Ocean Science
Discussions

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Interactive comment on "Deep-sea search and recovery: with and without operating an underwater vehicle" *by* Tongwei Zhang et al.

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We thank the Reviewer for the comments, which have helped us improve our manuscript. Our responses are in blue.

The authors describe the idea of creating a new deep sea recovery system based on a TV-grab. The work is presented well enough, with a sufficient English, but the proposed topic is not in line with Ocean Science aims. Response: We thank the Reviewer for this comment; however, we do not agree completely with the Reviewer on the point that "the proposed topic is not in line with Ocean Science aims". On behalf of the NHESS Editorial Board, Natascha Töpfer encouraged us to resubmit our manuscript to Ocean Science on July 18, 2018. In her email, she stated, "You

are encouraged to consider a resubmission of your manuscript to a related journal: https://editor.copernicus.org/OS/transfer/nhess-2018-188". The website section of Ocean Science detailing subject areas clearly shows that "The journal covers instrument development, in situ observations, remote sensing, data assimilation, laboratory, and numerical and theoretical studies", and "The coverage of the journal is worldwide and includes the deep ocean, the shelf seas, and inland seas, now, in the past, and the future." Thus, although our manuscript is not a pure ocean science research, such as ocean currents and eddies, we believe it is still in line with the Journal's subject areas. Furthermore, no experimental results are presented. Response: We thank the Reviewer for this comment. (1) In accordance with the Editorial opinions, we state that the new system described in this paper has yet to be tested in the Abstract and Section 5.3. (2) Our new deep-sea recovery system is based on the design idea and working model of TV- grab. Even though our new deep-sea recovery system is not tested, TV-grab is widely used in oceanography. (3) As shown in Figure 3, most of the onboard parts already exist on modern integrated ships and only a few units need to be added. Thus, the new deep-sea recovery system can work well. The next step is to test the new deep-sea recovery system in a practical application. The conclusions affirm that the proposed system is better than the other technologies taken into consideration (i.e. HOV / ROV), without demonstrating it. Response: We thank the Reviewer for this comment. (1) Only deep-sea Heavy Work-Class ROVs with a tether management system (TMS) can be used for deep sea recovery. This type of ROV is very complex, requires a special technical maintenance team and has a high diving cost [1-3]. On the other hand, a TV-grabber is much simpler, much easier to use, and it is very economical in deep-sea exploration [4,5]. (2) ROVs rely on their manipulators to grab targets, and the load-handling capacity of an ROV is limited, so it can only lift lightweight objects in the ocean [2,3]. On the other hand, most TV-grabs can sample up to 1000 kg or more at a time [4,5], and the maximum weight of our new deep-sea recovery system for lifting a lost target is up to 1000 kg in water. (3) Our new deep-sea recovery system is based on the design concept and working

model of TV- grabbers. It is specially designed for deep-sea recovery. Compared with ROVs, our new deep-sea recovery system can provide low-cost and rapid deep- sea recovery. Thus, our new deep-sea recovery system is better than ROVs/HOVs for this application. [1] https://en.wikipedia.org/wiki/Remotely_operated_underwater_vehicle. [2] Martin, A.Y.: Unmanned maritime vehicles: Technology evolution and implications, Marine Technology Society Journal, 47, 72-83, 2013. [3] Schilling, T.: 2013 state of ROV technologies, Marine Technology Society Journal, 47, 69-71, 2013. [4] http://www.ifm-geomar.de/ [5] Clark, M. R., Consalvey, M., Rowden, A. A.: Biological sampling in the deep sea, Wiley- Blackwell, New Jersey, 207-227pp., 2016. I do not understand what the authors mean on page 5, line 4: "To map the seafloor topography at the depths of several or even tens of kilometers....". Do the authors speak about depth or they are speaking about the surface of the investigated seabed? If they talk about depth it is a very serious mistake. Response: We thank the Reviewer for this comment. To clarify our meaning: The deep sea is the lowest layer in the ocean, existing below the thermocline, at a depth of 1800 m or more. Deep sea areas with a depth of more than 1800 m account for 84% of the ocean area. To map the deep sea (>1800 m) seafloor topography, a large-area walking survey can be performed with a shipborne deep-sea multi-beam sounding system to obtain relatively accurate data.

Please also note the supplement to this comment:
https://www.ocean-sci-discuss.net/os-2018-88/os-2018-88-AC3-supplement.pdf