Recent Developments on our AUV Fleet: Tri-TON 2 and HATTORI

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Autonomous Underwater Vehicles (AUVs) are now recognized as a convenient and high-performnce tool for underwater survey. They can move around underwater environment more freely and stably compared with Remotely Operated Vehicles (ROVs), as they don't need a teher cable connected to a support vessel. So they are suitable for mapping tasks such as bathmetry, water quality, and even optical images. However, under ice observation is still challenging. Because the surface has covered by ice, AUVs cannot directly surface in case of emergency. Surface aided navigation such as acoustic positioning is also limited.

This presentation introduces our AUV technologies showing the two latest AUVs we have developped, Tri-TON 2 and HATTORI, and then discusses on future AUV designs for under ice survey. The AUV "Tri-TON 2" has been built in 2013 under the governmental project to develop instruments to estimate ore reserves in underwater hydrothermal deposits [1]. The vehicle has two suites of imaging instruments looking forward and downward directions, in order to obtain dense, large-area 3D image of hydrothermal vent fields. The vehicle has succeeded in imaging actual hydrothermal vent fields at Kagoshima Bay with the high-resolution of 1mm. The AUV HATTORI (Highly Agile Terrain Tracker for Ocean Research and Investigation) is a lightweight and lowcost testbed designed for rapid and efficient imaging of rugged seafloor, such as coral reefs [2]. Most of current AUVs suitable for seafloor imaging are heavy and expensive, requiring a crane-equipped vessel for their operation. As HATTORI is one-man portable, it can be operated from any available boat. In the terrain tracking algorithm, the seafloor surface is estimated based on the potential method using the measurements of a scanning sonar and basic status of the vehicle, or depth, attitude and surge speed. The path to be followed is generated based on the algorithm. The AUV succeeded in following a rocky terrain at the altitude of around 2m, with a surge speed of around 0.8m/s.

Figure 1. AUV Tri-TON 2.

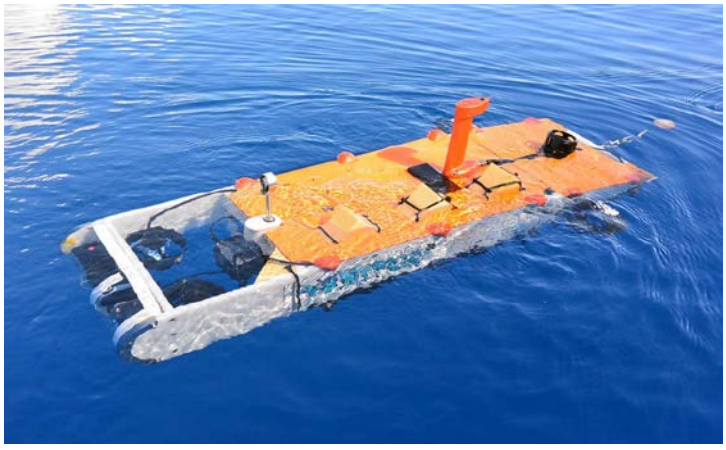

Figure 2. AUV HATTORI.

References

[1] T. Maki, Y. Sato, H. Mizushima, and T. Sakamaki, Development of the AUV Tri-TON 2 for detailed survey of rugged seafloor, AUVSI Unmanned Systems 2015, Atlanta, (2015.5)

[2] T. Maki, Y. Kuranaga, Y. Noguchi, T. Sakamaki, K. Masuda, M. Humblet, and Y. Furushima, AUV Hattori: a Lightweight Platform for High-speed Low-altitude Survey of Rough Terrain, OCEANS17 MTS/IEEE Anchorage, Anchorage, (2017.9)