

Harada Vehicle Design Co., Ltd.

Demonstration Project of Marine Debris Tracking System in Thailand



Objective of the project

The global marine debris problem is serious, with a particularly large amount coming from Southeast Asian countries. Marine plastic litter has a significant impact on ecosystems, tourism, and fisheries, and its collection is urgently needed. Debris collection on the sea is important, and effective methods are needed to identify where marine debris collects.

Currently, there are prediction models that combine ocean current data and satellite remote sensing, but further improvements are needed. We propose a system that utilizes actual marine debris movement data to identify marine debris more accurately and at low cost.

Cooperation with local companies/governments

Asia Technology Industry (ATI), a Thai company, develops tracking bottles that are likened to actual marine debris, installs wireless ground stations, discharges and collects the bottles. Satellite remote sensing experiments of marine debris in Thailand by Burapa University (BU); cooperation with local companies and the government, and negotiations with ground station sites for the system through Chulalongkorn University (CU).

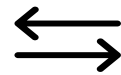
ATI, BU, CU

Project execution and consultancy

Thai government agency DMCR, GISTDA

DMCR: Sales destination for this system

GISTDA: Provision of marine data for the Gulf of Thailand



HVD

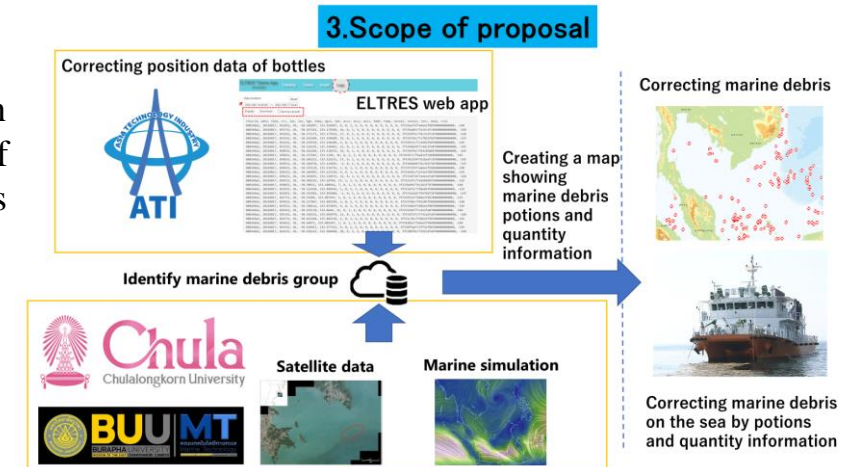
Project supervision and management

Targeted economic/social issues

Thailand is the sixth largest producer of marine debris in the world, and property owners and facility managers conduct weekly cleanups of marine debris that washes up on their beaches. Although there are efforts to collect trash from large rivers before it goes out to the sea and laws that impose fines for littering, public awareness is low and there has been no decrease in the amount of marine debris discharged.

Efforts to solve this problem around the world include devices aimed at reducing microplastics at sea and marine debris collection in the Pacific Garbage Belt. While these efforts have attracted attention as promising ways to solve the problem of marine debris that has already been released, their scale is extremely large. Therefore, we are developing a medium-scale, cost-sensitive collection system by developing marine debris tracking bottles, creating a marine debris simulation model, and doing others.

In particular, its strength lies in the ability to locate marine debris accumulation points with a high degree of accuracy, which contributes to reducing marine debris discharged, which is an issue in Thailand.



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Demonstration period

November 2022 – January 2024

Details of demonstration

This project targeted the northeastern Gulf of Thailand, and areas where marine debris collects, including the Chao Phraya River, Bang Pakong River and Bang Saen Beach, were selected as test sites. This experiment investigated the moving routes and drifting points of marine debris using tracking bottles to grasp their actual conditions and trends. In addition, we developed a system to discharge a tracking bottle equipped with a GNSS antenna into the ocean and check its location information in real time via LPWA communication. Furthermore, we created a simulated marine debris group and attempted to identify marine debris using satellite remote sensing. These experiments include: evaluating the performance of tracking bottles for checking movement and identifying marine debris, evaluating how much the bottles imitated marine debris, identifying marine debris using satellite remote sensing, evaluating the tracking system, recovering tracking bottles, and confirming the existence of debris group.



Project outcome / Future plans

The followings were confirmed as the results of the project:

- All 16 bottles had no water intrusion and no sunlight degradation was observed.
- The communication success rate was 100% in the ground stations and almost 100% at sea.
- The battery life was approximately 8 months. Highly accurate location information was obtained and moving routes in the river and ocean were confirmed.
- A variety of marine debris was identified from the tracking bottles that drifted ashore, but the location information of bottles could not be confirmed at some locations.
- Analysis of the data showed that they did not move together, but the communication success rate was high within the debris group on the sea.

Activities and future directions for each of the three demonstration projects:

The demonstration project for the marine plastic litter tracking system in Thailand was successful in developing/releasing tracking bottles and developing a marine trash monitoring map, for which further marine debris collection and other activities are needed in the future. Next, in the demonstration project for a marine plastic litter tracking system in Southeast Asian countries, it is necessary to conduct an experiment to confirm the existence of marine debris group and to see if the tracking bottles can merge into the litter. Finally, a demonstration project for a system to identify the extent of oil spills in Thailand is also under consideration, planning to use tracking bottles to monitor the spread of oil spills and identify the extent of spills to help recover crude oil.