Preliminary Evaluation of Multibeam Backscatter Consistency through Comparison of Intermediate Processing Results

M. Malik[1*], G. Masetti[2], A.C.G. Schimel[3], M. Roche[4], M. Dolan[5], J. Le Deunf[6]

1. Office of Ocean Exploration and Research, National Oceanic and Atmospheric Administration (NOAA), Silver Spring, Maryland, USA, mashkoor.malik@noaa.gov
2. Center for Coastal and Ocean Mapping/Joint Hydrographic Center, University of New Hampshire, Durham, NH, USA
3. National Institute of Water and Atmospheric Research (NIWA), Greta Point, Wellington, New Zealand
4. Federal Public Service Economy of Belgium (FPSE), Brussels, Belgium
5. Geological Survey of Norway (NGU), Trondheim, Norway
6. Service Hydrographique & Océanographique de la Marine (Shom), Brest, France

Although backscatter mosaics of the seafloor are now routinely produced from multibeam sonar data, significant differences have been observed in the products generated by different software when processing the same dataset. This represents a major limitation to a number of possible uses of backscatter mosaics, including quantitative analysis, monitoring seafloor change over time, and combining results from multiple data sources. A recently published study from the Backscatter Working Group: established under auspices of GEOHAB (http://geohab.org/) and consisting of more than 300 researchers representing academia, governments and industry (Lurton et al., 2015) also highlighted this issue. The study recommended that "to check the consistency of the processing results provided by various software suites, initiatives promoting comparative tests on common data sets should be encouraged [...]". With the aim of facilitating such a comparison, the Backscatter Software Intercomparison Project (BSIP) was launched in May 2018. Software developers were invited to actively participate in BSIP and discuss how the inconsistencies might be overcome and, or at least made more transparent. To date, the developers of four software packages (CARIS SIPS, MB Process, QPS FMGT, and Sonarscope) have actively collaborated on this project and other interested software vendors are encouraged to participate in this project.

Since backscatter data processing is a complex and (as yet) non-standardized sequence of steps, the root causes of observed differences in the end-results derived using different software packages are difficult to pinpoint. It is thus necessary to obtain data at intermediate stages of processing sequences. We provided software developers with several small datasets collected using different multibeam sonar models and asked them, at this initial stage of the project, to generate intermediate processing results focused on the output of the first stages of processing (i.e., as read by the software tools) as well as the fully processed results. Large differences between software outputs were observed. A major observation, even at this early stage of the project, was that in the absence of accepted standards, different software have adopted different methods to generate the initial backscatter value per beam from the raw data (snippets), prior to starting the

processing sequence. This initial difference is critical and hinders any comparison of the subsequent steps during backscatter processing. We conclude by presenting our plans for the next steps of the project including working closely with commercial software vendors in finding ways to overcome this limitation, as well as standardizing outputs and terminology.

Lurton, X., Lamarche, G., Brown, C., Lucieer, V. L., Rice, G., Schimel, A., & Weber, T. (2015). Backscatter measurements by seafloor-mapping sonars: guidelines and recommendations. *A collective report by members of the GeoHab Backscatter Working Group*, (May), 1-200.