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Survey of Tracking Plastics in Our Sea

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Abstract

Contamination of the marine environment by human-made plastic litter is a growing and global problem. Plastic is a waste pollution in our oceans is becoming increasingly urgent to address. It is estimated that over 5 million tonnes of plastic enter the oceans every year and that this figure in rapidly growing. Indeed, it is estimated that in the next 5 years global production of plastic will be higher than in the entire 20th century. Moreover, plastic pollution does not only stay on the surface of the ocean but penetrates right to the very depths and indeed into living ocean organisms and the marine food web. The propose is developing advanced modelling tools to help assess the full extent of the problem of plastic pollution in our oceans and how it is affecting the marine environment. The tools will help policymakers design targeted measures to address a big and growing issue.

Keywords: *Plastic; Topios; Marine Environment; Oceans*

I. INTRODUCTION

Travelling on ocean currents this plastic is now turning up in every corner of our planet. Our oceans are slowly turning into a plastic soup and the effects on ocean life are chilling. Big pieces of plastic are choking and entangling turtles and seabirds and tiny pieces are clogging the stomachs of creatures who mistake it for food, from tiny zooplankton to whales. Plastic is now entering every level of the ocean food chain and even ending up in the seafood on our plates. But it doesn't have to be this way. Greenpeace is campaigning to end the flow of plastic into our oceans. We are calling on big

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corporations to act to reduce their plastic footprint – and stop producing excessive plastic packaging that is designed to be used once then thrown away. We are also calling on governments to act to tackle this problem, by creating closed loop systems that allow us to recover and reuse materials rather than waste them. Plastic pollution doesn't just hurt marine species. When animals eat these plastic pieces, the toxins are absorbed into their body and passed up the food chain. As plastics break apart in the ocean, they also release potentially toxic chemicals such as bisphenol A (BPA), which can then enter the food web.

RELATED WORKS

[1] An emerging environmental issue for the world's oceans is the accumulation of plastic debris on or near the ocean surface. A novel collaboration between The Ocean Cleanup foundation and Teledyne Optech - an aerial survey with the Optech CZMIL system, data processing and analysis - is expected to provide initial volume estimates for future debris collection by The Ocean Cleanup.

[2] The amount of human generated debris entering the oceans was recorded at eight billion kilograms (kg) in 2010, and has been rising exponentially by 10% each year. The most common pollutant is plastic which composes about 80% of the debris. Plastic takes approximately 500 years to decompose, and in that time, it is harming wildlife while collecting in the ocean's circular currents called gyres. The Subtropical Convergence Zone, stretching between California and China, contains the largest of the five major gyres, the North Pacific Subtropical Gyre, which is located between California and Hawaii. The estimated cost of environmental damage from human generated debris is about three billion dollars. Seven design alternatives are evaluated: autonomous vacuum (AV), vessel with nets (VN), barge with unmanned aerial vehicles (B-UAV), artificial floating island (AFI), artificial floating island with sail (AFI-S), artificial floating island with motor (AFI-M), and barge with autonomous surface vehicles (B-ASV). Using a multi-attribute utility function, the best alternative was determined per weights associated with performance, technology readiness level (TRL), and risk.

[3] We have used ensemble averages of satellite-derived free-air gravity anomaly data, together with inverse modelling techniques, to determine the effective elastic thickness, Te, of circum-Pacific subducting oceanic lithosphere and its

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relationship to plate age. Synthetic modelling tests show that Te can be recovered best using gravity anomaly, rather than bathymetry, data and profiles that are at least 750km long. Inverse modelling based on a uniform Te elastic plate suggests that Te increases with age of the subducting oceanic lithosphere and is given approximately by the depth to the 390±10 °C oceanic isotherm based on a cooling plate model. Misfits between the observed and calculated gravity anomalies are significantly improved if a mechanically weak zone is included between the trench axis and the outer rise. This weak zone is coincident with observations of bend-faulting and seismicity. Inverse modelling shows that Te landward of the outer rise is generally 40–65 per cent less than the Te seaward of the outer rise. Both landward and seaward Te increases with age of the lithosphere and are given by the depth to the 342–349 °C and 671–714 °C oceanic isotherm, respectively. A dependence of Te on age is consistent with models for the cooling of oceanic lithosphere as it moves away from a mid-ocean ridge and the temperature-dependent ductile creep of oceanic lithospheric minerals such as olivine. By comparing the observed Te to the predicted Te based on laboratory-derived yield strength envelopes and an assumption of elastic-perfectly plastic deformation, we have attempted to constrain the rheology of oceanic lithosphere. Regardless of the assumed friction coefficient, the dry-olivine low-temperature plasticity flow laws of Goetze, Evans & Goetze, Raterron et al. and Mei et al. all provide quite a good fit to the observed Te at circum-Pacific subduction zones. This result contrasts with the Hawaiian Islands, where these flow laws are generally too strong to fit the observations. The discrepancy in rheology within Pacific plate may be caused by differences in the timescale of loading and therefore the amount of viscoelastic stress relaxation that has occurred. Other possibilities include thermal rejuvenation and magma-assisted flexure at the Hawaiian Islands.

[4] Most ocean-cleaning initiatives target `turning off the taps', i.e. stopping the flow of plastic litter - over eight million tonnes a year - from the land. Packaging is the main culprit. Without such measures, plastic in the sea will outweigh fish by 2050, according to the Ellen MacArthur Foundation's January 2016 report, 'The New Plastics Economy: Rethinking the Future of Plastics'. Even by 2025, projected increases in plastic production indicate the plastic-to-fish ratio will reach

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one-to-three, as plastic stocks in the sea grow from 150 million tonnes today to 250 million. While the USA, Europe and Asia jointly manufacture 85 per cent of plastic, the report says Asia is responsible for 80 per cent of leakage into the sea.

[5] The Teledyne Optech CZMIL (Coastal Zone Mapping and Imaging Lidar) is an airborne system primarily designed for topographic and bathymetric mapping. The combination of a scanning lidar, RGB camera system, and optional ITRES Co. hyperspectral instrument, in conjunction with the Optech HydroFusion software suite within a data fusion paradigm, makes CZMIL an integrated lidar-imagery system for the highly automated generation of physical and environmental information products beyond topographic and bathymetric mapping. These products include benthic classification, water column and bottom type characterization, 3D imaging of water column inhomogeneities, detection of submerged hazardous objects, etc. Its system capabilities are the reason why CZMIL has been applied to various environmental surveys aimed at the detection of distributed pollutions (oil spills, industrial leaks) or discrete targets (plastic debris, sunken objects, etc.) in the water column as well as bottom disorders (silt or sandy sediments). Several examples of CZMIL and its predecessor (SHOALS) engaging in environmental disaster surveys are presented and discussed in the paper, including detection of a leak from a sewer pipeline in Ft. Lauderdale, Florida; surveying the BP oil spill in Gulf of Mexico; coastal zone change detection and its implications after Hurricanes Sandy and Matthew; and detection of plastic fragments in the Pacific Garbage Patch.

[6] For the purpose of environmental impact assessment (EIA) at deep-sea hydrothermal environments towards development and utilization of seafloor massive sulfide (SMS) deposits, we have been developing a cost effective cabled underwater observatory. To realize a flexible and expandable system configuration, the observatory has a simple star-type network and power supply topology by employing an Ethernet interface. Pressure hulls and a framework of the observatory are composed of glass or plastic material to avoid corrosion of metals caused by hydrothermal fluid during long-term operation. The first observatory that has physicochemical sensors, water current profilers, and a video instrument will be deployed at the Oomuro Hole hydrothermal site, the northern Izu-Ogasawara arc for the

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purpose of system demonstration and practical data acquisition.

[7] The technique used in the paper is fingerprinting technique, which requires careful collection of training data at known locations. An app is developed to facilitate and expedite the process of collecting training data with iOS devices. The training data is collected by the app and saved in the cloud for future retrieval. The training data is collected from different floor maps, performed initial analysis on this data, and tested a fingerprinting algorithm in order to provide indoor localization. The app provides UI elements to select the building and floor where training data will be collected. Upon selecting the two options, the correct map is displayed on the screen.

[8] The bender disc transducer is a kind of low frequency sound source which is widely used in the sonobuoy and disposable underwater acoustic countermeasure equipment. It has the characteristics of low frequency, small size, simple structure and is light in weight. Traditional bender disc transducers with a cavity structure are not suitable in deep water resistance. In order to solve this problem, a free flooded structure is used in the bender disc transducer-which has a hole opening around the ring cavity structure without changing the external volume of the transducer. The water can thus enter the transducer, which greatly improves traditional bender disc transducer performance in deep water resistance. The acoustic properties of the deep water bender disc transducer are analyzed by using ANSYS finite element software The influences of its structural dimensions on the transducer resonant frequency and on the maximum transmitting voltage response are calculated. On the basis of the analysis, the structural parameters of the prototype transducer are determined and the performances of a virtual transducer are simulated and calculated. Finally, according to the simulation results of the software, the bender disc transducer is processed and manufactured. In conclusion its properties are tested. By the prototype performance test of the bender disk transducer, it is known that the resonant frequency is 5590Hz in air; the resonance frequency is 2000Hz in water; the radial maximum transmitting voltage response level(TVR} is 113.9dB (//μPa-m); and, the -3dB bandwidth of the transmitting voltage response curve can cover 1.9kHz to 2.2kHz. The axial maximum transmitting voltage response level is 115.8dB (//μPa-m); and, the -3dB bandwidth of the

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transmitting voltage response curve can cover 1.9kHz to 204kHz.

[9] T The advent of new plastic scintillator formulations opens avenues of application in terms of neutron-gamma discrimination. As a consequence, the likelihood that these detectors will be subject to regions of significant neutron flux is high. In order to study the tolerance to radiation damage a number of samples of both EJ-299 and EJ-200 plastic scintillator were irradiated with fast neutrons using a neutron flux of up to 2.2×1012 (+/-5.6%) n/cm2/s. All samples were cut to a size of 30 mm × 30 mm × 15 mm and polished prior to irradiation. The radiation response of the samples was measured by performing standard gamma spectroscopy on lab sources. The optical emission spectra were analysed by irradiating each sample with an 80 kV X-ray beam from a Hamamatsu X-ray tube. Optical spectroscopy of the scintillation light was recorded using an Ocean Optics QE6500 spectrometer, and the opacity of the irradiated samples was measured with a Cary 5000 spectrophotometer. The effect on the peak emission wavelength, optical intensity, and spectral shape of the scintillation was determined as a function of neutron fluence.

[10] Segmentation of the masseter muscle is one of the most important bases for diagnosis and treatment, but automatical segmentation of masseter is very difficult as the masseter and its adjacent tissues have very similar gray levels. In this paper, a novel method is presented to segment the masseter in MRI images, which modifies the distance regularized level set evolution (DRLSE) with a new adaptive edge indicator function. The presented method introduces the phase congruency into the edge indicator function and combines the image gradient with phase information together to solve the segmentation problem. The method is tested by 50 MR images of masseter muscle, and the results show it is an effective approach can be used to produce clinically acceptable results to this challenging work.

CONCLUSION AND FUTURE ENHANCEMENT

In general, surface drifter it’s a machine if losing the plastic budget by creating a novel comprehensive modelling framework that tracks plastic movement through the ocean. The resulting modelling framework will make it possible to simulate the various ways in which plastic is transported around the ocean, whether through fragmentation, sinking, beaching, ocean currents, wave-mixing or ingestion by living organisms. In future project will greatly improve the quality of information

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available to policymakers and the public on the current state of plastic pollution in our oceans.

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