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Abyssal & OPT solution for the mitigation of Illegal Fishing

Integrating a data gathering device with a visualization platform to create an integrated remote and unmanned approach to maritime and border awareness.

Contents

Executive Summary

The combination of an Abyssal Cloud Monitoring Platform and an Ocean Power Technologies (OPT) PB3 PowerBuoy® with a Maritime Domain Awareness Solution offers customers remote, autonomous, low- to zero-carbon solutions for Illegal, unreported, and unregulated (IUU) fishing prevention and supports active enforcement efforts to reduce the millions of tons of fish[1] and associated tax revenues lost every year to illegal activities.

This joint solution can benefit various entities whose mission is to develop advanced technologies for the maritime domain. It is particularly applicable for defense and security, drug interdiction, illegal immigration prevention, offshore perimeter monitoring, and IUU fisheries mitigation. The combined solution utilizes state-of-the-art technology to enhance and augment existing maritime security infrastructure and increase capabilities and safety while reducing costs and carbon emissions.

The joint solution can be programmed to conduct routine monitoring of the coverage area and continuously identify potential targets by radar, Automatic Identification System (AIS), and/or High Definition (HD) imaging equipment on the PowerBuoy®.

IUU fishing activities are currently one of the major threats to local economies, the environment, and the overall security of coastal areas – geopolitical stability, maritime piracy, human trafficking, food security, among others.

According to the Food and Agriculture Organization of the United Nations (UNFAO), nearly 90 percent of global fisheries are either fully exploited or overexploited and depleted[2]. This fact further deepens IUU fishing activities' emergence, which accounts globally for an estimated $15 to $36 billion of illegal profits annually[3].

Despite improvements in surface and subsea data acquisition technology, power management technology, and communications technology, only

[1] http://www.fao.org/fao-stories/article/en/c/1136937/
[2] http://www.fao.org/fisheries/en/
[3] https://www.stimson.org/2019/spurring-action-on-illegal-fishing-and-illicit-networks/

limited advances have been made to capture the real value of the vast amount of data generated from these state-of-the-art technologies in the fight against IUU fishing activities.

Current methods fail to properly integrate and contextualize the available data, which is presently being stored in separate databases or scattered through multiple systems and software, locking in the real value of the data and making it extremely difficult to extract actionable intelligence.

OPT and Abyssal realize that a significant gap remains in the market for a solution that

- can gather local data in real-time in large offshore regions that are unguarded;
- can integrate massive amounts of data coming in different formats from multiple scattered sources;
- can enable truly integrated real-time onshore monitoring able to visualize and recognize illicit activities efficiently.

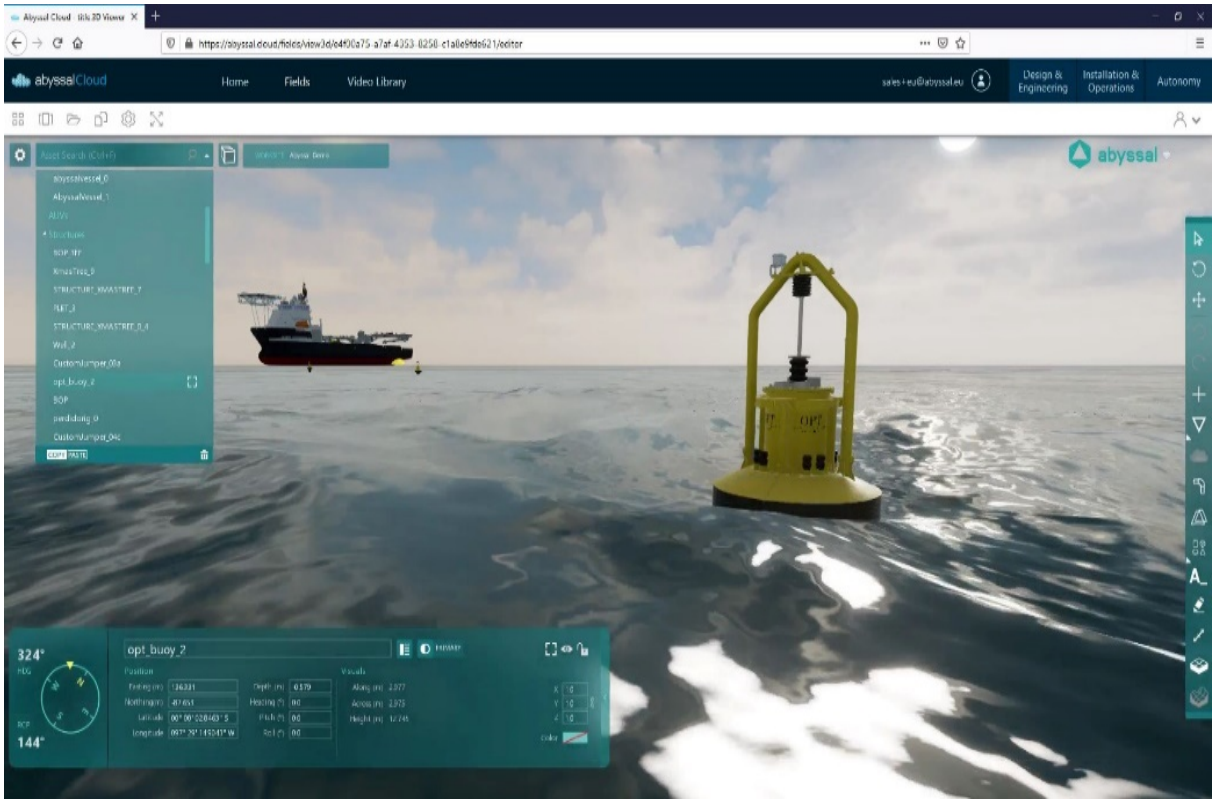


Figure 1: OPT PB3 depicted within the Abyssal Cloud Monitoring System

The Innovation

Abyssal and OPT propose integrating two innovative, field-proven products – the OPT PB3 PowerBuoy® equipped with a Maritime Domain Awareness Solution and the Abyssal Cloud Monitoring System.

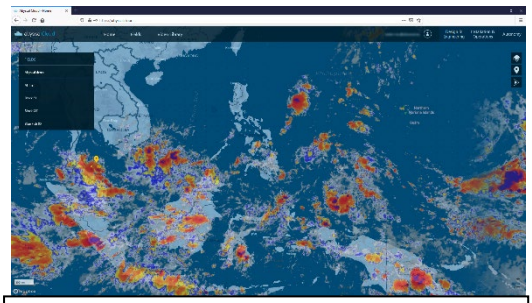


Figure 2: Abyssal Cloud GIS screen

The Abyssal Cloud offers a 3D visualization platform, incorporates a survey-grade Geographic Information System (GIS), see Figure 2,, and can acquire, process, and integrate data in real-time from multiple sources. This means that all the data gathered via the PB3 PowerBuoy®, such as imagery, radar, subsea sensors, and metocean, is time-stamped and geospatially-referenced (x,y,z) in a 3D asset-centric platform.

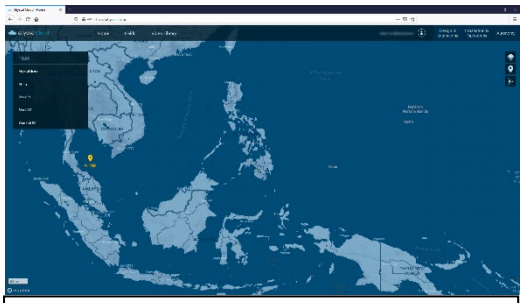


Figure 3: deployed buoy array within the GIS screen

Using the joint solution, the user can visualize all its relevant sites across the globe and can zoom into each site to understand in detail what is happening, and then further zoom down to the payload level of each PowerBuoy® to visualize any detail or retrieve any information (historical data, real-time data, imagery, documents, etc.), see Figure 3 for a depiction of an installed buoy array location

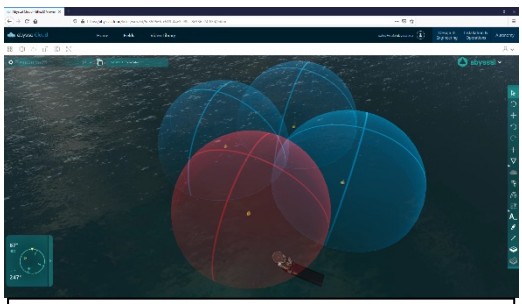
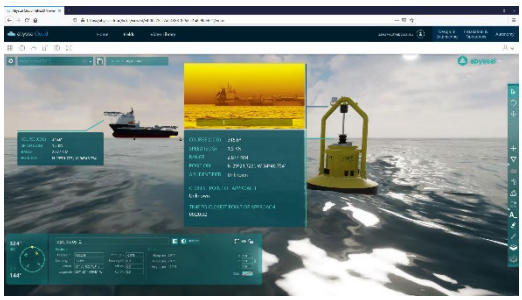


Figure 4: illustration of the data interfaces associated with each buoy.

The joint solution also enables integration of external data sources such as AIS, satellite, video libraries, documentation systems, and others. These can be assessed, analyzed, and displayed in real-time in a 2D and 3DGIS environment, see Figure 4, enabling a very powerful system to track any asset (being a threat or not) locally, via the PowerBuoy® in real-time, providing a very efficient and robust decision support system.



Additionally, the solution will also allow the user to act on specific payloads enabling users to remotely take control of these payloads in situations that require human intervention to improve the quality and/or quantity of the data being collected.

Having all the data available through a single user interface means it is easier to develop and deliver reports, either internally – for management – or externally – to meet regulatory, statutory, or voluntary compliance requirements. All these benefits will substantially reduce the need for human intervention – e.g. transferring data, correlating data, identifying ilicit activities, planning buoy location and payload coverage – and will drastically mitigate IUU fishing.

The integrated solution yields the following features and benefits:

- Better and more efficient decision making
- Single platform interface, cloud-based and accessible from anywhere, improving the user experience
- Ability to integrate extensive area monitoring
- Complementary integration of other data sources, such as from vessels (manned and unmanned) and satellites
- Lower cost compared to utilizing additional vessels
- Ability to reduce the number of man-hours spent at sea though targeted interdiction
- Connectivity through a wide range of communication channels, including LTE, 5G, long-range WiFi, and satellite data.

Mission Profile

- The PowerBuoy® with Maritime Domain Awareness Solution's integrated radar, camera, and AIS identify vessels entering a specified area and are capable of dark vessel detection (DVD) for vessels operating with AIS disabled at night,
- Data sent wirelessly via the Abyssal Cloud can then be correlated and combined with other data sources to be visualized. A single portal enables continuous monitoring without resorting to manned vessels offshore and without spending valuable time searching for data and information in multiple scattered systems and files.
- Abyssal Cloud provides a command and control software able to receive all the offshore data related to a specific location, which can include:
  - All data coming in via the PB3 PowerBuoy® as well as data coming from the payload attached to it;
  - Data coming from multiple scattered systems like satellite data and historical data relevant for the location;
  - Real-time data, telemetry, and positioning coming from multiple vehicles and vessels within that specific operating picture (this includes the vessels that are considered threats, intercept vessels dispatched, and even USVs that are being used to monitor or collect data).
- An array of multiple buoys can create a virtual "fence" when placed at coordinates considered high-risk zones of piracy, smuggling, illegal fishing, and border conflicts, see Figure 5.

Figure 5: illustration of a potential array around sensitive maritime areas in Indonesia

- The Abyssal Cloud collects the real-time data from the PB3 PowerBuoy® and can be visualized in coastal control stations to enable better decision-making. The OPT Maritime Domain Awareness Solution enhances the ability to detect, track, and monitor vessels passing through territorial and international waters.

Commercial Potential

The OPT and Abyssal ocean monitoring system has potential value in many segments, including, but not limited to:

- defense and security;
- prevention of IUU fishing;
- drug interdiction;
- monitoring of protected marine areas;
- illegal immigration prevention;
- ocean conservation initiatives.

Potential customers include government agencies, defense contractors, and ocean conservation groups.

Combining OPT's renewable energy and offshore communications experience with Abyssal´s automated visualization and monitoring technology, see example screen in Figure 6, could create new opportunities for many commercial and military applications.

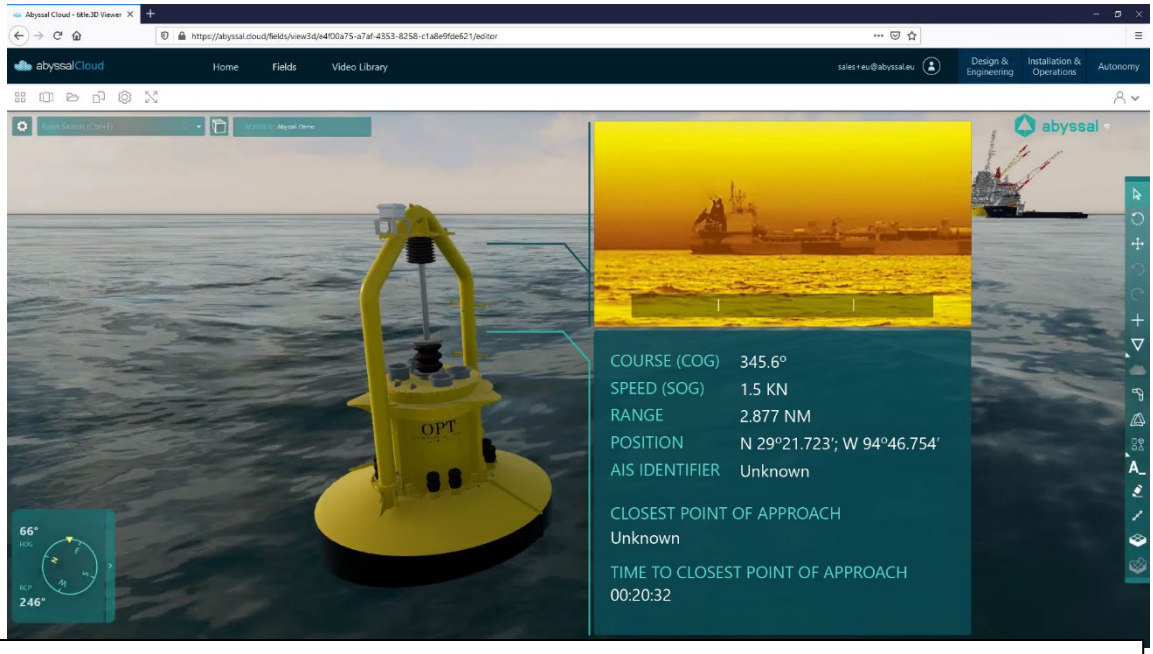


Figure 6: example query in the Abyssal cloud showing some of the data that can be depicted

Additional Information

For additional information about Abyssal & OPT´s solution for monitoring illegal fishing and how it could address a particular security concern, please contact Abyssal or OPT directly.

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Disclaimer

This paper outlines a new solution for autonomous offshore monitoring. Most elements of this concept are commercialy available. In addition to historical information, this paper may contain forward-looking statements that are within the safe harbor provisions of the Private Securities Litigation Reform Act of 1995.

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