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Towards better backscatter data products by multibeam echo sounder systems for improved seafloor mapping

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A three-day international workshop on multibeam sonar backscatter was held (October 25-27, 2022) at Dalhousie University (Halifax, Canada), coordinated by the Backscatter Working Group (BSWG), with 20 delegates attending on-site and 37 delegates attending online. The workshop served as a reviver for the BSWG activities which aim at supporting improvements in the quality and consistency of multibeam backscatter data products. The overall goal is to provide backscatter end-users with tools improving their use of backscatter for seafloor and habitat mapping. Several actions have been decided for the future, encompassing in particular the topics of at-sea acquisition, sonar calibration, data processing and collection of reference data.

multibeam echo sounder | backscatter data | BSWG
échosondeur multifaisceaux | données de rétrodiffusion | BSWG
Fächerecholot | Rückstreuinformation | BSWG

Un colloque international de trois jours sur la mesure de rétrodiffusion par sondeurs multifaisceaux a été organisé (25-27 octobre 2022) par le Backscatter Working Group (BSWG) à l'Université Dalhousie (Halifax, Canada), avec 20 participants sur place et 37 participants en ligne. Le colloque a donné une nouvelle impulsion aux activités du BSWG qui visent à améliorer la qualité et la cohérence des mesures de rétrodiffusion. Le but général est de fournir aux utilisateurs des outils améliorant leur utilisation de la rétrodiffusion pour la cartographie des fonds et des habitats. Plusieurs actions ont été décidées pour le futur, concernant en particulier l'acquisition des données en mer, la calibration des sonars, le traitement des données et la constitution d'un catalogue de données de référence.

Vom 25. bis 27. Oktober 2022 fand an der Dalhousie University, Kanada, ein dreitägiger internationaler Workshop statt, koordiniert von der Backscatter Working Group (BSWG), an dem 20 Personen vor Ort und bis zu 37 Personen online teilnahmen. Ziel des Workshops war es, die BSWG-Arbeiten hinsichtlich Verbesserung von Qualität und Konsistenz von Fächerecholotrückstreuinformation zu reaktivieren. Das übergeordnete Ziel hierbei ist es, in Zukunft eine verbesserte Meeresboden- und Habitatkartierung mit Hilfe der Rückstreustärke von Fächerecholoten für die Anwender zu erreichen. Für die Zukunft wurden mehrere Maßnahmen beschlossen, die insbesondere die Themen Datenaufnahme, Sonarkalibrierung, Datenverarbeitung und Sammlung von Referenzdaten umfassen.

Multibeam echo sounder systems (MBES) have become the standard swath-mapping sonar systems in hydrographic surveying. However, they not only provide accurate bathymetry, but also measure the seafloor's acoustic backscattering strength, which is useful for a range of applications including seafloor classification and habitat mapping. MBES backscatter data are conveniently acquired at the same time as MBES bathymetry data, and backscatter from MBES is an excellent proxy for mapping differences in seafloor properties (e.g. substrate and benthic habitat), and is therefore often used in the production of a variety of seafloor thematic maps. Such combined maps integrating bathymetry and backscatter information derived with modern MBES can partly outperform thematic maps derived from side-scan records, especially when it comes to quantitative analysis using algorithms.

To improve the quality and consistency of multibeam backscatter data, the Backscatter Working Group (BSWG) was formed in 2013 as an international group of experts on seafloor backscatter data acquired with multibeam sonar systems. The group includes researchers in acoustics, electrical engineering, geoscience and ecology, but also MBES hardware and software manufactures, surveyors, hydrographers and

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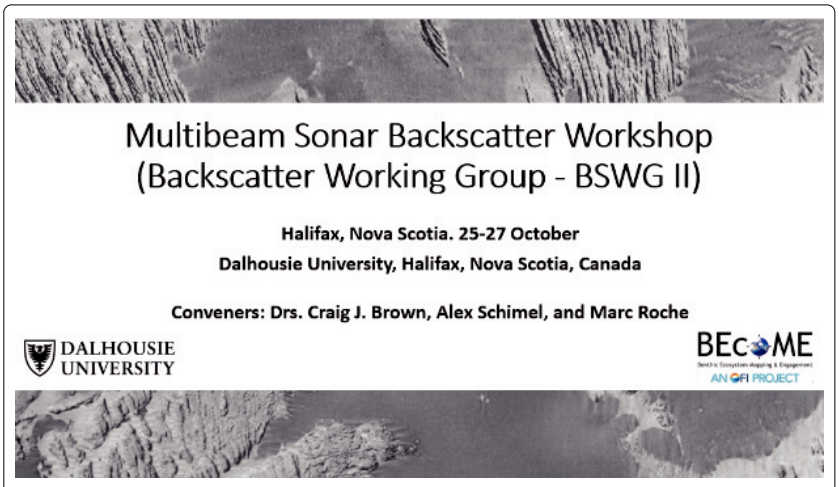

Fig. 1: Opening slide of the three-day workshop presented by the conveners

other end-users. The BSWG was formed in Rome in 2013 at the annual GeoHab conference, and to this day operates under the umbrella of the GeoHab association (https://geohab.org/backscatter-working-group). To date, the main output of the BSWG was a report published in 2015 providing comprehensive guidelines and recommendations on the nature, acquisition, processing and use of MBES backscatter data (Lurton et al. 2015), which is widely recognised today as the main resource on the topic of MBES backscatter data for all interested users. Subsequently, the group published a special issue on »Seafloor Backscatter Data from Swath Mapping Echosounders: from Technological Development to Novel Applications« in the journal *Marine Geophysical Research* (Lurton and Lamarche 2018), collating research articles on the topic of MBES backscatter data measurement, processing and applications.

In order to give a new impetus to the BSWG activities, the core members of the BSWG and active participants recently convened during a workshop held in Halifax, Canada, October 25 to 27 (Fig. 1). Thanks to the organisation and hosting of Craig Brown and the financial support from the Ocean Frontier Institute (OFI) BeCOME project (https://www.ofi.ca/research-projects/become), the hybrid event took place at Dalhousie University's Steele Ocean Science Building with 20 participants on-site and a total of 37 participants attending online. The workshop began with presentations from participants to outline the state-of-the-art and new developments regarding MBES backscatter data and its use (https://www.youtube.com/channel/UCxqsSrkihByHyVLzgp04-yg/videos), and which provided background for the subsequent discussions. Small break-out group discussions then took place where participants discussed current research gaps and priorities regarding the topic. The groups appeared unanimous in identifying a general lack of standards (in calibration, acquisition and processing) as a main issue to tackle. The group also discussed what solutions can be put forward to improve the education and training of backscatter users with this data type. Furthermore, it was agreed that new models and technical advances such as multispectral acoustic analyses and water-column data information deserve more attention and are offering tremendous potential for applications in environmental surveying. The workshop concluded with a synthesis of the topics discussed and an open discussion on updating the groups' mission, objectives, structure and roadmap. A major decision was to re-organise the BSWG into thematic sub-groups.

The workshop was brought together by host Craig Brown (Dalhousie University) and co-convened by Alexandre Schimel (Geological Survey of Norway) and Marc Roche (Federal Public Service Economy, Belgium), who worked together to revitalise the BSWG this year. The group actively looks for interested and active participants from the community of backscatter users. Further meetings of the group are expected online and in person at the next GeoHab conference to be held in May 2023. If you are interested in becoming an active participant in the future activities of BSWG or simply remaining informed about those future activities through the mailing list, contact the BSWG at bswg@geohab.org. //

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