1 µPa and at air is 20 µPa. This change produces that the usual levels in air are very different in water. The basic equation (1) is used to calculate the sound level (SL):

$$SL = 20 \cdot log\left(\frac{P}{P_0}\right) \quad (1)$$

For example a car in air has a noise level of 85 dB, but the same pressure in water has a noise level of 111 dB.

Other important factor is the sound speed in the environment, in air about 300 $m \cdot s^{-1}$ but in water the speed is around 1500 $m \cdot s^{-1}$.

The paper analyses the data from a hydrophone located at 20 meters of depth. This device is connected to a permanent marine observatory (OBSEA[1]) and the data are in real time. The OBSEA also has connected other devices as a CTD that monitoring the temperature, conductivity and the pressure.

EQUIPMENT

The basic equipment used in the paper is OBSEA, CTD and the meteorological station situated in a buoy on the sea surface around the OBSEA point and 1 PC, Fig 1.

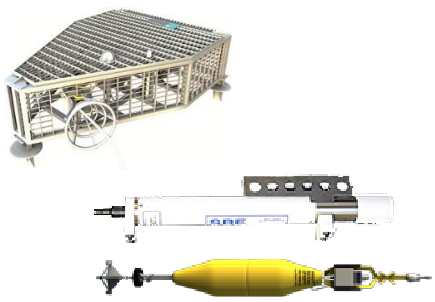

Figure 1. Scheme of the equipment: Obsea, CTD and buoy of the right to left

METHODOLOGY

The methodology consists in measure counts from hydrophone during 1 minute to calculate the value of the number of count that marks the zero position, then reads 1 minute more and calculates the sound level in dBrms. This process is shown in Fig 2.

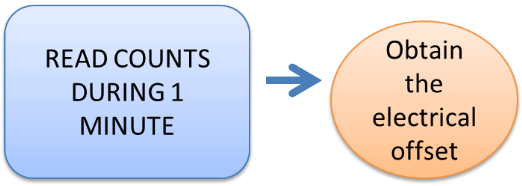

Figure 2. Scheme of the acquisition process

The measure is realize each 10 minutes where the points of measure are at 00, 10, 20, 30, 40 and 50 minutes per hour.

The hydrophone gives counts, and to the transformation of the electrical signal to physics parameter is necessary knows the sensitivity of the hydrophone. This value has studied in [2] and in this case the sensitivity value is -192 dB rel 1V/µPa. The equation (2) shows the conversion of voltage to Pressure:

$$S = 20 \cdot log\left(\frac{V}{P}\right) \qquad (2)$$

The process to calculate the dB rms is the squareroot of the sum of square of the independent pressure peak values divided by the number of samples. This value is function of the measure time such shows the Fig 3.

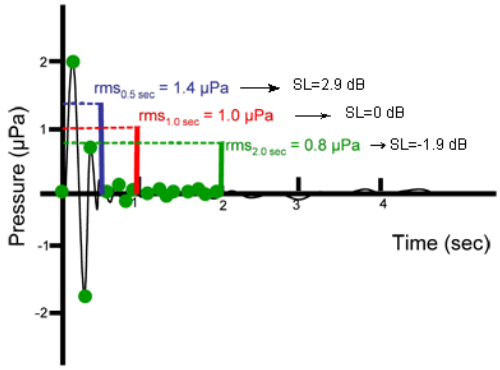

Figure 3. Different values of the signal level in dBrms in function of time

In this case the sound level is calculated by 0 to peak. The electrical offset and the sound level are saved in txt file with the date of acquisition.

RESULTS

The results obtains in this period are shown in Fig4.

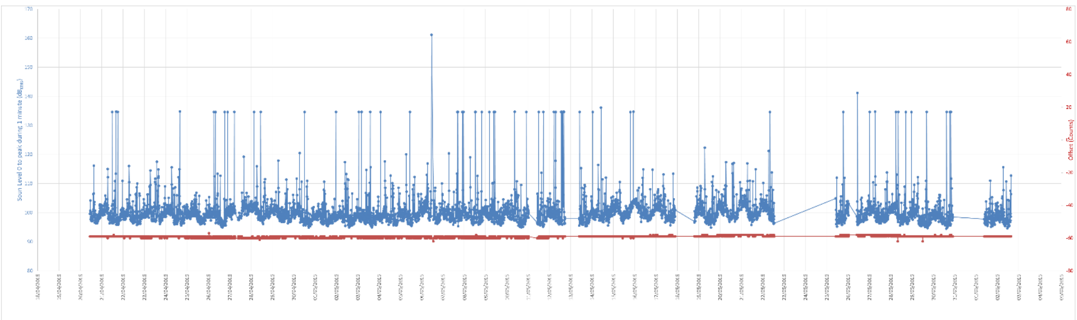

Figure 4. The sound level in blue and the offset in red.

In Fig 4 the lacks are produced by interruption of signal of wrong works of the PC. For make an accuracy evaluation is necessary evaluates a short period of time. The Fig 5 and 6 show the variation of the sound level to a short period of time.

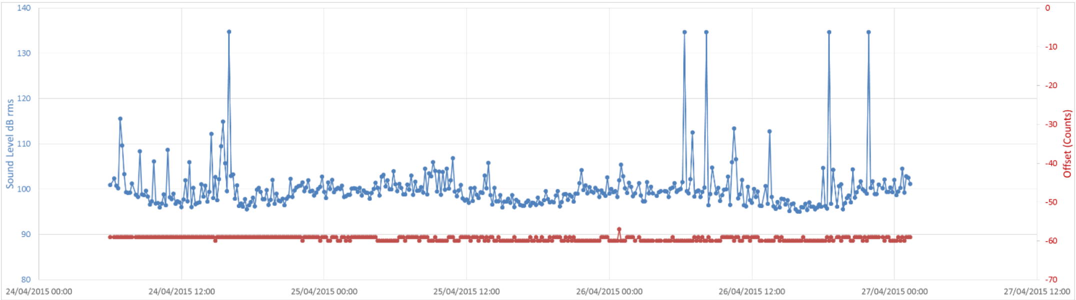

Figure 5 values of the week from 24 until 27 of April

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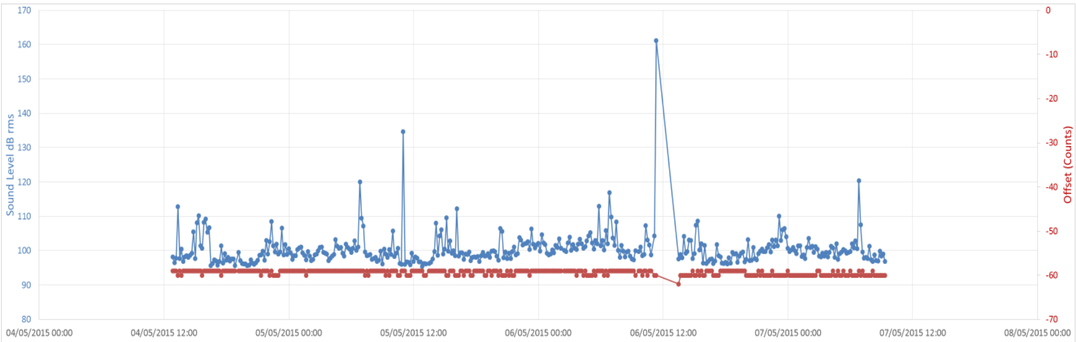

Figure 6 values of the week from 4 until 7 of May.

The last figures detect the increasing level each the same time. These high values coincided when the fishing boats go out to the port and when the fishing boats return to the port

CONCLUSIONS

The paper shows that at the sea exists more sources of noise, and the background noise level is too variable, a cause of this variation is the large amount of life at 20 meters of depth. Some sources are the algae that create an oxygen bubble and crap, fish, among others. Other factors are the human activities at the sea such as the fishing boats.

Other important factor is to know the variation of offset caused by the changes at the environment, and the sensitivity value because any change of this value will change the evaluation of the sound level.

The next step will be to evaluate the variation of the electrical offset with other parameters to get a mathematical model. The second step will be to get a continue recording of a year to evaluate the variation during all year seasons.

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