

# Synthetic Aperture Mapping Sonar for Hydrography

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Synthetic aperture sonar imaging (SAS) [1] is a mature technology used for high resolution seafloor mapping applications such as mine counter measures. SAS systems are integrated on stable platform such as Autonomous Underwater Vehicle (AUV) since performances degrade in challenging environmental or navigation conditions. At iXblue, we develop and commercialize high resolution mapping sonar systems based on SAS technology but with a more flexible approach to overcome some of the main limitations of the conventional SAS processing scheme and to adapt the SAS system to the hydrographic survey needs[2]. We will first present how our SAS processing is designed to construct the focused image directly onto the georeferenced map : coherent focusing and precise absolute georeferencing are done simultaneously. We solved the compromise between stability and performances by implementing multiple imaging modes : multibeam incoherent imaging, fixed coherent gain or full coherent imaging. This enables to get the optimal imaging solution regarding to the environmental conditions. We will illustrate the relevance of this approach on real data acquired on a towed fish platform navigating in rough navigation conditions.

Recently we have developed a full interferometric SAS (inSAS). The same flexible and adaptive approach has been applied to the interferometric processing scheme. Multiple interferometric methods have been implemented : standard interferometric sidescan , incoherent or multiple beam incoherent processing , fixed gain and full coherent inSAS processing. We are investigating the inSAS bathymetric performances for each of the processing method and the development of total vertical and horizontal error models. We will also give a review on quality control parameters and criteria that can be computed from the inSAS data.

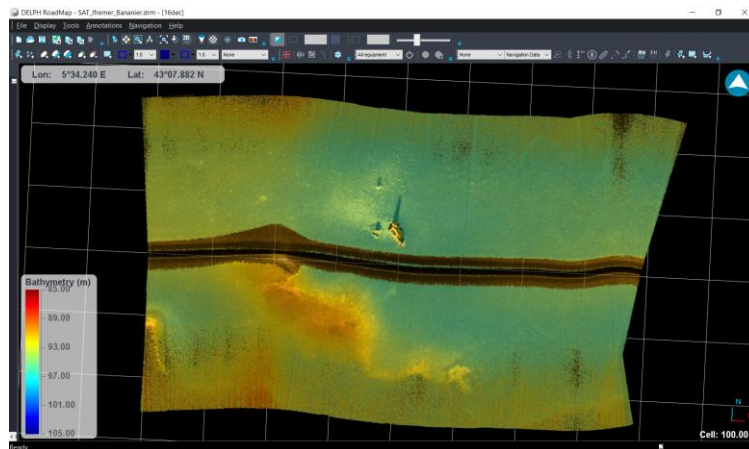


Figure 1 : SAMS150 inSAS Mosaic and bathymetry map

[1]. R.E. Hansen , 'Introduction to Synthetic Aperture Sonar', in N. Z. Kolev (ed.), Sonar Systems, Intech Open, 2011.

[2]. D. Charlot, F. Mosca, 'Towards a New Sonar Imaging Concept for Survey', Hydro International, March/April 2018.