Comparison Between Backscatter Derived From Side Scan Sonar and Multi Beam Echo Sounder

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Why I Chose This Topic for My Dissertation?

BACKGROUND

With the continued development of multi-beam echo sounders for the rapid collection of bathymetric data, a new tool has become available for seabed imaging. With more modern MBES and software it has become possible not only record depth information but also raw backscatter intensity. From this it is possible to produce seabed images as similar as side scan sonar.

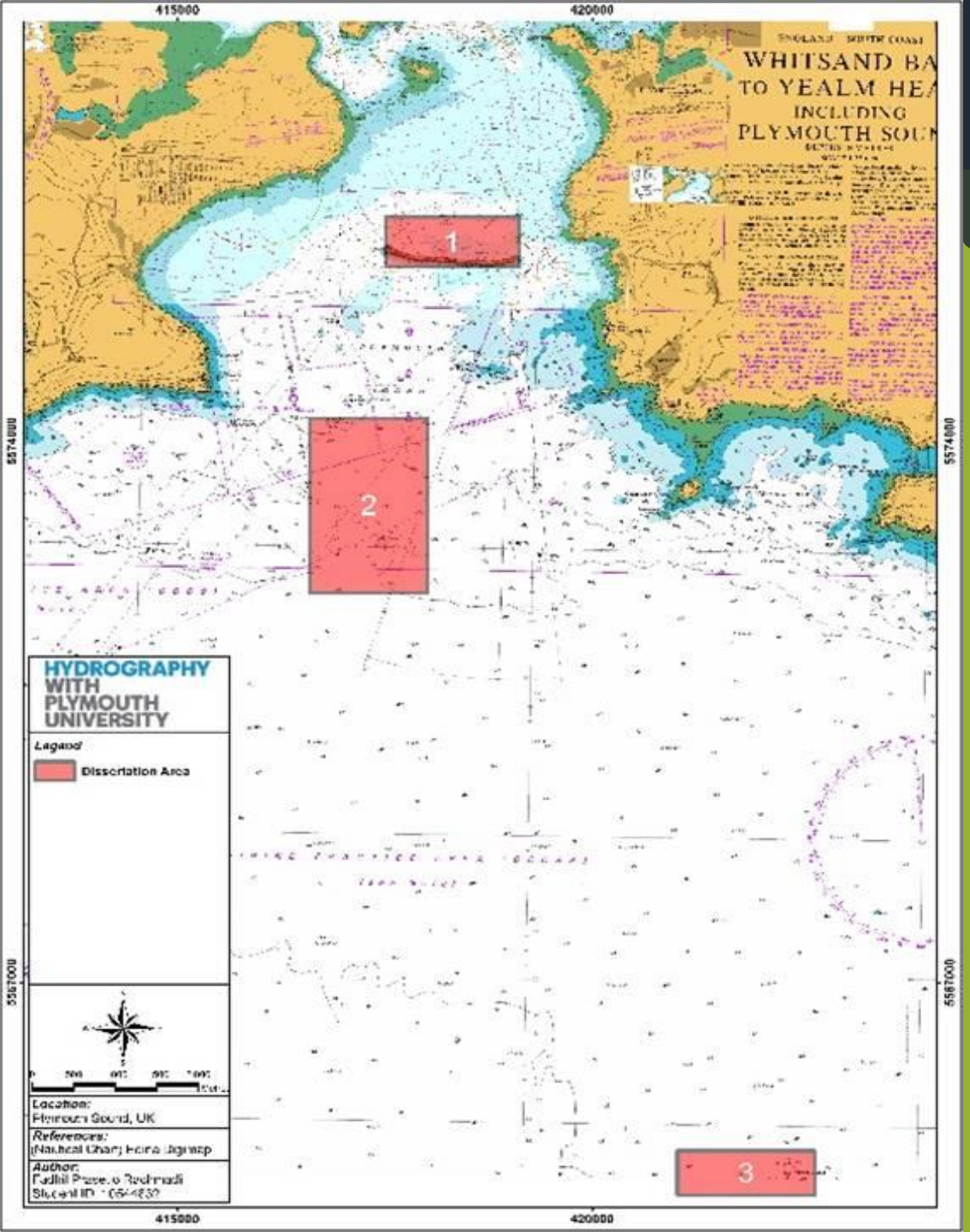
AIM

The aim of this dissertation is to compare the TruePix 400kHz backscatter data collected from R2Sonic2024 multi-beam echo sounder system to the a GeoAcoustics dual frequency 159D sides can sonar raw waterfall data and to determine whether multi-beam backscatter has a place in the survey industry, and if so, which areas may benefit from this new technology.

OBJECTIVE

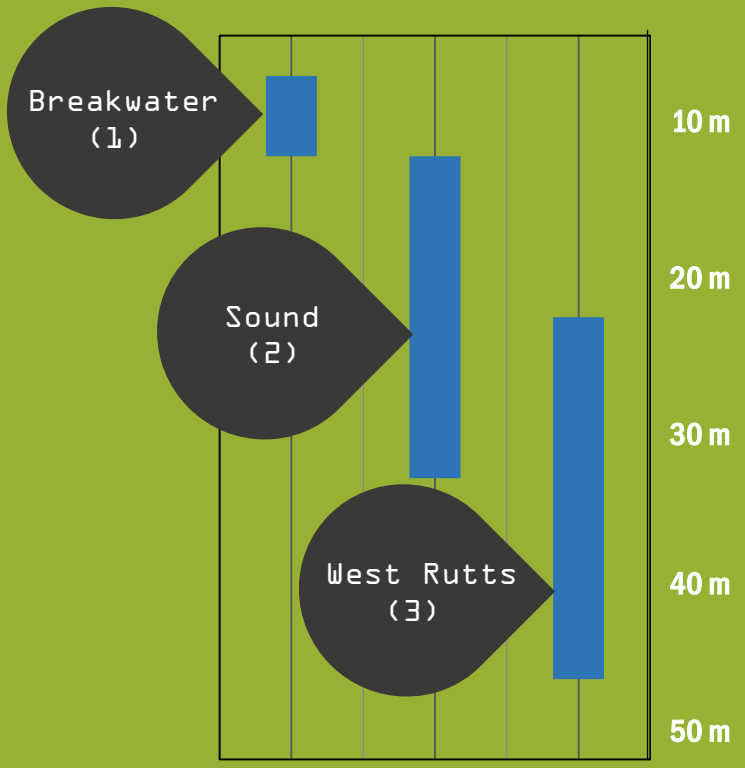
The following objectives were set out to be achieved:

1. Basic analysis of the mechanics of each system and their suitability for the survey
2. Plan, mobilise, and execute a high-resolution MBES survey with snippets methods and SSS survey
3. Compare the results obtained from each system (backscatter and shadow detail), highlighting the advantages and disadvantages respectively

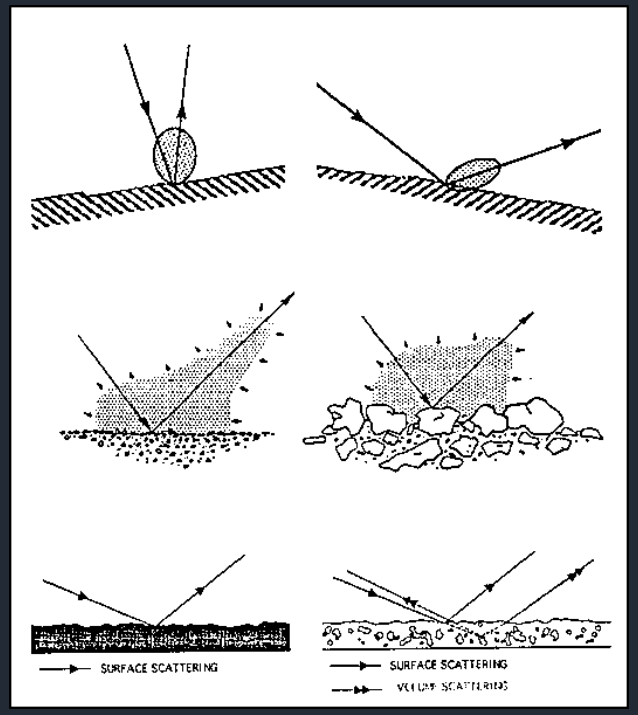


Where Is It?

Plymouth Sound, United Kingdom



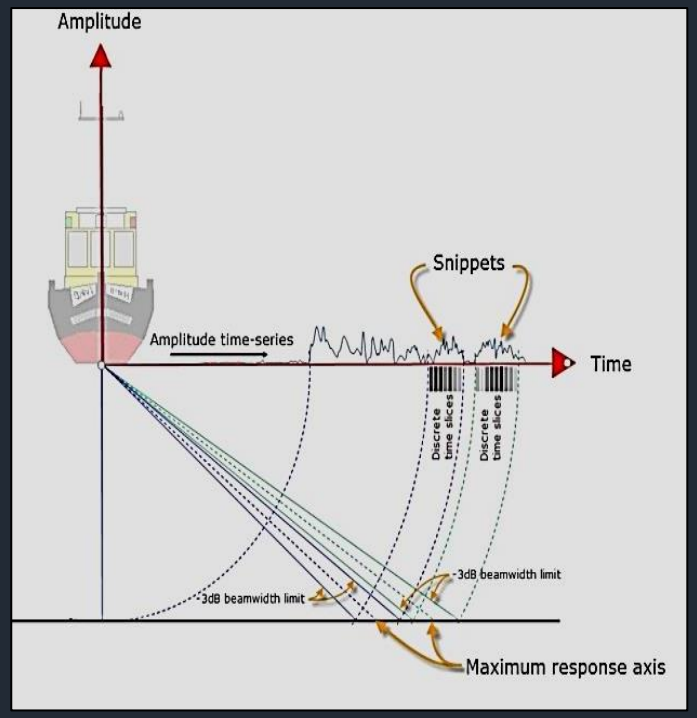
What Is Backscatter ?



The seafloor backscatter is defined as the amount of acoustic energy being received by the sonar after a complex interaction with the seafloor. This information can, and has been used to characterize bottom type as different bottom types scatter sound energy differently (Hewitt *et al.*, 2010).

Picture Source: (Lurton, 2002).

MBES vs. SSS

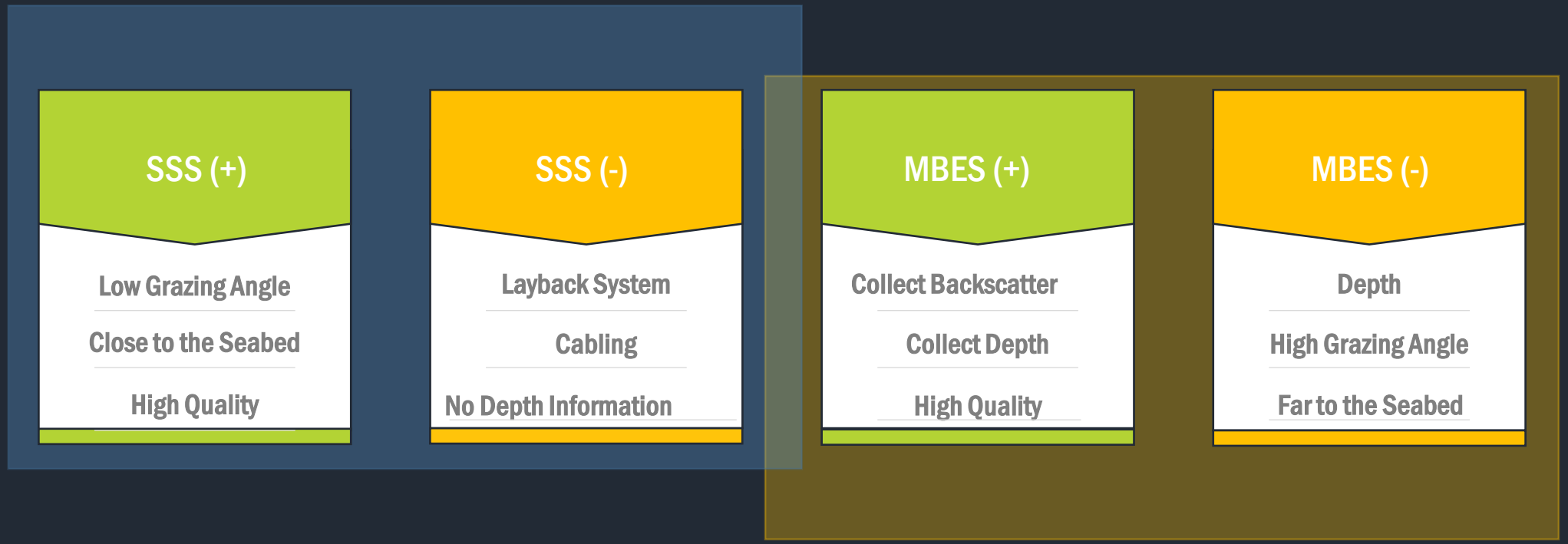


Snippets data is raw backscatter time-series data for each beam footprint and each ping (Lockhart et al., 2001).

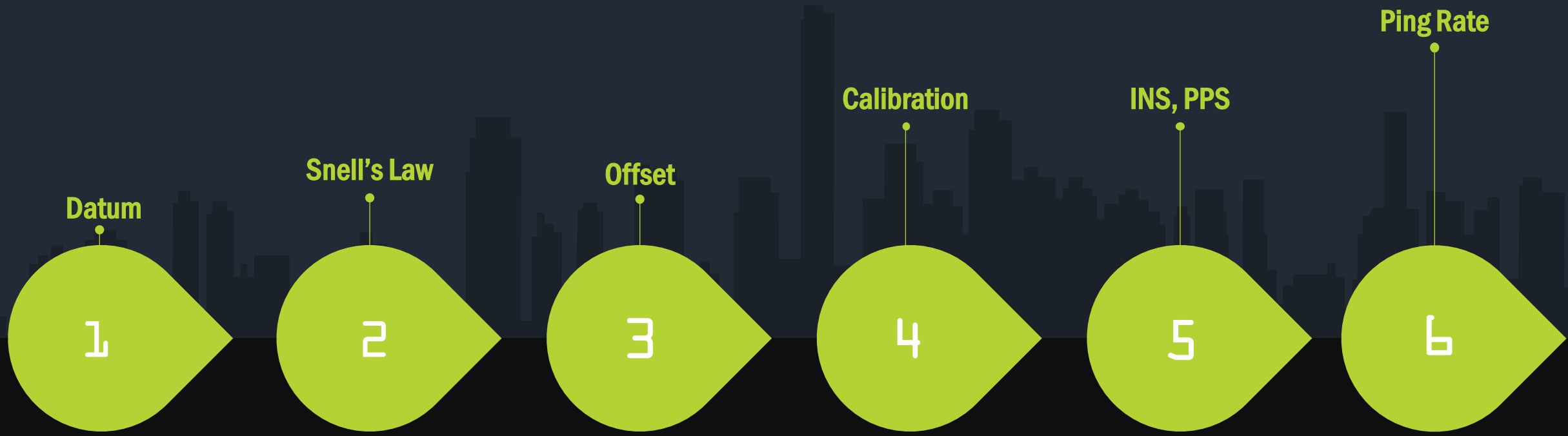
Snippets data packet contains pertinent information such as time stamp, sequential ping number, sample rate, sound velocity and operator settings such as power, gain, absorption and range scale (QPS, Not dated).

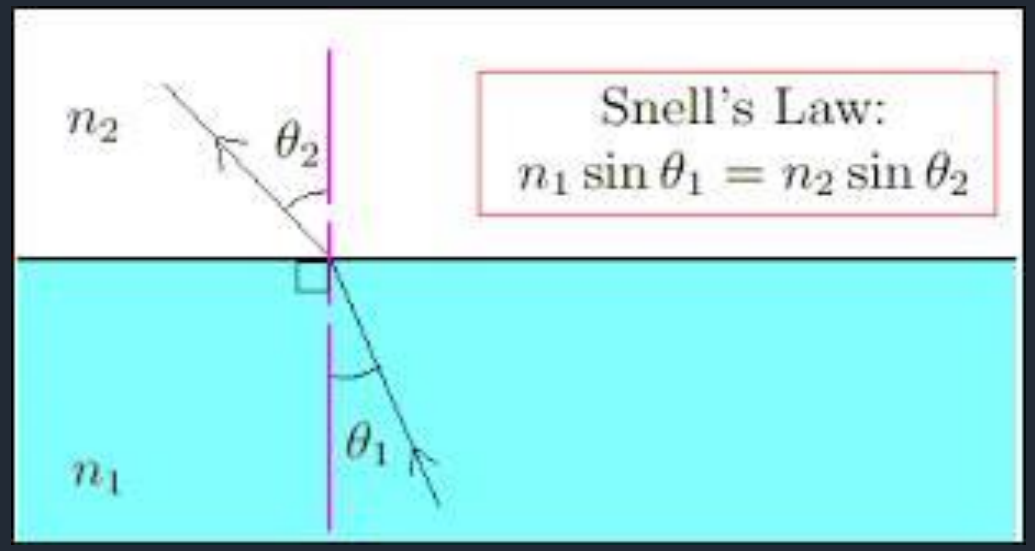
Picture Source: (QPS, Not Dated).

Advantages and Disadvantages

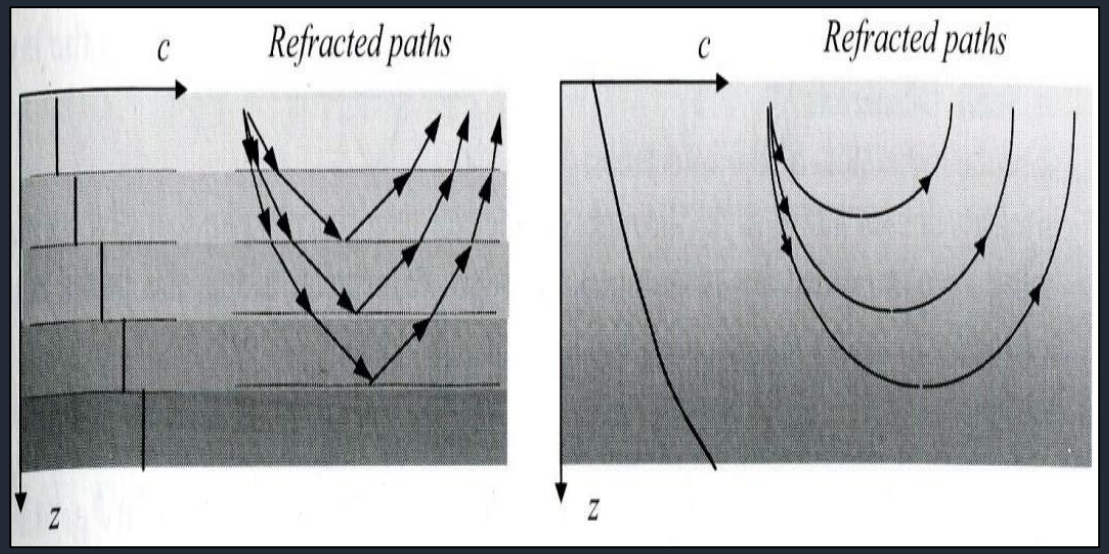


Do We Have Any Technical Issues?

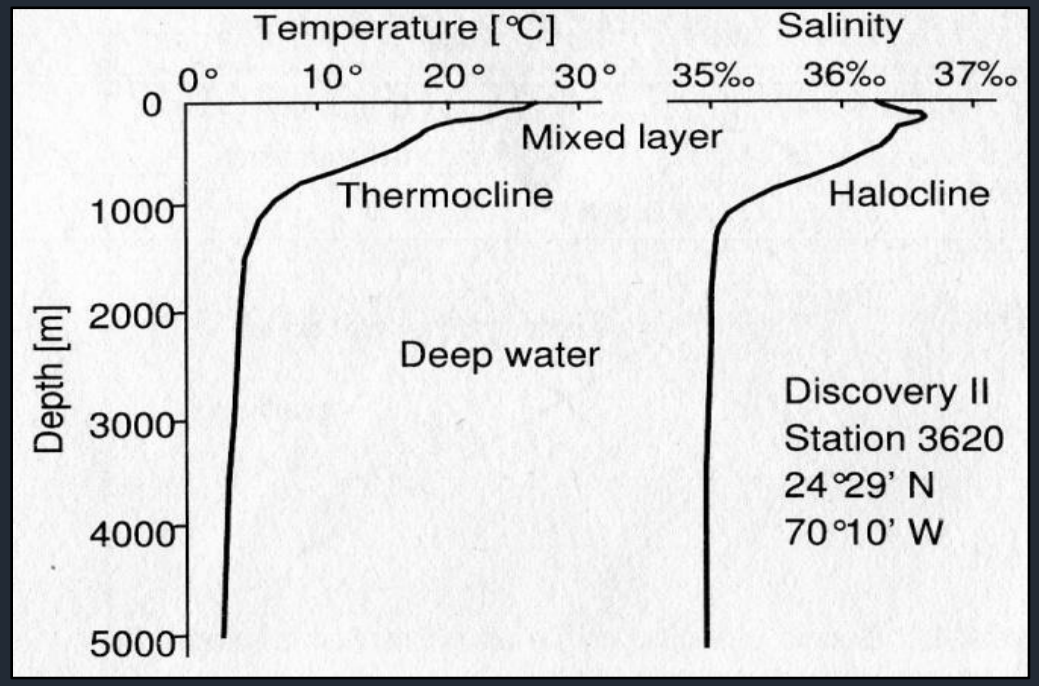




Source: (Urick, R.J., 1975).



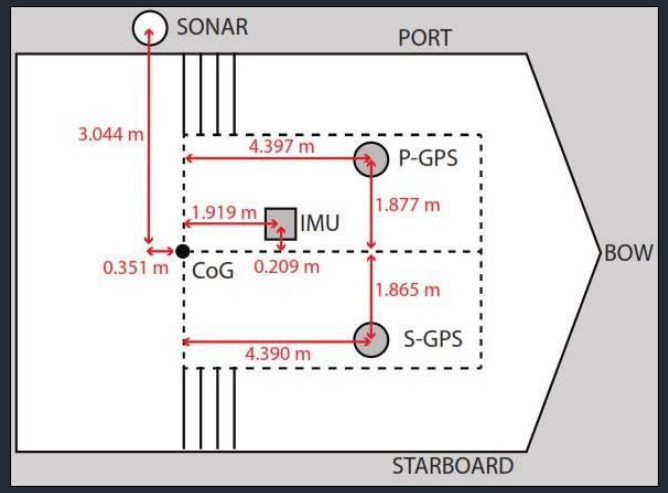
Source: (Lurton, 2002).

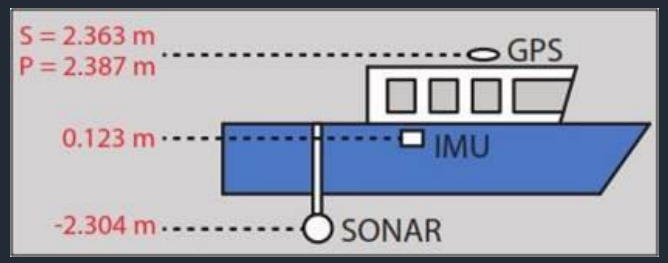


Source: (De Jong et al., 2002).

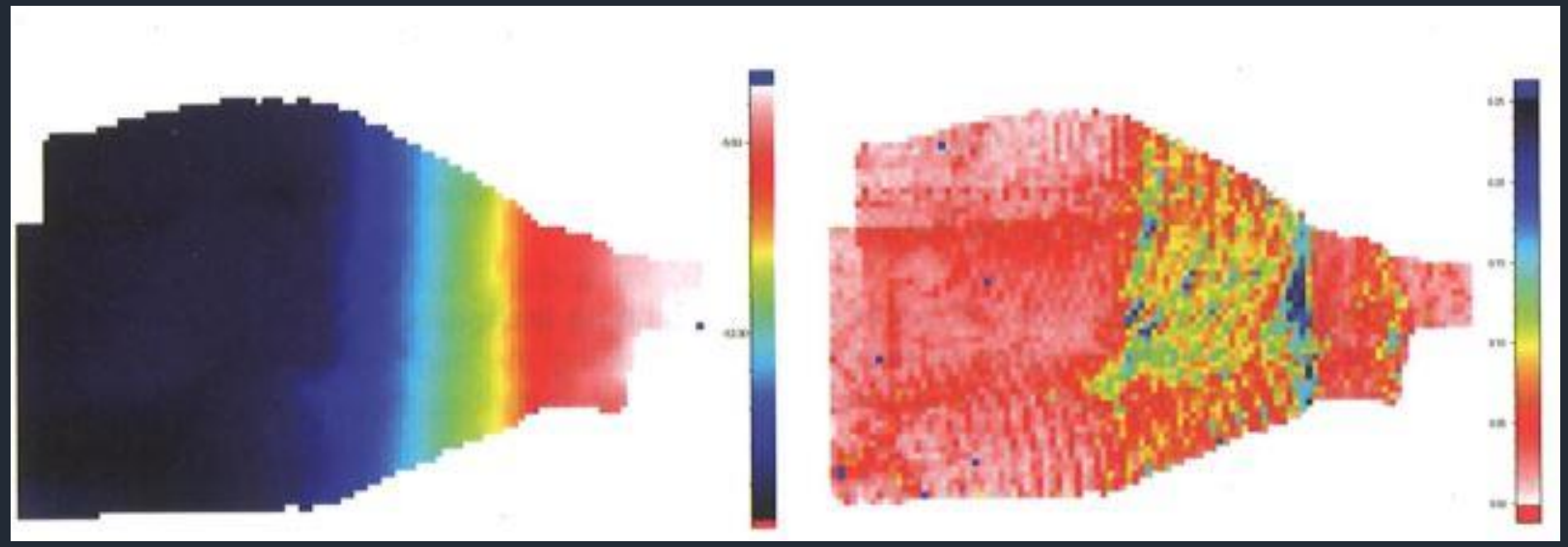
Temperature	**2.7 m/sec /°C**
Salinity	1.2 m/sec /ppt
Pressure	0.017 m/sec /m

Source: (Urick, R.J., 1975).





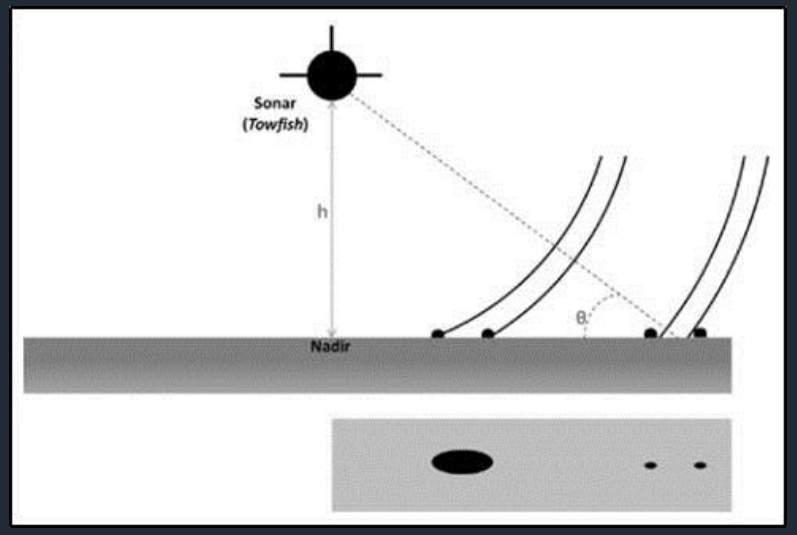
Source: (Plymouth University, 2005).



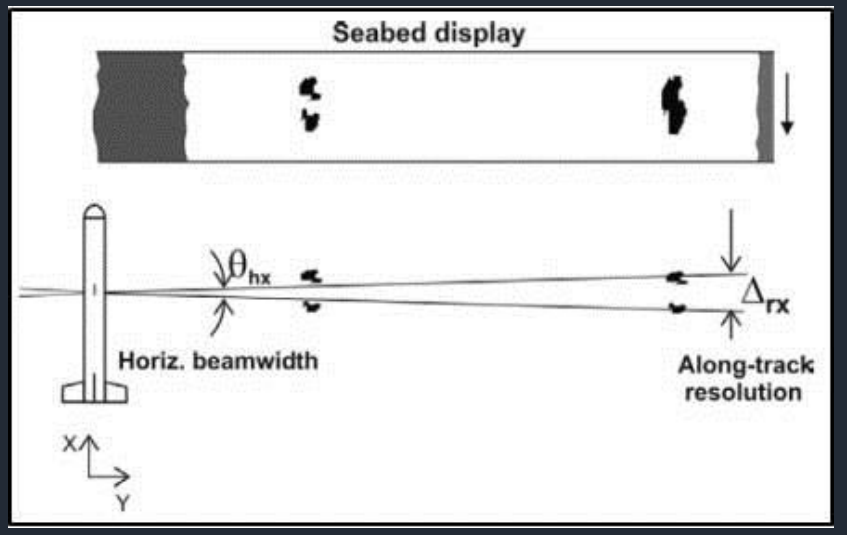
Source: Patch Test Callibration (Lekkerkerk et al., 2011)

What to Compare?

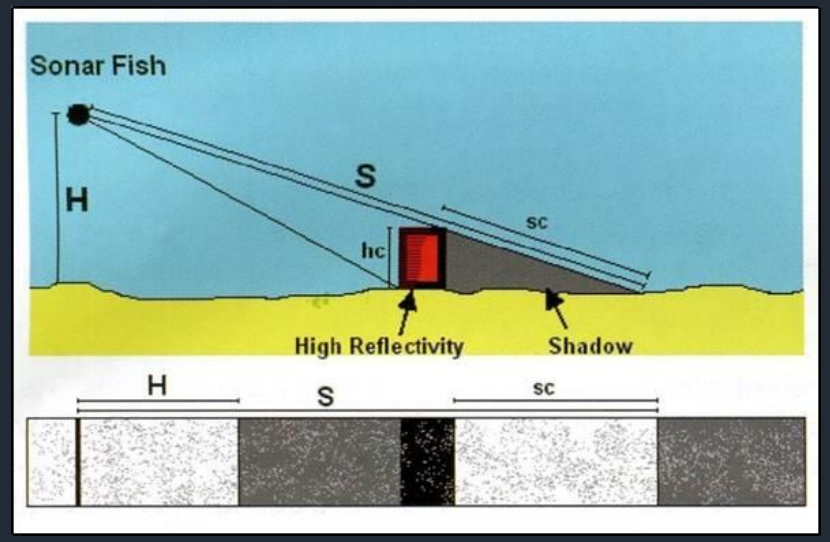
1. Resolution
2. Shadow Length



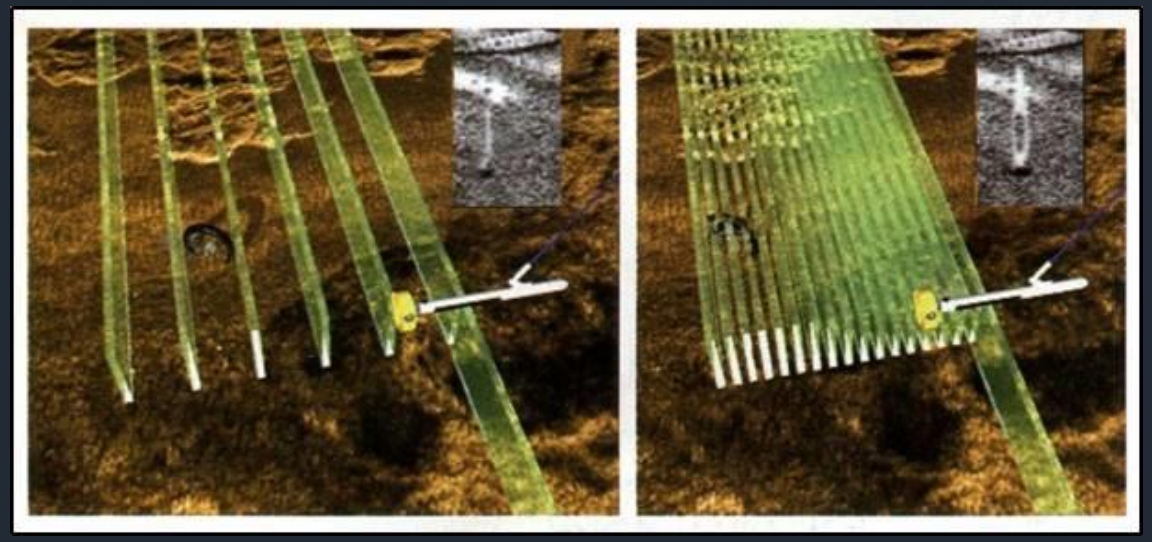
Source: Across Track Resolution(Mazel, 1995).



Source: Along Track Resolution (Henriques et al, 2003).



Source: Side scan sonar geometry (Lekkerkerk et al., 2011)



Source: Effect of different speed (Lekkerkerk et al., 2011)

Thank You

Terima Kasih