SAILING TOWARDS A PLASTIC-FREE OCEAN

PROJECT REPORT
March 2020

JAMSTEC

UN environment programme WCMC

Background

Awareness of and global concern for marine plastic pollution continues to grow, with initiatives being implemented to tackle the problem worldwide. The Osaka Blue Ocean Vision, set at the G20 Summit in Osaka, Japan, in 2019, aims to 'reduce additional pollution by marine plastics litter to zero by 2050 through a comprehensive life-cycle approach'[1]. Despite the rising profile of this issue, additional research is needed to understand the flow of plastics around the ocean, and patterns in accumulation. This includes the need for increased ocean observation activities to understand the full extent of the threats posed by marine plastics pollution. One ocean connects us all, and therefore international partnerships are essential to achieve this goal. In addition to observation by research institutions, contributions from non-scientific ships - such as pleasure boats, ferries and cargo vessels - are becoming increasingly important in helping to collect survey data across the world.

One such collaboration took place during the Japan to Palau Goodwill Yacht Race 2019/2020, which involved developing international partnerships to collaborate on ocean observation in the western North Pacific. This collaboration between the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), the Yacht Race Organising Committee, one of the participating racing yachts, TREKKEE, and sail training ship MIRAIE (pictured in Figures 1a and 1b) enabled data collection in order to improve our understanding of the status of plastics pollution in this region. An additional partnership between the Yacht Race Organising Committee and the Republic of Palau (hereafter referred to as 'Palau') enabled the participation of children from Palau and their families on this research cruise. The UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) partnered with JAMSTEC to design a tailored education programme about ocean conservation for the passengers onboard MIRAIE, to be delivered alongside the microplastics research. This increased the social impact of the research and provided tangible actions to empower non-scientists to help to make a difference.

Project aims

The *Sailing Towards a Plastic-Free Ocean* project had two primary aims: (1) to conduct marine plastic pollution research, and (2) to educate the next generation of ocean leaders.

Marine plastic pollution research

Microplastic data were collected during the research cruise to contribute to ongoing work by JAMSTEC under the project *Understanding the dynamics of marine plastics*. The purpose of this element of the project was to contribute to understanding the global status of plastics contamination, by contributing data from the western North Pacific where information is currently scarce. By undertaking continuous observations for the duration of the passage, this

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[1] Ministry of Environment Japan, November 2019. *Osaka Blue Ocean Vision G20 Implementation Framework for Actions on Marine Plastic Litter* [pdf] Ministry of Environment Japan. Available at: https://www.mofa.go.jp/files/000493728.pdf

project was able to fill the knowledge gap regarding microplastics distribution in the region, and to provide insight into microplastics contamination at a global scale.

Educating the next generation of ocean leaders

The onboard education programme aimed to demonstrate the potential for, and benefits of, environmental education carried out at sea. The programme was designed to provide an introduction to ocean conservation to students aged 8 to 13. The content of the programme outlined key issues facing the ocean, such as climate change, marine pollution and overfishing, and provided positive solutions to inspire everyday action.

Figure 1a. Sail training ship MIRAIE. Credit: Toshihiko Tanaka

Figure 1b. Racing yacht TREKKEE. Photo credit: Hajime Nitta

In addition to contributing to Sustainable Development Goal 14 and associated Target 14.1[2], this project further promoted the role of women in science (SDG 5, Gender Equality) and generated partnerships for conservation (SDG 17, Partnerships for the Goals).

Promoting the role of women in science

Having a team of three female onboard researchers who conducted microplastics research and educated the students allowed the project team to highlight the work of female scientists. Women are often underrepresented in science, technology and engineering, particularly in some Asian countries. This was highlighted by the IOC-UNESCO Global Ocean Science Report[3], which identified an uneven gender balance in Japan in the number of experts attending selected international conferences and symposia in the ocean technology and engineering and ocean observation and marine data fields.

Partnerships for conservation

Global ocean circulation connects continents across the world and, as a result, partnerships are key to increasing knowledge and protection of the ocean. International partnerships are needed to understand processes that are transboundary, whether they are socio-economic (for example, fishing or shipping) or ecological (understanding the health of fish stocks or the spread of pollutants and the resulting impact on marine life). Multi-sectoral partnerships are also needed to expand ocean observation capacity, in order to overcome the knowledge gap. This project demonstrated successful partnerships between multiple sectors and countries, with the outcome of collecting scientific data and delivering an educational programme. The *Sailing Towards a Plastic-Free Ocean* project will provide an example to inform future collaborations.

[2] By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

[3] IOC-UNESCO. 2017. Global Ocean Science Report - The current status of ocean science around the world. L. Valdés et al. (eds), Paris, UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000250428

Microplastics research

What is the issue?

Microplastics, or plastics smaller than 5 mm in diameter, pose a threat to human and wildlife health in several ways: there is evidence to suggest that microplastics absorb toxins from the water and transfer them to marine organisms that consume them[4]. These toxins then move up the food chain as the contaminated fish are predated on, and can eventually end up in food consumed by humans. Ingestion of plastics can lead to a range of physical effects in marine life, including choking and loss of appetite.

It is estimated that approximately 80% of all discarded plastics have been sent to landfill, or has been inappropriately managed and leaked into natural environments[5]. Of this amount, approximately150 million tonnes of plastics have entered the ocean.[6] However, estimations based upon the current best available ocean data explains only a small amount of the amount of plastics which should currently be in the ocean. Further research is needed to understand the location of these 'missing' plastics. Knowledge regarding the degradation, circulation and accumulation patterns of marine plastics is needed in order to design and implement effective policies to safeguard people and the marine environment.

Scientists hypothesise that the 'missing plastics' will be found in under-surveyed regions. One such region is located south of Japan, in the western North Pacific, where a large amount of plastics from Asian countries are expected to accumulate, and the route of the Japan-Palau Goodwill Yacht Race passed through this area. Other studies suggest that a large portion of the missing microplastics exist as particles too small to collect by using conventional sampling methods, typically a surface net tow with approximately 300 micrometre mesh size. Microplastics can be broken down into even smaller pieces and taken up by organisms, but little is known about the distribution and ecological impacts of microplastics smaller than 300 micrometres. In this project, we successfully collected microplastics smaller than 300 micrometres over a distance of 3000 km, using a semi-automatic sampler.

Sampling undertaken during this project is contributing to our understanding of the status of microplastic pollution in the western North Pacific. When all laboratory analyses are completed, the data will help to solve the mystery of the 'missing plastics' and fill the knowledge gap on global marine plastic distribution.

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[4] United Nations Environment Programme, 2016. Marine plastic debris and microplastics – Global lessons and research to inspire action and guide policy change. United Nations Environment Programme, Nairobi

[5] Geyer, R., Jambeck, J. and Law, K., 2017. *Production, Use, And Fate Of All Plastics Ever Made*. [online] Available at: <https://advances.sciencemag.org/content/3/7/e1700782> [Accessed 23 March 2020]

[6] McKinsey Center for Business and Environment and The Ocean Conservancy, 2015. *Stemming the Tide: Land-based strategies for a plastic- free ocean. [online]. Available at:* https://mck.co/2QEQJ1k [Accessed 23 March 2020]

Methods

Two approaches to microplastics sampling were taken:

1) Sampling with a semi-automatic sampler allowed continuous data collection in all weathers for microplastics smaller than 300 micrometres. This system is designed for monitoring microplastics on small, non-scientific ships. Additional detail is provided in Box 1.
2) Daily samples of larger than 300 micrometres were collected through conventional net sampling with a Neuston net, towed in the surface waters alongside the ship. Additional detail is provided in Box 2.

Box 1: Microplastics sampling equipment and methodology

Semi-automatic microplastic samplers

SubCTech Co. microplastic samplers were installed on the seawater intake system of both vessels, MIRAIE and TREKKEE, and automatically ran once or twice per day to filter a minimum of 120L of seawater. The samplers were fitted with three metal filters (mesh size: <30 micrometres: ½ diameter of human hair, <100 micrometres: thickness of a sheet of paper, <300 micrometres), which were changed twice per day after microplastic samples were collected. The filters were labelled and stored at a cool temperature in order to preserve the samples for analysis on return to the JAMSTEC laboratory after the cruise.

Figure 2 Filters of the semi-automatic microplastics sampler (left); and Yurie Seki working on the microplastic sampler (left) changing the filters to collect the microplastic samples (right)

Analysis of the samples from the semi-automatic microplastic sampler has not yet taken place. Once this laboratory analysis has been completed, it will be possible to compare the data from these two methods. The intention is to investigate the relationships between the distribution of larger and smaller microplastics, to evaluate whether the relationship is sufficient to develop an algorithm to model the distribution of smaller microplastics in the ocean.

Box 2: Microplastics sampling equipment and methodology

Neuston net tow

On MIRAIE, a Neuston net (mesh size of 335 micrometres, mouth area: 0.75 x 0.75 m) was towed to collect sea surface microplastics greater than 335 micrometres in size. The net was towed for 30 minutes at ship speed of approximately two knots during daylight hours, whenever conditions allowed. Samples collected were soaked in alcohol to preserve organic matter and stored in a fridge upon returning to the onboard temporary laboratory during the cruise.

Figure 3. (left) Neuston net tow, (top right) sample containing organic matter, (bottom right) sample containing plastics

Initial Results

Cruise tracks of MIRAIE and TREKKEE, and sampling location by the microplastic samplers and Neuston net are shown on the map (Figure 4). Microplastics were easily spotted by eye in the Neuston net samples from 12 of 14 tows, showing that plastics were widespread throughout much of the voyage. Exceptions to this occurred closer to land, where organic matter dominated the samples collected during the last two tows, which were conducted in the Marine Protected Area of Palau.

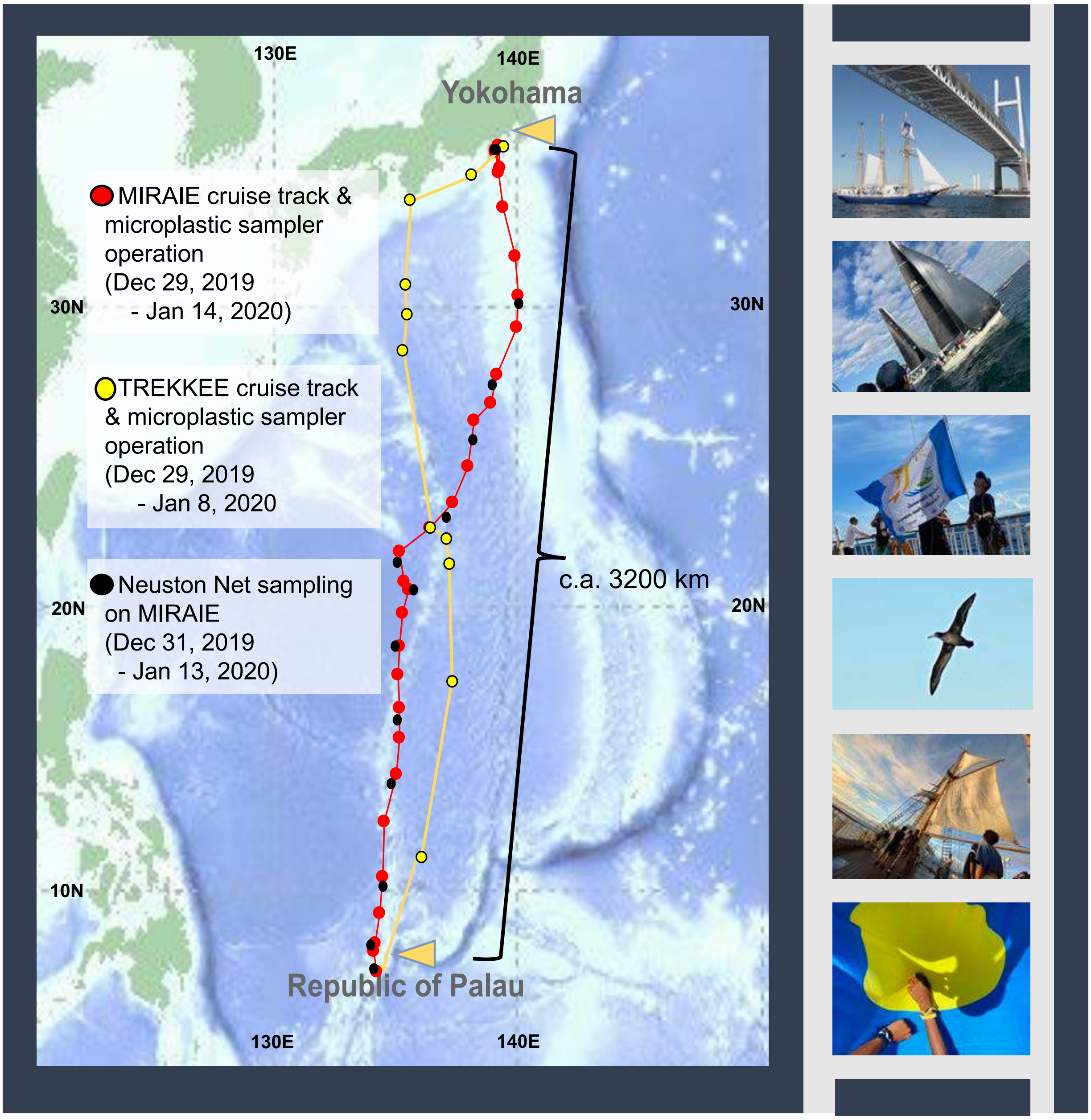

Figure 4. Cruise track and microplastic sampling location

Microplastics obtained by both methods are currently undergoing laboratory analysis at JAMSTEC, with the intention of publishing the findings in 2020. The initial results from analysis of the Neuston net samples are presented in this report (Figure 5).

Through laboratory analysis, the density of microplastics particles was found to be highest off the coast of Japan, at more than 900,000 particles per square kilometre. Macroplastics were also observed in the coastal waters of Japan. Densities of microplastics particles were lowest off the coast of Palau, where approximately 10,000 particles per square kilometre was recorded. Samples collected in offshore areas between Japan and Palau during the voyage through the western North Pacific ranged from a density of 20,000 to 100,000 microplastics particles per square kilometre, which is similar value that was recorded around the Great Pacific Garbage Patch in the eastern Pacific[7]. The majority of microplastics were found to be polyethylene (PE), which is widely used for everyday single-use products such as grocery bags and plastic film. Polypropylene (PP) - a common material used for bottles, packaging and rope - and polyethylene together accounted for more than 50% of the microplastics recorded in all samples with the exception of one sample collected in the coastal waters of Palau.

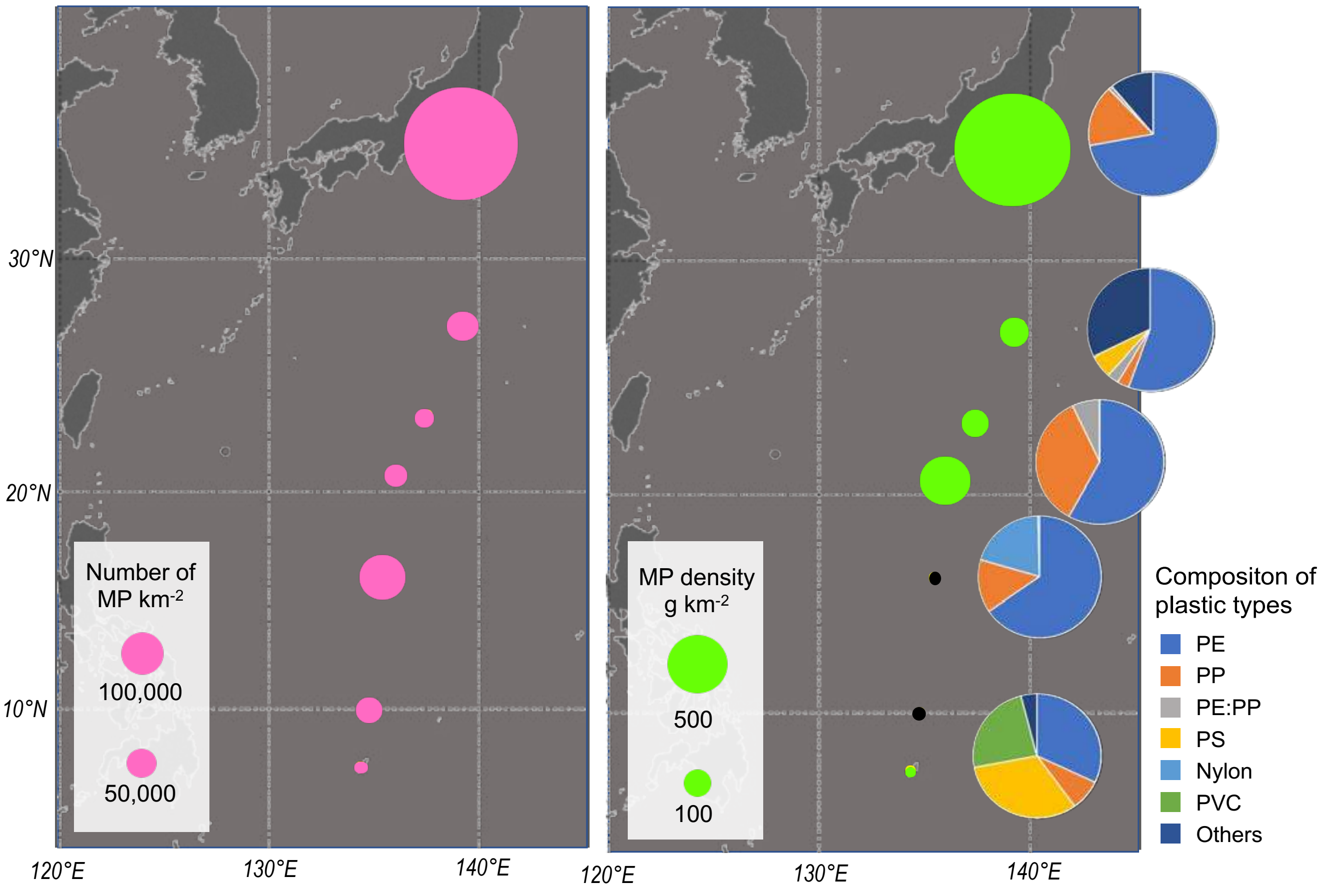

Figure 5. Density and composition of sea surface microplastics (MP) collected by a Neuston net (data of selected samples). PE: polyethylene, PP: Polypropylene, PS: Polystyrene, PVC: Polyvinyl Chloride.

[7] Kershaw, P.J., n.d. *Floating plastics: a wide-reaching problem.* [online] One Shared Ocean. Available at: http://onesharedocean.org/open_ocean/pollution/floating_plastics

Ocean Literacy

Globally, there is a need to increase recognition amongst the general public of the impact of our behaviour on the ocean. The public can feel disconnected from the marine environment, particularly if they do not live close to, or otherwise interact with, it on a regular basis. Education and communication can offer ways of overcoming this challenge if messages are tailored appropriately and are delivered through the right channels. In order to progress beyond knowledge provision, building educational approaches around the values and attitudes of the audience can help to foster engagement and increase the resonance of the messages. Integrating the principles of social marketing[8] can therefore be a powerful educational tool.

What is Ocean Literacy?

Developing messages to engage the public with the ocean can build on existing educational approaches. Improving 'Ocean Literacy'—or understanding of the ocean's influence on you, and your influence on the ocean[9]—is an important mechanism to address ocean challenges with a human component. In many cases, Ocean Literacy is part of a formal educational process, usually aimed at children, which focuses on increasing understanding of the ocean. Seven 'Essential Principles' have been developed in order to outline elements of ocean science and conservation that students should be familiar with by the end of their secondary education.

Figure 6. Young people from Palau learning about microscopic observation of plankton onboard MIRAIE

[8] National Social Marketing Centre, n.d. *What is social marketing?* [online] National Social Marketing Centre. Available at: https://www.thensmc.com/content/what-social-marketing-1.

[9] National Marine Educators' Association, 2013. Ocean Literacy: *The Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages*.[pdf]. National Marine Educators' Association USA. Available at: https://bit.ly/2Jsj7jk

Table 1 outlines these 'Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages', as defined by the Ocean Literacy Network (2015).[10] These principles were developed to support the standardisation of teaching ocean-related content to learners of all ages. Each 'Essential Principle' is underpinned by a series of Fundamental Concepts, designed to guide educators in delivering education on these topics in a coordinated and consistent way across different age groups. The full Ocean Literacy Framework document can be found here. The Ocean Literacy programme delivered as part of the *Sailing Towards A Plastic-Free Ocean* project (see Table 2) was designed to align with several of these 'Essential Principles', with particular focus on Principles 5, 6 and 7 (see Table 2).

Table 1 Ocean Literacy: The Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages [10]

1	The Earth has one big ocean with many features.
2	The ocean and life in the ocean shape the features of Earth.
3	The ocean is a major influence on weather and climate.
4	The ocean made Earth habitable.
5	The ocean supports a great diversity of life and ecosystems.
6	The ocean and humans are inextricably interconnected.
7	The ocean is largely unexplored.

Figure 7. Holly Griffin teaching about the ocean to young people from Palau on deck of MIRAIE. Credit Sanae Chiba

[10] National Marine Educators' Association, 2013. Ocean Literacy: *The Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages*.[pdf]. National Marine Educators' Association USA. Available at: https://bit.ly/2Jsj7jk.

As part of the *Sailing Towards A Plastic-Free Ocean* project, UNEP-WCMC designed and delivered an Ocean Literacy programme onboard sail training ship MIRAIE. The aim was to educate children from Palau about how the ocean provides for us, and the impact that we have on it. This programme was delivered alongside microplastics research being carried out by JAMSTEC, and provided opportunities for the children to engage with the research process, as well as learning about a range of ocean science and conservation topics. The intention was to help develop the next generation of ocean leaders, equipping them with facts and getting them thinking about the challenges that the ocean is facing, as well as practical solutions.

Ocean Literacy programme

Table 2 provides an overview of the topics covered as part of the Ocean Literacy programme. These topics were selected in order to expose students to a wide range of ocean conservation issues, as well as the opportunity to discuss current research activities and opportunities to create change. The level of detail and the difficulty of concepts and activities were tailored to the ages of the children onboard (8 – 13); however, it soon became clear that some students were capable of understanding concepts that were more advanced than typically expected of this age range. Visual- and problem-based learning approaches were used, with a range of different activities designed to allow the students to take charge of their own projects during their time onboard.

Figure 8. (left) Holly Griffin demonstrating how to explore a microplastics sample under microscope. (right) Sanae Chiba teaching young people from Palau about handling of Neuston net sample. Credit Yurie Seki

Students learned additional skills during their time onboard the ship, including adapting to learning in adverse conditions (using microbiology equipment in a lab on rolling seas), supporting research in the field (by taking water temperature and salinity measurements with onboard researchers) and designing and communicating original ideas (designing their own ocean-friendly cities).

Table 2 Content covered during the onboard Ocean Literacy programme, and areas of alignment with the Ocean Literacy Framework Essential Principles[11]

Date	Session topic	Examples of content covered	Aligns with Ocean Literacy Principle(s) (as seen in Table 1)
29 December 2019	Microscopy	Learning to use microscope, and observing presence of organisms/plastic	7
1 January 2020	What is Ocean Literacy?		
2 January 2020	Plastic in the food chain	Marine food webs, and predator/prey relationships How plastic enters food chain, and impact on higher trophic levels Bioaccumulation	5, 6
3 January 2020	Industrial fishing	Fishing methods & mesh types Fish Aggregation Devices (FAD) Bycatch and discards Overfishing & what it means to be sustainable	6
4 January 2020	Ocean giants – whales and dolphins	Identifying blue, humpback, right, sperm whales and bottlenose dolphins Echolocation Prey and feeding habits Migration	5
5 January 2020	Coral reef ecosystems	Coral reef structures – polyps and skeletons Symbiotic relationships Predator/prey relationships Human threats to coral reefs and reducing impact	5
6 January 2020	How do we survey microplastics in the ocean	Neuston net and semi-automatic microplastics sampler Sample handling – filtering & preserving How mesh size affects filtering	7
7 January 2020	Designing ocean-friendly cities	Identifying design features for urban communities to reduce impact on the ocean	6
8 January 2020	Designing ocean-friendly cities	Drawing, labelling and presenting ocean-friendly cities (see Figure 9)	6

[11] National Marine Educators' Association, 2013. Ocean Literacy: *The Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages*.[pdf]. National Marine Educators' Association USA. Available at: https://bit.ly/2Jsj7jk

9 January 2020	Marine Protected Areas	Concept of MPAs Current coverage Benefits and challenges of MPAs Concepts of spill over, zoning and Paper Parks	6
10 January 2020	Game – ocean facts		
11 January 2020	4Rs for fighting against marine plastic pollution	Ways to reduce, reuse, recycle, refuse plastic in everyday life	6
12 January 2020	What did we learn?	Recap and poster-making session (see Figure 9)	

Figure 9.(above) Poster created by young people onboard summarising topics covered in Ocean Literacy programme. (left) Example of an 'ocean-friendly city' designed and drawn by students onboard

Conclusion

Preliminary analysis of samples collected as part of this project has allowed us to gain insight into how microplastic density (per square kilometre) changes across the western North Pacific. Initial results show higher densities of microplastics off the coast of Japan along with the presence of large macroplastics drifting at surface level. Although expected, the fact that we regularly observed some microplastics of similar composition to the type of plastics found in offshore sampling sites far away from any densely-populated lands, indicates microplastic pollution is widely spread over the western North Pacific due to the oceanic currents. In contrast, the lowest microplastic density in the Marine Protected Area of Palau indicates that this location may not be within reach of currents carrying microplastics at this time. Even a well-managed Marine Protected Area, however, cannot be free from the future transboundary threat of microplastics. Therefore, strengthening international partnership will be key to protecting the marine ecosystems of Palau in the coming decades. Analysis of the rest of samples is needed in order to be able to draw more substantive conclusions from this microplastics research. This will be available later in 2020.

Partnering with sail training ship MIRAIE was a great success, both in terms of undertaking research and carrying out educational activities. The ship's crew were passionate about the mission of the *Sailing Towards A Plastic-Free Ocean* project, and the aim to educate and inspire young people very much aligned with the ethos of MIRAIE. Sail training ships are equipped to carry a range of passengers, and therefore can accommodate teaching activities in various locations throughout the ship. The research team made a dynamic assessment of the best location for teaching activities each day, based on weather conditions, passenger morale and ship activities. MIRAIE offers a range of available facilities (all areas of the deck, the messroom, the temporary laboratory, the engine room), and therefore the research team were able to plan a wide range of different styles of activity. Creativity in the use of space on the ship was key to the success of the Ocean Literacy programme, and being flexible to the changing needs of children spending an extended period of time at sea was essential to maintaining enthusiasm and engagement.

The children demonstrated a considerable engagement with the programme, which was noted in particular by several of their parents at the end of the trip. They retained a lot of information, and were able to absorb complex concepts, asking insightful questions when they did not understand, and taking the opportunity to learn from the research team outside the organised Ocean Literacy sessions.

Next steps

Ships of opportunity

The success of the project offers inspiration for future collaborations between the scientific and yachting communities. Noting the scale of current challenges, and peoples' desire to contribute to solutions, this collaboration presents a unique, engaging and enjoyable opportunity to further understand of the scale of marine plastic pollution and to increase engagement with the issue. Responding to societal demands toward the solution of marine plastic pollution, momentum is building in the international marine debris observation community to establish an integrated global marine debris observation system. Its goal includes the production of a scientifically-credible dataset which can be used for development of the global indicator of SDG 14.1.1[12]: floating marine debris density. Coordination of the activities of existing projects, harmonisation of data taken through various sampling methods and sharing of data sharing strategies are being actively discussed. JAMSTEC is already taking part in these discussions. With the development of cost-effective, user-friendly, innovative observation technology, the availability of a temporally- and spatially-broad range of non-research vessels including pleasure boats, tanker ships and ferry boats (ships of opportunities) will be the key players in the global marine plastic monitoring. Together with international colleagues, JAMSTEC intends to increase collaboration with the shipping and recreational boating industries to contribute to better understanding of global marine plastic dynamics.

Future Ocean Leaders

This project was able to build on existing partnerships in order to take young people to sea to learn about ocean conservation in an immersive environment. It is recognised, however, that there are significant barriers to scaling up the approach taken by this project. The research team from the *Sailing Towards A Plastic-Free Ocean* project suggest a number of approaches that could be explored in order to increase opportunities for engagement with this 'learning through adventure'-style of experience.

a) Explore partnerships with sail training ships, such as MIRAIE. This type of ship is equipped to take inexperienced sailors to sea, and combines an expedition and personal development ethos with opportunities to run more formal teaching sessions onboard.
b) Collaborate with the yachting industry. There are a large number of international yacht races that take place worldwide each year, for both amateur sailors (for example, the Royal Ocean Racing Club Caribbean 600) and for professionals (for example, The Ocean Race, Vendee Globe). These events provide an engaging platform to promote a variety of Ocean Literacy activities, and, where possible, can be combined with 'Get Into Sailing' youth events to engage young people in dinghy sailing where going to sea is not a viable option.

[12] SDG 14.1.1: Index of coastal eutrophication and floating plastic debris density

c) Explore opportunities to engage with sailors, and plan a virtual expedition alongside a professional yacht sailor or research team onboard a Research Vessel. Design lesson plans around preparing for an expedition, integrating interactive activities and speaking to researchers about their work, life at sea and challenges they face. Help students to be inspired by current research and adventure, and provide information as to the steps that they need to take to develop a career in this area.

A decade of change

As we enter the United Nations Decade of Ocean Science for Sustainable Development (2021 – 2030), increased knowledge of the state of the ocean through observations, awareness raising and engagement with the public through Ocean Literacy will be vital to generate the progress required. High-quality data help us to understand the status of plastic pollution and, when accompanied by Ocean Literacy campaigns, can provide information necessary to educate global leaders, politicians, decision-makers and the public. Understanding the link between our behaviour and the health of the ocean is key to catalysing change and the international partnerships necessary to manage this globally shared resource effectively.

Figure11. Our adventure on MIRAIE with the "Future Ocean Leaders", (lower middle) showing the Certificate of Completion for the Ocean Literacy programme on the last day of the cruse.

Research team

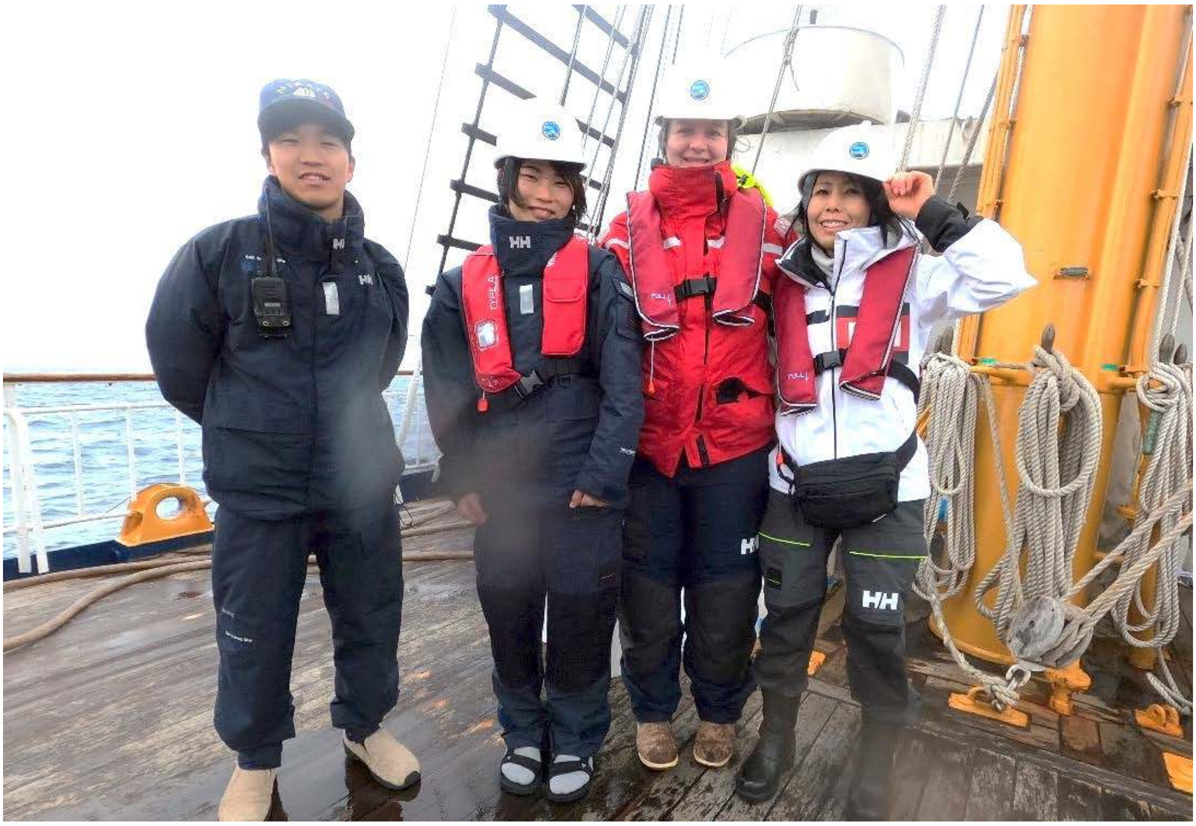

Figure12. Research team with First Officer of MIRAIE: Yurie Seki (l), Holly Griffin (centre), Sanae Chiba (r)

Sanae Chiba (Japan Agency for Marine-Earth Science and Technology) Project Leader, Senior Scientist

Sanae has studied marine ecosystem responses to global environmental pressures thoughout her career, and from April 2019, was assigned as the Leader of the newly launched Marine Plastics Research Group at JAMSTEC. Her current interest is toward not only natural science but also social science including science-policy interface, and Ocean Literacy, which are important components in solving the problems of marine plastic pollution.

Holly Griffin (UN Environment Programme World Conservation Monitoring Centre, UNEP-WCMC) Ocean Literacy Lead

Holly is a marine social scientist at UNEP-WCMC, whose work in Ocean Literacy involves understanding perceptions and communicating the links between our behaviour and our resulting environmental impact. She is also a sailor, and is passionate about the benefits of outdoor classrooms and enabling learning through adventure.

Yurie Seki (Yamaha) Onboard Researcher

Yurie works for Yamaha Motor Company in Japan. She has been a sailor for about nine years and competed in international level races. Spending a lot of time in, and cruising across, the ocean, she has become deeply concerned about marine pollution. She is keen to take action to clean up the ocean she loves.

Project sponsors and partners

The research team are grateful to the following sponsors and partners for enabling this project to take place. For further information about the project, please contact:

Sanae Chiba, Project Leader, JAMSTEC: chibas@jamstec.go.jp
Holly Griffin, Ocean Literacy Lead, UNEP-WCMC: holly.griffin@unep-wcmc.org

Organisation	Website
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)	http://www.jamstec.go.jp http://www.jamstec.go.jp/ocean-plastic/e/index.html
UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)	https://www.unep-wcmc.org/
YAMAHA Motor Co., Ltd.	https://global.yamaha-motor.com
Mitsui O.S.K Lines (MOL)	https://www.mol.co.jp/en/index.html
Promotion of Global Human Resource Development Organization	http://miraie.org/
Japan – Palau Goodwill Yacht Race	https://japan-palau-yachtrace.com/