.building up active groups sharing their knowledge, methods and resources.

.acting as one body towards funding institutions (including EC), stakeholders, potential users and similar international projects,

.jointly acting for a strong cooperation with other networking efforts in ocean sciences, ocean technology, ocean data management (GEOSS, MERSEA, GMES, HERMES, EUR-OCEANS), and infrastructure (SEADATANET).

.Establishing functional relationships with the above (knowledge or data provider, cooperation, complementary scientific goals, complementary sea or subsea intervention means,…),

.Advancing the infrastructure policy of subsea observatories in Europe.

.On line monitoring to make the investment safer including quality control.

.Combinating oceanographic, geological, and biological themes at one station to enhance cost effectiveness compared to short term deployments

From the beginning of the project, lasting integration is in perspective through the construction of a permanent structure able to provide a set of ESONET CORE SERVICES, related to ESONET REGIONAL LEGAL ENTITIES. All of them will be linked for their implementation scheme as well as for a scientific and technical improvement process.

The RLE (Regional Legal Entity) might be a research institute, a government agency, a company or a partnership or private organization depending of the size and circumstances of the project. The ESONET RLE would be responsible for providing the utility services to the observatories in the ocean and will report to the stakeholders and financing bodies. The ESONET RLE would be responsible for receipt of funds from international, national or regional sources and paying for installation and operation of the regional observatory.

3 – Conclusions

The kick-off meeting of the project was held in Brest on March 21st – 23rd, 2007 in Brest. It was decided to organize in Barcelona September 5th-7th, 2007 a "All regions" workshop where the ESONET RLE were constituted. In parallel a call was published to co-fund demonstration missions showing to scientists and to public the interests of sea observatories

4 – References

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OPTIMIZATION OF DATA ACQUISITION SYSTEM FOR MARINE SEISMIC EXPERIMENTS

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1. Introduction

The progress in marine instrumentation during the last decades has allowed improving the quality of the data acquired, as well as adding more features to the equipment. In marine seismic experiments, the active source is placed many kilometers away from the sensor, bringing up the need for a high resolution acquisition system where parameters as Signal-to-Noise Ratio (SNR) and Effective Number of Bits (ENOB) have to be optimized.

This paper presents a high resolution acquisition system designed and built for our new Ocean Bottom Seismometer (OBS) constructed. This version of the equipment is the result of a series of optimization tasks carried out on a previous one. The results of these optimization tasks have been evaluated in the lab by the direct comparison of the characterization test results of both versions. The performance of the optimized version of the system has been tested in real enviromental conditions during the CALIBRA 2006 active seismic survey.

OBSs are instruments used to collect underwater seismic data. They are widely used in active seismic experiments where a compressed air gun acts as the active source [1]. In such experiments, a series of OBSs are deployed on the sea-bed at a depth of up to 6000m. The instrument is equiped with 2 sensors: a tri-axial geophone that is coupled to the sea-bed to collect the refracted data, and a hydrophone that registers the reflected signal. An oceanographic vessel is used to drag the compressed airgun and shoot every certain time (90-120 s). The acoustic signal generated by the air gun travels to the bottom of the sea, where it is reflected and refracted by different ocean sublayers. The refracted signal can travel tens of Km before it is detected by the geophone, so having a small amplitude. The equipment is recovered by sending an acoustic signal with a certain code from a telecommand unit on-board. When this signal is received by an acoustic transducer, the anchor weight is unattached by a motor driven unit [2]. Figure 1 shows a picture of the OBS constructed:

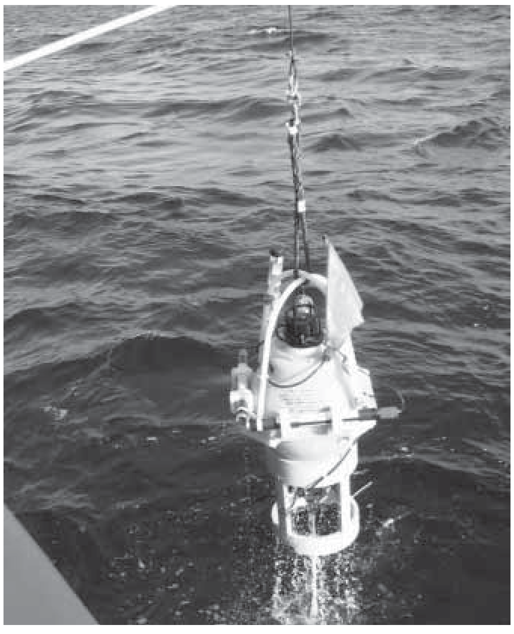

Figure 1: Ocean Bottom Seismometer (OBS).

The acquired data provides significant information on width and composition of the seabed sublayers down to 10 Km.

2. The Acquisition System

The acquisition system is based on a 4 channel 24 bits CS5372/76A analog to digital conversion (ADC) together with input signal amplification [3]. The CS5372 are two channel high dynamic range, fourth order Δ-Σ modulators designed for geophysical and sonar applications. The CS5372 ADC converter provides a dynamic range of 130 dB @ 103 Hz bandwidth and a Total Harmonic Distortion (THD) of –118 dB, while consuming low power per channel. The modulators generate an oversampled serial bit stream at 512kbits per second when operated from clock frequency of 2.048 MHz.

In the first version of the acquisition system, The input stage is based on OP97 and OP297 low noise amplifiers in a single ended to differential signal converter configuration, due to the fact that the signal coming from the geophone is single ended and the CS5372 ADC is differential. A MC68332 microcontroller is in charge of the configuration of the CS5376A digital filter selecting sampling rate, filter output and low power operations, through a QSPI (Queued Serial Port Interface) bus. A Persitor CF8 storage module based on Compactflash memory card with a capacity of 2 GB has been used for mass storage. The velocity of acoustic signal through the medium is the parameter that provides information about its width and composition. Therefore, the acquired data has to be time stamped before being stored. In order to perfrom a coherent acquisition with minimal phase difference between signals, a signle TC-140 crystal with a time drift of 44 ms/day, is used to generate all the signals necessary for the acquisition.

In order to quantify the system performance, a series of tests based on the international standards [4][5] have been developed. In these tests, the effect of external noise coupled to the system has been minimized. Moreover, a low noise and distortion signal generator (Stanford Research Systems DS360) has been used. The developed test tools are based on data processing of a known input signal acquisition in the frequency domain. The main characterization tests are:

- -DFT (Discrete Fourier Transform) test
- -Random noise Test
- -Crosstalk test

The detailed test procedure as well as the expressions used to calculate the parameters in these tests are given in [6].

The developed tests were used to characterize the fisrt version of the acquisition system with the results gathered in table I. The samplig rate is 250 sps and the number of samples acquired per channel is 4096.

Parameter	Value
Dynamic Range	110 dB
Signal-to-Noise Ratio (10·µVpp single ended input)	2 dB
ENOB	18.6 bits
Total Harmonic Distortion (THD)	-72 dB
RMS Noise	-139 db
Random Noise	1.72 µV
Channel Crosstalk	-95 dB

Table I. Specifications of the first version of the acquisition system. Sampling rate is 250 sps and number of samples per channel is 4096.

Comparing data in table I with the specifications of the CS5372/76A ADC system, we can see that there is a 20 dB dynamic reduction in the same bandwidth while the noise level of the system has reduced the Effective Number Of Bits (ENOB) to 18.6 bits. At maximum input amplitude (3.5 Vpp), the system presents a very high distortion level (-72 dB).

Finally the acquisition system was tested in real environmental conditions and the collected data was compared with another calibrated OBS (GEOMAR K/MT 562). The results of this comparison between the two instruments have been satisfactory.

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