Paper #157 - Second review

The English language has been significantly improved. Now it is possible to understand much more of the proposal. However the English usage is still quite poor in many points of the paper.

The presentation style has not been improved so much. Many topics and specific parts of the proposals are presented almost without explanation. The revised version of the paper added only a few words, clarifying a little more but not enough. The experimental validation has not been discussed enough. The experimental set-up has not been described enough. As a result the manuscript rises a lot of doubts.

As far as I could understand the paper is still far from being suitable for publication on an international scientific journal. Nevertheless the idea seems good and the research should continue on the subject. The authors should consider the possibility of rewriting the manuscript before submitting it again for a new review.

The authors don't seem to assess the reproducibility of the calibration, that is, in my opinion a pre-requisite of any calibration. They only state that it's difficult to obtain. In my opinion a calibration that is not reproducible cannot be called calibration as it is not functional to the traceability of the measurement results. Therefore as the authors state the impossibility of reproduce the tests the main question is: "what is the aim of the proposal?".
The reproducibility of the experiment is possible but the problem is the high number of requisites. These requisites are the following: The values of different parameters as temperature, pH and salinity. The spreading factor value of the space where the experiment will be performed. In fact, we have performed this test five times, where we have improved the experiment.
The authors decided not to provide a state of the art. In this case it seems that exists only a reference document (standard) and already well assessed laboratory calibration procedures. However, in order to proof the validity of their proposals the authors should first present and discuss the metrological capability of the existing calibration laboratories (instrumentation, standards, provided uncertainty, calibration facilities), then they should present the laboratory calibration conditions and procedures. Only with those data clearly stated they could provide a target uncertainty for the main field applications they intend to deal with. They could proof their proposal simply showing in the paper that the target uncertainty has been reached.
OK. The introduction has been extended.

In the following there is a list of mistakes, typos, unanswered questions that I could find in the paper along with some proposals for changes in the next revision.

Page 1 - Introduction

The sentence *"To perform this type of test are used hydrophones"* should be revised: the subject first, then the verb. Hydrophones are used to perform such tests.
OK. The change has been realized.

After the sentence *"In this case, it is proposed the calibration of the hydrophone in the marine environment at 10 kHz with a not omnidirectional source"* please describe the advantages and disadvantages on the use of an omnidirectional source. Instead of using not omnidirectional I'd suggest to use anisotropic emitter or directional emitter or source.

The advantage of using an omnidirectional source is that we avoid the study of the emission directionality and the systematic process for calculating the emission directions by using a compass and the PVC triangle.
The reason for using a not omnidirectional source is that it has more problems, and the purpose of the paper is to solve those giving clear guidelines.

Please reconsider the sentence *"Although in many cases this increment of the uncertainty compensates the little investment in performing the calibration"*. Either you are able to define an uncertainty interval, and therefore to assess quantitatively the reproducibility of the experiment or it is impossible to define an uncertainty interval, and therefore there is no way to compare the proposed calibration with the laboratory one.
Numerically it is possible to estimate the uncertainty. This study had been presented in the Metrology congress, celebrated in Madrid in 2013. But this estimation is in the best-case scenario and its value is ±1 dB rel V/µPa, whereas the laboratories offer an uncertainty interval of less than the unit.

The sentence "The second step is the process time for the calibration" only introduces the existence of a laboratory calibration. It doesn't replace the description of the calibration procedure. Please add a whole new section devoted to the description of the laboratory calibration as above suggested.
The possible calibration processes performed in laboratories have been detailed in the introduction. We cannot give

more information about the laboratories calibrations because the standard has to be purchased and this would violate its reproduction.

Page 1 - Development

The word *necessary* has been used two times in the first sentence. The second time is a typo.?

The words *"detail all interesting factors in sound marine environments"* don't agree with the rest of the sentence. As a result all the first paragraph is unclear.

???

Page 2 - Equipment

TVR (Transmit Voltage Response), that it is function of SPL (sound pressure level) and the emission frequency. The sentence is incomplete.

with their sensitivity in function of frequency. I propose to reformulate as in terms of sensitivity versus frequency??

The hydrophone, (DUT, Device Under Test) must be characterized with their sensitivity in function of frequency. After this sentence a detailed description of the hydrophone under test is needed including input and output physical quantities and ranges and a block scheme.

A major description has been added. As well as a basic drawing of the hydrophone used in the test. The rest of the information can be found on the internet.

The GNSS receiver has to be able to get the raw data from satellite reception and be compatible with an open source program package as RTKLIB. applications, where the acronyms RTK mean Real Time Kinetic. Check the grammar, the sentence is unclear.??

The signal generator has to generate the signal of amplification, HP 33120A. Check the grammar and the content, the sentence is unclear.???

The generator is connected to the amplifier and it is connected to a sound pressure generator. Check the grammar. The characteristics of the sound generator and of the amplifier are missing.

Ok. The brand and model have been included.

The equipment used to measure the direction of emission is missing.

OK. The compass is included.

A description of the generated waveform in the time domain is missing. Why a specific type of impulse has to be generated? Is it a repetitive one? Why a time delay should be inserted between two following impulses?

The generated pulse is detailed in the figure 6, now figure 3. It is an impulse generated every second. The reason why it is generated every second is detailed in the section 2.1. If we generate a pulse burst, there would be interferences in the reception. For this reason, if we just generate a single impulse there would be bounces, but they will be easily detectable and underestimated with the study in section 2.1.

Page 2 - Basic Equations

Eq. 1. The measurement units are missing.

The RL value is obtained with sensor, and the value SL is obtained at 1 meter with another calibrated hydrophone. In this case, the source is not omnidirectional and for this reason is very important to know the direction of emission. Which sensor? The DUT? Why 1 m?

The measures are performed with another hydrophone, in this case the B&K 8103. The calibration is performed at 1 meter deep for two reasons. The first reason is to avoid the initial perturbations when generating the pressure of the generator. Secondly, the output of all generators is detailed at 1 meter.

After this paragraph the authors should introduce the Eqs. 4 and 5, then they should define the sensitivity S and mathematically proof the Eq.3.

Conceptually the sensitivity is the electrical energy generated minus the pressure energy received, and this pressure energy received is the same of the generated minus the energy absorbed or lost in the environment. We think that this description is better than the mathematical equation. In the paper use the measurement unit symbol m after a number instead of the word metre, as specified by the SI writing rules.

Which writing rule? Could you give us the reference? We have looked up in the BIMP, where the word metre is detailed (http://www.bipm.org/en/si/base_units/). Even though, we have replaced the word metre when it is preceding a numerical value.

Why in Eq. 2 there is a sign ± while in Eq. 3 the sign + is used before R_{echo}?

The bounce in the water surface implies a phase change. However, there is no phase change in the seafloor. As the distance of the first bounce on the water surface is greater than the rebound on the seabed we consider only one of the two contributions.

Other representation of (2) with the simple variables is (3). This sentence should be replaced by the proof quoted above.

Eq. 6 is the same as 3. The symbols G and E are used to replace TL and SL introduced only a few lines before. Moreover a new symbol r' is introduced (and not explained) only to remove the number 1000 in Eq. 3. Why? This is confusing for the reader.

It is not correct. The Eq.6, now 9, is the representation of the characteristic parameters of the environment and the Eq.3 is the complete equation with all parameters (generator, receiver and environment). The change in the nomenclature was made to provide the reader the origin of each of the parameters, but seeing their confusion we will use the same nomenclature (SL=G, TL=E and R=RL). The term r 'is the same as r, but with different units, and therefore in the above equation r' = 1000 * r. To avoid to cause confusion we include back the term 1000 * r.

In (3) is ready to calculate the sensitivity, S. This sentence introduces the target of the calibration without defining it. See above.

The introduction has been structured again emphasizing on the sensitivity as well as in the laboratory methods used.

Page 2 - Transmission Loss

The transmission loss is composed by other factors, see equation (2). I propose to change to The transmission loss depends on other quantities, as it can be seen in equation (2).

OK. Done.

The attenuation index is function of other basic parameters, the temperature, salinity, pH, depth between emission and reception and the emission frequency. I propose to change to The attenuation index α is function of other basic parameters, like the temperature, the salinity, the pH, the depth difference between emission and reception and the emission frequency.

Done.

The behavior of increasing alpha is due to the increase of the frequency. The sentence grammar is unclear. Do the authors mean: α increases with the frequency of the impulse waveform?

Alfa's own environment, and indicates the attenuation value of any waveform that passes through the environment. The alpha value depends on the frequency of this wave, and increases with the frequency of the impulse waveform. For this reason, in the sea you can hear the low frequencies at greater distances than in the air.

Please explain in the text the difference between the frequency of the truncated sine wave waveform used as elementary impulse and the frequency of emission of the impulses. This is detailed further on, in section 3.1. What kind of relation links α to the other independent variables?

There are interactions between all variables, but we just wanted to emphasize with the frequency and the temperature. We show in figure 6 the alfa dependence of frequency and pH, and the figure 7 the dependence of frequency and pH. But the most important is that the study is located in offshore, and for this reason the parameters gradients are nulls.

The authors state they are also important but don't describe any other relation except that with frequency and temperature here. All the relations are reported in Eqs. 14 and 15 almost without comments. It would be better to put Eqs. 14 and 15 in this section and to comment them introducing the symbols. OK The Figure 2 should follow such discussion

In the Figure 2 the variation of alpha in function of frequency and temperature can be seen. I propose to change to In the Figure 2 the variation of α versus frequency and temperature can be seen.

Done

between generation. I propose to change to between two successive sound pulses.
Done.

This factor is very complex to evaluate, thus if in the geometrical scene the velocity of acquisition and the time between generation are well planned, this factor will be minimized or even null. This sentence is too general, please explain how to minimize R_{echo} and state the hypotheses that, once verified, ensure that from now on R_{echo} can be considered null.

The reason for including a geometric study and to impose a time interval between the primary signal and the first rebound of 1 second, and due to the high speed acquisition of the hydrophone, this allows us to consider R_{echo} as a null contribution.
It is not null, but is detectable graphically.
.Alternatively send the reader to the following sections and explain that in the section 2.5 or 3.1

Page 2 - Not omnidirectional source

The aim of this article is to propose a good practice to evaluate the not omnidirectional sound marine source. According to the abstract and introduction the aim of the paper is different. This is only a step. Please use more words to present the reason for calibrating the generator on field.
In the introduction it is detailed that the reasons for calibrating on field are for its low-cost and not to lose any data of the hydrophone. In some cases, hydrophones located at 1 km deep or more, the extraction logistics and the reinsertion equipment is very complicated.

The first step is to calculate the sound generator in function of the angle. Actually this should be a measurement of the sound pressure versus the angle.??

The signal reception measured for a calibrated hydrophone, in this case a Brüel &Kjaer (B&K), model 8103, located over a semi sphere with a 1 meter of radius. Check the grammar. I propose to change to The emitted sound is measured using a calibrated hydrophone, in this case a Brüel &Kjaer (B&K), model 8103, located over a semi sphere with a 1 m of radius.
Done.

However this sentence is too small to present a calibration or an on-field measurement. How many calibrated hydrophones are used contemporarily? Where are they placed? On a semi-circle obtained by intersecting a 1 m sphere centred in the sound generator and a semi-plane parallel to the symmetry axis of the generator in front of the generator? Add a figure with the geometry. Introduce there the angles you will report in the Table 1. How should this assembly be placed under the sea? Do you evaluate the symmetry of the emission lobe around the axis of the generator?
The information in 2.4 and in 5.1 has been expanded.
The Figure 3 shows the semi-circle establishment in the source to obtain the directionality generation of the source. Unclear. The generator is anisotropic. Is this assembly used to measure its directivity in all the directions or the direction and intensity of main emission lobe?
The hydrophone B&K is located in different positions while the generator is on, thus the directivity is measured.
It is clarified with an image, as well as in section 5.1.

Once the directionality generation of the source is known, over surface with the polyvinyl chloride (PVC) triangle, that fleet over sea surface, and compass the direction of emission will be known. I could not understand this sentence. Please use more text to describe how the generator and the semicircle are deployed under the sea and the role of the PVC triangle, that is not only a floater device. From Figure 3 it seems that the generator is suspended to the floater by means of a cable. As a result could the generator change position even if the floater is still due to currents or waves?
Initially the mission of PVC triangle is to prevent the rotation of the generator that is sunk in water, and the determination of the direction of emission. But in practice, we have found that not only prevents the generator rotation, it also dominates it, so we can orient the generator as we want. The generator has a metal skeleton cubic form. In the top rear vertices of the cube, the vertices of the PVC triangle are joined. I have attached an image to clarify the concept. This image is included in the paper.

Page 3 - Not omnidirectional source

Caption of Figure 3- *Join of source generator and nylon semicircle.* I propose to change to Source generator and nylon semicircle assembly.
Done.

Page 3 - Initial geometrical study

An introduction describing the aim of the geometrical study, the scenario you are thinking at and the reason of the simplified geometry is missing. A list of simplifications (two ray propagation model, neglectable intensity on propagation paths longer than 2 m, neglectable influence of h_e, ...) should also be put here and explained

Done.

for this reason the velocity of sound will be constant. In 2.5 the sound velocity is supposed constant, in Eq. 15 no.

We assume that the gradient of temperature, salinity and depth are estimated nulls, even if the temperature and salinity change the sound velocity changes too.

Please explain.

d_0 = the distance from the sound generator to the hydrophone. I propose to change to d_0 = distance between the sound generator and the hydrophone on a plane orthogonal to the surface and including the emitter and the receiver.

Done.

θ = angle of the reflected wave. I propose to change to θ = angle between the reflected wave and the surface plane in a plane orthogonal to the surface and including the emitter and the receiver.

Done.

The he and hr are measured with tape measure. The he does not appear because the reflections over the surface are not evaluated since the distance is bigger than 2 metres. For this reason, the minimum distance will be hr which is 1 meter.

This part should be put before (7) and (8) while explaining the adopted simplified model. Firstly, we want to present the equation. However it is not clear. The typical depth of the receiver and emitter are not reported. Do you mean that the he and hr are measured manually? Yes From a ship? The hr is measured when the diver goes down to perform maintenance tasks, and h_e is measured manually when the test has been performed. With which uncertainty? All measures have 30 mm of uncertainty.

The conclusion of the geometrical study is that the minimum distance between the sound generator and the hydrophone is 750 m for 1 s of interval of time. Also this part should be explained better. From the beginning the aim of the geometrical study is not clear. Explain why a minimal distance should be kept between emitter and receiver, explain how those numbers are obtained in practical cases, for example no word is spent to describe how θ can be obtained to solve (7) and (8) or if do can be replaced by its projection on the sea bed. Moreover the interval of time is probably the pulse emission period. If yes please use the same correct terminology all over the paper.

To see the result we make several approximations, but the only condition is that the time interval has to be 1 s. If we put this value in equation (7) and make the following approximations:

c*sin(θ)>>hr

c*sin(θ)^2>>3*hr^2

c=1500 m/s

We obtain that (7) gives the value of d0 = c / 2

We do not think this detail is relevant in the paper. The approximation that c * sin (θ) >> h is consistent as the angles we get are small, of the order of 1º, which decreases 2 magnitude orders of the c value, yet the product has a magnitude order greater than the hr magnitude.

Page 3 - Procedure

I'd remove 3.1 and place the part concerning the location in the 2.5 and the part concerning the signal in 2.1. Then the introduction can be changed referring to the procedure only.

The change has been done.

Page 3 - Location

it is the necessary distance for the acquisition of the main signal without the contribution of the first echo. This is the target of Sec. 2.5 but never explained in that Section. Place it there.

OK. The reason is that if we assume that the time interval between the direct and the indirect route is 1 second we can find the minimum distance. This clarification will be included in the paper.

The Figure 5 shows one of this pulses injected to the environment. I suggest to change to The Figure 5 shows one of the generated waveforms. and place it in 2.1 after explaining the reason and the characteristics of the pulse waveform and of the generated signals.

Done.

Page 4 - Readings

There are two points for collecting the data. One point is the ship where the pulse had been generated, and the other point is the receiver. Recall SL or G and explain which sensor has been used and where it has been placed. Is the 'receiver' the DUT? Is the emitter floating near the ship and the hydrophone at a known position?
OK. The RL is the DUT. The collected data in the ship are: the orientation, measured with a compass situated over the PVC triangle and the GPS satellite signal with raw signal. The SL is measured with a B&K hydrophone located over the nylon semicircle. The temperature, the salinity and the pH are collected in the OBSEA located in the DUT position.

Orientation of the source through a compass located at the main triangle's vertices. The triangle has never been described in detail along with its role and embedded equipment.

Emission depth. Is this hr? Manually measured?
The emission depth is he, and it is measured manually, in this case by me

Voltage output, sent to internet using the protocol UDP (User Datagram Protocol). Sent to a remote client unit via Internet? The DUT is a smart sensor including signal conditioning circuitry, a processor with digitizing capability, an embedded UDP stack and a wireless modem? Please explain.
Correct. These details are now included in the paper, section 2.1.
Environment conditions as temperature, salinity and pH. No position measurement?

The parameters are measured in OBSEA, see 3.2. We will try to improve the description.

caster file that will be imported in the free software Real Time Kinetic (RTK). To do what?

We carry out a differential correction of the position without having a terrestrial base of our own. For this reason, we use the services provided by different entities such as ICC, IGS, among others. This allows us to make a high quality positioning without financial investment.
Page 4 - Uncertainty calculation

In the uncertainty study starts with (3), where the propagation law is applied by the guide of uncertainty (GUM) with the nomenclature detailed in (4),(5) and (6), (9) is obtained. Check the grammar. The sense of the sentence can hardly be guessed.
???

Eq. 9. I don' agree for several reasons (given what I understood from the paer): 1. The simplified version of the propagation formula is allowed for uncorrelated direct measures. Explain why G and E should be independent from r (see next comment).
Initially I thought that there was a high correlation between the variables, but observing the equations we can see that the dependence of the magnitudes depend only on temperature, salinity, pH, distance, and there is no relationship between them, at least not mathematic. To the question of the correlation between the distance and the generator (SL), it does not exist, since the generation is done regardless of the distance. The environment is relevant, in fact it is characterized into three parts, the attenuation index (independent of distance), the spreading factor (element that depends on the morphology and the depth where the test is performed) and the echo contribution (not considered since we are at a distance greater than the minimum required)

2. The hydrophone output depends on several parameters linked to the environment, not only on the quantizer.
We have considered the hydrophone as a black box where we only know the output values (counts), in any case we analyzed the transducer nor the conversion from analog to digital. What we have done is the elimination of the offset of the signal by the difference between maximum and minimum, therefore we can eliminate the possible variation of the offset.
3. The uncorrelated variables seem to depend on others, like temperature that are not reported in the formula.
This is correct. We have not included all the equations to avoid confusion. In this new version we have included a comment with the distribution of probability used. The complete equations not have included because these equation are the results of the partial derivate
4. The second part of the formula is incorrect. The sign minus (-) can never appear in a simplified propagation formula.
It's true. That was a big mistake. In all cases the uncertainty contributions are additive. But it is correct in the calculation because in the excel sheet we included the partial derivate squared
In my opinion a version of Eq. 3 should be reported using as independent variables only those which are actually

uncorrelated. Yes , I agree with you.

All factors included in (9) have not correlated term, because the factors are independent between them, even the environment factor depends of independents parameters as temperature, salinity, pH and distance. Please explain better, provide more quantitative or logic proof.
It has been detailed in the previous point. Arguments will be included in the paper.

Page 4 - Uncertainty of the receiver

This is also unclear. It seems that the receiver is the DUT. Please explicit the elementary subsystems of the hydrophone.
They are detailed in section 2.1.

Where the voltage uncertainty has a rectangular probability distribution with a width of the resolution in voltage. This hypothesis is quite good for a linear quantizer with a constant input (see above). The hydrophone is a much more complex system including a series of analog components adding non-linearities, gain and offset errors and a real ADC adding its own contributions. From the logic point of view the role of u_v is not clear. As the hydrophone output has never been clearly defined, it seems that V is the hydrophone output, therefore u_v seems to be the output uncertainty, that should be a target of the calibration, more than a datum. It is a good comment. In future works I will prepare a individual study of this theme. Please explain better. Probably a clearer derivation of Eq.3 could solve the question
ok.

then the gain correction will be applied. So the code bin width = 76,3 μV for a Full Scale Range of 5 V using a 16 bit ADC? What is Vmin? Why Vmin^2/6? Report the code bin width value and the DAQ characteristics. Which is the gain correction? Reading the paper there is no reason for that (see comment above).
In this case, the hydrophone has a converter of 16 bits, as the full scale of the equipment is 5 V, we obtain that the conversion factor between counts and V is 2.5 V / 2 ^ 15 counts. The value Vmin is the minimum voltage that gives the hydrophone and corresponds to the value of 1 count. The value of the squared uncertainty in voltage Vmin ^ 2/6 is a typo since the correct value is Vmin ^ 2/3, corresponding to a rectangular probability distribution with a width equal to the minimum value assigned. Note that this value is the squared uncertainty.

Page 4 - Uncertainty of the generator

Where the $u(P_S)$ is obtained in the calibration certificate of the generator as follows (12). Explain and justify the symbols: S, V. Are them related to the reference hydrophone? How? Report here the values of Ug and kg and the method used to obtain them. These parameters are calculated by the accredited laboratory follow the standard. The parameter S_{BK} and V_{BK} are the sensibility and the voltage of the B&K hydrophones respectively. This term is included because the out signal is measures with B&K hydrophone. This measure is realized because the amplificatory not is digital, and for this reason we don't known the out value.

Page 4 - Uncertainty of the environment

Where c is the sound speed in seawater. In Eq 15 c is not constant, previously it has been supposed constant. Please present consistent approaches
This has been clarified before.

D is the distance in metres. So α is a function of the distance D. Has this quantity been previously called r? In the Eq. 13 α is supposed to be independent from r. Please use consistent symbols.

Yes, it is a mistake. D is the depth, not the distance.
Page 5 - Uncertainty of the environment

The Figure 2 shows the characterization of α for one case. This sentence ends the discussion about α. How the u_α can be obtained? Which are the typical values of α and its uncertainty?
The uncertainty value is done by error propagation of the Eq.15., now 11, This development was not included, and now is explained.t

the depth of the generator point, and independent of the other parameters. Please report here the formula or the method for estimating u_C. The reference [6] doesn't say much about. Only a couple of numbers are reported there.

The detail of the spreading factor would be the aim of another article; therefore it is given a reference to another article which is more detailed. Nevertheless, the description has been extended in order to provide more information.

In order to obtain the uncertainty of the distance the rectangular probability distribution with a 1 m width is used.

Explain the reason and the value used

If we analyse the reception quality factors of the GPS data in raw, after the data integration from the caster, we could affirm that the width of the rectangular probability distribution is 40 cm. But we consider this fact too optimistic; therefore we have chosen a higher interval, in this case of 1 meter. It is thus an overestimation.

Page 5 - Results

Any Subsection of this section should include 1) a description of the target, 2) a description of the experiment, 3) a presentation and discussion of the intermediate results referring to the suitable subsections 3.x and 4.x. Current presentation is difficult to understand.

I completely agree with you, but the magazine template does not support a third-level sections.

If the reviewer indicates so, I understand that it can be made and therefore we will include third level sections. Could you possibly give us the format of this new level?

Page 5 - Direction of emission

Which is the target? To measure G and estimate u_g given the actual direction of emission and the other parameters in Eq.12? If yes please explain it better and provide an estimate of u_g.

It is detailed before.

Table 1 - Define the reference planes or lines used for measuring angles in a figure.

This parameter will enable to apply the real amplitude in all positions in function of the orientation data obtained with the compass.

Explain how with numerical example.

Done

Page 5 - Evaluation of position and distance

What is the target, the measurement of distance D (or r) to be used in Eq. 14? State it and describe better the method. It is not clear how the DUT position is measured. Is it already known?

The measure of the DUT position is performed in previous studies. The measure is not reported, as it does not offer much information, but by way of comment it has been done using the same GNSS that is used in the paper. To get the vertically over the point where the DUT is situated, The globe , it tie up with capes, are used to get the perpendicular position between the surface point and the DUT. During this test, the involvement of divers is necessary to verify the verticality of the rope as well as ideal conditions of the sea, a fact that may occur early in the morning.

If I understood well the distance obtained is on the same geode surface.

Yes, the longitude and latitude of the points are located over the geoid, WGS84.

What about the different depths of emitter and receiver?

The depth difference is obtained manually, since it is impossible to know the value of the real heights. Since for this calculation is necessary know the ortometric height (difference between the geoid height and the real height) as in the marine environment the study is not performed. The debate on the calculation of the heights can also be the aim of an article; therefore we do not enter into discussion.

What about the angle between the direction of emission and the line connecting the emitter and the receiver?

They are two important parameters, but they are not related. The heights between the emitter and the receiver remain constant since neither the emitter nor the receiver changes its height regarding the maximum emission angle and the angle between the DUT position and the PVC triangle indicates the correction value to applied

The use of the RTKLib for position correction allows to know the correct position Of what? Both the receiver and the transmitter?

Yes, both positions have been obtained with the same process. OK

In this case, the quality factor included inside the RTKLib has been analyzed and the position has been evaluated with a pair of GNSS. This is too vague. Provide quantitative method and results.

Once the quality factor . Define it.

the value of the distance uncertainty is 0,60 m. The paper don't include enough elements to understand how the uncertainty of the distance has been estimated.

I disagree. It is detailed in the paper that a rectangular probability distribution is applied with a width of 1 metre, so if we apply the calculation we obtain the value of 0.60 m

Page 5 - Index attenuation value

I propose to change the title to Attenuation index and its uncertainty

OK

Page 6 - Index attenuation value

The absorption index is 0,85 dB/km. Call it attenuation or absorption index all over the paper, don't use different terms. The numerical result has not been justified in the text.

OK

The uncertainty value for this case is 0,99 dB/km. Estimated applying which formula or method?

It is detailed in section 4.3.

Page 6 - Spreading value

In this case the value is 16,04±0,67. The reference [6] doesn't explain very much, except than some kind of linear fit has been carried out. Please explain how the standard uncertainty about C has been obtained by applying a method referred in [5] or it latest addendum. According to [6] C slightly depends on r.

The parameter C depends on the morphology of the seabed, as well as the used source. When using a non-omnidirectional source, the dependence of C with r is created, as r is the required distance for the energy displacement to be one kind or another (spherical or cylindrical). In our case, the value of C is valid because it has been performed using nearly the same distances as the previous study. Yet, we agree that the further work is to find the limit values depending on the distance.

Page 6 - Evaluation of the signal receipt (did you mean the received signal?)

??

I propose the following rewording of the first two sentences.

The generator system and reception system are not synchronized and for this reason the received signal timing is independent of the generation. The reception file is bigger because the sampling frequency is 96000 Samples/second and the duration of the record is 1.5 hour, although the test time is 15 minutes.

Done.

It is not clear why the record is so much longer of the sound generation time (it is presumed that the test duration time is the signal generation time). Why acquiring 1 h and 15 min of background noise?

This is a facilities problem. An application has been made for recording the signal, located in a PC located on Land, which in this case has a speed of 96 kHz. Once we reach the place where the measures will be carried out, we call the Land and then the application is activated. When performing tests at sea for checking the directivity, the B&K has to be placed in different positions over the semicircle, it is done manually. And when I dive in to move the B&K, the generator has to be stopped, because otherwise it could not hear anything.

The not time synchronization of the generator and receptor elicit that the processed signal is a critical task. Check the grammar. Why a critical task and how such task is accomplished?

I do not know if you've ever seen a signal from a hydrophone in the marine environment, which is full of life (crustaceans, fish, seaweed, bubbles, etc.) this causes a lot of noise in the received signal. So when we see the hydrophone recording, we have a huge number of signals, and not knowing the time base between the generation and the reception may cause misidentification. This problem has been solved using a Matlab application which detects signals at 10 kHz.

The grammar of the following text in the subsection 5.5 should be checked again.

the acceptation case, and the Figure 8 is for the decline case. What are the acceptance and rejection cases? A record is accepted if the maximum of the FFT is around 10 kHz and rejected otherwise? Such statement is not clear in the paper.

Ok, we have improved the text, but you interpretation is correct.

Figures 7 and 8. The figures and the text are too small to be read clearly.ok Moreover they seem the same provided in [6]. Change them.

Yes, because it is the same, but with the echo effects
Once the maximum value for the acceptation case and its time are found, another Matlab® application is used to overlap the time values. What happens then?
The maximum and minimum values of the signal are chosen, and this value divided by 2 is the amplitude of the received signal.

What is measured? This value is counts.
How? It is described before.
It is important to show how the S value is obtained., Ok , the information has been extended.

Page 6 - Sensitivity value

The last step is to assemble all contributions and calculate the sensitivity value and its uncertainty. Report u_R, u_G and u_E here adding all the direct measurements and their uncertainties used to obtain them.
OK. We have included the Table 6 where the obtained values appear.

The step is calculated for every point, Which points?
The points where it is obtained a good signal of the hydrophone, as well as a good correction of a quality factor of 1 in the GNSS signal. This does not always occur because the signal may lose some of GNSS satellite during the test execution.
.How many?
As many as we can, in the last test we obtained 250 points.
A procedure is missing here.
Esperamos que con las explicaciones anteriores quede claro el tema de los puntos.

the Table 6 shows an example with some points. Why some points only?
Because placing 250 points would be excessive for this paper. It is enough with an example.

rel 1 V/µPa at 10 kHz. What does it means? Relative to a receiver sensitivity of 1 V/µPa? Never introduced before.
Are the conversion units. If we make a dimensional analysis of eq.16

After Eq. 16 report the numerical values of the variables and u_P

After Eq. 17 report the numerical values of the variables and u_{RL},

In my opinion Eqs. 16 and 17 and the related text should be put in the first sections of the paper when explaining how the hydrophone works. Then in Section 5.6 only the results should be presented.
Use the same symbols for P_{read} and $P_{reference}$ (previously called P_s and P_o) everywhere in the paper.
OK, we have moved the equations to the Introduction section and the nomenclature has been changed.

The real result for 15 mV is inside the interval of 149,82 dB and 155,72 dB. A result in mV included in a dB interval? This is not clear. Where does the 'real result' and the dB interval come from?
This point is now detailed in the Introduction. We have added information to clarify this point.

Page 6 - Conclusions

which is less than 1 dB. Has the same hydrophone already been calibrated in laboratory? It would be extremely important to devote a whole new sub-section to discuss the comparison of the two calibrations.
In the case the information provided here concerns general metrological capabilities of calibration laboratories it should be put in the beginning on the paper and then recalled in the conclusions.
OK.

In the last hydrophone calibration, about February of 2010, the sensitivity value was -192 dB rel 1 V/µPa at 10 kHz, which is inside the confidence interval. Is this result obtained by means of another calibration following that reported in this paper?
The calibration test of this equipment is accessible in the OBSEA webpage.
Please report all the significant information before the conclusions and use the final space to state the next steps of the research.