

Design of the Variable and Compact AUV “MONACA” for Antarctic Survey

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Autonomous Underwater Vehicles (AUVs) have been used for under ice explorations of the Antarctic Ocean [1,2]. Most of the current under ice AUVs are large and are used for long distance survey. Survey results of these AUVs are extremely precise, but there is a trade-off between precision and running cost and/or risk of losing AUVs.

In this presentation, the authors propose a variable and compact AUV "MONACA: Mobility Oriented Nadir Antarctic Adventurer" which can take the necessary and sufficient compositions by its modular design. Although the survey range is limited compared with large AUVs, it can conduct a highly precise survey with lower costs.

The three missions are considered as shown in Fig. 1. (A: Seafloor tracking, B: Ice tracking, C: Water survey in constant depth). In the missions A and B, the shape of the seafloor or the ice is mapped by a multi-beam sonar while tracking it by a probabilistic approach using a scanning sonar [3]. In the mission C, MONACA navigates at a constant depth, measuring water quality by CTD. In order to realize these three missions at low-cost, MONACA (Fig. 2) has the sensor unit that can be turned upside down. The sensor unit includes the multi-beam sonar, an INS, and a DVL. Another feature of the vehicle is a modular structure. As the front and tail parts can be apart from the center part, it is easy to add new sensors or functions as necessary. In addition, the modular structure reduces a transportation cost.

MONACA is currently under construction, to be launched in 2019.

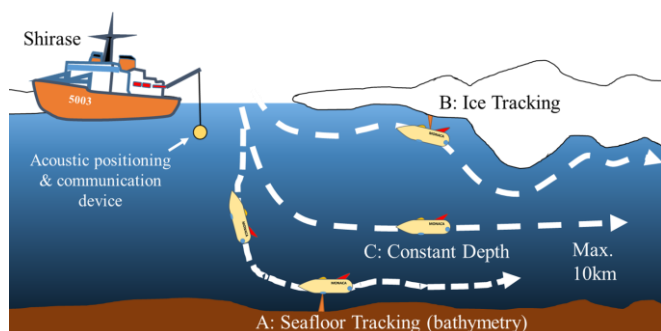


Figure 1. Mission of MONACA

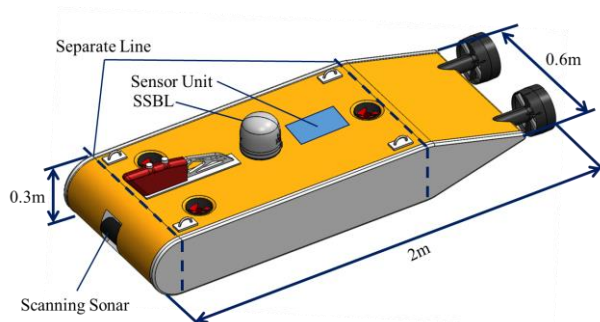


Figure 2. Overview of MONACA

References

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- [3] T. Maki, et al., AUV Hattori: a Lightweight Platform for High-speed Low-altitude Survey of Rough Terrain, *OCEANS17 MTS/IEEE Anchorage*, Anchorage, 2017.