

ID7- ANTEIA SYSTEM: COST-EFFECTIVE SOLUTION FOR EXTENSE WAVE MONITORING

IRATXE ARRAIBI-LANDA¹²⁷, ADOLFO GARCÍA-CORCUERA¹²⁸, JULIEN MADER¹¹, MANUEL GONZÁLEZ¹²

Abstract

Bearing in mind the growing importance of reliable temporal data series for scientific surveys and monitoring related to climate change and extreme events, among other things, the ANTEIA System was developed as a cost-effective solution and service to measure ocean surface waves, available to the scientific world.

In this sense, ANTEIA System has some specific advantages which include its light weight (26kg), its diameter (0.6m) and its solar powered rechargeable battery. It also offers real time data visualization via website and app, bespoke mooring design for each site and tried-and-tested reliability, which will be shown in the comparative section of this paper.

Keywords – wave buoy, array, oceanography, comparative, service.

I. INTRODUCTION

Marine meteorology and oceanography occupy a global role, serving a wide range of users, from international shipping, fishing and other met-ocean activities on the high seas, to the various activities which take place in coastal and off-shore areas and on the coast itself.

The observational requirements for global and regional wave modelling depend on the applications for which the data are required and are based on the need to provide an accurate analysis of the sea state at regular intervals. The key model variables for which observations are needed are: 1) significant wave height; 2) dominant wave period; 3) wave 1-D energy frequency spectrum; 4) wave directional energy frequency spectrum, and 5) 2-D frequency-direction spectral wave energy density[1].

Although the technology for ocean observation has improved during the last few decades, the prices for these systems have remained more or less constant, and this is the main reason for a poor coverage of in situ wave data collection. ANTEIA addresses this gap by proposing a cost-effective solution to wave observation and long-term monitoring.

II. ANTEIA SYSTEM DESCRIPTION

ANTEIA System has been developed to fulfil the most recent market requirements and it is composed of the following elements:

1. ANTEIA Wave Buoy: A small and easy-to-deploy buoy weighing 26 kg and measuring 0.6 meters in diameter. The physical characteristics and the materials with which it is made provide many advantages. There is no need for heavy lifting equipment as it can be deployed and recovered using a small boat and it is much easier to deploy an array of buoys to cover as much area as possible. Its physical characteristics also open the way to reducing the operational costs linked to buoy maintenance.

2. Mooring system: This buoy has a bespoke mooring system, allowing free movement for optimum wave parameters detection. This mooring is specially designed for the buoy and can be fitted to different depths and current conditions.

3. Real-time data website: Zunibal has developed its own website for data visualization. By means of this website, Zunibal offers the following relevant information:

- Display of the latest wave data;
- Historical data download, both statistical and spectral wave data;
- Data visualization through a set of dynamic graphics;
- Wave-by-wave data display and download options.

4. 24x7 technical assistance policy: In this case, the assistance and monitoring of the state of the buoys is given by automatic warnings if any problem is detected, such as a low battery or mooring break.

In terms of technology involved in this innovative system, the wave parameters are obtained from GPS information, unlike traditional systems which use inertial technology. The advantages of this novel technology are the following:

- No need for calibration;

- Provide a time absolute reference (GPS time);

- Increased accuracy as a single integration is needed to obtain wave parameters, instead of a noisy double integration of accelerations.

The data obtained from this system is related to all wave parameters (i. e., wave heave, period and direction), both statistical and spectral data, every 30 minutes and includes the possibility of having wave-by-wave information in real time.

III. COMPARATIVE

In this section, we show the tried-and-tested reliability of this system compared to the most known commercial buoy on the market (Datawell's Waverider). These comparative tests are taking place in the Smartbay Test Site, Galway Bay (Ireland).

	Latitude	Longitude
Datawell Waverider	53° 13.649'	09° 16.087'
ANTEIA Wave Buoy	53° 13.762'	09° 16.100'

Table 1. Buoys' locations at Smartbay Test Site

The following figures show the data from ANTEIA and Waverider buoys, located at a distance of 130 m from each other, over a ten-day period.

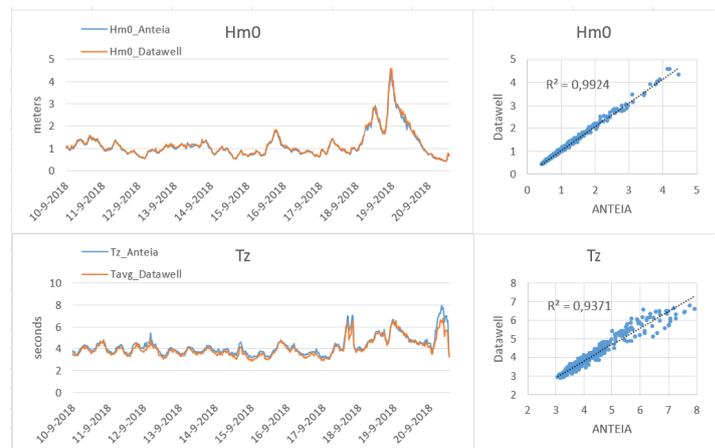


Fig 1. Data comparison between buoys

IV. CONCLUSIONS

As shown in the previous section, the correlation between ANTEIA and Datawell wave data is certainly high so it can be asserted that ANTEIA System can provide a long term solution for the current observational requirements in near shore operational surveys and coastal defence and management, as well as enable the validation of numerical models used for predictions.

REFERENCES

- [1] Guimei Liu, "Statement of guidance for ocean applications", IPET-OSDE, June 2016.
- [2] Waverider Data Resource at Smartbay by Marine Institute Ireland, <https://erdap.marine.ie/erddap/index.html>