SAILDRONES, THE FUTURE OF OCEAN EXPLORATION,

BEING AN ESSAY SUBMITTED TO

THE DEPARTMENT OF POSTGRADUATE STUDIES,

ATLANTIC INTERNATIONAL UNIVERSITY.

AMINU ABDULLAHI

October, 2022

SAILDRONES, THE FUTURE OF OCEAN EXPLORATION.

INTRODUCTION

A drone is any unpiloted aircraft or vessel that can carry out range of tasks, from military operations to package delivery. It can be as large as aircraft and as small as the palm of your hand. Drones are robot-like aircrafts vessels which receives remote commands from a pilot or rallies on software for autonomous flight. A drone is made up of aerodynamics, circuit boards, chipset and software which is the brains of the drone (Urwin M, 2022).

Examples of drones include DJI Phantom series with professional aerial cinematographers, highly advanced drones like DJI, Mavic Mini, Mavic 2, Mavic Air 2, Phantom 4, Pro V 2.0, Yuneec Typhoon H3 and Autel Evo 2 all are available in the market.

HOW DOES A DRONE WORK?

A typical unmanned aircraft or vessel is made up of a light composite material to reduce weight and increase manoeuvrability. This composite material strengthen allows military drones to cruise at extremely high altitudes. The UAV drones are equipped with different state of the art technology such as infrared cameras, GPS, and laser (consumer, military and commercial UAV). Drones are controlled by remote ground control systems (RGC) known as ground cockpit.

An unmanned aerial or sail vehicle system has two parts, the drone itself and the control system. The nose of the unmanned aerial vehicle is all the sensors and navigational systems are present. The rest of the body is full of drone technology systems, since there is no space required to accommodate humans.

The engineering materials used to build the drones are highly complex composite designed to absorbed vibration, which decrease the sound produced. The materials are very light weight (Corrigan F, 2020).

Ocean mapping or seabed mapping is the measurement, mapping, and imaging of water depth of the ocean (seabed topography) or another given body of water. Ocean bathymetric charts and submarine geomorphology have significantly impacted our understanding of our planet, from plate tectonics to deep sea ecosystems (Bastos A, 2022). Bathymetric measurements started from simple methodology using depth sounding, sonar and Lidar techniques, then buoys and satellites altimetry. Various methods have advantages and disadvantages and specific method used depends on the scale of the area under study, financial means, desired measurement accuracy, and additional variables.

Study had shown that the first recorded evidence of water depth measurement was from Ancient Egypt, about 3000 years ago (Ameribrahimi S, Wolfl A C, Snaith H, 2019).

Why Ocean Mapping?

Accurate ocean mapping is important and necessary for sciences and industry, navigation and transportation purposes, laying underwater cables and pipelines, building offshore wind turbines, exploration for oil and gas projects, fisheries management and conservation, telecommunications, offshore energy and understanding the ocean currents and physical properties related to weather and climate. Oceans make up 70% of the earth's surface with millions of living organisms.

Enhanced seabed mapping is vital for security, safety, and economic health of every country sharing border with oceanic bodies. It is also critical to the growth of the blue economy, which according to the Organization for Economic Cooperation and Development (OECD) is valued at **$1.5 trillion a year**, and create the equivalent of **31 million full-time jobs** (Saildrone, 2021).

The joint initiative between GEBCO and the Nippon Foundation which was backed up by the United Nations aimed to produce a definitive map of the world ocean by 2030 and the White House Memorandum on ocean mapping which calls for national strategy for mapping, exploring, and characterizing the United States exclusive economic zone made it very necessary to develop more sensitive and cost effective state-of-the art instrument to mapped out the entire ocean of the world. Knowing the shape of the seabed is critical in understanding ocean circulation patterns, which affect climate and weather prediction, tides, waves action and tsunami wave propagation, sediment transport, under water geo-hazards, and resource exploration (Saildrone, 2021).

Methods and Techniques Use in Ocean Mapping

Various methods and techniques had been utilized in conducting ocean mapping from depth sounding, sonar and Lidar techniques, to buoys and satellites altimetry. It is currently done using very large and expensive crewed ships. This was very expensive and hazardous, putting human lives at risks. Then there was emergence of Saildrone Explorer which was also launched by same Saildrone Company, about 23-foot wing and solar powered. It had conducted several operational mission for science, ocean mapping and maritime security, and had covered more than 500, 000 nautical miles from the Artic to Antarctic (Saildrone, 2021).

The Launching of Saildrone Surveyor.

The launching of Saildrone Surveyor is a scale up project of the Saildrone Explorer. It was a major advancement in marine technology, being an uncrewed vessel, and using renewable solar energy to power its robust sensor suite. With equivalent survey capabilities to Saildrone Explorer, Saildrone Surveyor can work at a fraction of its cost, and being uncrewed vessel, without putting human health and safety at risk.

The Saildrone Surveyor is a new 72-foot unmanned surface vehicle equipped for high resolution mapping of the seafloor. It carries a sophisticated array of acoustic instruments for both shallow and deep water ocean mapping. It is capable of mapping the seafloor down to 7,000 meters below the surface. It also carries two state-of-the art acoustic Doppler current profilers (ADCPs), the Teledyne Pinnacle 45 ADCP and the Semrad EC 150-3C ADCP, to measure ocean currents and understand what is in water column. It is also equipped with the Semrad EK 80 echo sounder for fish stock assessments.

The Saildrone Surveyor was developed in part through a Public Private Partnership with the University of New Hampshire (UNH) and the Monterey Bay Aquarium Research Institute (MBARI) aimed at integrating and testing sensors on the Saildrone Surveyor for mapping the seafloor and revealing life in the water column. The surveyor was also expected to collect samples of environmental DNA (eDNA) from the water in addition to ocean mapping mission. The Public Private Partnership was supported by a three-year grant from National Oceanic and Atmospheric Administration (NOAA), Office of Ocean Exploration and Research (OER) through the National Oceanographic Partnership Program (NOPP) (Saildrone, 2021).

Conclusion.

The invention of Saildrone Surveyor being environmentally friendly, powered by wind and solar, and uncrewed, operating 24/7/365 without the need for a crew support vehicle was a major breakthrough in the field of marine technology. The benefits are enormous from economy, security and safety, to educational and job creation.

REFERENCES:

1. Ameribrahimi S, Wolfl A C, Snaith H, (2019) “Seafloor Mapping-The Challenge of a Truly Global Ocean Bathymetry” Frontiers in Marine Science. 6: 283. Doi: 10.3389/fmars.2019.00283@.
2. Bastos A, (2022). Ocean Mapping: history of Exploration in Meaningful Words. Available from: (https://www.hydro-internatinal.com>...). Accessed on 08/09/2022.
3. Corrigan F, (2020). How Do Drones Work and What is Drone Technology? Retrieved from: (https://www.droneszon.com/learn-about-drone-quadcopters...). Accessed on 01/10/2022.
4. Saildrone, (2021). Technology, Saildrone Launches 72-Foot Surveyor, Revolutionizing Ocean Seabed Mapping. Retrieved from: (https://www.saildrone.com/news/saildrone-launches-72-foo...). Accessed on 08/09/2022.
5. Urwin M, (2022). Drone Technology: What is a Drone? Retrieved from: (https://builtin.com>drones)