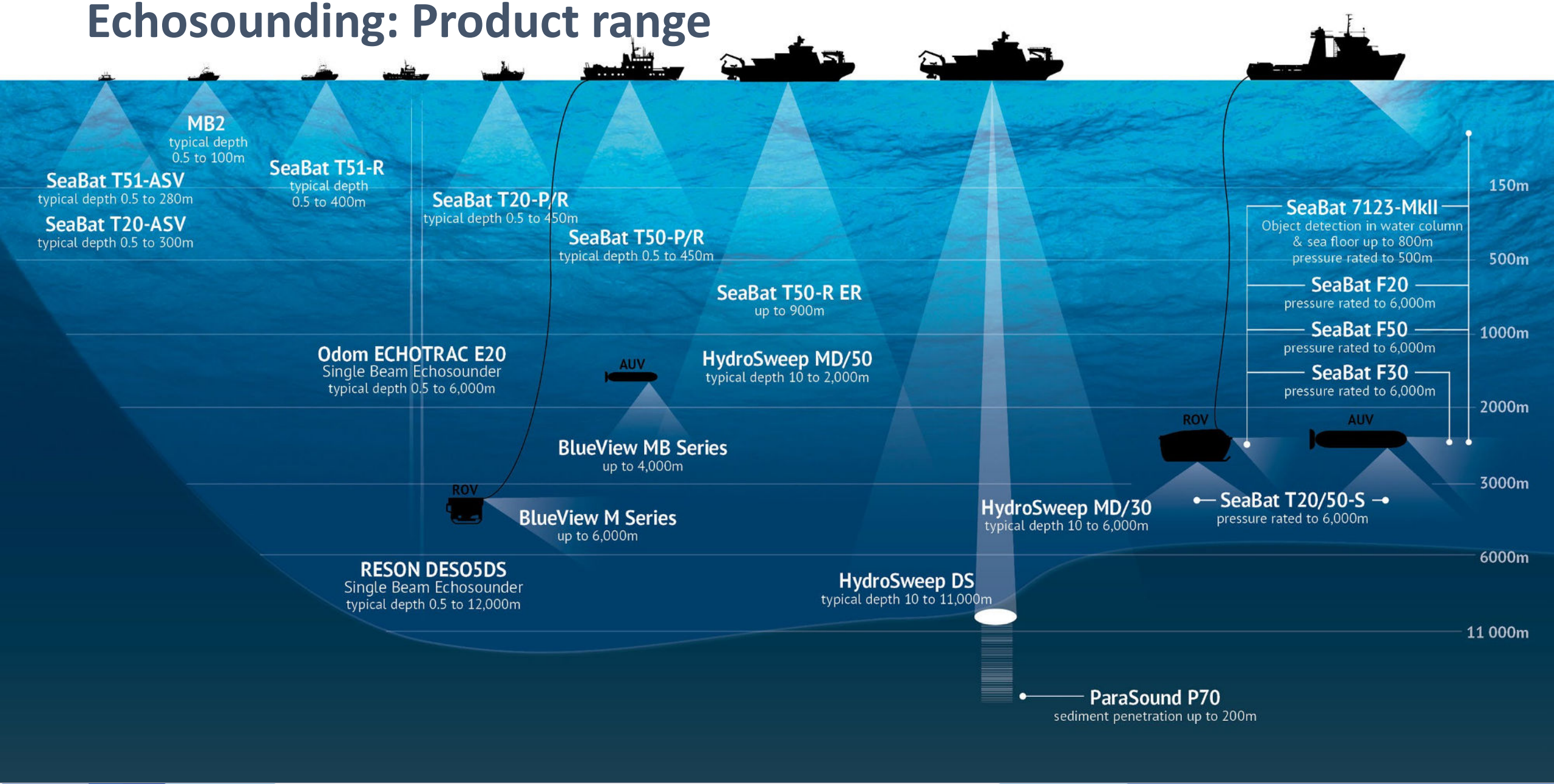
TELEDYNE MARINE
Everywhereyoulook™

Teledyne Valeport Open House
Updates from the SeaBat product line

Pim Kuus
Senior Hydrographer and Product Manager

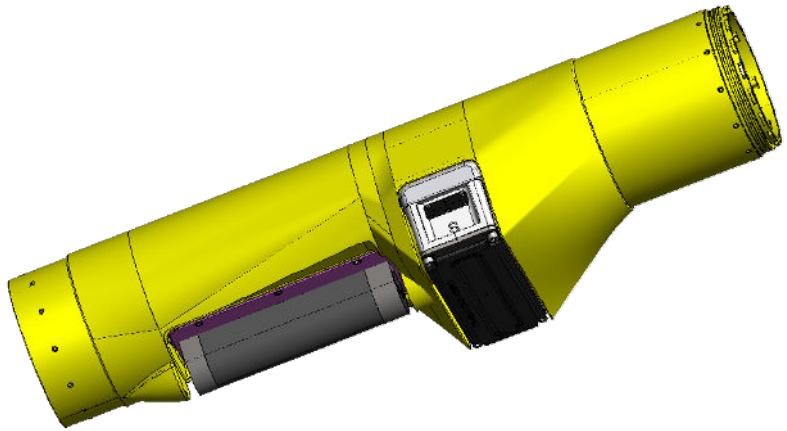
2024

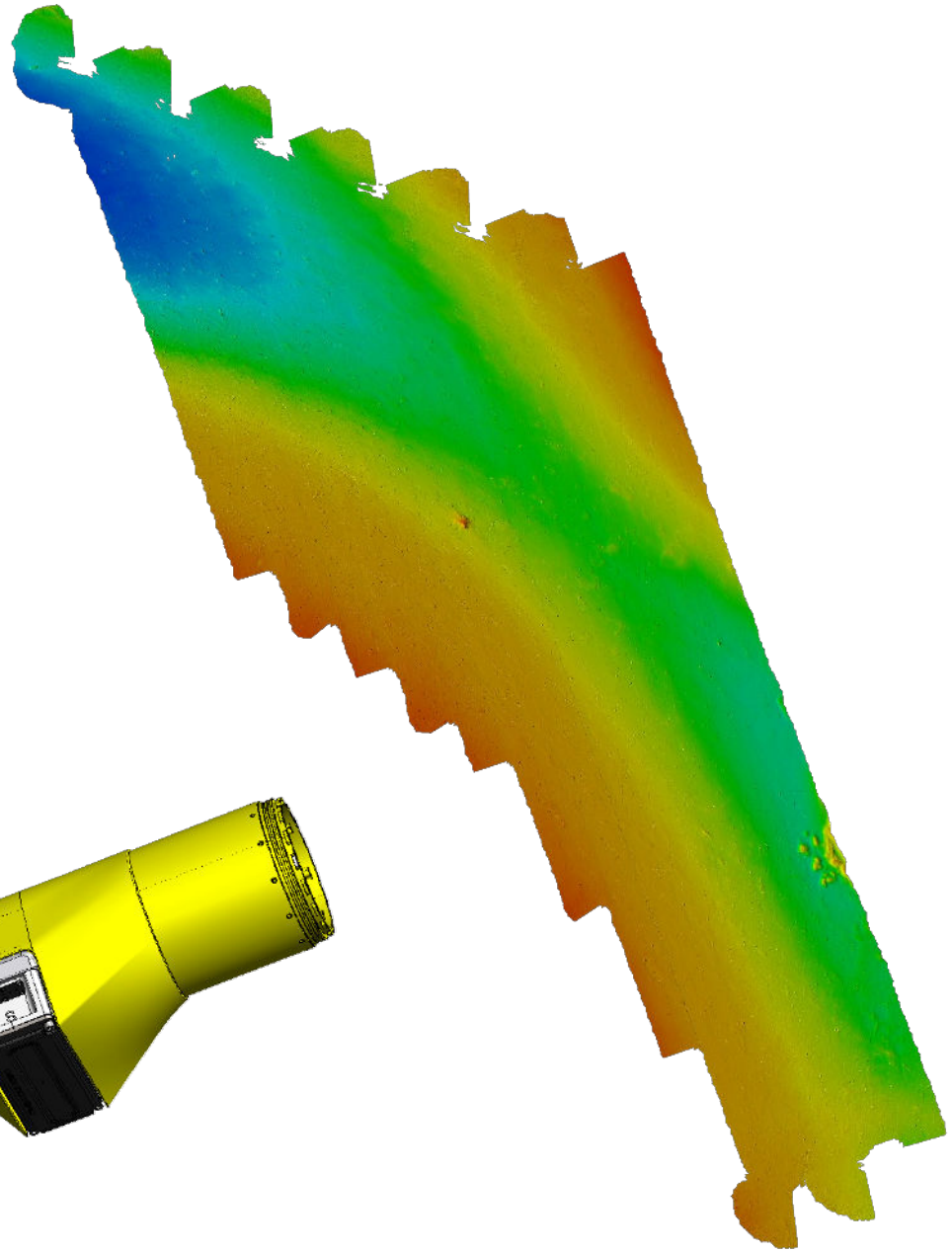
Echosounding: Product range

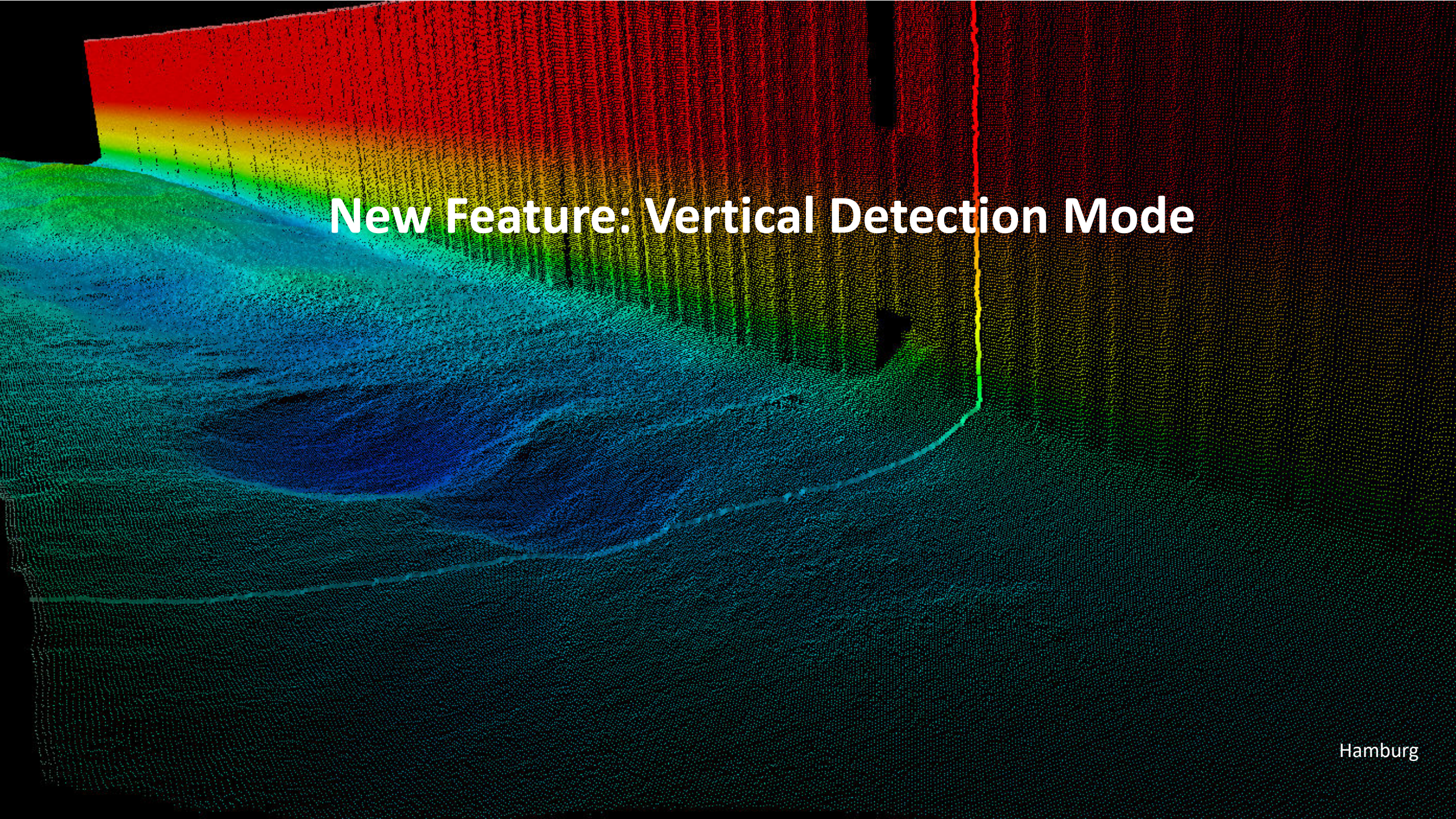


Gavia & SeaBat

- T50 in Raptor AUV (6000m depth rated)
- T20 in Gavia AUV (1000m depth rated)

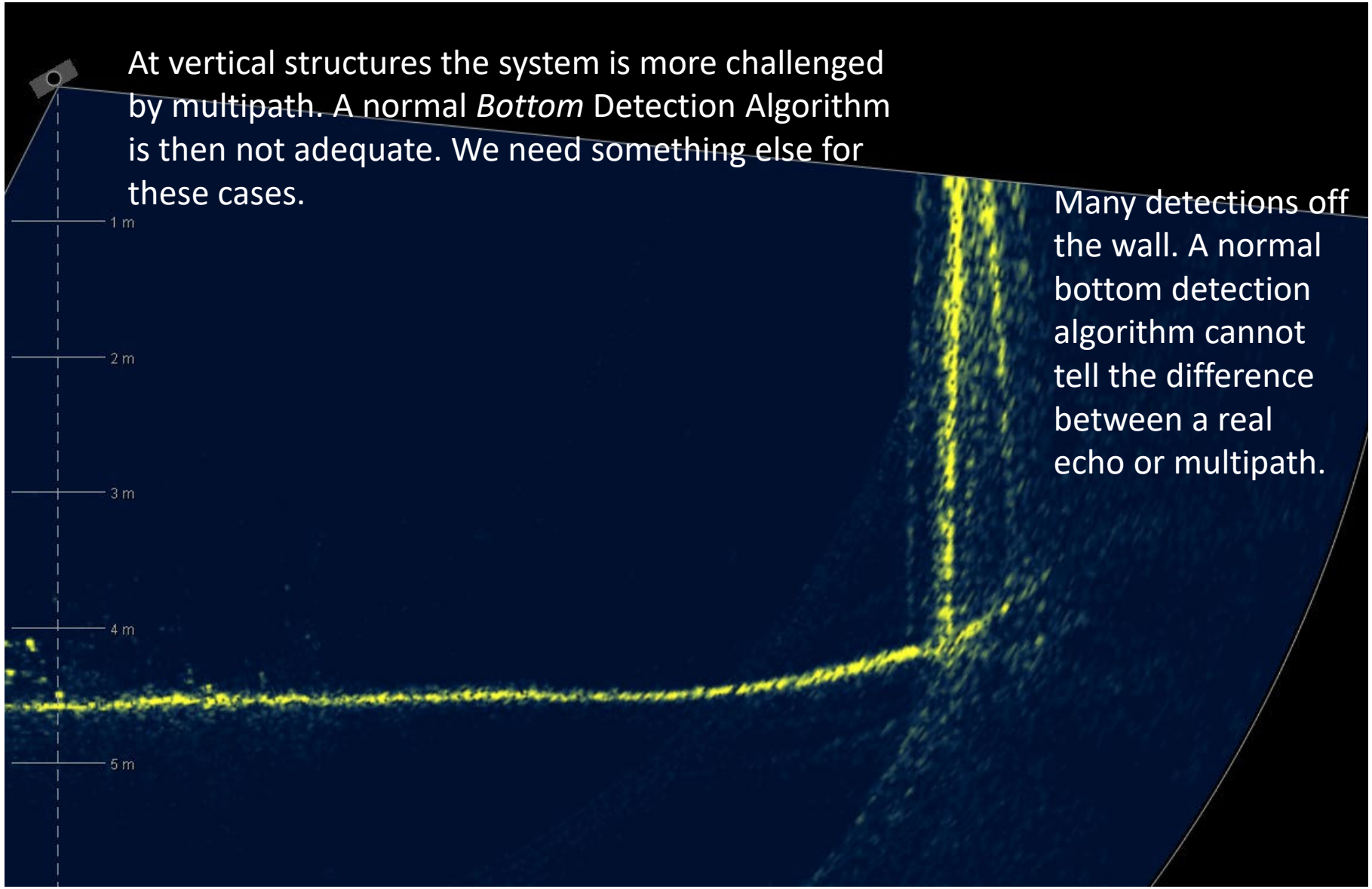





New Feature: Vertical Detection Mode
Hamburg

Detections off vertical structures

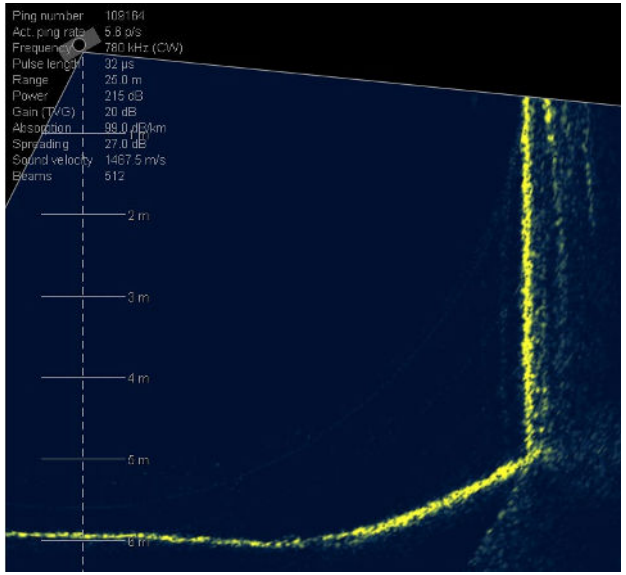
At vertical structures the system is more challenged by multipath. A normal *Bottom* Detection Algorithm is then not adequate. We need something else for these cases.

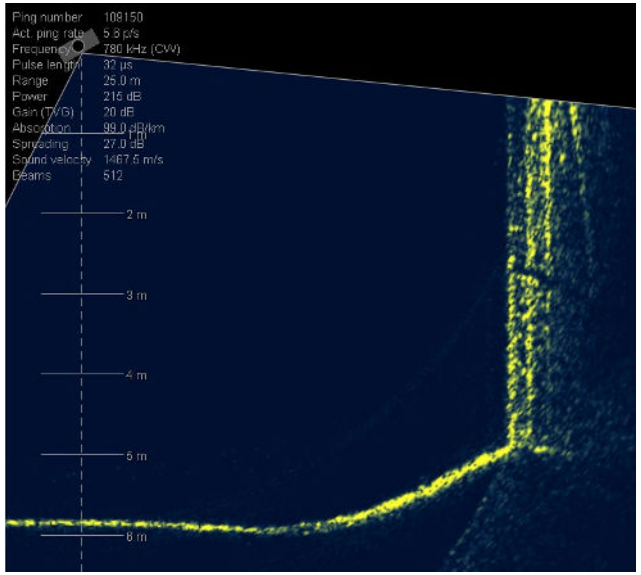


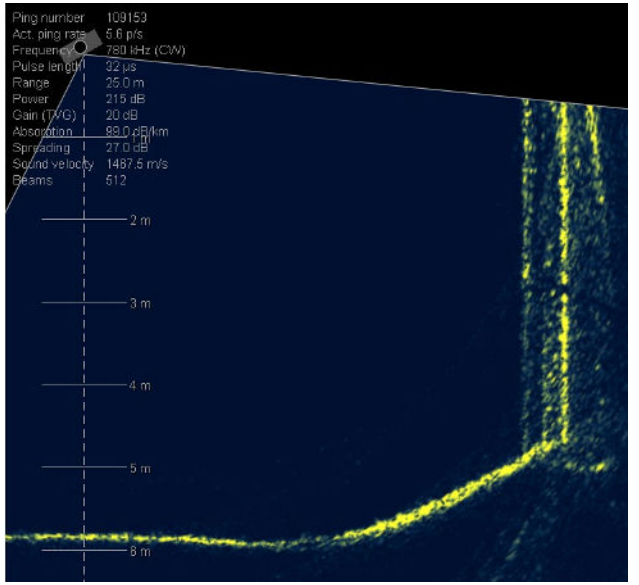
Many detections off the wall. A normal bottom detection algorithm cannot tell the difference between a real echo or multipath.

New SeaBat feature: Vertical Detection Mode

Sheet piling is particularly troublesome for detections as lot's of multipath happens when sound is sent into the aft 'cove'. Here we see the typical backscattered data as we pass along sheet piling.

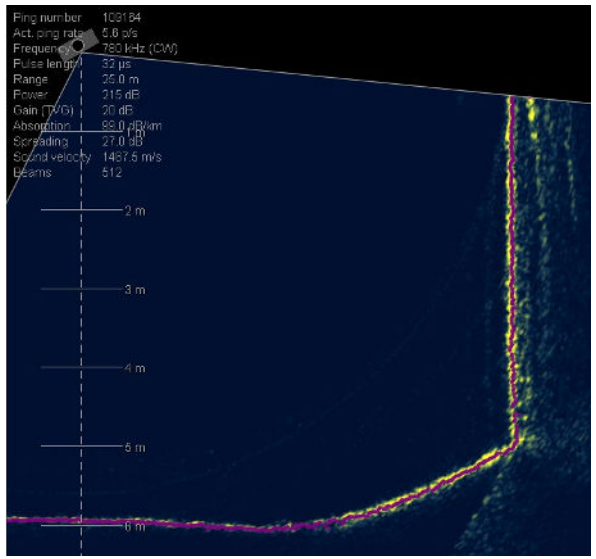


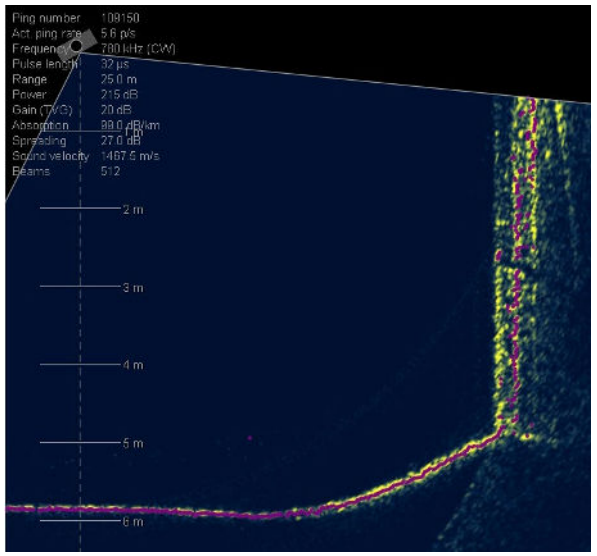


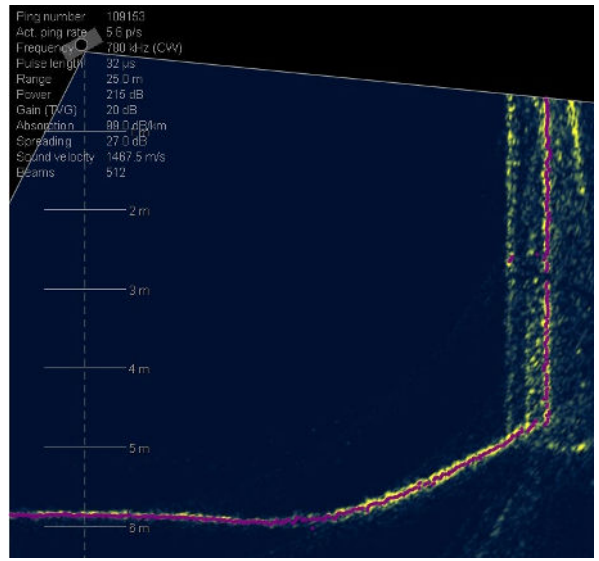


New SeaBat feature: Vertical Detection Mode

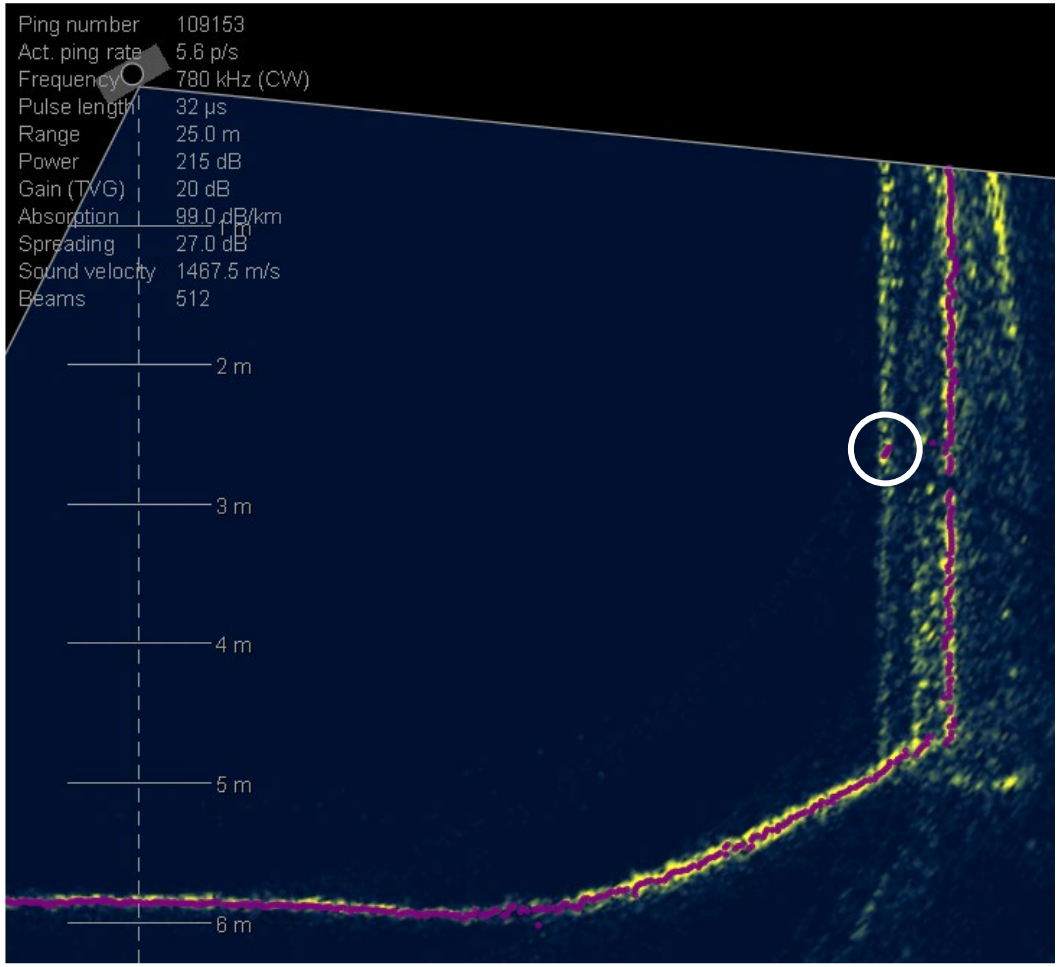
Now let's look at the detections using VDM. Note that the algorithm never uses any information from neighbouring beams or pings. We take a 'purist' approach because each detection must stand on its own without aiding or a-prior information.

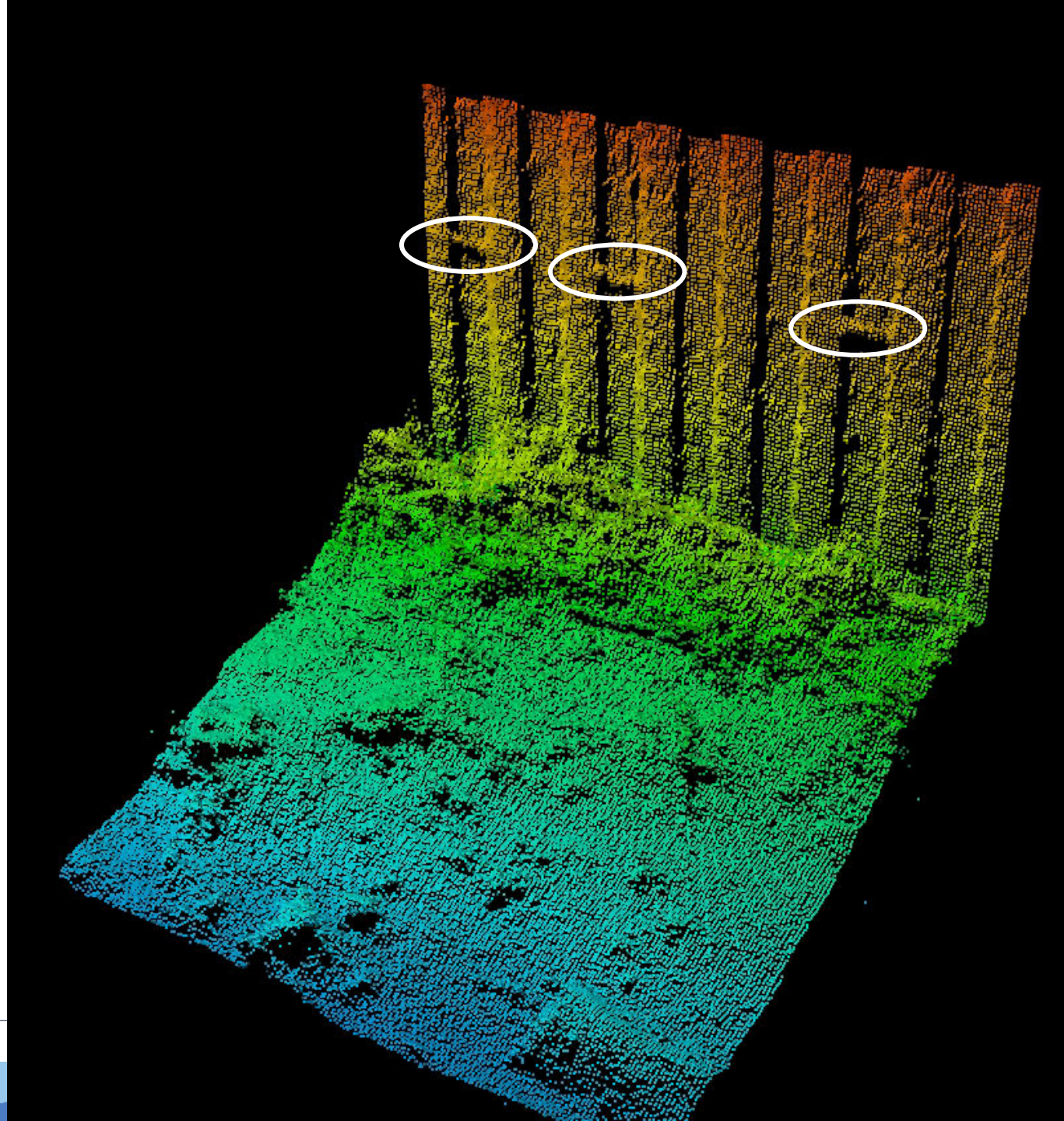




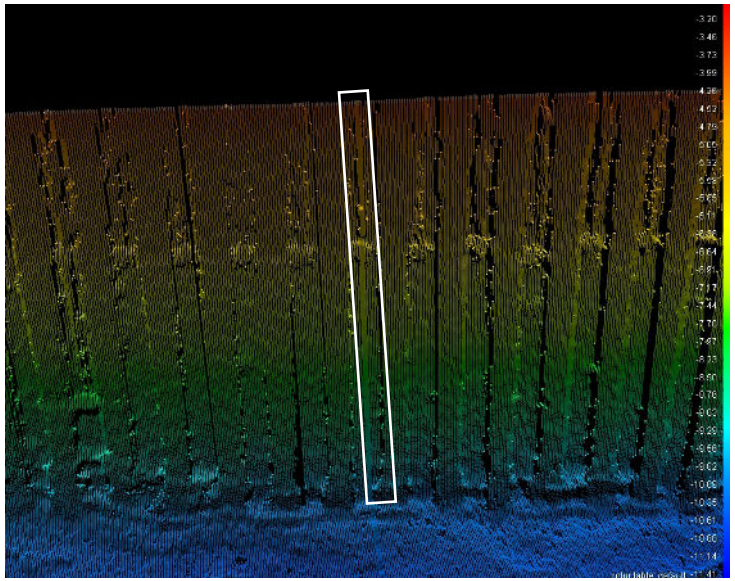


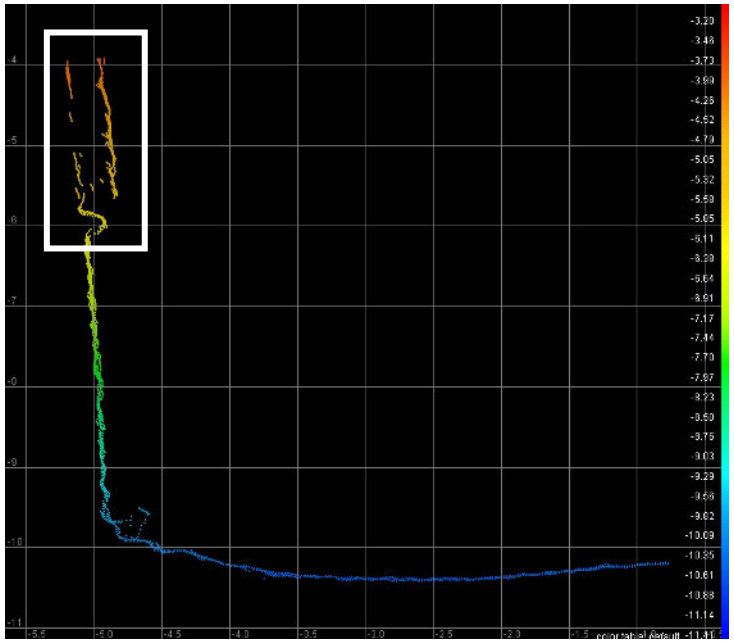
Real features are not lost.
Key is to preserve details after all!

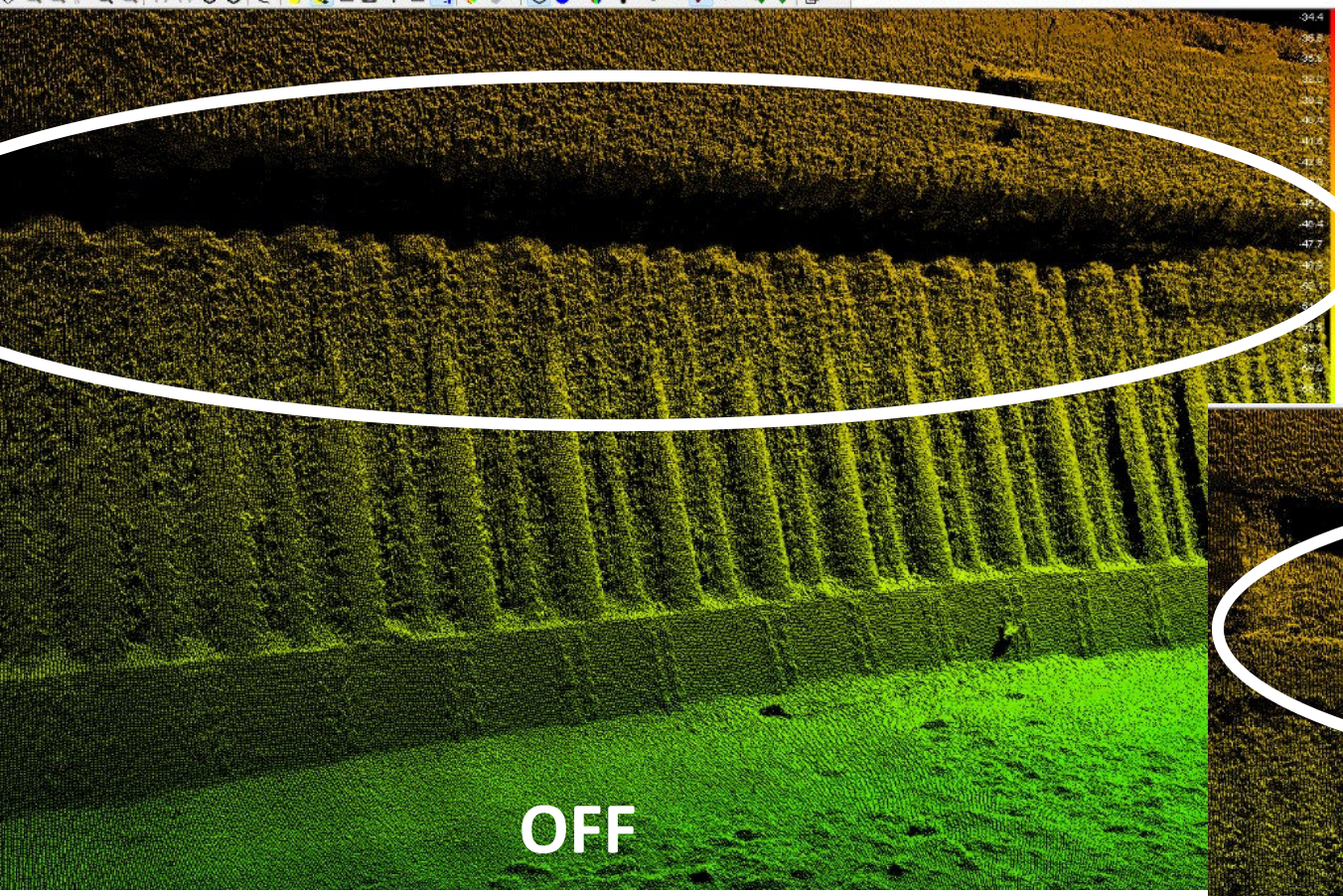




Preserving real features



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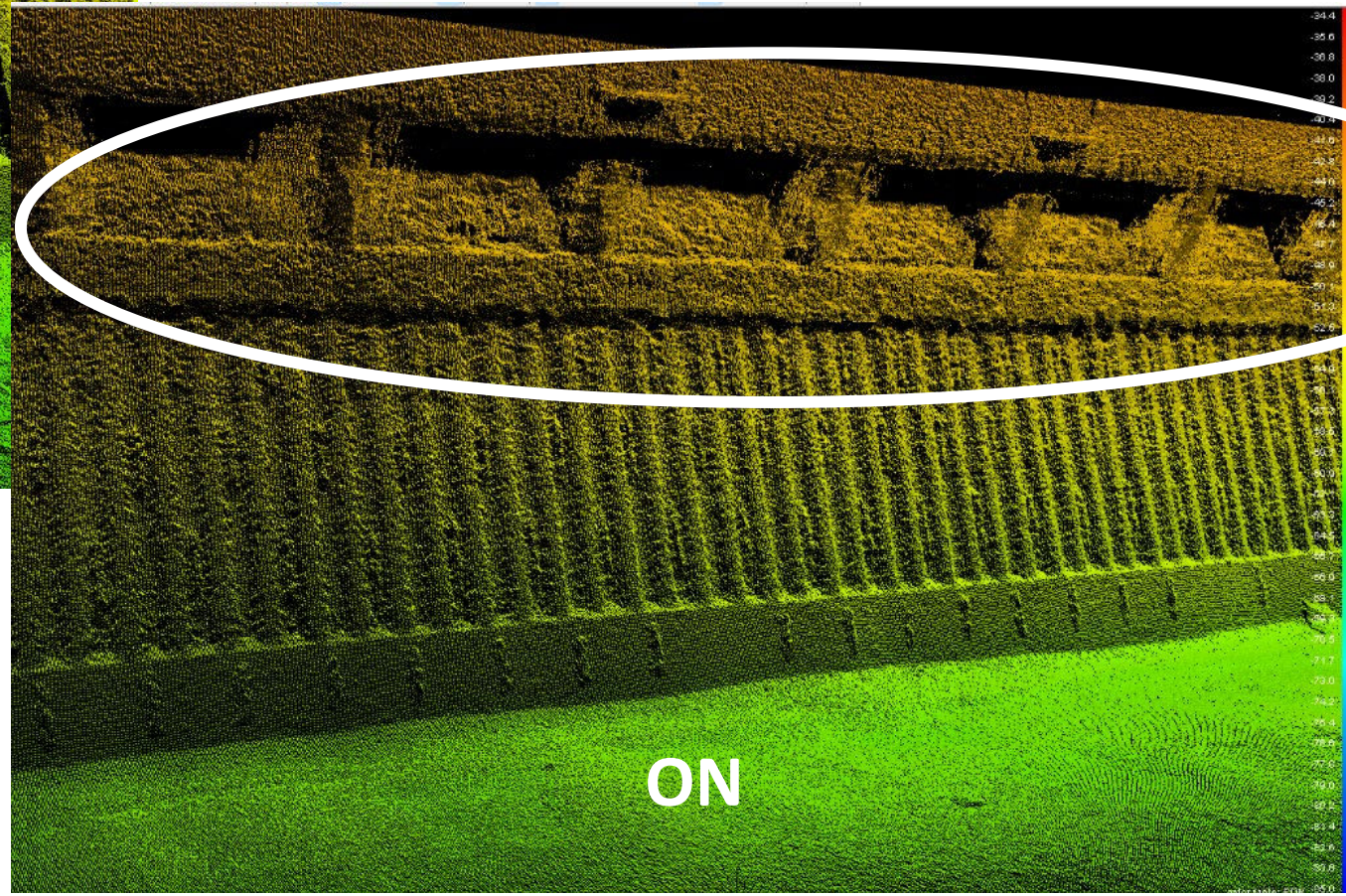
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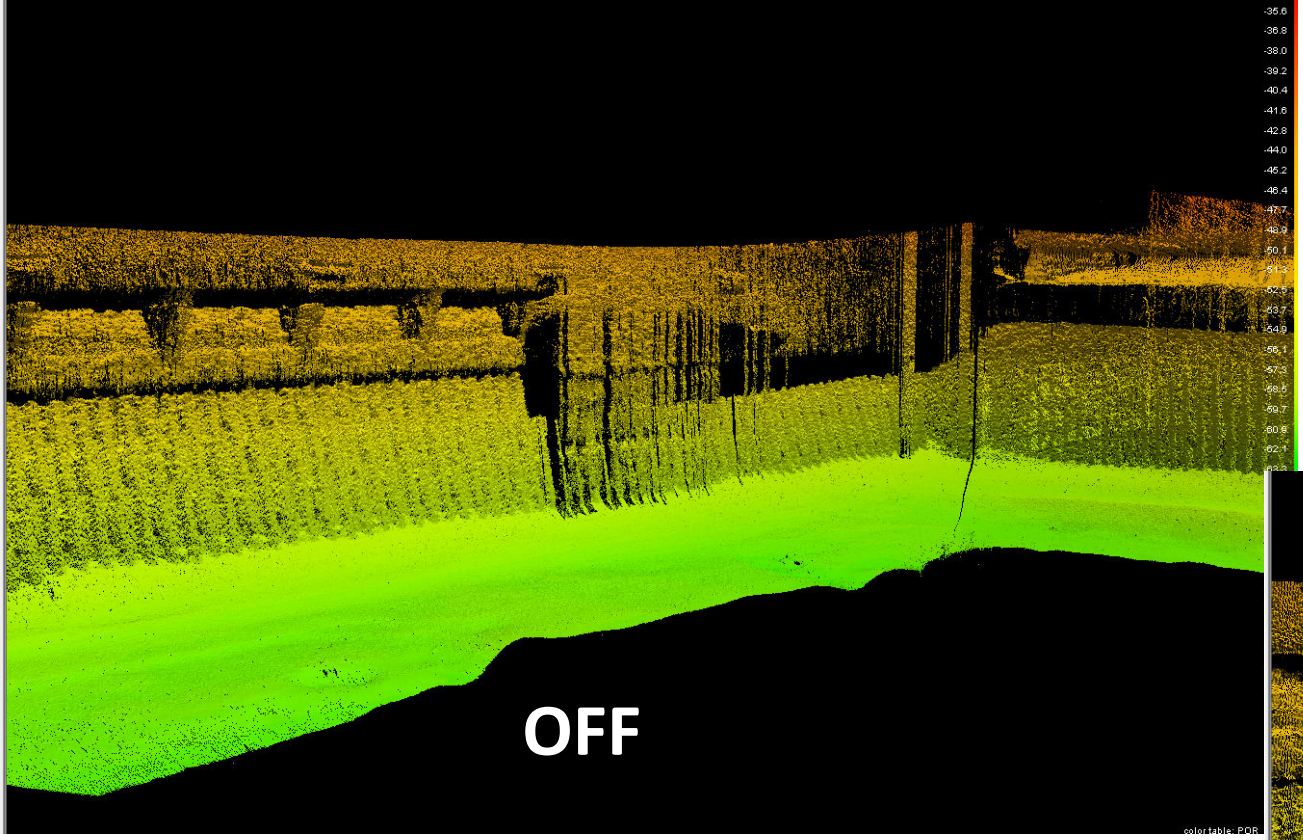
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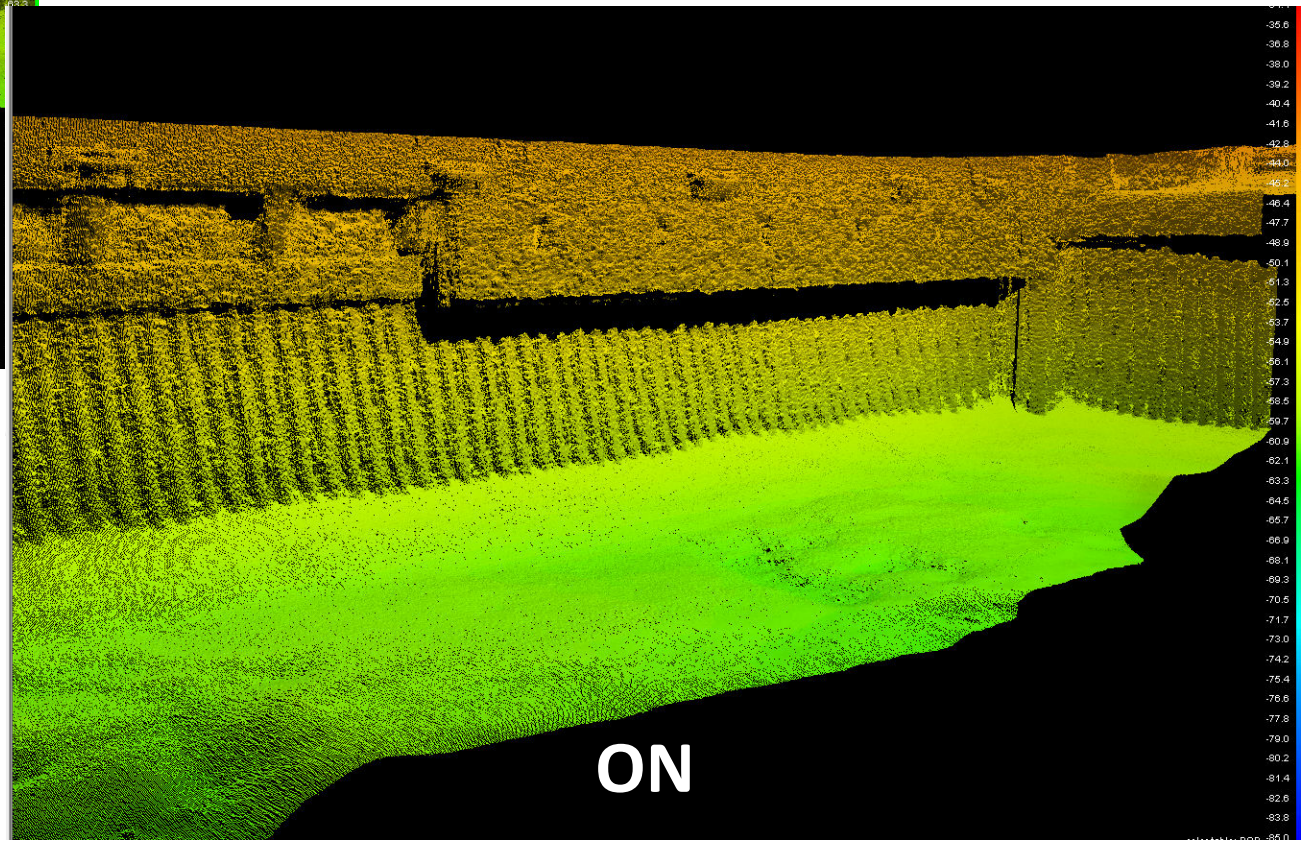
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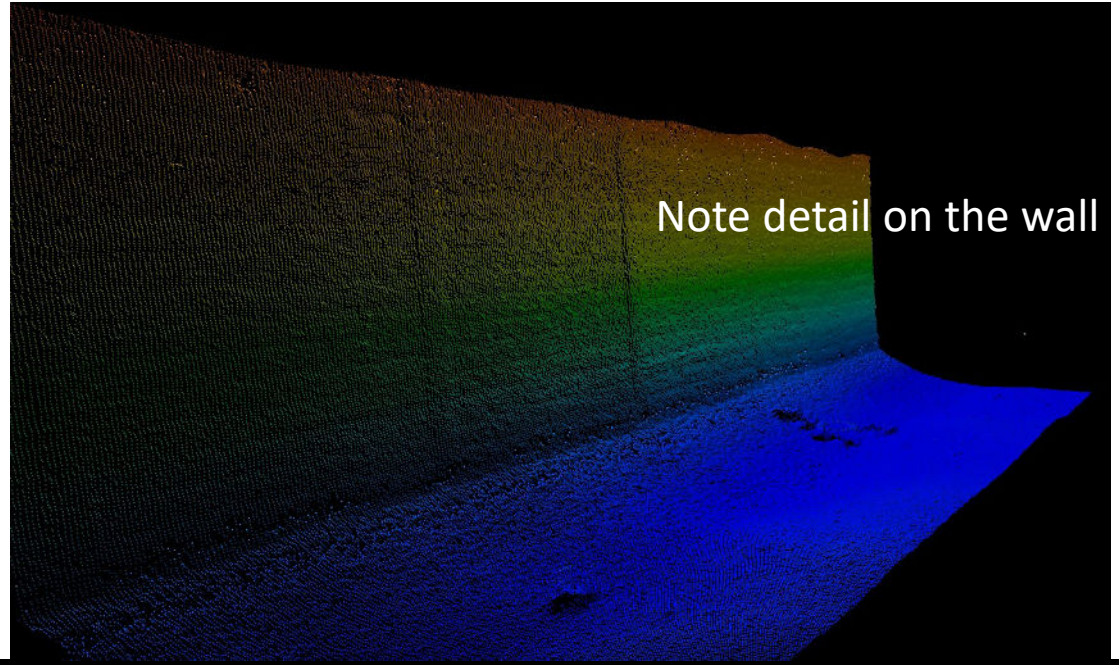

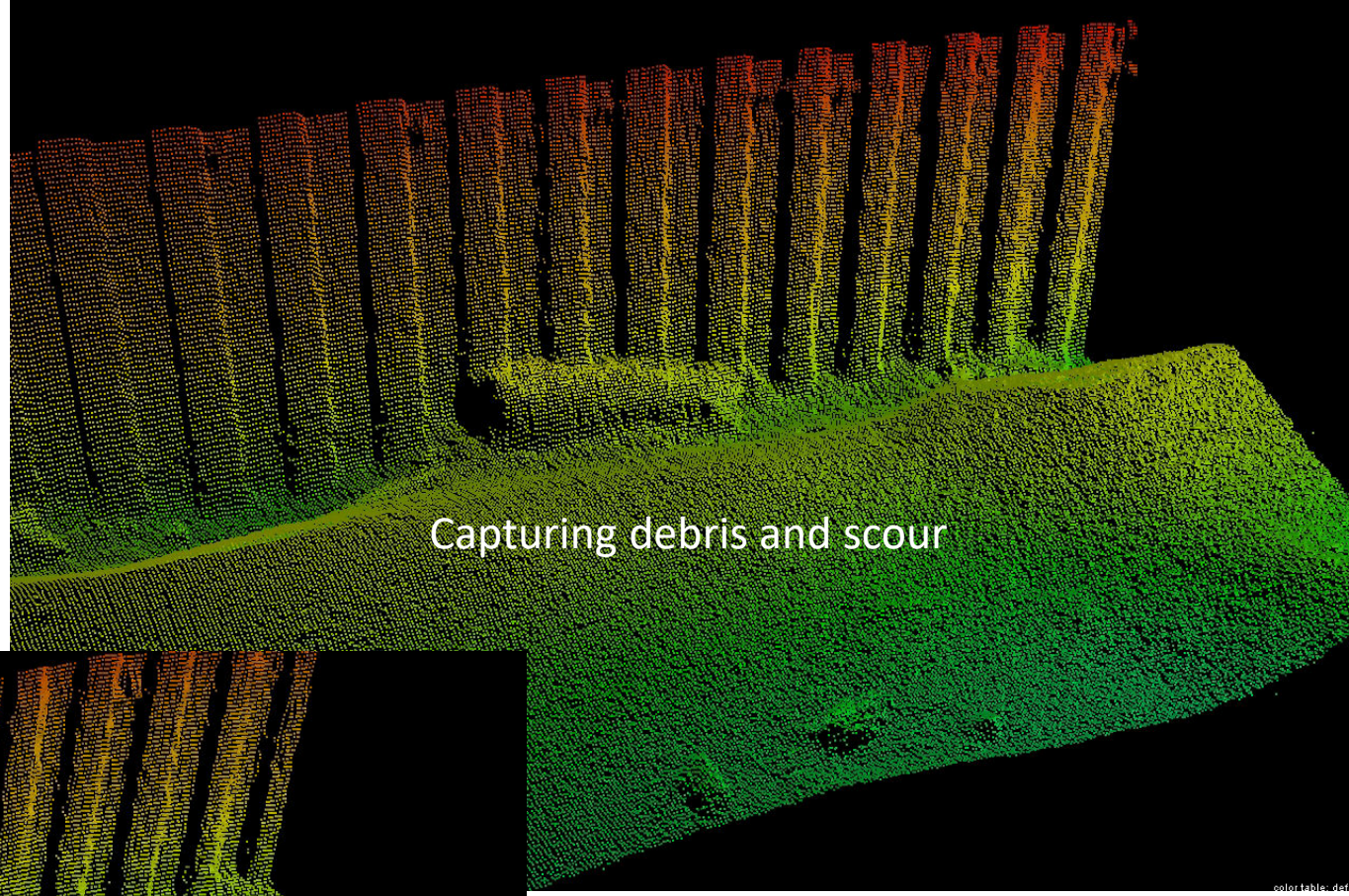

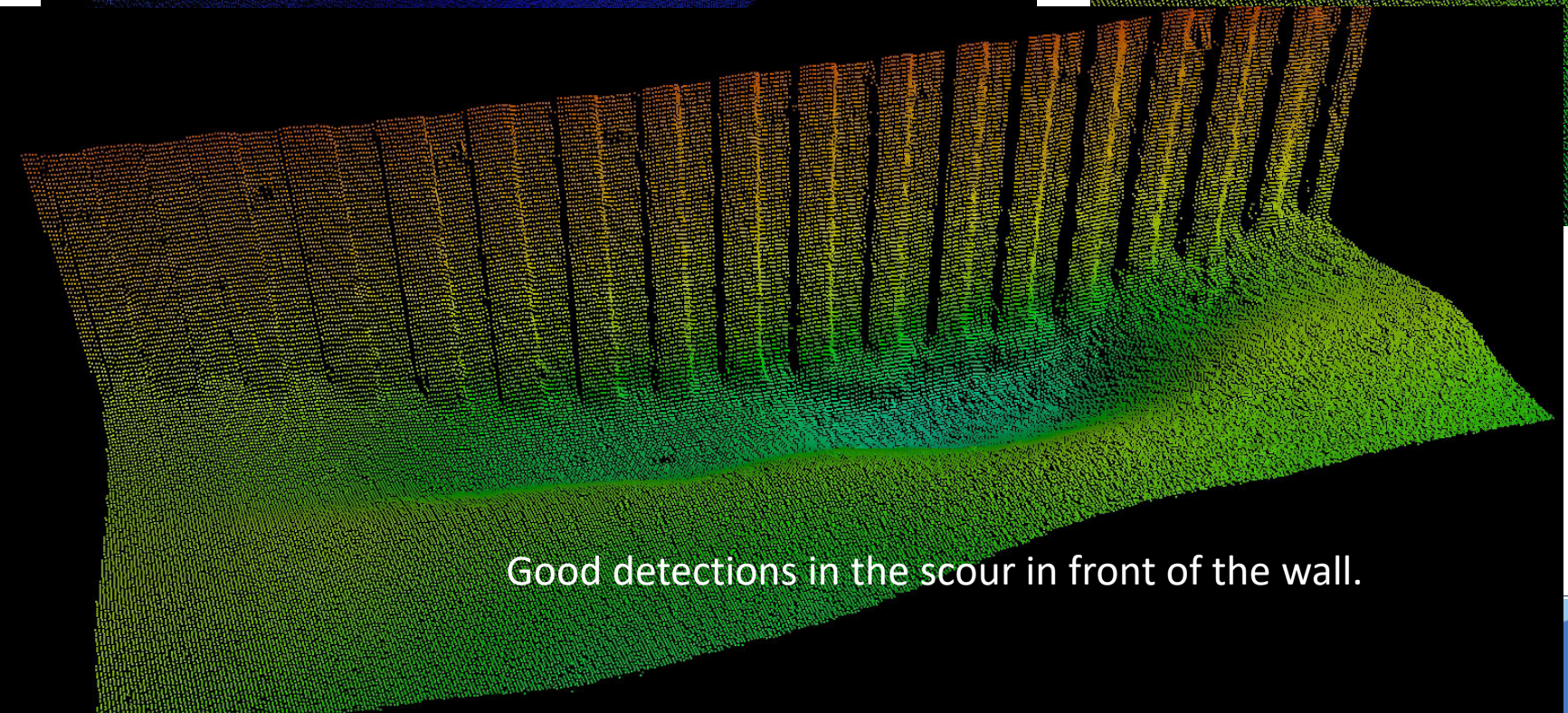

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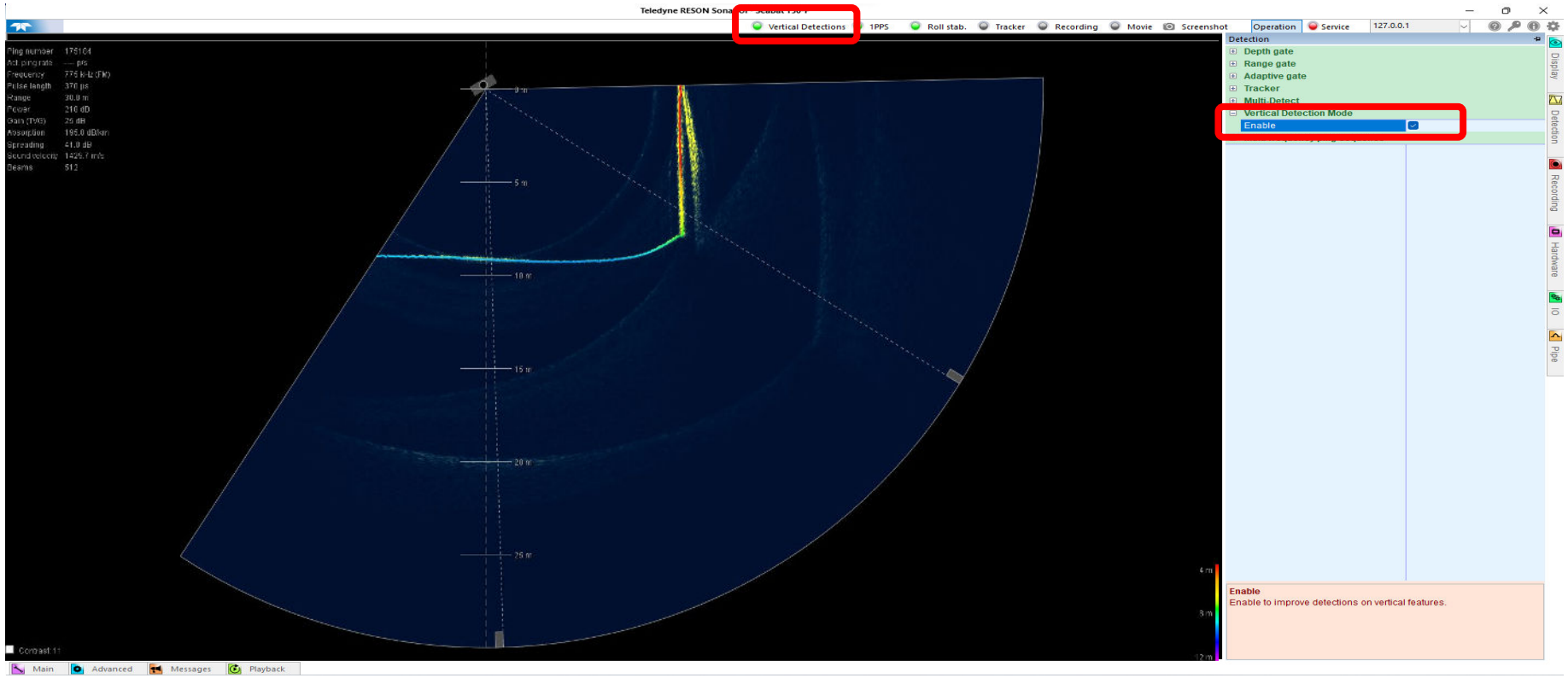
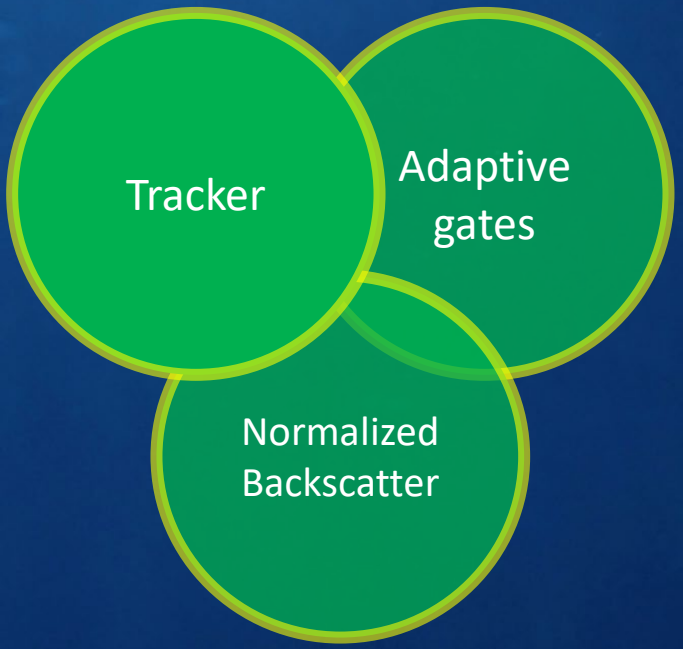
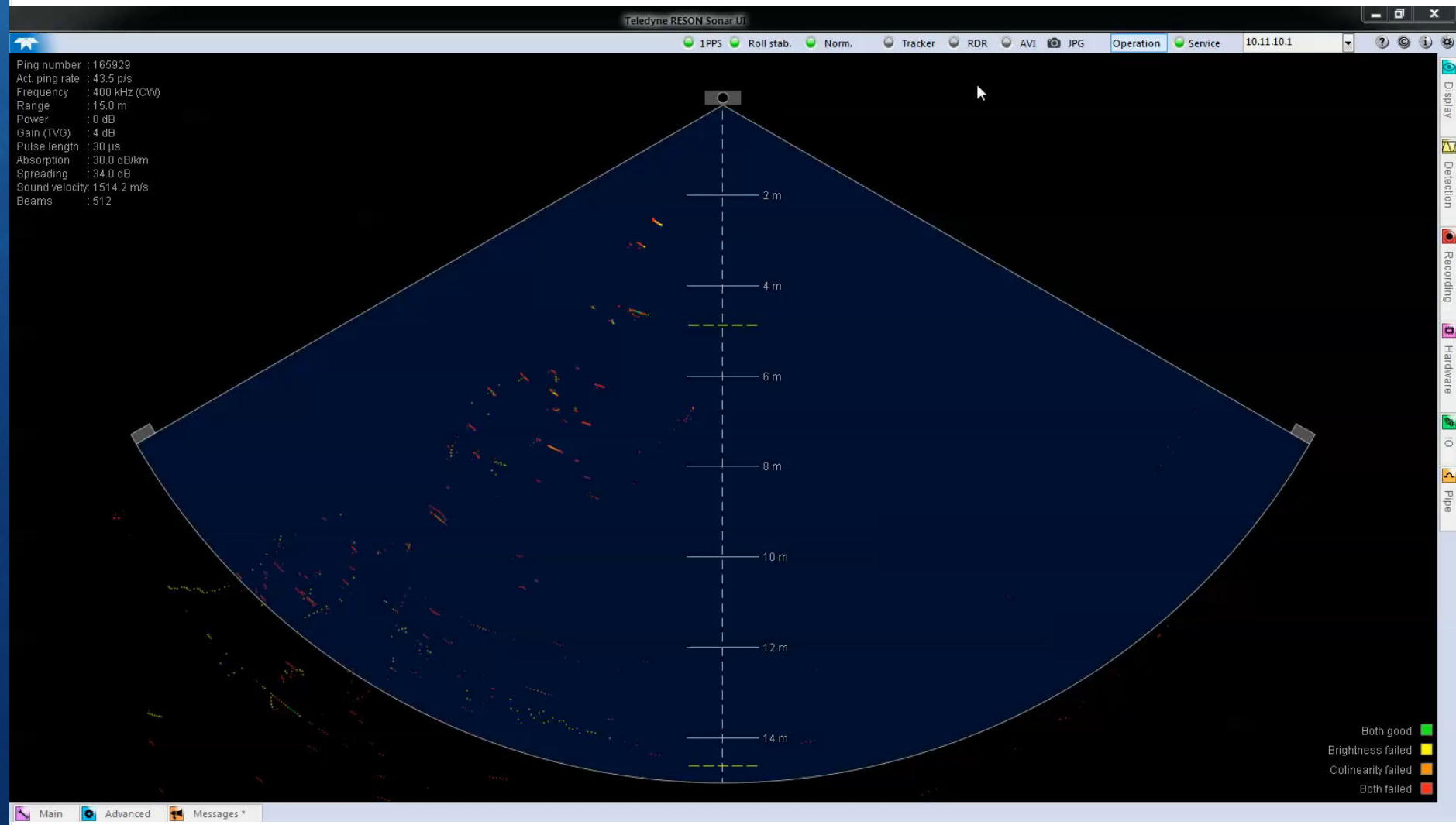
Vertical Detection Mode

- For ALL SeaBat T-series
- Works for any Frequency/Pulse/Beam mode, single or dual head, etc
- No extra license required
- No change to data output
- No additional settings – easy to use



Automated Features





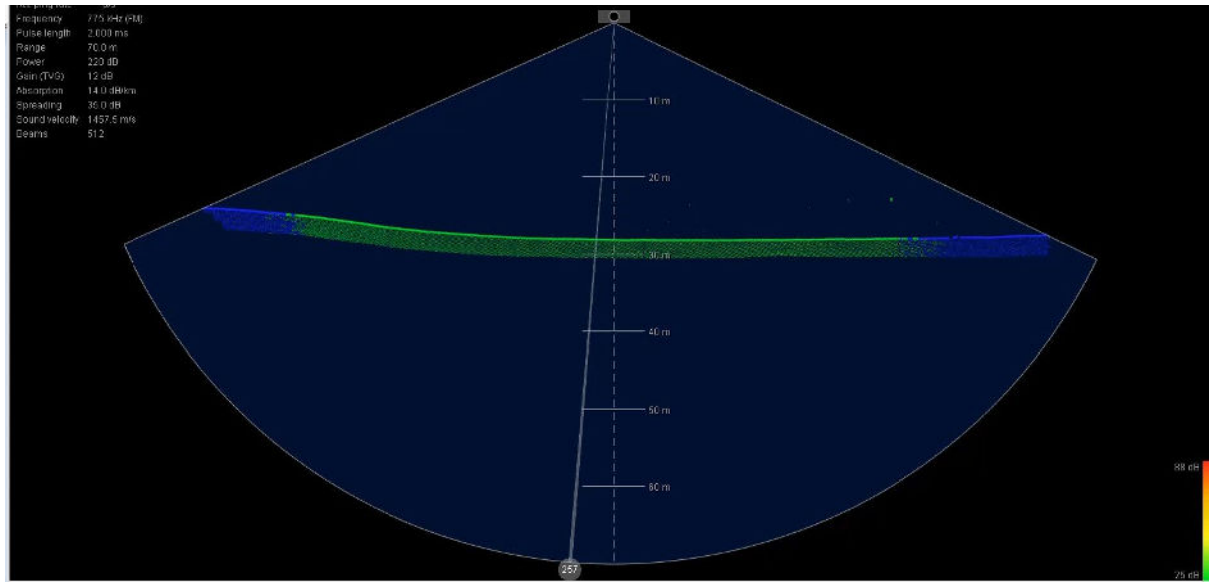
Automated control of sonar settings:

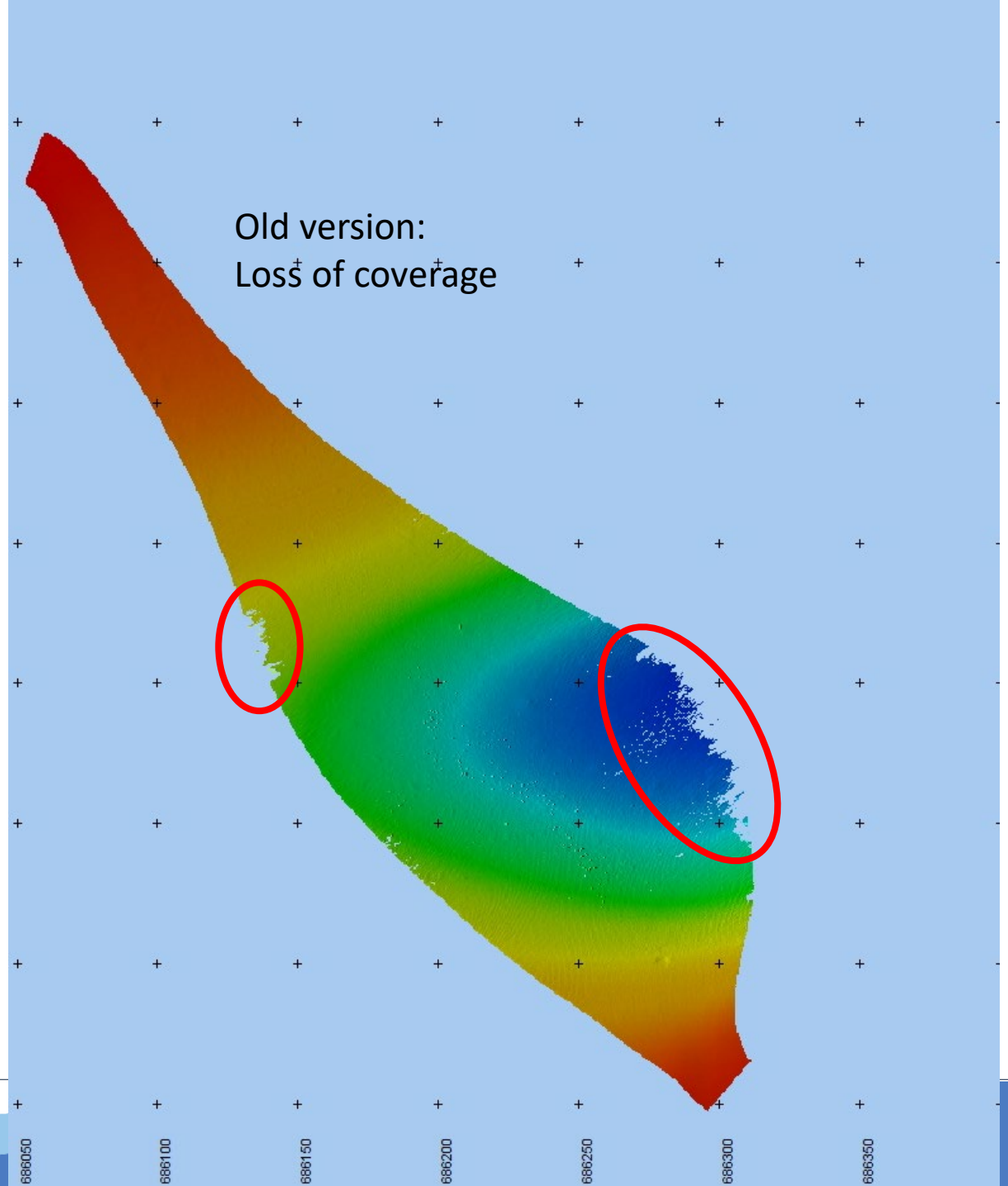
- Power
- Gain
- Absorption
- Spreading
- Pulse length
- Range
- Coverage
- Optimise settings for Bathy and Backscatter

Improved Tracker

Example: Old version

- Tracker not compensating enough for ‘weak’ beams (blue).
- Swath coverage compromised. Requires extra infill lines to cover.

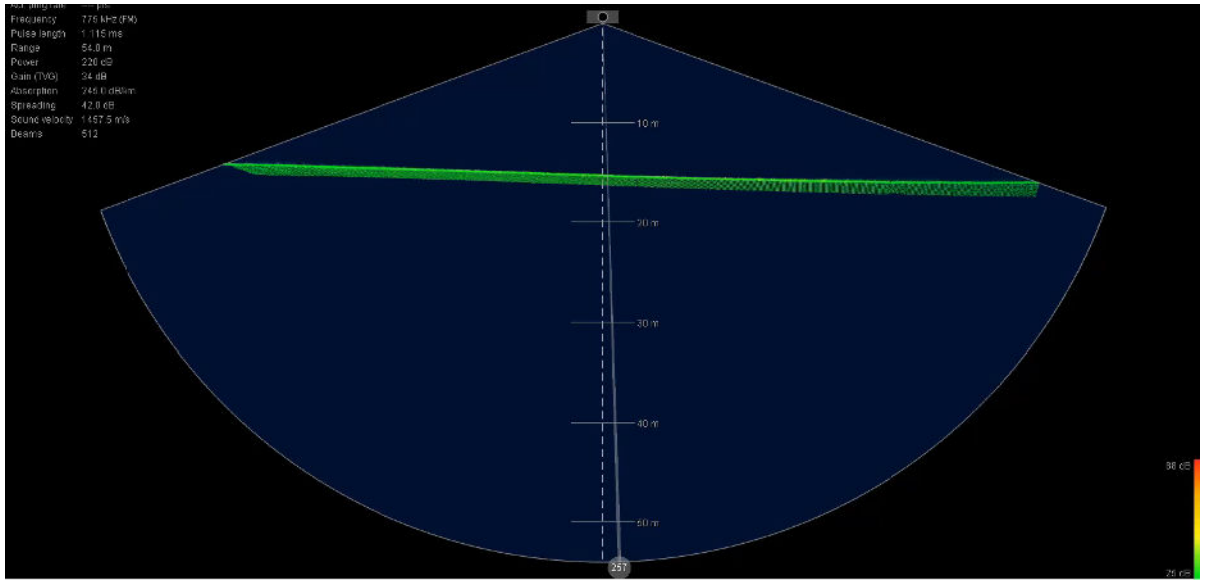


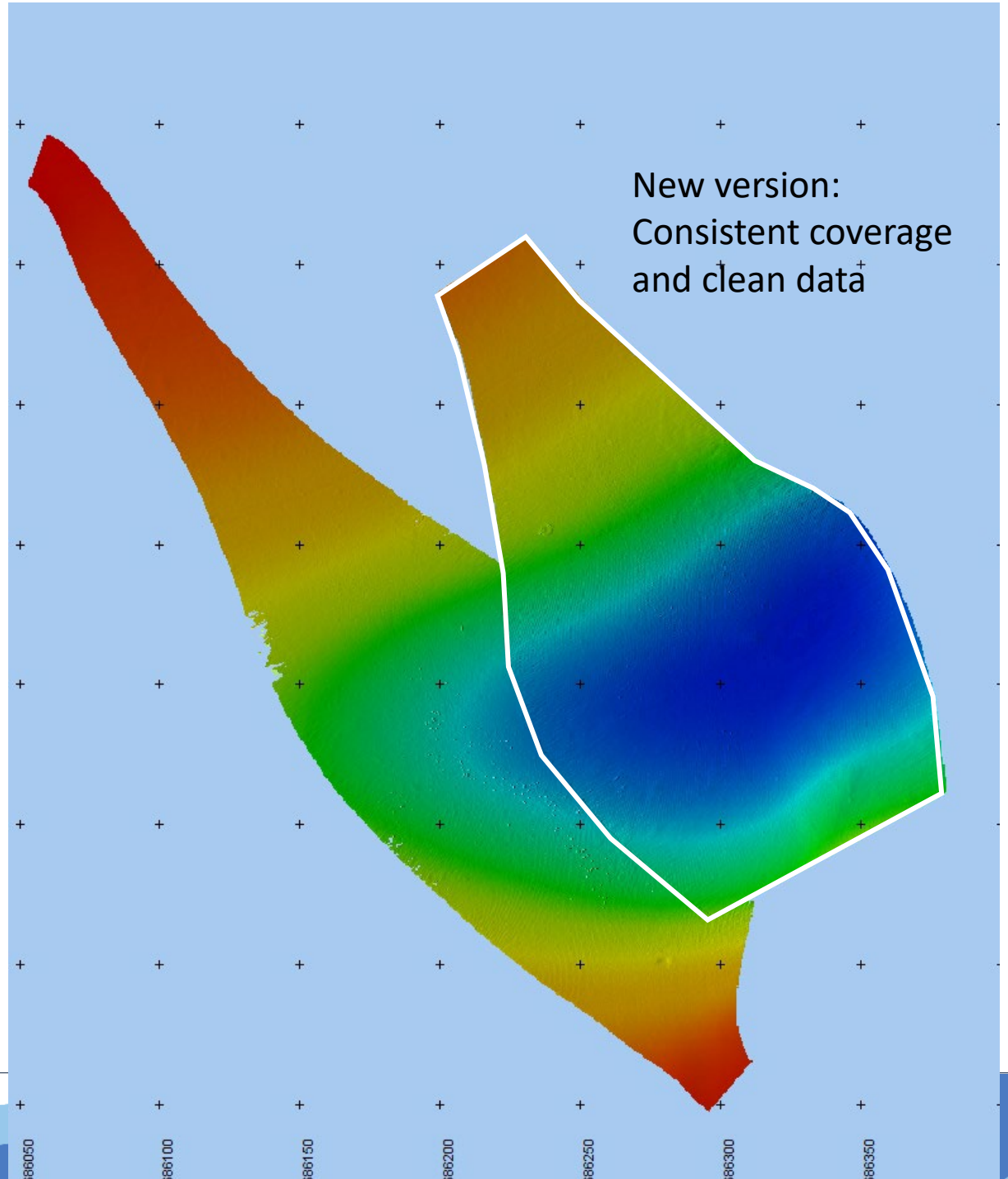


Improved Tracker

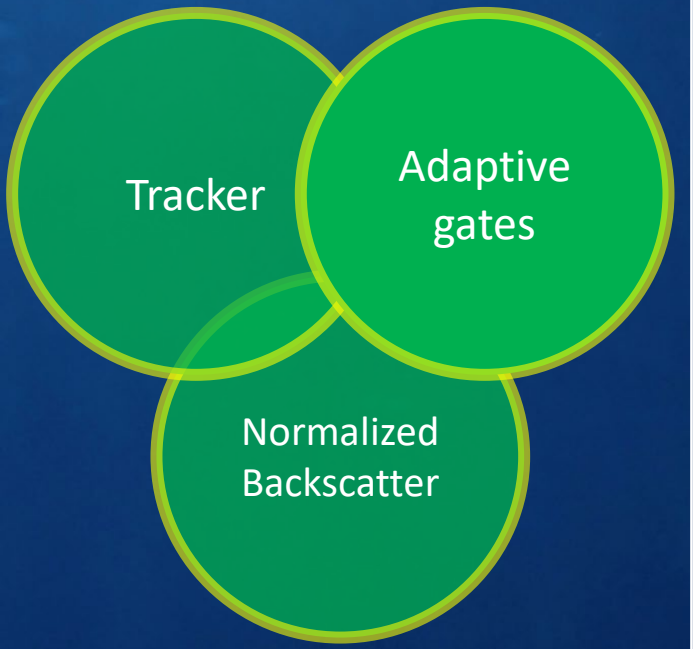
Example: New Version

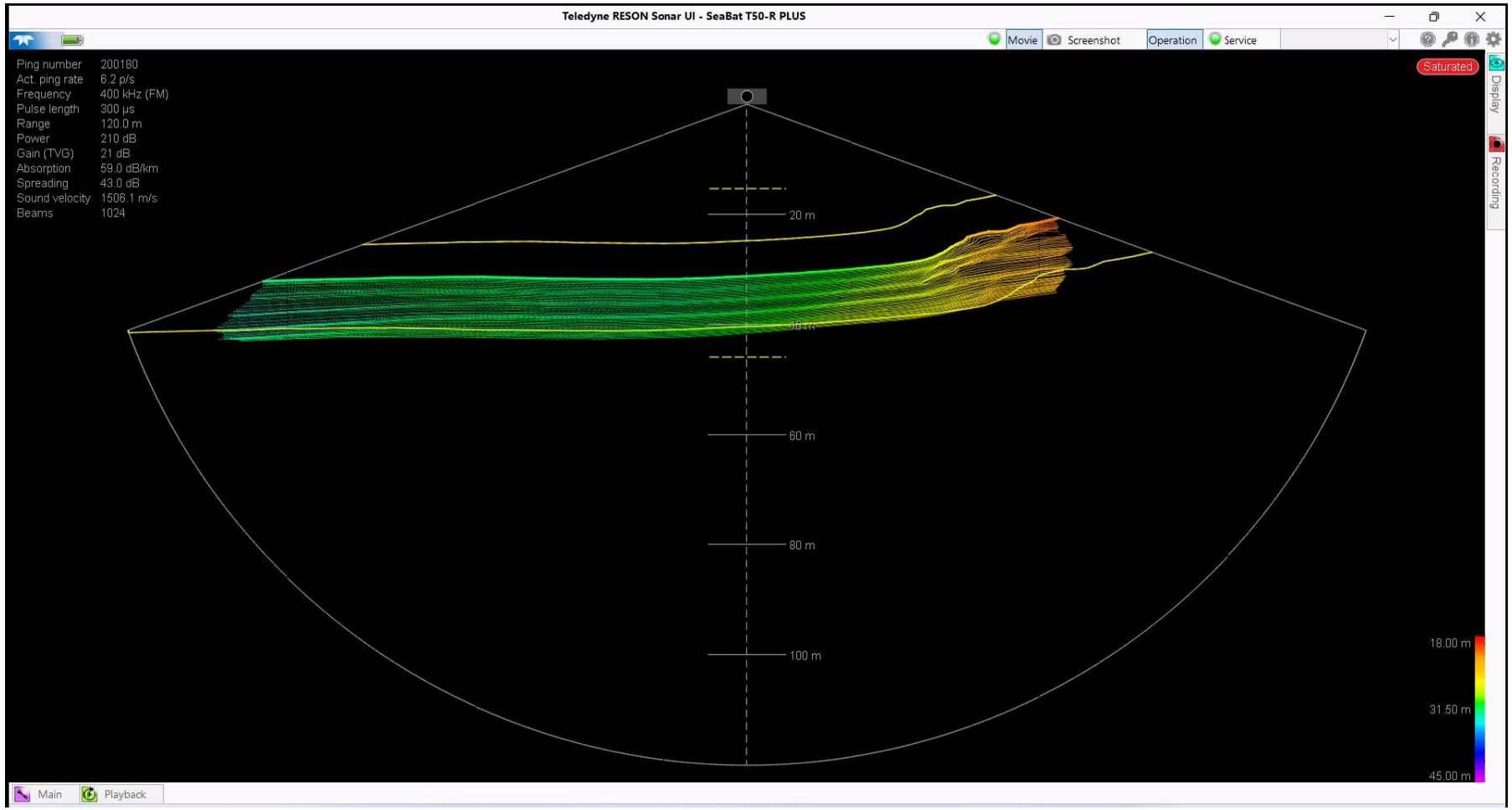
- As depths increase and beams are getting weaker, tracker now properly compensates.
- No loss of coverage or noisy data.



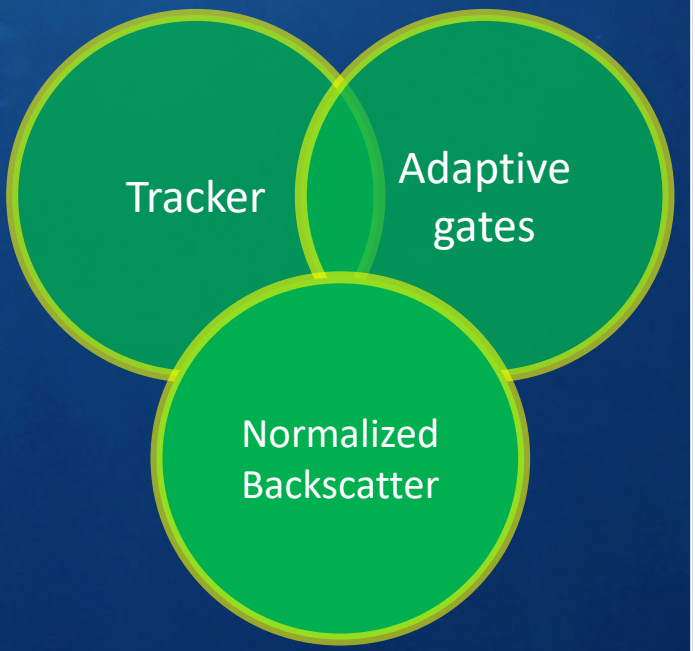


Automated Features

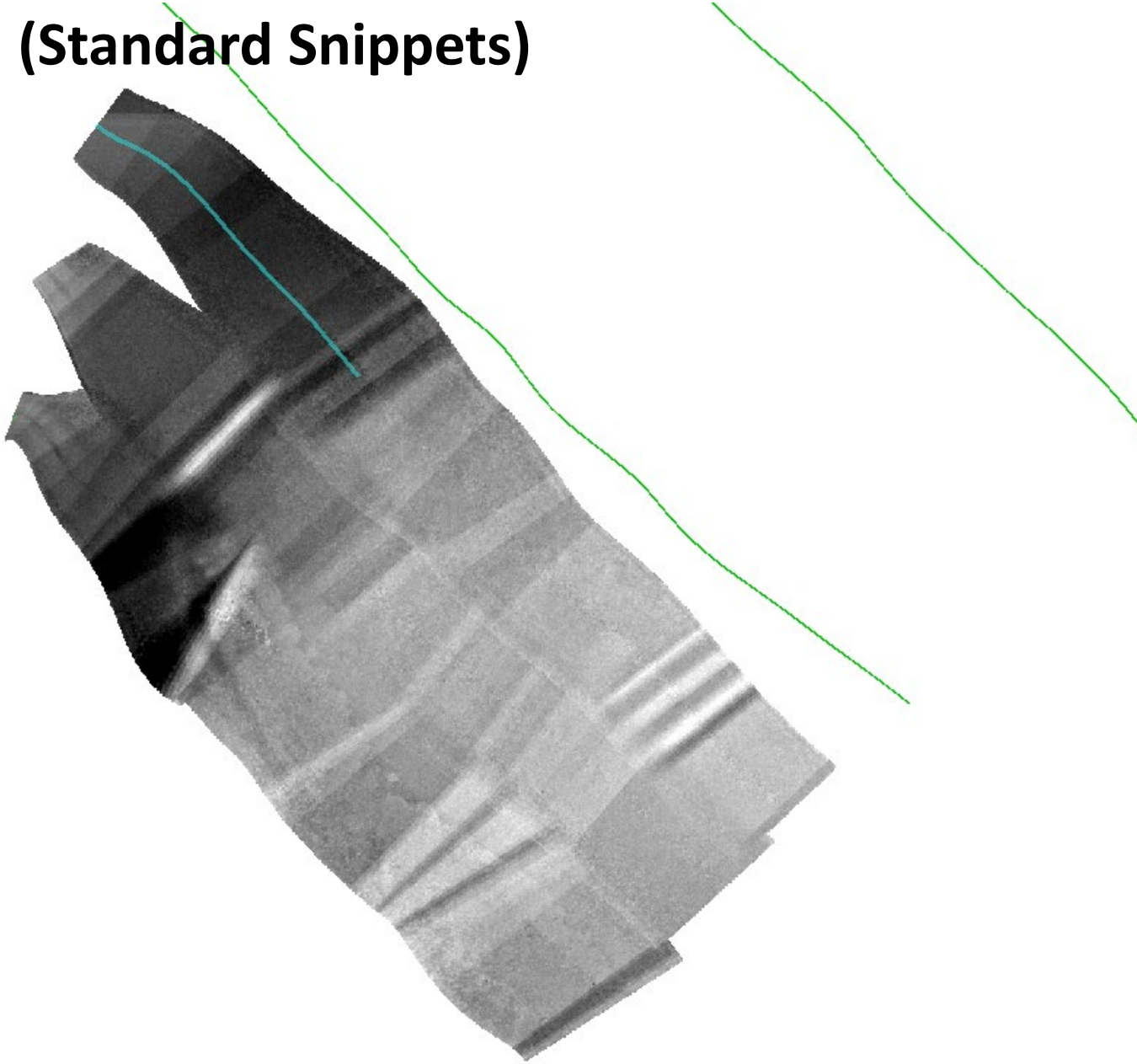




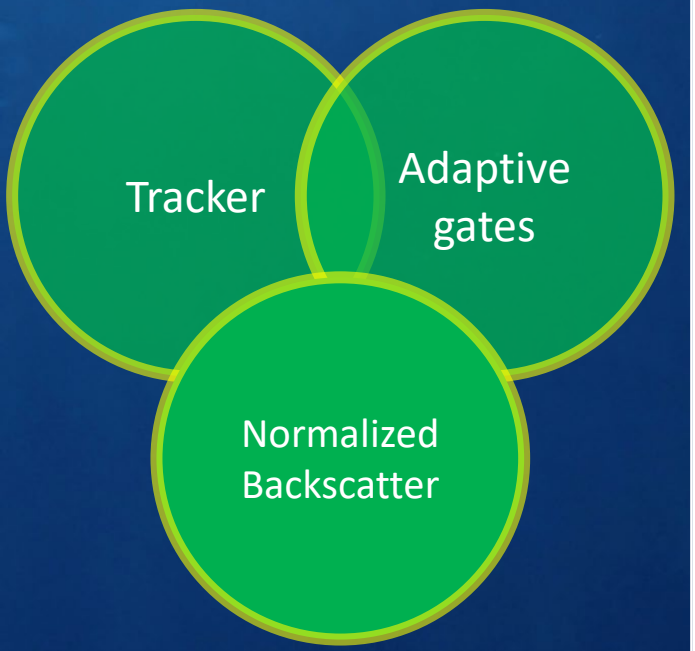
Automated Features



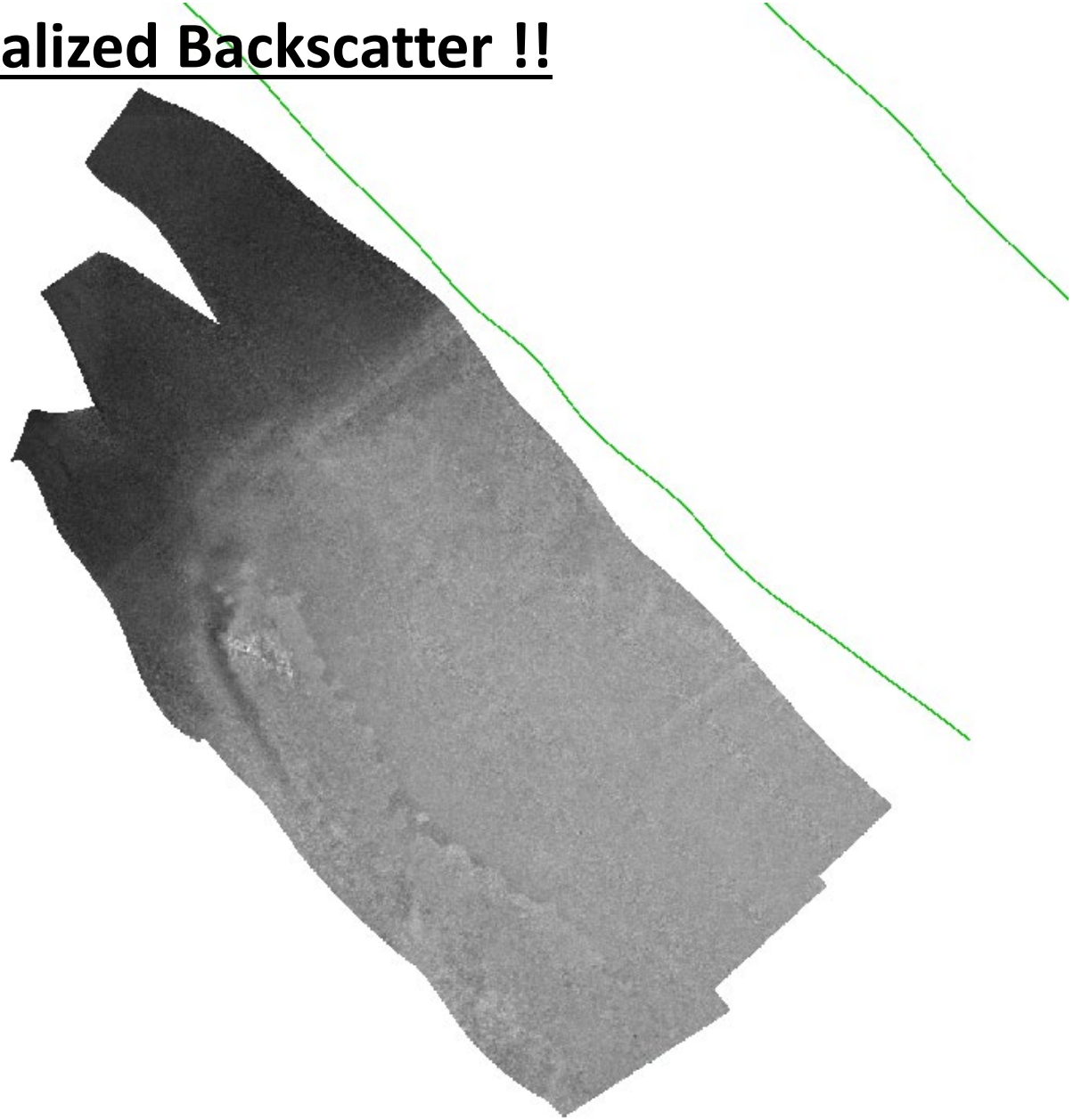
Tracker enabled (Standard Snippets)



Automated Features



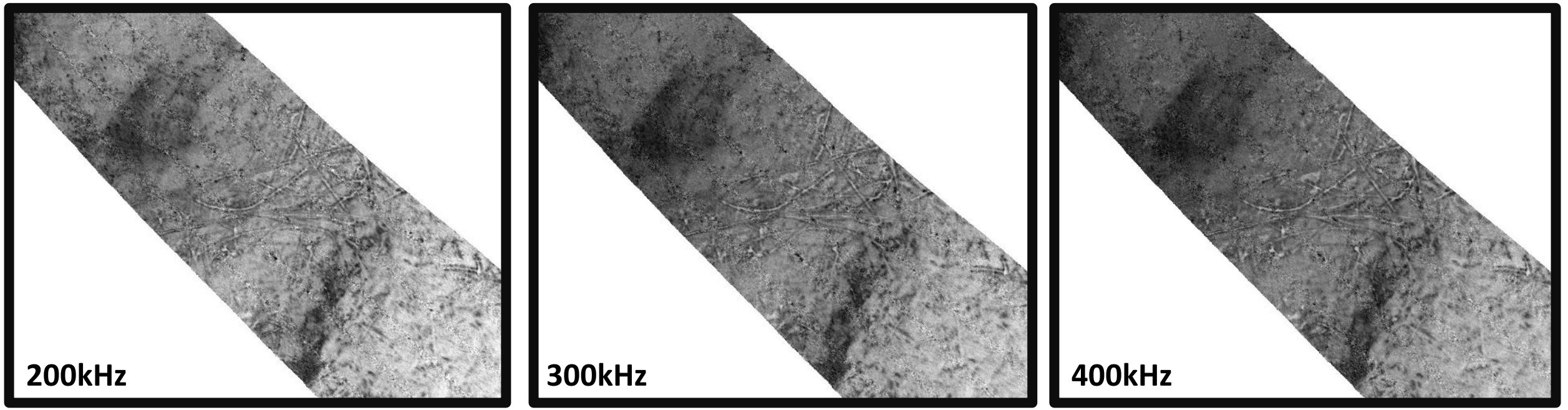
Tracker + Normalized Backscatter !!



Ping sequencing (part of update 3.0)

Cycle through different frequencies

- Collecting bathy, snippets and water column backscatter each time.
- Sediment characterization – different frequencies give different backscatter
- Bathymetry differences – e.g. to detect fluid mud layer
- Cycle through more than 5 user defined frequencies



TELEDYNE MARINE
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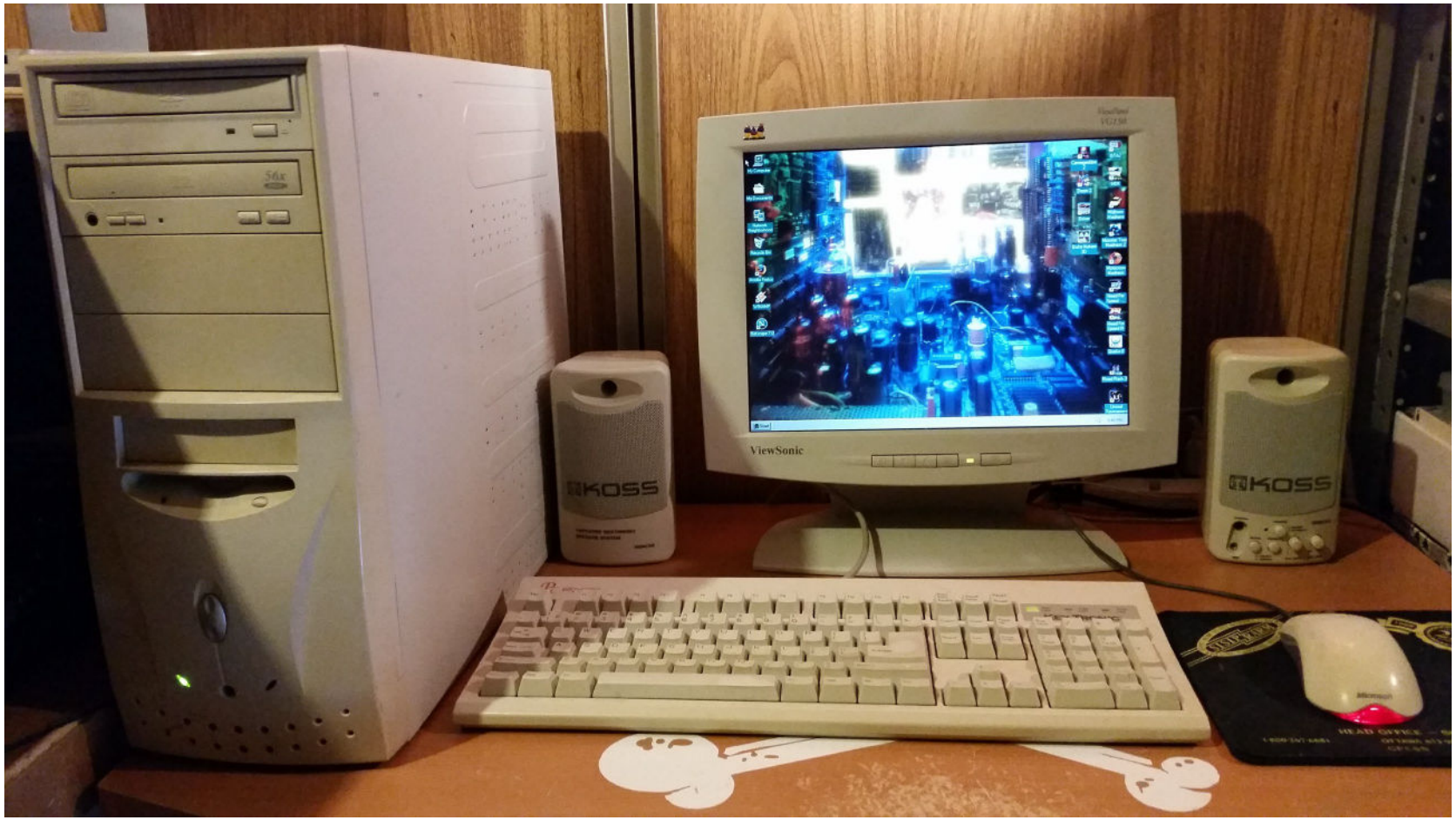
New product: Teledyne GNSS INS

intrepid

in·trep·id

Characterized by resolute fearlessness, fortitude, and endurance

Create Mapping System instead of sensors



Intrepid for SeaBat T20-ASV

- An entry level system with a simplified and intuitive workflow
- Fully integrated with Sonar UI
- Single IP address
- All data readily available in industry standard Teledyne 7k protocol – no users setup required
- All software and firmware updates for SeaBat and Intrepid through the same update package
- Single supplier for support and maintenance

Intrepid

For T20-ASV

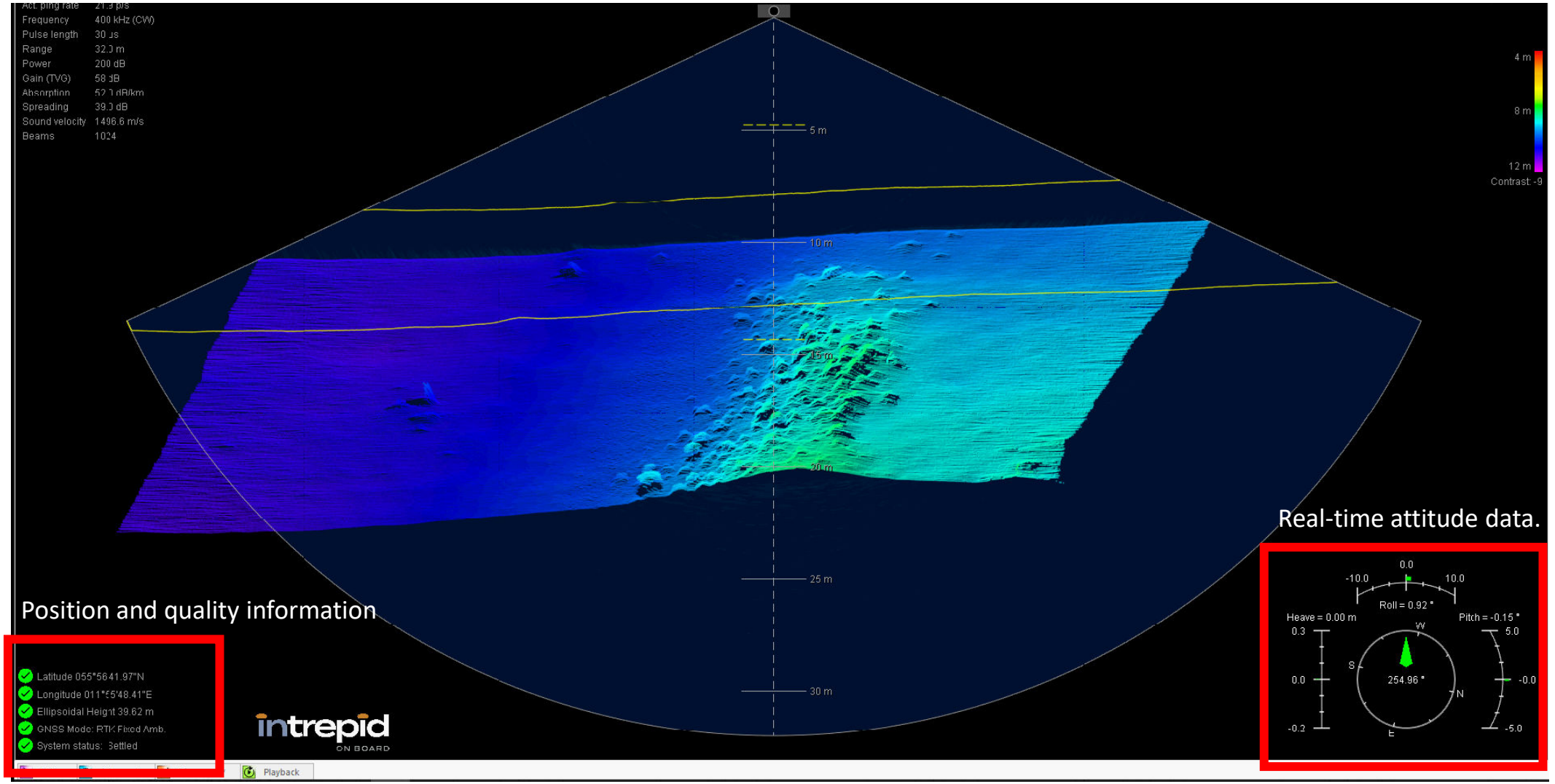
- Position: 8 mm horizontal / 15 mm vertical
- Heading: 0.03°
- Roll/Pitch: 0.02°
- Heave: 50 mm / 5%
- Delayed heave: 20 mm / 2%
- Teledyne 7k, binary, NMEA outputs
- GNSS: GPS, Galileo, BeiDou, GLONASS, QZSS, SBAS, L-band
- RTK serial or UDP (RTCM v2, v3, CMR2)
- Build-in NTRIP

Supporting Fugro MarineStar

- Correction service (received via L-band)
- Worldwide coverage
- G4+ compatible (GPS, GLONASS, BeiDou, Galileo)
  - 4cm horz. / 6cm vert. (95%)

FUGRO MARINESTAR®

Sonar UI


Frequency 400 kHz (CW)
Pulse length 30 µs
Range 32.0 m
Power 200 dB
Gain (TVG) 58 dB
Absorption 52.1 dB/km
Spreading 39.0 dB
Sound velocity 1496.6 m/s
Beams 1024
4 m
8 m
12 m
Contrast: -9
5 m
10 m
15 m
20 m
25 m
30 m
Position and quality information
Latitude 055°56'41.97"N
Longitude 011°55'48.41"E
Ellipsoidal Height 39.62 m
GNSS Mode: RTK Fixed Amb.
System status: Settled
intrepid ON BOARD
Playback
Real-time attitude data.
0.0
-10.0
10.0
Roll = 0.92 °
Heave = 0.00 m
Pitch = -0.15 °
0.3
0.0
-0.2
5.0
-0.0
-5.0
W
S
N
E
254.96 °

Teledyne RESON Sonar UI - SeaBat T20-A Intrepid INS

1PPS | Roll stab. | Tracker | Recording | Movie | Screenshot | Operation | Service | INS | 10.11.10.5

	IMU	CoG	Output lever arm
Latitude	055°56'33.85"N	055°56'33.86"N	055°56'33.85"N
Longitude	011°54'43.08"E	011°54'43.14"E	011°54'43.08"E
Ellipsoidal Height	39.664	36.851	39.664
Heave	-0.008	-0.002	-0.008

Motion, speed and heading

Roll [° +PU]	Pitch [° +BU]	Speed [kts]	Heading [° T]
-0.085	-0.128	5.675	80.206

Real time accuracy

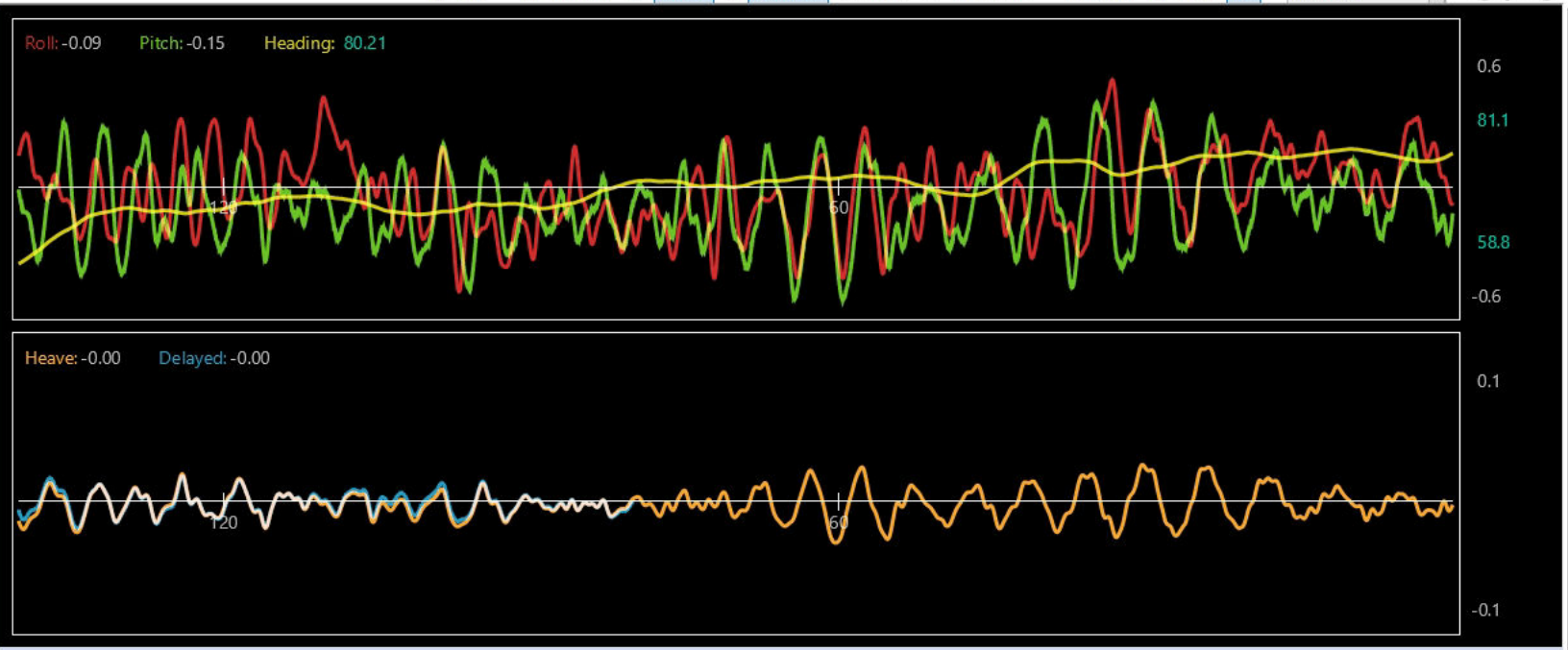
Latitude	Longitude	Height
0.000	0.000	0.000
Roll	**Pitch**	**Heading [° T]**
0.000	0.000	0.000

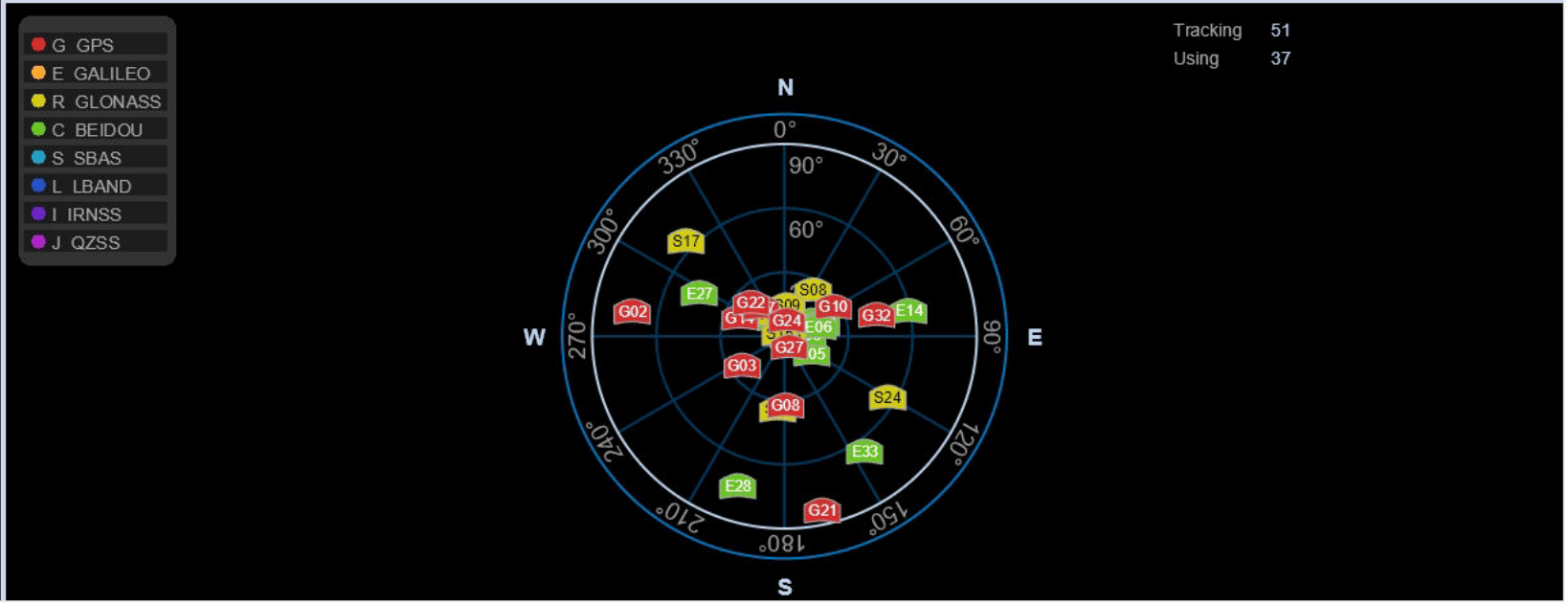
GNSS

VDOP	PDOP	HDOP	Position mode
1.190	1.390	0.720	RTK Fixed Amb.

Corrections

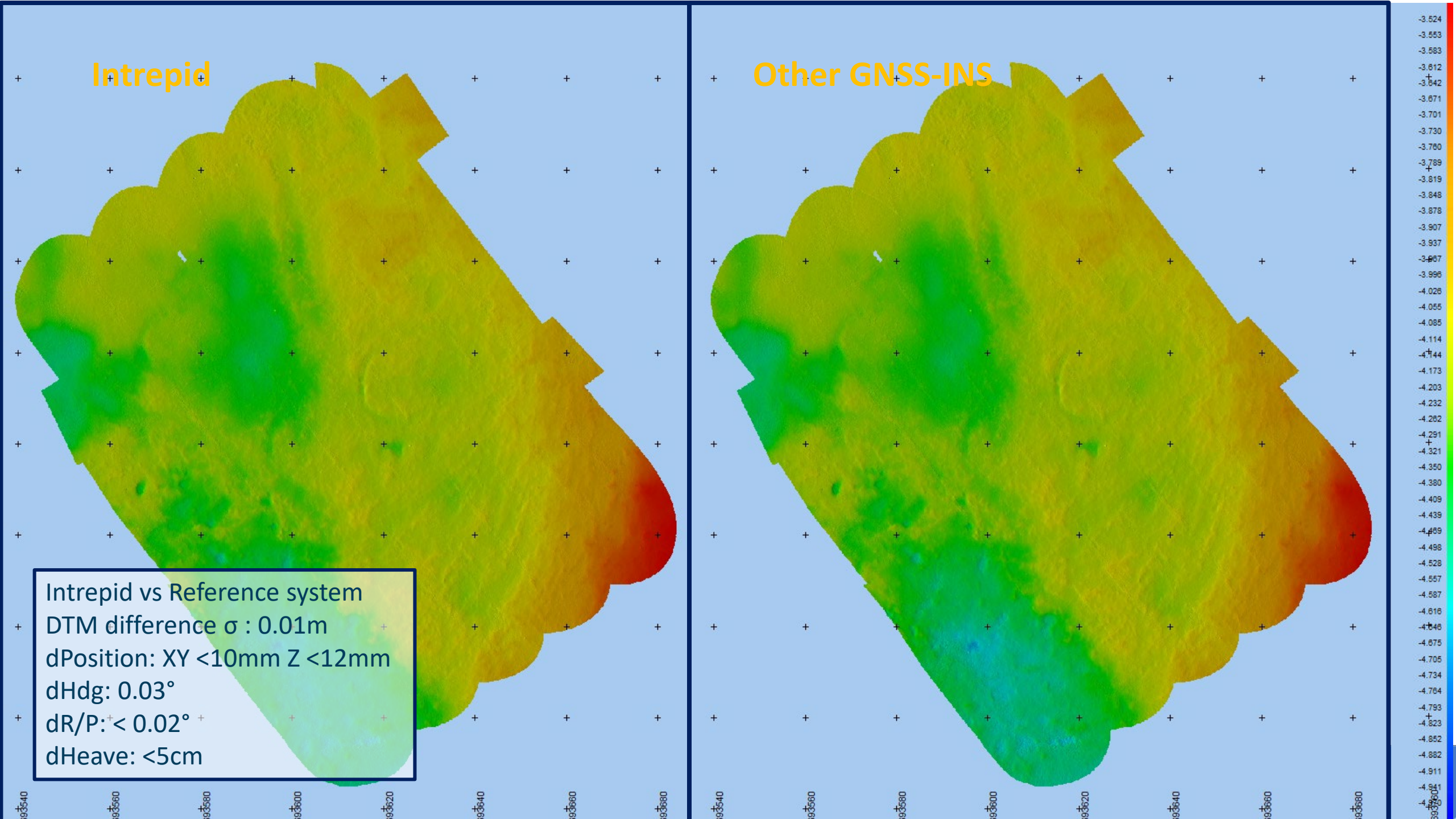
Fugro Marinestar status	Subscribed mode	Expire date
No L1 Stations Warning	G4, VBS, GLO, GAL, BEI	2024-09-13 00:00:00
Fugro Marinestar Id	**Currently used beam**	**Current mode**
023-3240336	ERSAT	G4, GLO, GAL, BEI

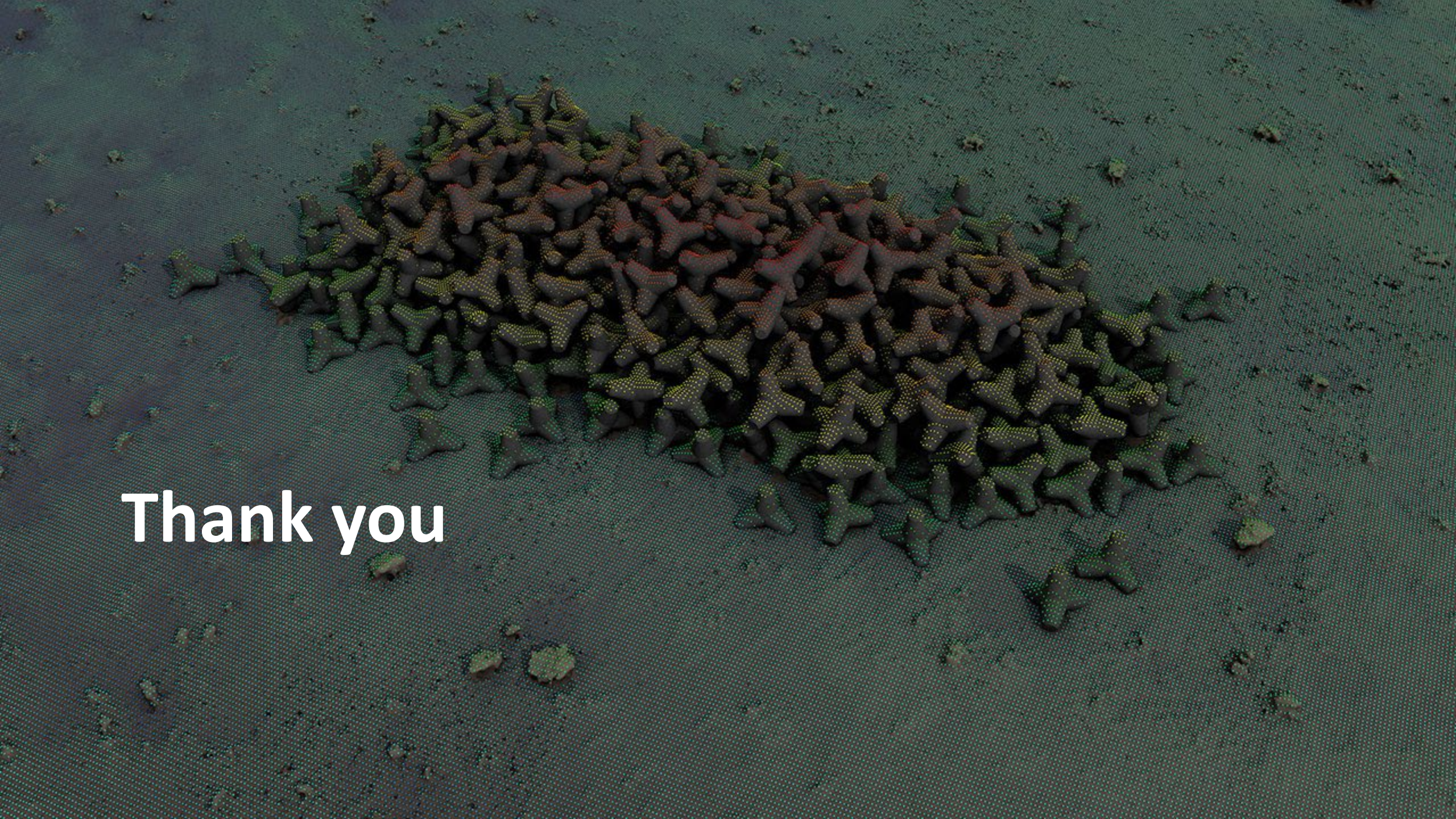




Main | Advanced | Messages * | Playback

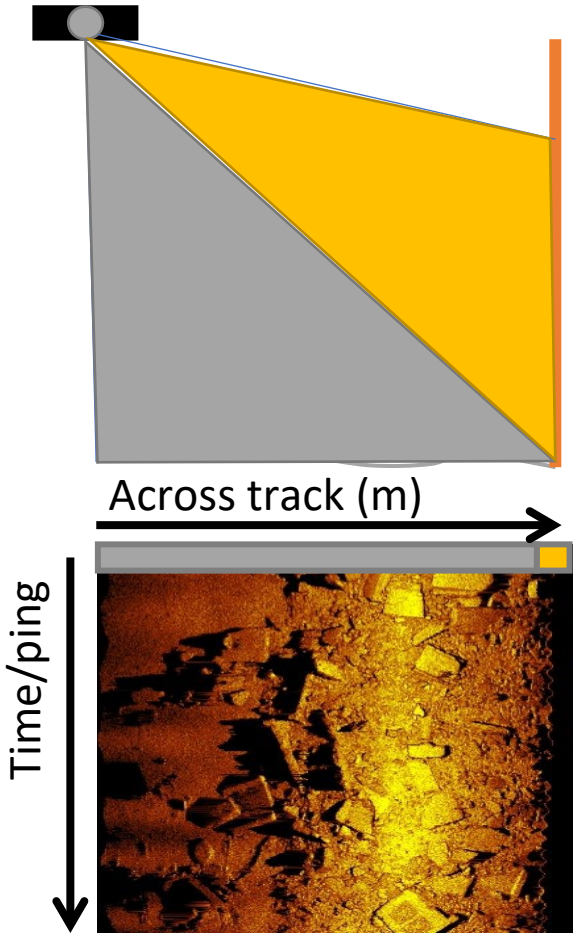
Display | Detection | Recording | Hardware | IO | Pipe | INS


Intrepid
Other GNSS-INS
Intrepid vs Reference system
DTM difference σ : 0.01m
dPosition: XY <10mm Z <12mm
dHdg: 0.03°
dR/P: < 0.02°
dHeave: <5cm


Thank you

What about backscatter?

Can backscatter give us additional information about the quay wall

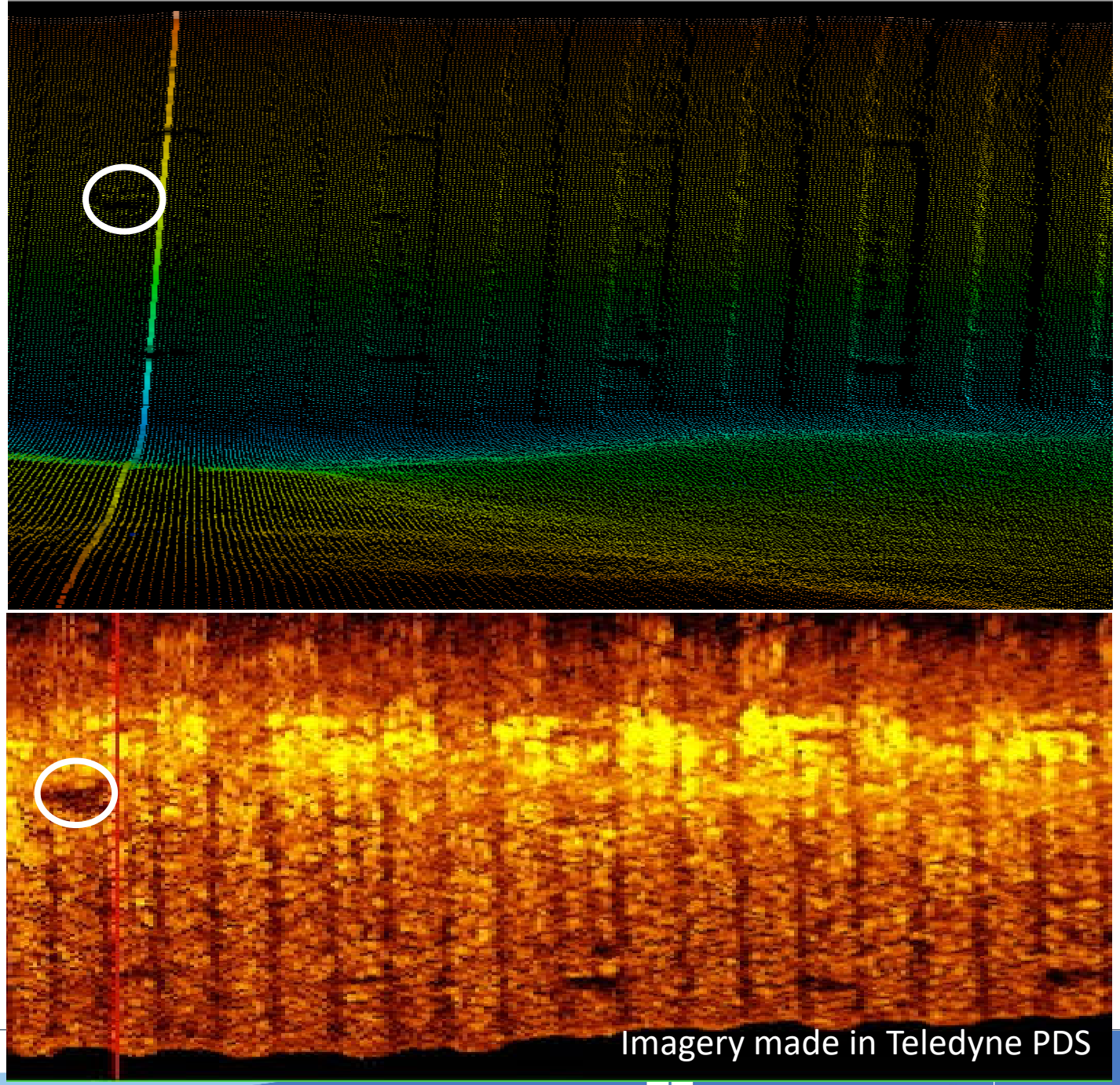


Problem:
All interesting snippets data from vertical structures are collapsed into tiny row of pixels

What about backscatter?

Can backscatter give us additional information about the quay wall

- New feature in Teledyne PDS
- Displaying snippets backscatter along the depth axis.



Imagery made in Teledyne PDS