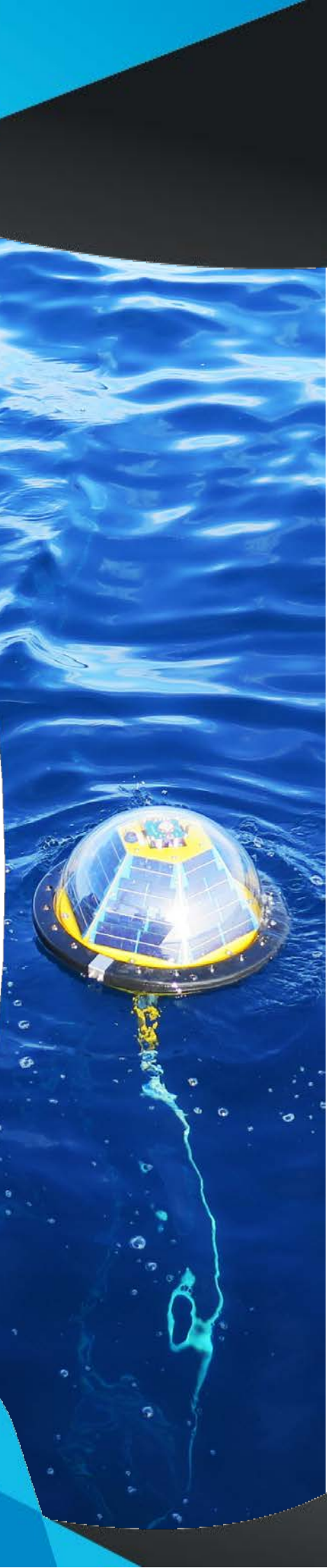
Anteia

Directional Wave Buoy

USER MANUAL



ZUNIBAL

Contents

I. INTRODUCTION

This user manual provides an overview of the principal components of the ANTEIA Directional Wave Buoy. This includes recommendations on installation, maintenance and recovery of the buoy, as well as the visualisation of data obtained from the buoy in OCEAN WATCHER (zuniwave.com).

The following points are covered within this manual:

- Description of the buoy and how it works;
- The manufacturer's recommendations on how to correctly install and recover the buoy;
- Description of the types of telemetry available to the user;
- Recommendations on maintenance procedures to be carried out on the buoy;
- Description of how to use the OCEAN WATCHER online interface to visualise ANTEIA Directional Wave Buoy data.

II. SPECIFICATION

1. Technical Specifications

Wave motion sensor

Calibration	Not needed
Sensor	GPS 10Hz
Period	1.6 to 60 sec
Exclusion	GPS signals do not penetrate through water, occasional data gaps may occur

Wave data

Data	North, East, Down (Only for special requirements)
Resolution	1cm
Range	± 20m
Rate	1.28Hz
Wave by wave	Each individual wave detected is reported and also sent

Spectral data

Frequency resolution	0.005Hz
Frequency range	0.005 to 1.275Hz
Direction resolution	1°
Direction range	0-360°

Standard features

LED flashing	4 leds, with IALA pattern
GPS position	From 1 to 15 minutes (configurable with steps of 0.5 minutes)
Water temperature	-1°C to 40°C, resolution 0.1°C, accuracy: ± 0.5°C

Options

Radio transmitter	868MHz. Up to 4Km
Iridium	Satellite communication
GSM	Internet communication

General

Hull diameter	0.6m (with fender)
Material	Plastic
Weight	26Kg
Batteries	Rechargeable Li-Ion
Solar panel	6 solar panels. Ensure the battery charging (power enough for long term survivability)
Power switch	Magnet

Data access

Web page	Data management/visualization, data downloading

2. ANTEIA Directional Wave Buoy: Components and operation.

ANTEIA is composed of the following:

a. Bottom half of the external casing is made of plastic material while the upper part of casing is manufactured from transparent plastic.

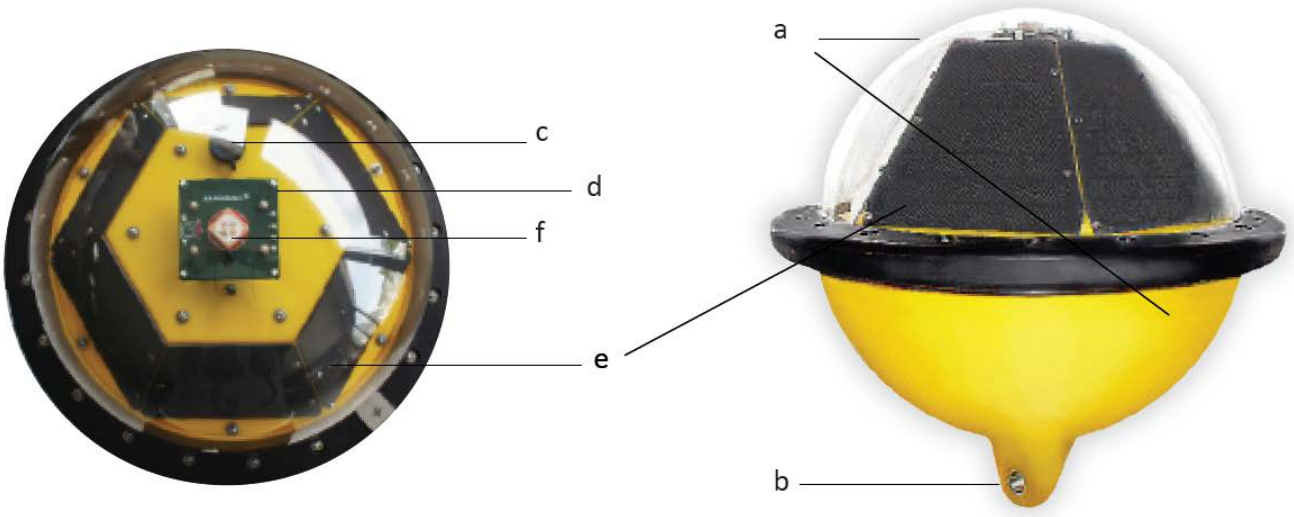
b. Eyebolt.

c. Batteries.

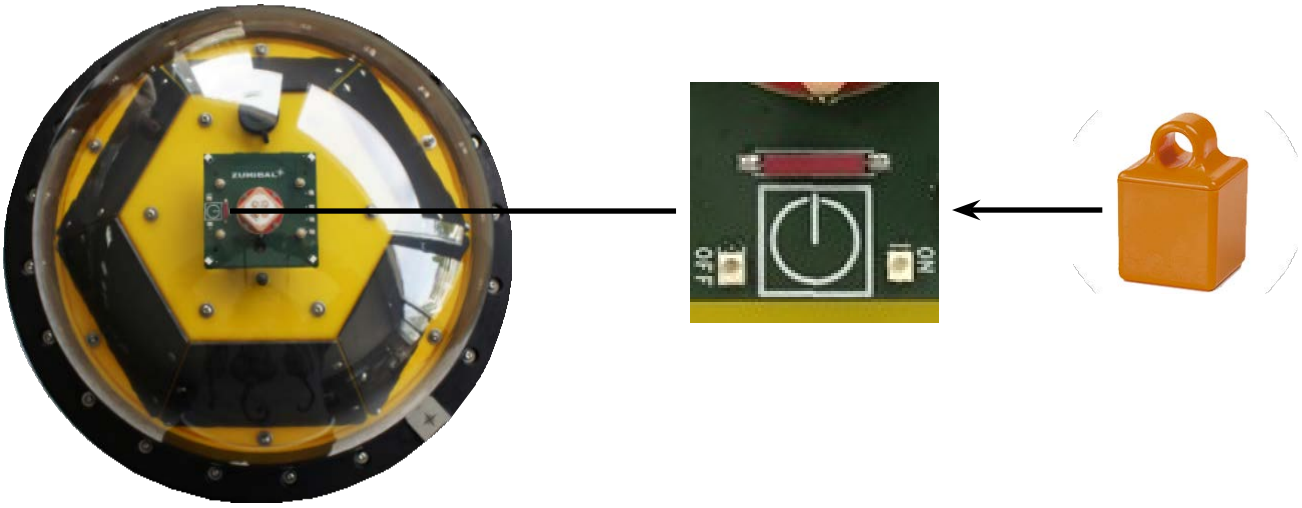
d. Electronics for system control.

e. Solar panels for energy supply.

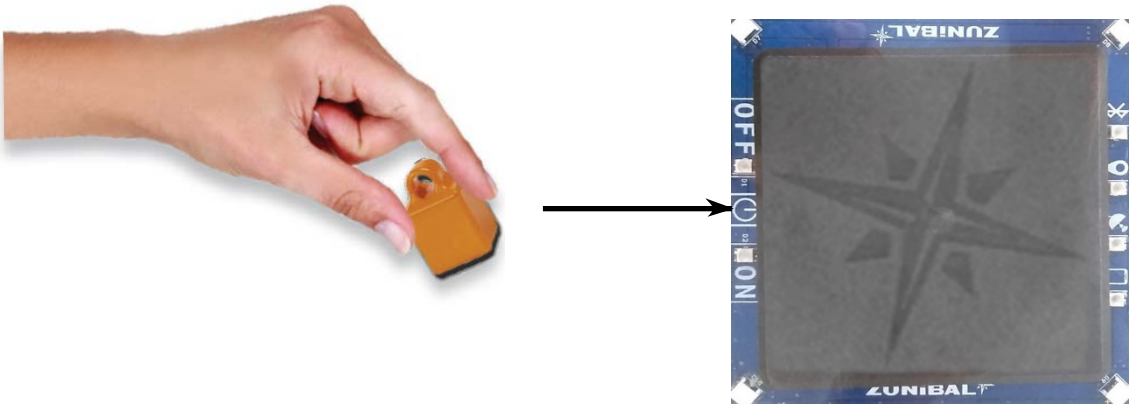
f. Communications antenna.



The buoy can be turned on by placing a magnet over the reed switch that is located at the top part of the buoy (as illustrated below).



To check whether the buoy is currently ON or OFF, briefly place the magnet over the ON/OFF icon. A red LED will appear if the buoy is switched off and a green light will appear if the buoy is switched on.

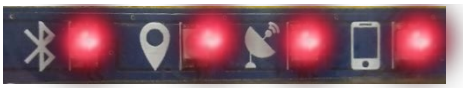


To turn the buoy ON or OFF, the magnet must be placed over the ON/OFF icon for 5 seconds until the colour of the LED changes (from red to green when switching the buoy ON and from green to red when switching it OFF) .

A number of LEDs are visible in the top part of the buoy. These LEDs, through specific flash sequences, can inform the user of the buoy's status, the status of its communications system as well of the telemetry in use in each case.

These LEDs are red when active. The flash sequences are as follows:

» **Bluetooth LED**: Flashes for 5 seconds when the buoy is switched on and then stops flashing. During this 5 second period, the buoy can connect via Bluetooth. Once the LED turns off, place a magnet over the ON/OFF icon again to reinitiate the Bluetooth LED flash sequence and reopen a new 5 second Bluetooth connection window.

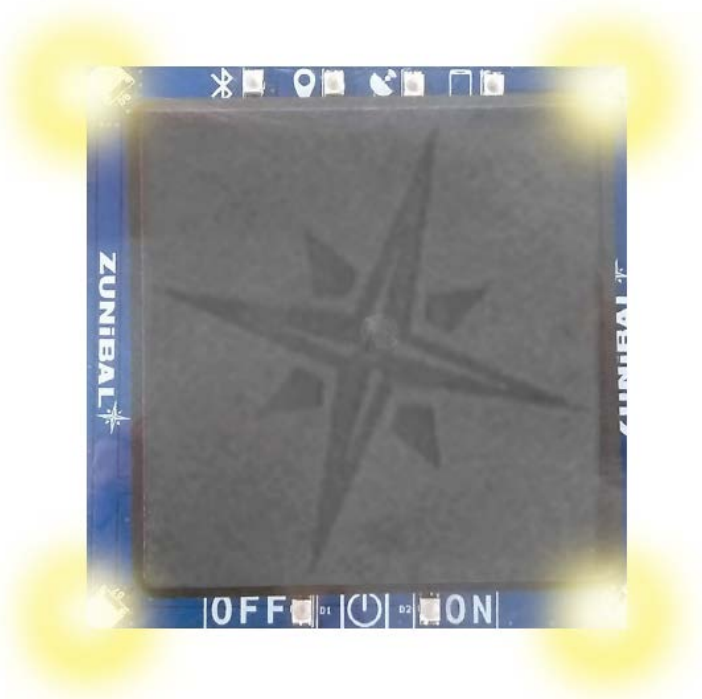


» **GPS LED**: On initiating the buoy, the GPS LED will remain ON for approximately one minute. After this, the LED will flash for a subsequent 15 minutes until it switches off automatically indicating that the GPS/GNSS is operational and the buoy has satellite position fixes.

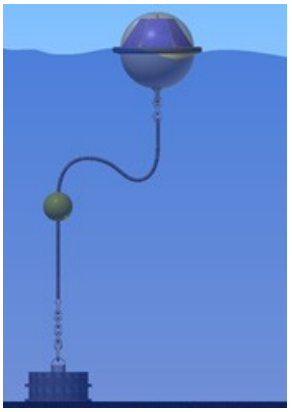
» **GSM LED**: On initiating the buoy, this LED will flash for 5 seconds indicating that GSM is active. This LED will automatically switch off after a 5 second period. If, however, the GSM LED does not flash when the buoy is switched on, this means that the GSM module is not activated.

» **Iridium communications LED**: On initiating the buoy, this LED will flash for 5 seconds indicating that Iridium is active. This LED will automatically switch off after a 5 second period. If, however, the satellite LED does not flash when the buoy is switched on, the Iridium module is not activated.

In addition, the LEDs located at the corners of the board are designed to display a flash sequence, which according to IALA rules, indicates the buoy to be an Oceanographic Data Acquisition System. The rhythm of LED flashes is as follows: during the initial 10 seconds there will be two groups of 5 flashes with 2 second intervals between each group. The LEDs will then switch off for the subsequent 10 seconds before once again reinitiating the 20 second sequence.



3. Mooring System



The mooring system is composed of a section of elastomer, followed by a section of rope connected to the dead weight by means of a chain. ZUNIBAL's recommendation for a correct and safe buoy installation is to carry out a controlled decent to ensure that the buoy ends up safely in its correct position.

In addition, it is necessary to ensure that the bolt for each shackle is correctly fastened, as indicated in the images below:

4. Communications.

Anteia Wave Buoy has three ways of communicating its data: GSM, satellite and radio. These three systems can work at the same time, or select the best one for each mode of operation.

GSM:

Inside the buoy, there is a 2G modem that allows the buoy to send all the information generated to a server. The communication is established every 30 minutes, and all the information that has been generated in this period of time is sent to the server. All this data will be accessible through the website.

On the top part of the buoy, a SIM card has to be inserted, and configured without a PIN code. For each location a good mobile provider should be selected, taking care that the modem only works on 2G networks.

Frequencies: 850/900/1800/1900MHz

Satellite:

Using satellite communication ensures worldwide coverage, and avoids the dependence on cellular networks. In this buoy, the Iridium network is used. It can work in 3 different ways:

->Watcher: If the buoys drifts, it starts to send message positions. This position can be displayed in the website, email or SMS. In normal mode, the buoy sends one message per day, just to ensure the proper coverage of the area.

->Statistical 60 min: It sends some statistical parameters every 60 minutes. This information covers only measurements of the last 30 minutes of the hour.

->Statistical every 30 minutes: It sends some statistical parameters every 30 minutes.

Zunibal will provide the communications plan for each mode of operation.

Radio:

For short access (less than 4 Km), a direct radio link can be used. By using this method of communication, a radio link is established between the buoy and the transceiver.

By using radio, at the moment that some information is generated in the buoy, it is sent in real time, for example, when a wave passes through the buoy, it sends its height and period. As for statistical parameters, they will be received every 30 minutes along with GPS information, depending on the buoy configuration.

The receiver has a proprietary NMEA output with the wave information.

The below chart shows the radio characteristics:

General	
Voltage	9-36 Vdc
Power Consumption	0.6 W
Radio	
Radio Frequency	868.0-870.0 MHz
Max output power	27 dBm
Channels	3
Interface	
Protocol	Proprietary NMEA
RS-232	9600,19200,115200 bps
USB	2.0
Dimensions	
H x W x D	63 x 115 x 198 mm
Weight	750 g
Environmental	
Temperature range	-5 – 50°C
Relative humidity	10-70% (non-condensing)
IP	IP40

III. MAINTENENCE

ZUNIBAL, as the buoy's manufacturer, strongly recommends that users check the elastomer every 8 months. If a deterioration in the elastomer is detected, replacement elastomer should be used.

To ensure that the battery is able to charge correctly using its solar panels, it is essential that the cupula of the buoy is cleaned at least every 8 months to avoid a build up of bio-fouling and dirt.

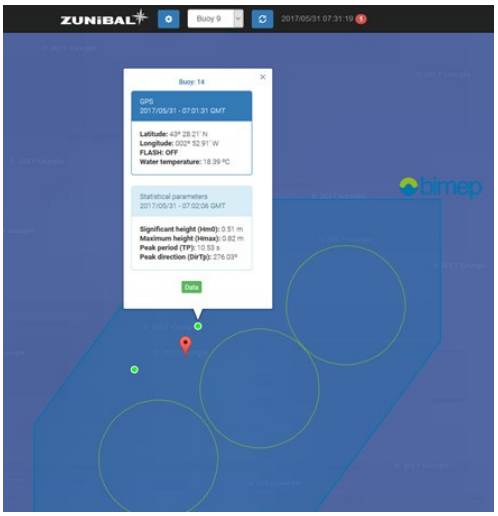
ZUNIBAL will take no responsibility for any incorrect data resulting from a lack of appropriate maintenance of the buoy.

IV. DATA VISUALISATION: WEB INTERFACE

To view the statistical and spectral parameters in real time, ZUNIBAL provides users with a web tool which, by means of a unique personal access password, allows users to access information from the buoy(s).

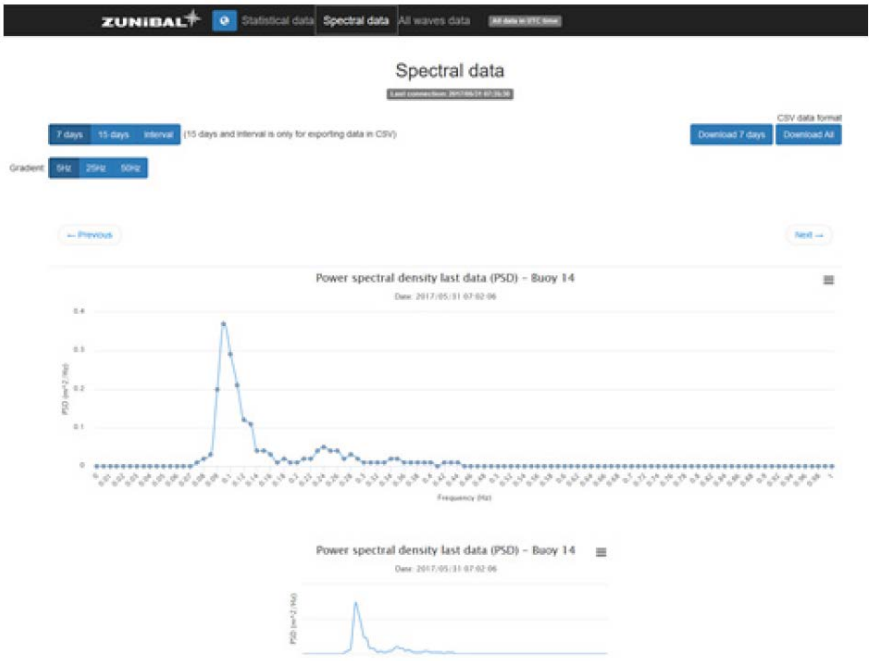
The options that are available to users are as follows:

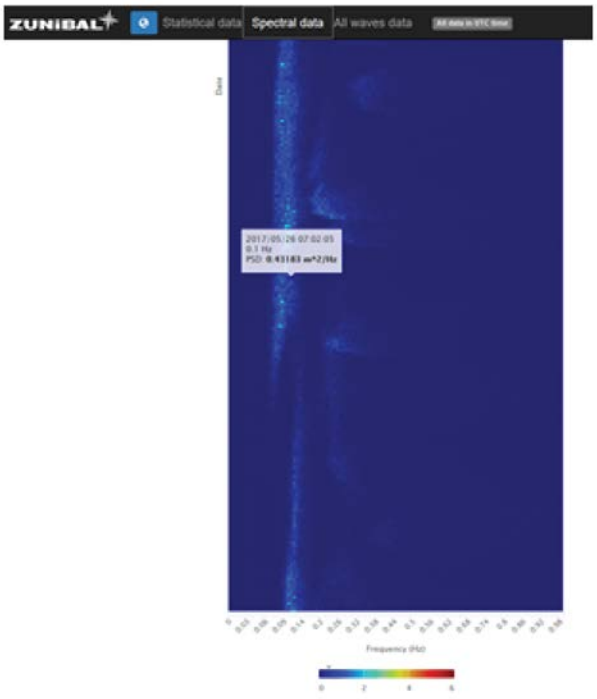
- Visualisation of current data and position information on a home screen.



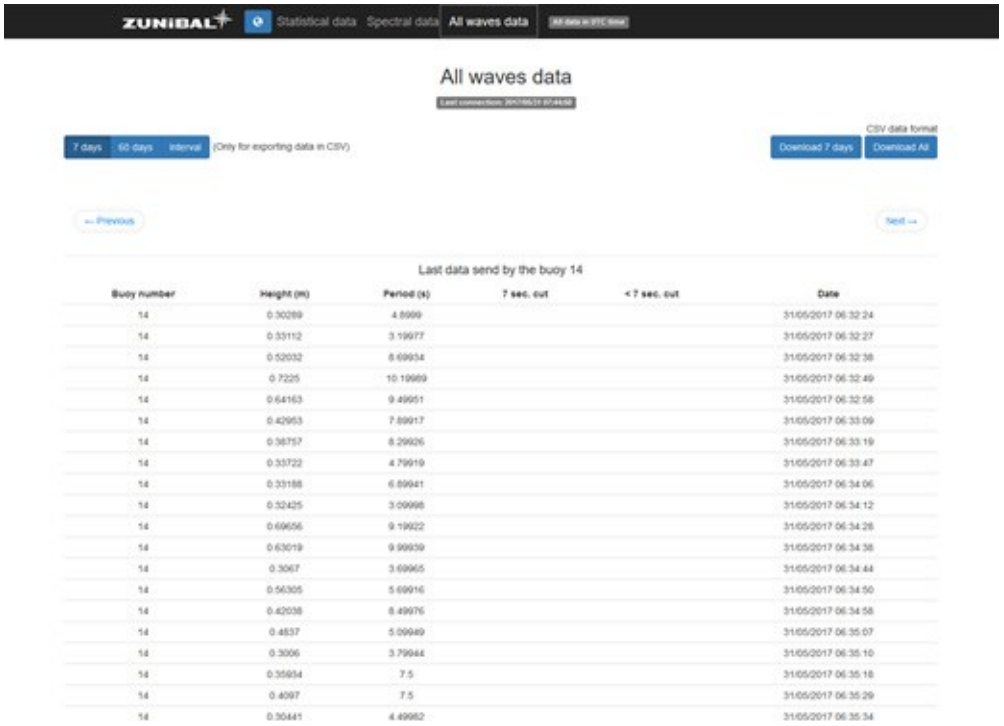
- Visualisation of statistical data compiled over the previous 30 minutes.

- Visualisation of spectral data.




ZUNIBAL
Statistical data
Spectral data
All waves data
All data in UTC time
Date
2017/05/26 07:02:05
0.1 Hz
PSD: 0.43183 m^2/Hz
Frequency (Hz)

- Visualisation of real time data.



On each of the screens where users can view buoy data, there are a series of buttons that allow users to change the way data is displayed between 7 and 60 days. Alternatively, users can manually select an interval of their choice.

Likewise it is also possible to download files with the selected data in CSV format for the previous 7 days or all the data that appears on the page.

Anteia

Directional Wave Buoy

ZUNIBAL

zunibal@zunibal.com
www.zunibal.com
Idorsolo, 1
48160 Derio
Bizkaia - Spain