ISSN No:-2456-2165

To Feel the Pulse of the Sea : With Capacitance Sensors on Carbon Fibers Paper

Beiting Wang
PhD (Engineering), SEGi University No. 9, Jalan Teknologi Taman Sains Selangor,
Kota Damansara PJU 5, 47810, Petaling Jaya,
Selangor Darul Ehsan, Malaysia.
Feng Ling
PhD (Information Technology). SEGi University No. 9, Jalan Teknologi Taman Sains Selangor,
Kota Damansara PJU 5, 47810, Petaling Jaya, Selangor Darul Ehsan, Malaysia.
Department of Electronics and Electrical Engineering, Zhejiang Lishui University, Lishui 323000, PR China.

Abstract:- The ocean is the largest ecosystem on our planet, regulating change and variability in the climate system and supporting the global economy, ocean plays a pivotal role in the earth's physical, geochemical and biological systems and as such affects us all in pervasive and profound ways. a foundation for any observing, monitoring or research effort is effective and reliable in situ sensor technologies that accurately measure key environmental parameters. The main purpose of this study is to demonstrate the feasibility of using carbon fibers paper to identify the ocean observation sensor. To try fund a method that it can connect 500,000 islands on all the world, and a new ocean observation technology was established.

Keywords:- *ocean observation, digital ocean, sensors on carbon fibers paper.*

I. INTRODUCTION

The ocean is the largest ecosystem on our planet, regulating change and variability in the climate system and supporting the global economy, nutrition, health and wellbeing, water supply and energy. The coastal zone is home to the majority of the world population; dependency on the ecosystem services provided by the ocean is likely to increase with population growth.[1]

The ocean is critical to the earth's global systems, regulating weather and climate, the concentration of gases in the atmosphere, the cycling of nutrients, and providing important food resources. As ocean scientists deploy new technologies to observe these dynamic processes, the impacts of human activity are becoming increasingly obvious and of growing concern. Rising sea level, melting ice sheets, ocean acidification, dead zones, harmful algal blooms, coral bleaching, fish population and ecosystem declines are all being experienced at local and global scales. There is also a rising likelihood of major changes in ocean circulation, weather and climate. The well-being of humankind is dependent on the health and function of the world ocean.

Covering more than 70% of the earth's surface, the global ocean is under-sampled and poorly understood. But the ocean plays a pivotal role in the earth's physical, geochemical and biological systems and as such affects us all in pervasive and profound ways. [2]

Since the 1960s, remote sensing has played an important role in characterizing the marine environment, with particular emphasis on sea surface features, temperature, and salinity; mapping of shorelines, wetlands, and coral reefs; local fisheries and species movements; tracking hurricanes, earthquakes, and coastal flooding; and changes in coastal upwelling and marine productivity.[3]

Ocean science depends on skilled individuals and a broad array of infrastructure. Technological advances and international collaboration to transfer marine technology are key to leverage investigation and observation of the global ocean.

Sensor fusion has gained widespread acceptance for the study of terrestrial and marine environments by integrating data acquired from remote sensing systems of varying spatial, spectral, temporal, and radiometric resolutions. The generation of accurate oceanographic, hydrographic, biological, and ecological data models is of extreme importance to conservation efforts and the sustainability of marine resources.

Last century, the most prominent progresses in oceanography where in biology. Chemistry and physics remained behind mainly because of the lack of instruments, methods and data bank. The evolution of the scientific knowledges of the oceans towards modern oceanography occurred into two main steps: first a global understanding of surface phenomenon, especially winds and derived from data in navigators logbooks, and secondly the exploration of the depth when sounding and dredging by properly designed vessels became available.[4]

There is an international commitment to develop a comprehensive, coordinated and sustained ocean observation system. However, a foundation for any observing, monitoring

or research effort is effective and reliable in situ sensor technologies that accurately measure key environmental parameters.

Since the 1980s, ocean observation has shown a trend of "diversification, three-dimensional and real-time", and regional and national ocean observation systems play an important role in key sea areas. With the development of technology and innovation of ideas, the regional ocean observation system has been widely used and improved. International Marine observation stations such as the Irish sea area, the Carolina sea area, and the diversity of Victoria in Canada underwater experimental observation observation system (VENUS) is worth reference for example, they have diversified, three-dimensional real-time measurement data and physical oceanography, combining ecology and biochemistry pattern and implements of the Marine environment can be forecast.

"Digital ocean" with the concept of "digital earth" arises at the historic moment, via satellite, remote sensing and sea surface plane, submarine sensors such as comprehensive, real-time, continuous data acquisition, the ocean physical, chemical, biological and geological information into a "super computing system", make the sea into the human development and protect the ocean is the most effective virtual visual model. The United States, Britain, France, Germany, Russia and Japan are investing in "digital oceans" with cutting-edge scientific research and large amounts of money in order to gain information advantages in maritime competition. For example, the "Neptune" plan developed by the United States and Canada and the ARANA plan in Japan have been preliminarily implemented. Africa's 25 coastal countries have also jointly established a platform for offshore resource data and network information.

On January 31, 1998, a. Gore of the United States proposed the concept of digital earth, which is a representation of the earth that can be embedded into massive geographic data, multiresolution and three-dimensional, and can add a lot of information related to people's production and life. [6] This concept has been rapidly applied to political, economic, military and other fields, and the digital ocean derived from the digital earth has become the only way for humans to control the ocean.

The main purpose of this study is to demonstrate the feasibility of using carbon fibers paper to identify the ocean observation sensor. To try fund a method that it can connect 500,000 islands [8] on all the world, and a new ocean observation technology was established.

II. THE MATERIAL AND METHOD

A. *Material*

Used carbon fibers paper with silicon sheet be made a ribbon compose material on carbon fibers paper, according to table, select F=200Hz, C= 350.00Nf, theoretically, the capacitance sensor on carbon fibers paper can be made of infinite or infinite segments, used it connect 500,000 the Islands on the world.

F (Hz)	100	200	300	400	500	600	700	800	900	1000
Capacitance (Nf)	13.66	21.20	13.67	9.89	7.62	6.11	5.04	4.23	3.60	3.10
Capacitance (Nf/cm²)	0.028	0.035	0.0227	0.0165	0.0127	0.0102	0.0083	0.00705	0.006	0.005
Capacitance (Nf/m²)	280.00	350.00	227.00	165.00	127.00	102.00	83.00	70.50	60.00	50.00
Capacitance (F/km²)	0.28	0.35	0.227	0.165	0.127	0.102	0.083	0.0705	0.06	0.005

Table 1. The data of capacitance on carbon fibers paper

B. *The Islands on the world*

Almost 10% of global population live on islands. What are the 'official' cut-offs between what are large islands and what are small continents? There are no official 'designations'. There is no court of Geography making the regulations for such.

The number is very large, but there is no official number. If you add up a few official national counts, it is easy to get to 500,000. Sweden and Finland number their islands at 401,415.[7][8]

This is actually a much more complicated and difficult question than it might seem at first. What counts as an island? Australia? Greenland? So big. Rockall? So small. Manhattan? Miami Beach? So many bridges. Sealand? Manmade. Professor Steve Royle addressed this question in his magnificent *A Geography of Islands*.

There are also disputes over what is an island and what is not. Take Indonesia as an example. The CIA says it has 17,508, the Indonesian space agency says it has 18,307 and the UN says 16,056.

C. *Gradually global island sensor network*

I think can through three sets:
First, map the global island network,
Second, calculate the shortest path of the network.

Third, Deployed ribbon compose material on carbon fibers paper in the sea, to connect some islands, so a network of capacitance sensors on carbon fibers paper be finished.

III. RESULTS

A. *An example*

Taiwan Strait is a Strait between China's Taiwan is land and the coast of Fujian. North east - south west, about 370 km long. North narrow south wide, north mouth about 200 km wide; South mouth about 410 km wide; The narrowest point is

ISSN No:-2456-2165

between Taiwan island baisha headland and fujian haitan pingtan island, about 130 km. The total area is about 80,000 square kilometers.

Qiongzhou strait is located between leizhou peninsula of guangdong province and hainan province. It is one of the three major straits in China. The strait is about 80 km long from east to west and 39 km wide from north to south.5 kilometers, the narrowest 19.4 kilometers, with an average width of 29.5 km. The two sides of the strait are serrated, with cape and gulf. From east to west, the north bank has red cliff Angle, tailrace Angle, lantau Angle, teaching tailrace Angle. The promontory is composed of basalt rock, including hongkan bay, hai 'an bay and jiao wei bay. The qiongzhou strait is an important channel between the guangdong sea area and the beibu bay, which connects the beibu bay with the sea corridor in the middle and east of the south China sea. It is also a shortcut between guangzhou, zhanjiang and hainan, guangxi and Vietnam.

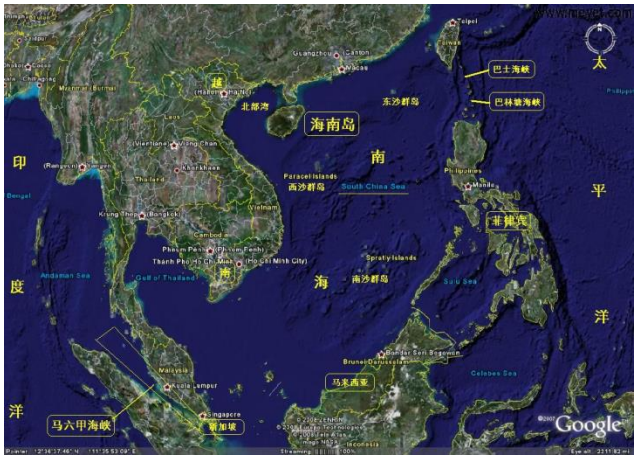

Fig 1:- A map of China

The direct distance from kaohsiung, Taiwan to haikou, hainan is about 1130km, and from Taipei, Taiwan to haikou, hainan is about 1340km.

	Distance (km)	*Capacitance (mf)*
From Taiwan to Fujian	200	70
From Taiwan to Hainan	1130	395.5
From Hainan to guangdong	19.4	6.79

The width of the Ribbon is 1m, and the capacitance is 350 nf/m^2.

IV. DISCUSSION

The project on network of island is a very huge, if the distance between the two islands are about mean 10 km, the total distance of the island network around the world are:

500,000 * 10 = 5,000,000km

The total distance of the island network around the world are:

5,000,000 * 1000 * 350 = 1,750 F

This study only is to demonstrate the feasibility of using carbon fibers paper to identify the ocean observation sensor. To try fund a method that it can connect 500,000 islands [8] on all the world, and a new ocean observation technology was established . The huge project still have many problem and technologies to be studied.

V. CONCLUSIONS

Used the carbon fibers paper as new materials made capacitance sensor and connect the islands all the world, the carbon fibers paper easy to industrialized production, easy to spend large area, through Block resistive, easy to set up performance indicators. Especially for economic applicability, the cost can be controlled at \$100 /m^2. May be a new technology about to observe the ocean dynamic processes, it can reach the objective on feeling the pulse of the Sea. So the technology of super capacitance sensors on carbon fibers paper connecting the islands all the world are achievable technology, must be able to be widely used, expect to be able to spread quickly.

VI. AUTHOR CONTRIBUTIONS

Beiting Wang performed an island network on the world model of the super capacitance sensor on carbon fibers paper, and Analysis of the model. Feng Ling research on the Signal processing system about the super capacitance sensor on carbon fibers paper. All authors proofread the paper and helped write the final document.

*Funding***:** "This research received no external funding"

VII. ACKNOWLEDGMENT

This work would not have been possible without the SEGi University and the IGS given me the opportunities for learning and research.

I am especially indebted to Dr Gibert Thio Tze Hwai and Chris Chong Hock Siong, who have been supportive of my career goals and who worked actively to provide me with the protected academic time to pursue those goals.

Nobody has been more important to me in the pursuit of this project than the my son, Dr. WANG XIAOFEI, who make the carbon fiber paper and help me finished the experiments. So, I would like to thank him, he is the ultimate role models.

Most importantly, I wish to thank my loving and supportive wife, Dr. LUI HONG, who has provided unending inspiration and unending supported.

Conflicts of Interest: “The authors declare no conflict of interest.”

REFERENCES

[1]. ‘Global Ocean Science Report’**,** Published in 2017 by the United Nations Educational, Scientific and Cultural Organization 7, place de Fontenoy, 75352 Paris 07 SP, France.

[2]. Eric Lindstrom, John Gunn, Albert Fischer, Andrea McCurdy and L.K. Glover , ‘A Framework for Ocean Observing’, Document Citation: A Framework for Ocean Observing. By the Task Team for an Integrated Framework for Sustained Ocean Observing, UNESCO 2012 (revised in 2017), IOC/INF-1284 rev.2, doi: 10.5270/OceanObs09-FOO.

[3]. Laura Brewington, Brian G. Frizzelle, Stephen J. Walsh, Carlos F. Mena. and Carolina Sampedro, ‘Remote Sensing of the Marine Environment.

[4]. Challenges and Opportunities in the Galapagos Islands of Ecuador’.

[5]. ‘Ocean Sciences: Their History and Relation to Man’, |S S N J 3 0 7 0 - 4 1 7 2.

[6]. C. Waldmann1, M. Tamburri2, R. D. Prien3, and P. Fietzek4, ‘Assessment of sensor performance’, Received: 8 June 2009 – Published in Ocean Sci. Discuss.: 31 July 2009 Revised: 24 November 2009 – Accepted: 30 November 2009 – Published: 17 February 2010.

[7]. ‘Digital ocean’, https://baike.so.com/doc/6137142-6350305.html.

[8]. ‘ISLAND DIRECTORY’, http://islands.unep.ch/isldir.htm.

[9]. ‘How many islands are there (officially) in the world?’ https://www.quora.com/How-many-islands-are-there-officially-in-the-world.