

Shallow Survey 2008, Portsmouth (NH), 21-24 Oct. 2008

Interferometry for Bathymetry Sonar : Accuracy vs Resolution, and a new Quality Estimator

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Interferometry is the prevalent processing technique used in bathymetry sonars ; although the quality of its results is well-known and universally admitted, the objective estimation of its performances is not always well understood. In this paper, after a short reminder of interferometry fundamentals, and its implementation into side-scan sonars and multibeam echosounders respectively, we propose to introduce and discuss the "accuracy-resolution trade-off" : since the interferometric measurement is intrinsically quite noisy, the required bathymetry accuracy imposes some kind of spatial averaging, which is detrimental to the resolution of the measurement. Some recent achievements aimed at improving this compromise are evoked. Finally, we present a new Quality Factor for sounding measurements, based on this analysis, and providing an estimation of the bathymetric quality of a given sounding ; this estimator was defined in the frame of the recent development by Ifremer of post-processing softwares for Reson Seabat 7100 sounders, but can be applied to any bathymetry system.