

## Paper for Information

### Backscatter measurements by seafloor-mapping sonars: Guidelines and Recommendations

<b>Submitted by:</b>	France
<b>Executive Summary:</b>	Progress report from the BackScatter Working Group
<b>Related Documents:</b>	
<b>Related Projects:</b>	<a href="http://geohab.org/bswg">http://geohab.org/bswg</a>

#### Introduction / Background

Marine science and technology communities involved in seafloor mapping have long recognized the potential of using sonar data not only for bathymetry charting but also as a proxy of seafloor nature and physical characteristics, using the backscatter level of seafloor echoes. This line of research has been supported and encouraged for long by the GeoHab group, an international association of scientists focusing on marine Geological and biological Habitat mapping (see <http://geohab.org/>). Since 2001, the GeoHab community discusses potential and advances of using remotely-sensed data to develop quantitative study on relationships between seafloor substrate and benthic ecosystems.

At the 2013 GeoHab conference, the QPS company ([www.qps.nl](http://www.qps.nl)), well known in the field of software products for seafloor mapping, organized a specific workshop on "Multibeam Backscatter – State of the Technology, Tools & Techniques". During this event, the need for a compendium on backscatter acquisition, processing and interpretation came up. The Backscatter Working Group (BSWG) was created in the wake of this workshop (see <http://geohab.org/bswg/>). Co-chaired by Xavier Lurton (Ifremer, France) and Geoffroy Lamarche (NIWA, New Zealand), it gathers today about 120 people from all over the World, from various communities spanning a wide range of marine specialties.

The discussions at the QPS workshop identified a lack of commonly accepted acquisition procedures and processing methodologies of backscatter data recorded with sonars commonly used for seafloor surveys. Similarly, gaps in the documentation and literature pertinent to backscatter theory and applied operations were recognized. Concerning the acquisition procedures, it was found that a lack of consistency between the backscatter acquisition equipment from various manufacturers had never been addressed, which was regarded as an obvious hindrance to the progress of backscatter science and applications. By comparison, much had been done for decades in the field of sonar bathymetry, with the definition and general agreement on standard acquisition and processing procedures, and recommendations for compliance to standardized performance; the BSWG intends to promote a similar approach to sonar reflectivity measurements.

#### Analysis/Discussion

The purpose of the BSWG and of the report proposed here is twofold: (1) agree on, and provide, guidelines and best practice approaches for the acquisition and processing of backscatter data from seafloor-mapping sonars; and (2) provide recommendations for the improvement and further development of seafloor-mapping sonar systems for acquisition of backscatter data and related processing tools.

The summary of the document is as follows:

1. Introduction
2. Background & Fundamentals
3. Users needs
4. Backscatter measurement by bathymetric echosounders
5. Acquisition : Best Practice Guide
6. Backscatter Data Processing
7. Synthesis & Conclusions
8. Appendices : References, Glossary...

A copy of the draft report (in its status of May 2014) can be made available to HSSC for checking the relevance of the work proposed.

The writing by the BSWG has been undertaken over two years, starting in May 2013. The goal is to have the report ready for presentation and distribution in May 2015. Hence the draft report is due by the end of 2014, to leave some time for reviewing and edition. However, in order to make possible a (slight) feedback from the 2015 GeoHab, the final date for publication is late June 2015.

This schedule has been respected up to now, and a first intermediate version of the document has been presented, as expected, at the GeoHab general assembly in 2014. Considering that the various author teams are presently working hard on writing the missing elements, it is not overoptimistic to think that the document will indeed be ready in due time.

### **Recommendations**

It is expected from the BSWG addressing this request to the HSSC that the document be published as an IHO publication. This will imply obviously some reviewing by IHO in order to check that the purpose and general level of the document is in coherence with the current IHO publications. However the detailed reviewing will be ensured by the BSWG itself, since this is a collective work undertaken by many of major actors in the field. The edition will be undertaken by the BSWG chair as well – although obviously some help by IHO will be appreciated for the final editing stages.

### **Justification and Impacts**

No impact.

### **Action Required of [HSSC] [Relevant HSSC WG]**

The [HSSC] [Relevant HSSC WG] is invited to:

- a. note this paper and consider its recommendation.