Appendix A

Mobilization Report

Contents

Mobilization Report

eTrac Inc. used the supplied charter vessel Miss Alyssa for hydrographic and geophysical survey operations for the Channel Navigation Improvements Feasibility Study in Dutch Harbor, Alaska. Vessel Miss Alyssa is a 43-foot all fiberglass twin diesel powered commercial fishing/dive support and charter vessel (see Figure 1). The Vessel Miss Alyssa has the following specifications:

Overall Length: 43 feet

Beam: 14 feet

Draft: 3.5 feet

Propulsion: Twin Diesel

Fuel Capacity: 1,000 gallons

Figure 1 Vessel Miss Alyssa

A full suite of geophysical, hydrographic and positioning systems were mobilized onto the vessel. These are listed below in Table 1.

Table 1 Hardware Installed on Vessel Miss Alyssa

Instrument	Function	Manufacturer	Model	Function
Bottom Sampler				
Stainless Steel Grab	Bottom Sampler	WILCO	Standard Ponar	Subsurface sediment classification Used 4/14/17
Multibeam Echosounder				
Deck Unit	Bathymetry	R2Sonic	2024	Object Detection, surface sediment characterization, Bathymetry Used 4/12/17 – 4/14/17
Sonar	Bathymetry	R2Sonic	2024	
Sound Speed				
Surface Sound Speed	Bathymetry/Subbottom	AML	Micro X	Beam formation and steering
Sound Speed Profiler	Bathymetry/Subbottom	AML	Base X2	Primary SV profiler
Navigation				
Deck Unit	Position/Attitude/Heading	Applanix	POSMV 320 V5	Integrated Differential Global Positioning System (DGPS) and Inertial reference system for position, heading, heave, roll, and pitch
IMU	Position/Attitude/Heading	Applanix	IMU 36	
Starboard Antenna	Position/Attitude/Heading	Trimble	Aero Antenna	
Port Antenna	Position/Attitude/Heading	Trimble	Aero Antenna	
Radio Receiver	Position/Attitude/Heading	Trimble	Trimmark 3	Radio for RTK Corrections Primary positioning system
USBL Transducer	Position	Link Quest	Tracklink 1500	Position and communication with beacons on towed instruments Used 4/17/17 – 4/30/17
Cable Counter	Position	Hydrographic Survey Products	Smart Sensor ver. 3	Secondary Positioning for towed instruments Used 4/17/17 – 4/30/17
Subbottom Profiler				
Source	Narrow Band Subbottom	Falmouth	HMS 620 Bubble Gun	Sediment Stratification, Bedrock depths Used 4/18/17 – 4/20/17
Streamer	Narrow Band Subbottom	Falmouth	HMS 620 Bubble Gun	
Topside	Narrow Band Subbottom	Falmouth	HMS 620 Bubble Gun	
Sonar	Chirp Subbottom	Edgetech	216S	Subsurface object detection, sediment stratification Used 4/18/17 – 4/24/17
Topside	Chirp Subbottom	Edgetech	3200	
USBL Beacon	Position	Link Quest	Tracklink 1500	Communication with Transducer Used 4/18/17 – 4/24/17
Gradiometer				
Gradiometer	Gradiometer	Geometrics	TVG G-882	Surface and subsurface object detection Used 4/25/17 – 4/30/17
Topside	Gradiometer	Geometrics	TVG G-882	
USBL Beacon	Position	Link Quest	Tracklink 1500	Communication with Transducer Used 4/25/17 – 4/30/17

1. Vessel Positioning POS MV

a. Reference Points

An Applanix POS MV v5 Oceanmaster was used to position the vessel. This is a dual GNSS antenna, integrated system with combined inertial measurement unit (IMU) to compensate and account for vessel motion and accurate heading measurements in real time. The target of the IMU was used as the vessel reference point. The offset from the central measuring point for the system to the target is a known value which is automatically entered into the controlling POS View Software. The primary GNSS antenna was measured as an offset from this reference point (listed in Table 2). The antenna and IMU were mounted on a Universal Sonar Mount (USM) – Vessel of Opportunity (VOOP) kit. A spreader bar of known distance is used to separate the primary antenna from the secondary.

Table 2 Offsets from the Reference Point to the Primary GNSS Antenna and IMU

Reference Point	X +ve STBD (ft)	Y +ve Bow (ft)	Z +ve Up (ft)
To IMU	0	0	0
To Primary GNSS Antenna	0	-3.904	3.232
GAMS Baseline	6.561	0.098	0.098

b. Calibration

An online GAMS calibration was completed in the field. This confirmed the separation distance of the antennas. The POS PAC calibration tools were used to confirm this GAMS calibration and the offsets. Figure 2 shows an example image from POS PAC processing of the calculated lever arm for the primary GNSS antenna in the X axis. The computed position is within 3cms of the measured position.

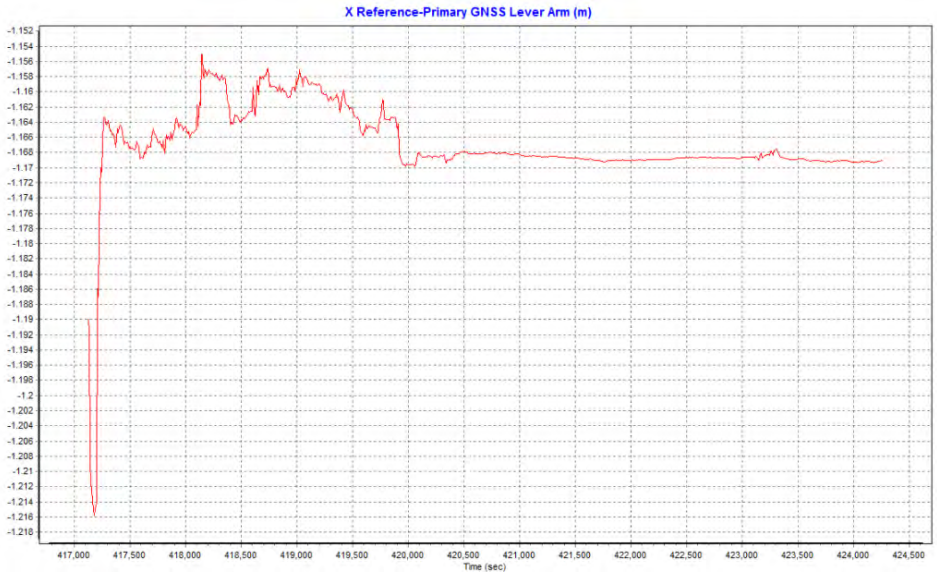


Figure 2 Calculated Lever Arm for the primary GNSS Antenna

The computer GAMS in post processing is shown below in Figure 3. The calculated post processing solution is within 1cms of the online calculated position.

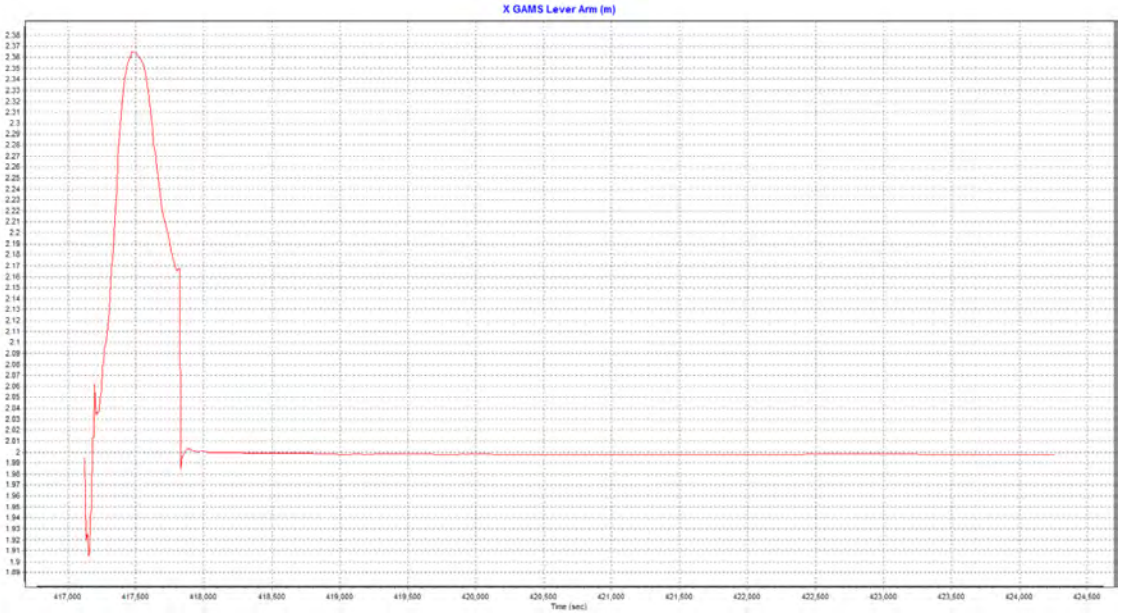


Figure 3 Calculated GAMS lever arm from Post Processing

Data was logged during mobilization and post processed to determined a calculated accuracy of data based on the position RMS. Figure 4 below is an example image during mobilization with the vertical position RMS

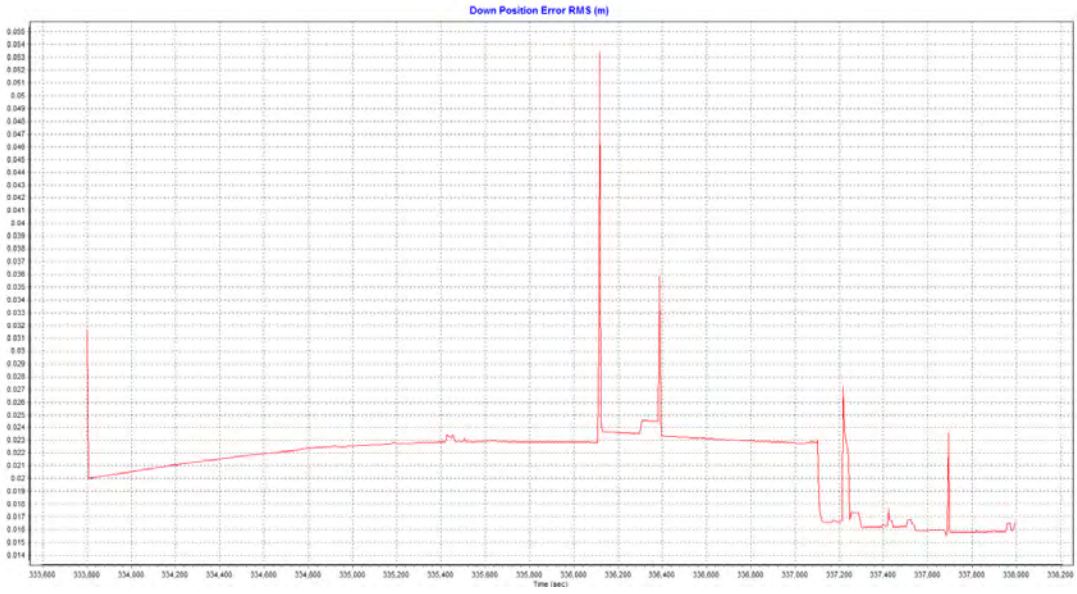


Figure 4 Vertical RMS error

2. QINSY

QINSy software was used during all acquisition as the positioning software. The system was set up to include several objects, nodes and computations so that positioning systems and results could be QCed against each other. Alarms were set up to warn the surveyor of data gaps and/or data out of a set threshold. QINSy was used to calculate the position of the vessel with the USBL and tow points calculated lever arms. The USBL range and bearing data to the beacon was input into QINSy which combined vessel and USBL calculations to position the beacon as well as the offset from the beacon to the fish reference point.

3. Multibeam

Vessel Miss Alyssa was mobilized for multibeam acquisition on April 10th through April 13th. The following sections detail the equipment, offsets, and methods used to calibrate the systems used for multibeam acquisition.

a. Reference Points

An R2 Sonic 2024 multibeam system was mobilized onto Miss Alyssa. The sonar was mounted with a UUSM – VOOP kit. The IMU, GPS Antennas, and the R2 Sonic sonar were mounted on the VOOP (see Figure 5). The top center of the IMU was chosen as the Reference Point (RP) in order to reduce offsets which would reduce error. The distance between the primary and secondary antennas was measured.

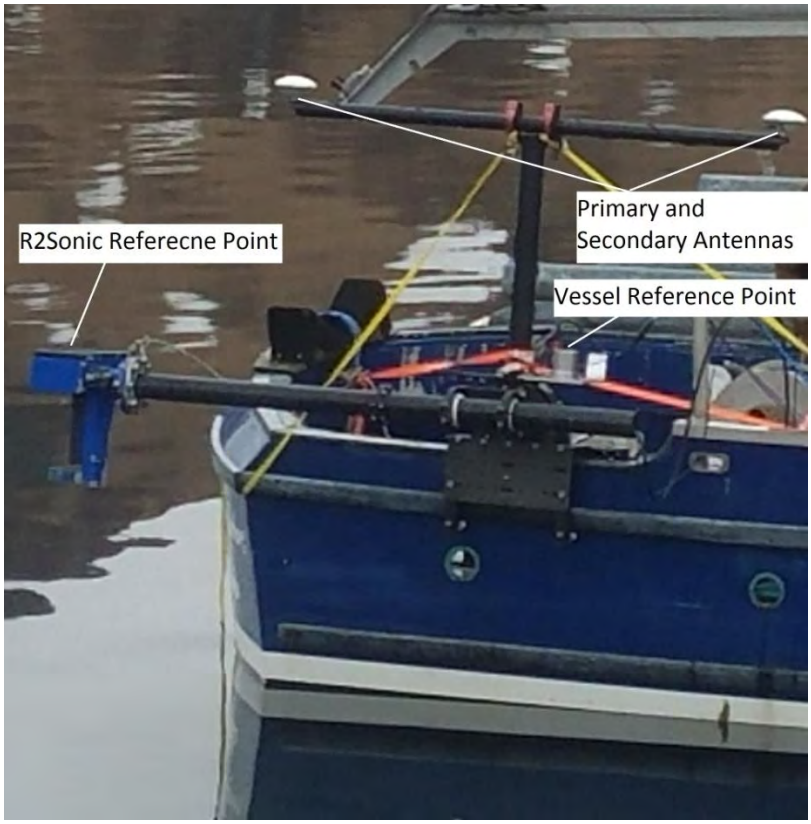


Figure 5 Vessel Central Reference Point

Three sets of measurements were individually taken in the x, y and z directions between the RP and Primary GPS Antenna and the RP and R2 Sonic Acoustic Center. These measurements were averaged and applied in the vessel Database. These measurements can be seen below in Table 3.

Table 3 Offsets from Reference Point to the R2 Sonic (USft)

Reference Point	X +ve STBD (ft)	Y +ve Bow (ft)	Z +ve Up (ft)
To R2Sonic Ref Point	1.170	-0.039	-6.575

b. Sound Velocity Calibration

The AML Base X2 sound velocity profiler and the AML Micro X mounted at the sonar head are sent into the manufacturers for scheduled Calibration. When casting for a sound velocity profile, the sound velocity of the AML, at 2ft, is compared to the sound velocity from the AML Micro X at the Sonar head. An example is shown below in Figure 6.

Time of Cast		Location of Cast	
10:53		SW of Survey Area	
SVP Unit		**Sonar Head SVP Unit**	
AML Base X		AML Micro X	
SV @ Sonar Head (m/sec)			**Δ(Surface SV vs Sonar Head SV)**
1461.8			0.0
			The SV probe at head is 2ft below the waterline
Depth Input Units		**SV Input Units**	
meters		meters/sec	
Depth (m)	**Depth (ft)**	**SV (m/sec)**	**SV (ft/sec)**
0.48	1.6	1461.794	4795.9
1.48	4.9	1462.023	4796.7
2.52	8.3	1461.927	4796.3
3.58	11.7	1462.364	4797.8
4.6	15.1	1462.431	4798.0
5.65	18.5	1462.436	4798.0
6.66	21.9	1462.377	4797.8
7.68	25.2	1462.258	4797.4
8.73	28.6	1462.245	4797.4
9.77	32.1	1461.949	4796.4
10.79	35.4	1461.951	4796.4
11.78	38.6	1461.962	4796.5
12.86	42.2	1461.861	4796.1
13.87	45.5	1461.78	4795.9
14.86	48.8	1461.78	4795.9
15.91	52.2	1461.792	4795.9
16.9	55.4	1461.983	4796.5
17.9	58.7	1462.034	4796.7
18.91	62.0	1462.018	4796.6
19.9	65.3	1462.024	4796.7
20.92	68.6	1462.051	4796.8
21.91	71.9	1462.151	4797.1
22.91	75.2	1462.186	4797.2
23.9	78.4	1462.196	4797.2
24.91	81.7	1462.2	4797.2
25.9	85.0	1462.232	4797.3
Average:		***1462.1***	***4796.8***

Figure 6 Sound Velocity QC

c. R2 Sonic Calibration

The difference in the angle of the R2Sonic and the IMU was calculated in roll, pitch and yaw calibration tests.

i. Roll Calibration

A roll calibration was completed by running two lines in opposite directions over a flat area. The details of the lines run are shown below in Figure 7. A value of -0.55° was determined for roll.

Lines Used:

01: 0030 - RM_170412_Dutch - 0001 (068°, 3.4 kts)

02: 0031 - RM_170412_Dutch - 0001 (250°, 3.8 kts)

Calibration Type: Multibeam Roll

Patch Location: 53°53'57.70"N, 166°29'48.84"W

Patch Heading: 68.0°

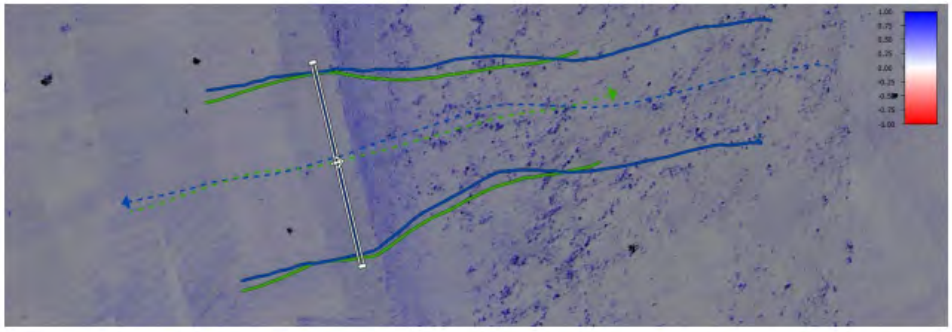
Patch Width: 233.78 meters

Patch Height: 4.24 meters

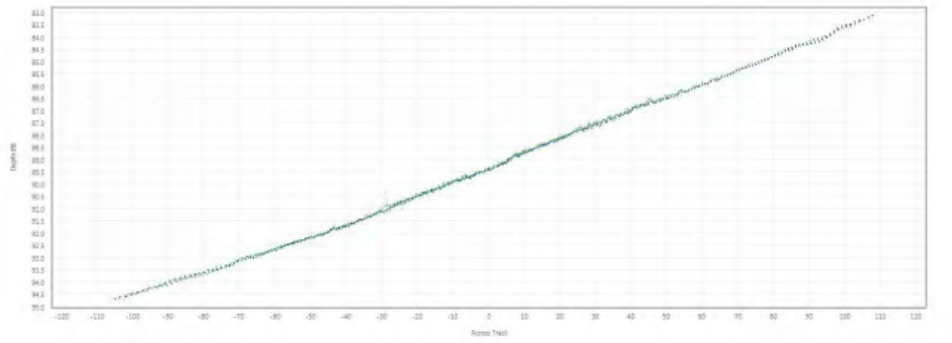
Active Motion System: POS_Motions

Active Position System: POS_POS

Calibration Target: R2Sonic



Calibration Area



Calibration Plot

Figure 7 Roll Calibration lines and results after value applied

A statistical check was run on the calibration using QIMERA Auto Solve. The resulting statistics are shown in Figure 8.

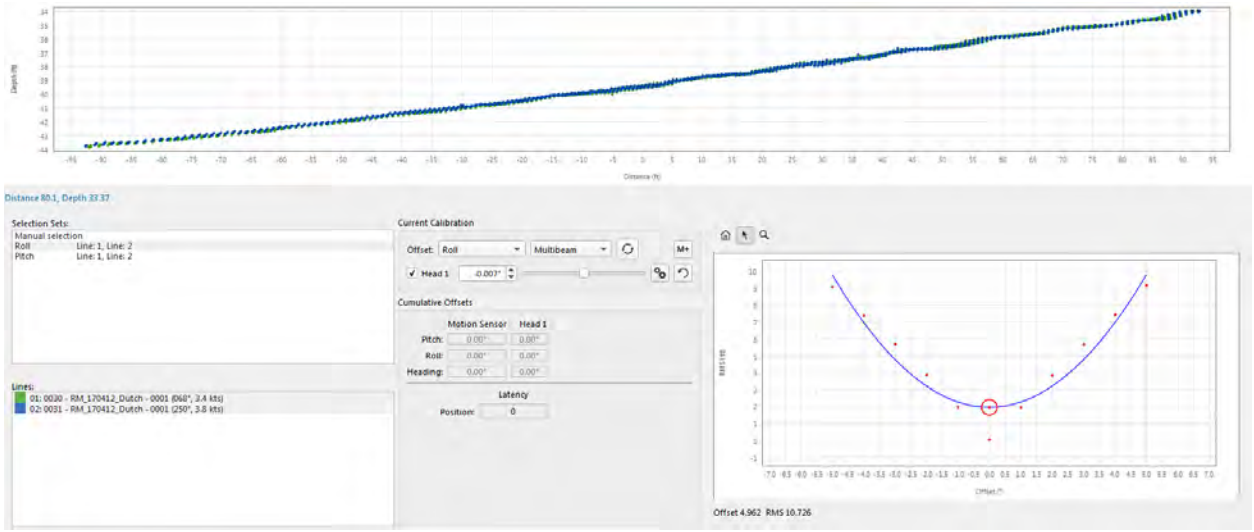


Figure 8 Statistical Check of Roll Calibration Result

ii. Heading (Yaw) Calibration

The heading calibration was completed by running two parallel lines in the same direction, perpendicular to a steep slope. Along track outside beams are compared.

A value of -0.57° was determined for heading (yaw). The details of the lines run are shown below in Figure 9.

Lines Used:

01: 0030 - RM_170412_Dutch - 0001 (068°, 3.4 kts)

03: 0032 - RM_170412_Dutch - 0001 (071°, 3.3 kts)

Calibration Type: Multibeam Heading

Patch Location: 53°53'58.65"N, 166°29'47.54"W

Patch Heading: 68.0°

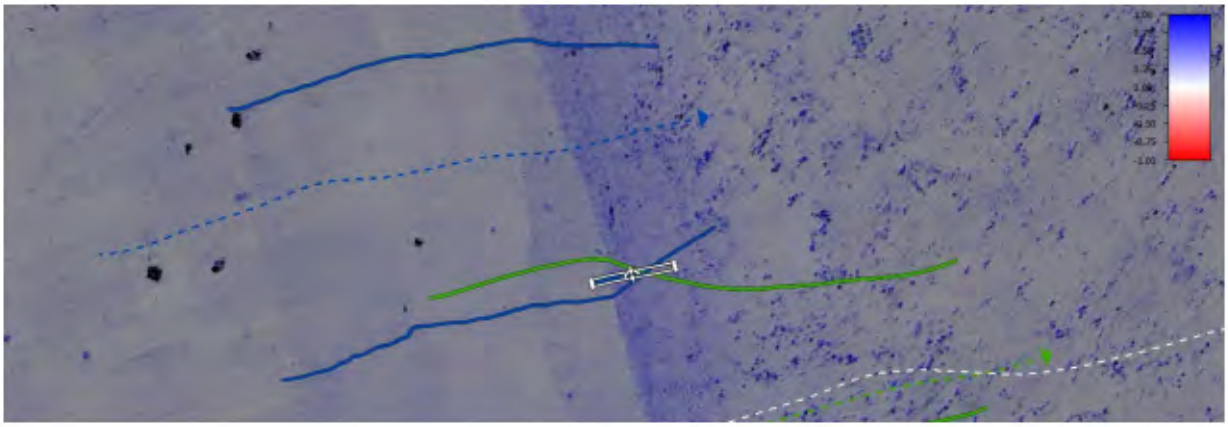
Patch Width: 5.73 meters

Patch Height: 69.23 meters

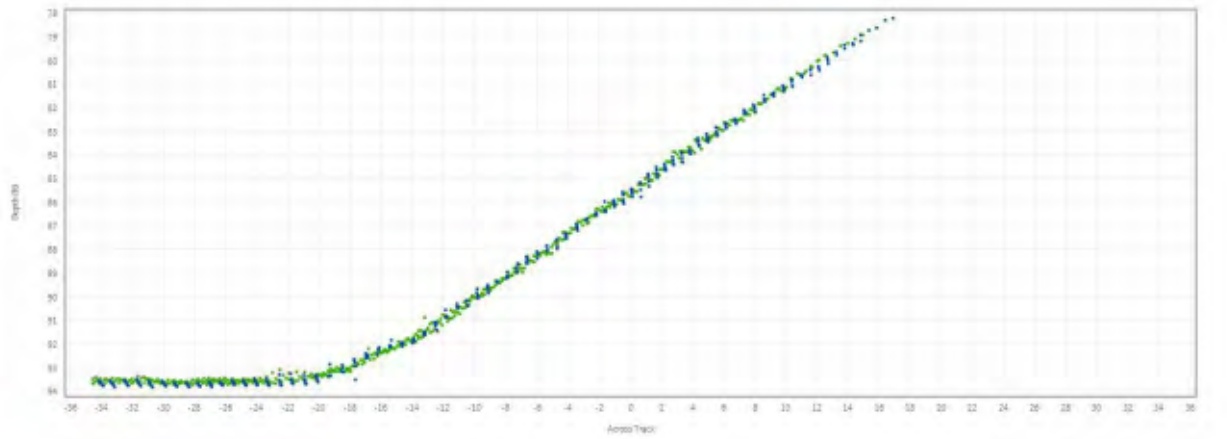
Active Motion System: POS_Motions

Active Position System: POS_POS

Calibration Target: R2Sonic



Calibration Area



Calibration Plot

Figure 9 Heading Calibration lines and results after value applied

A statistical check was run on the calibration using QIMERA Auto Solve. The resulting statistics are shown in Figure 10.

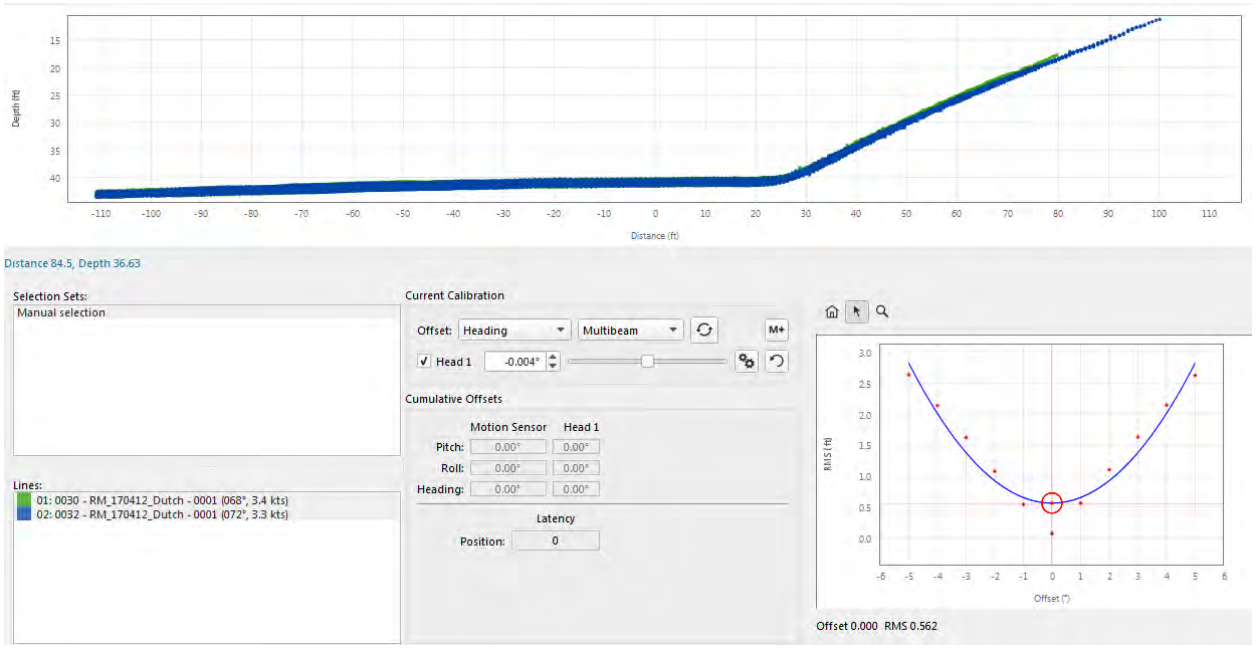


Figure 10 Statistical Check of Head (Yaw) Calibration Result

iii. Pitch Calibration

A pitch calibration was completed by running two lines in opposite directions on the same track over a steep slope. Along track nadir beams are compared.

The details of the lines run are shown below in Figure 11. A value of 0.13° was determined for Pitch.

Lines Used:

01: 0030 - RM_170412_Dutch - 0001 (068°, 3.4 kts)

02: 0031 - RM_170412_Dutch - 0001 (250°, 3.8 kts)

Calibration Type: Multibeam Pitch

Patch Location: 53°53'57.97"N, 166°29'47.15"W

Patch Heading: 68.0°

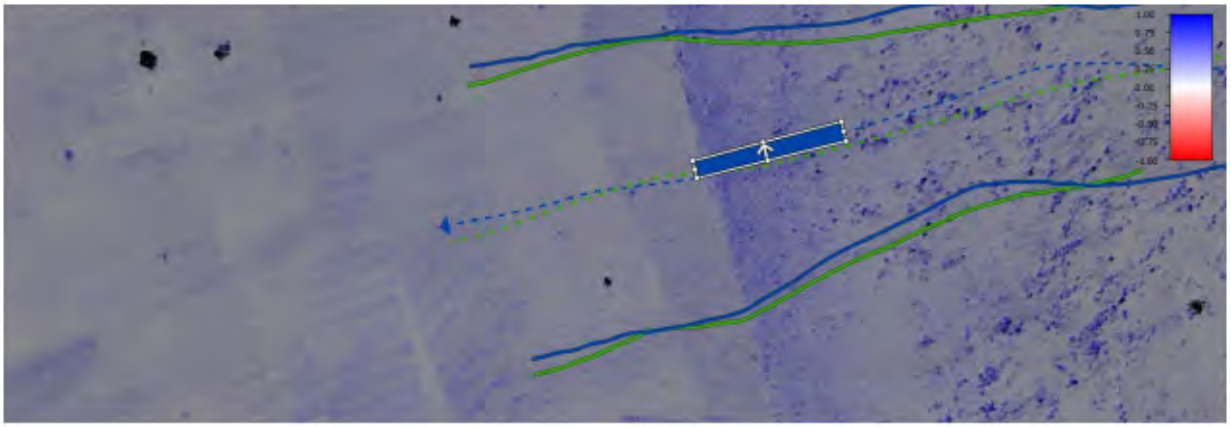
Patch Width: 3.54 meters

Patch Height: 39.76 meters

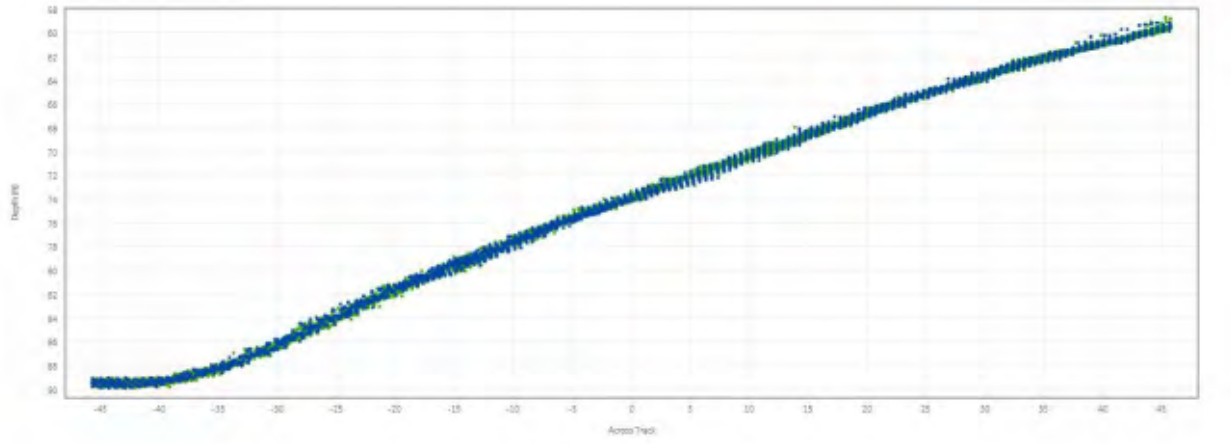
Active Motion System: POS_Motions

Active Position System: POS_POS

Calibration Target: R2Sonic



Calibration Area



Calibration Plot

Figure 11 Pitch Calibration lines and results after value applied

A statistical check was run on the calibration using QIMERA Auto Solve. The resulting statistics are shown in Figure 12.

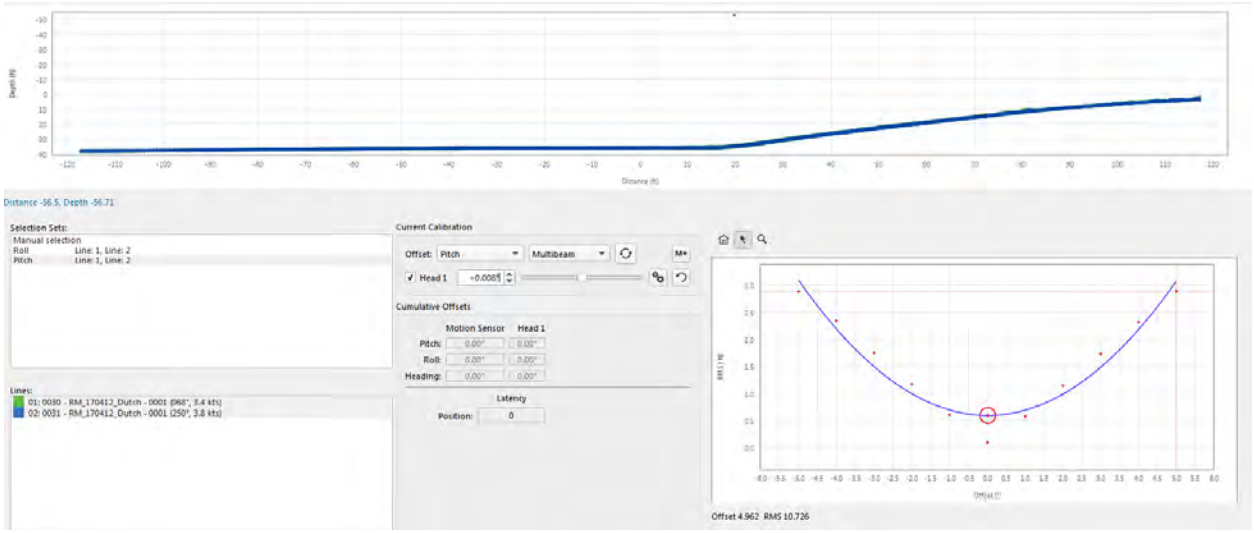


Figure 12 Statistical Check of Pitch Calibration Result

d. Quality Control

i. Position

A Rover was used to measure Topo points at three locations; Vessel Reference Point, Sonar Acoustic Center, and Waterline. These points were compared to the values of these locations displayed in the QINSy shell. These comparisons can be seen below in Table 4.

Table 4 RTK Rover QC

Vessel RP

	Northing	Easting	Elevation
From Vessel	1181145.99	5313195.75	7.63
From RTK Rover	1181146.07	5313195.83	7.55
Δ	-0.07	-0.08	0.08

Sonar AC

	Northing	Easting	Elevation
From Vessel	1181147.67	5313194.44	1.75
From RTK Rover	1181147.23	5313194.32	1.71
Δ	0.44	0.13	0.04

Waterline

	Elevation
From Vessel	3.78
From RTK Rover	3.64
Δ	0.14

ii. Data Density

Using the QINSy sounding grid the sounding density of the survey data was analyzed. Multibeam data was collected to achieve 200% bottom coverage with object detection of any object larger than 1 ft by 1 ft resulting in requirement of at least 2 soundings per node in a 1 ft by 1 ft sounding grid. The density (sounding per node) of our 1 ft x 1 ft grid is shown below in Figure 13. The density of our survey data ranges from at least 2 soundings per node to over 40 soundings per node.

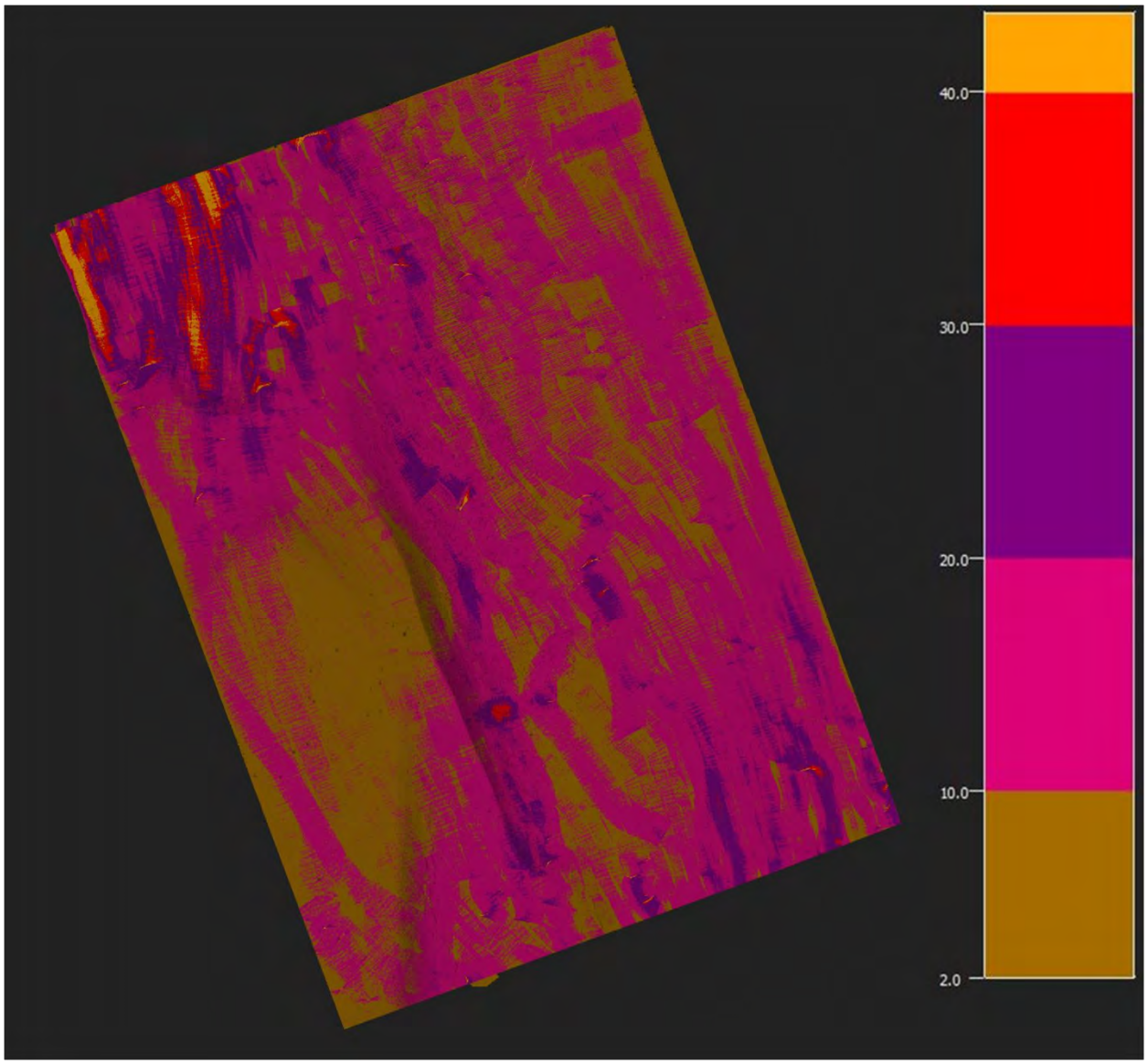


Figure 13 Data Density of 1x1ft sounding gird

iii. Standard Deviation Grid

A surface colored by 95% confidence, standard deviation of the points making up each grid cell is produced in order to determine data anomalies and issues. Vertical differences in overlapping lines appear as cells with higher standard deviation values. Any discrepancies in the data can be viewed and corrected for immediately. The grid is colored using a polar color map with ranges from -1 to 1. Mismatching data will appear as a strong red or blue color of higher standard deviation while lighter colors show greater data correlation. Figure 14 below shows the standard deviation grid of processed survey data. Higher standard deviation values are seen on slope areas which is a product of gridding on steep surfaces. However, in the flatter areas the data showed good agreement.

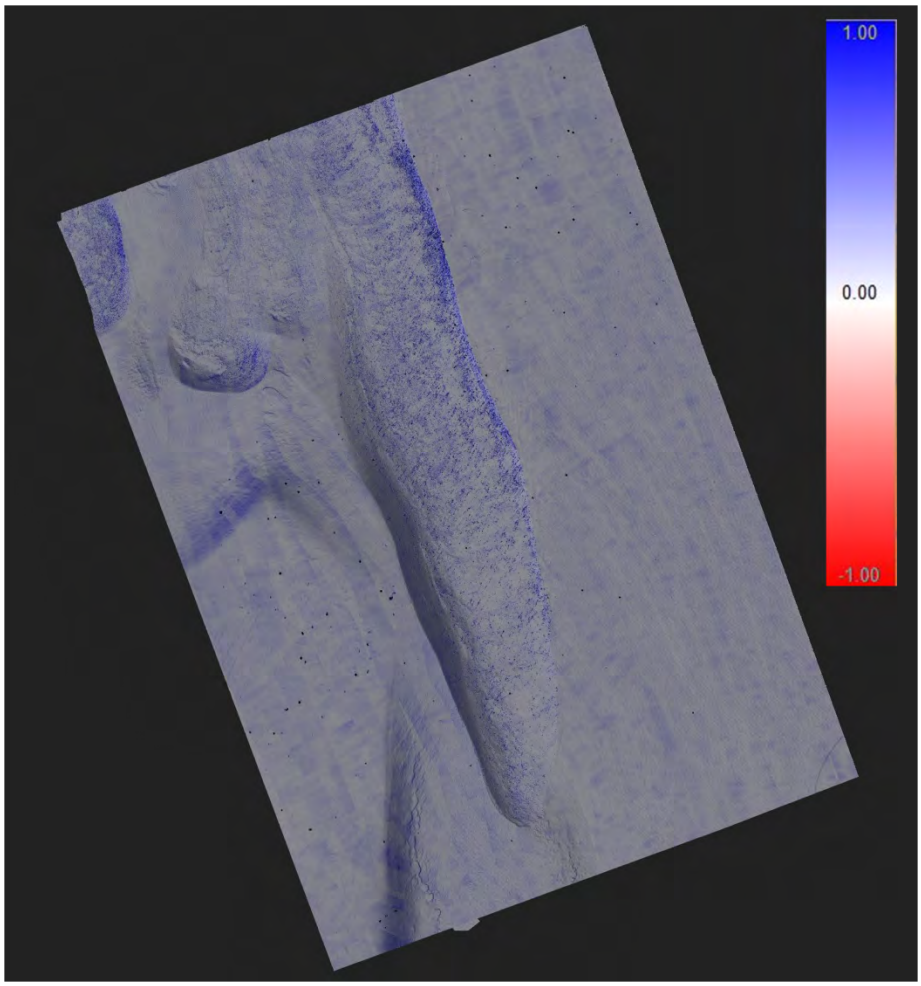


Figure 14 Polar colorization of QINSy sounding grid.

The data statistics run on the entire survey area show that 66.4% of all cells had a 95% confidence level less than 0.07 ft. 88.2% of cells in the entire survey grid had a 95% confidence level less than 0.1 ft (see Figure 15).

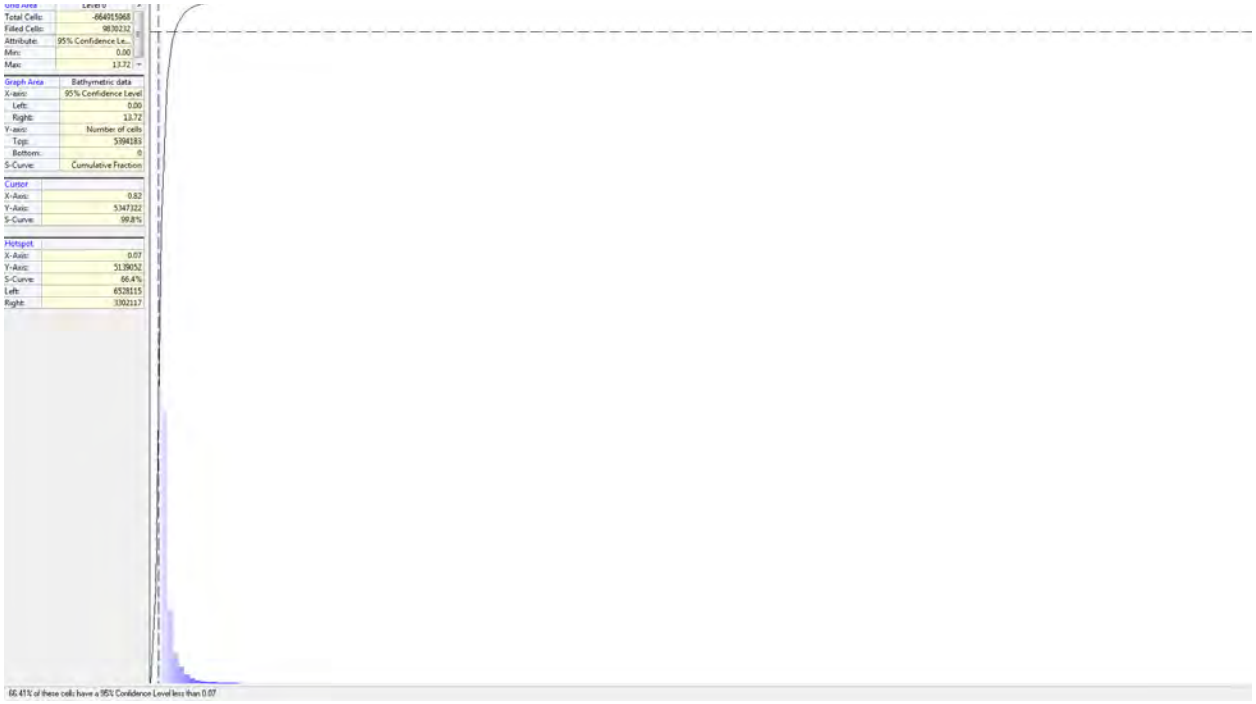


Figure 15 95% confidence level statistics over the entire survey grid

iv. Repeatability

In order to test all the different parameters, data collected over the bar and surrounding survey area was compared to historic survey data for any discrepancies. The data used for comparison was from NOAA survey OPR-Q328-FA-11 surveyed in 2011. The data was compared using a surface colored by standard deviation of the points making up the grid. Figure 16 below shows the standard deviation grid between the recent data versus the historic data and a cross section profile (pink line) displaying the recent data represented in Blue and the historic data represented in magenta. The profile shows good agreement between the two datasets. Figure 17 shows the data distribution of the difference. 95% of the data (2 standard deviations) are within 0.2 ft difference, while the mean difference is 0.12 ft.

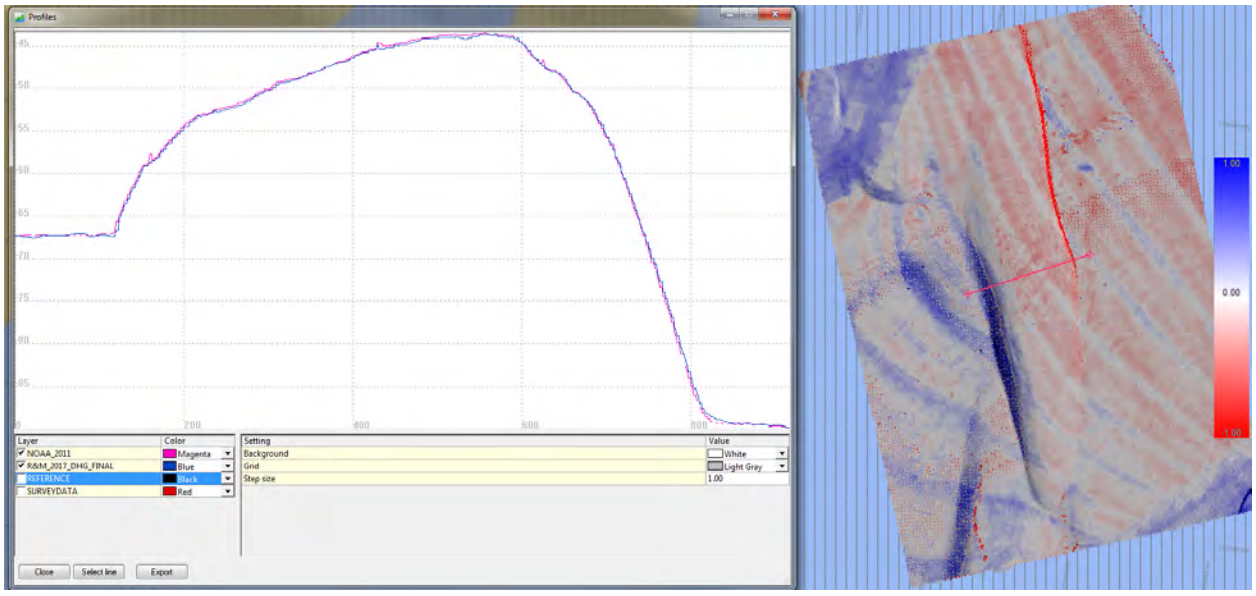


Figure 16 Historic vs. Current data

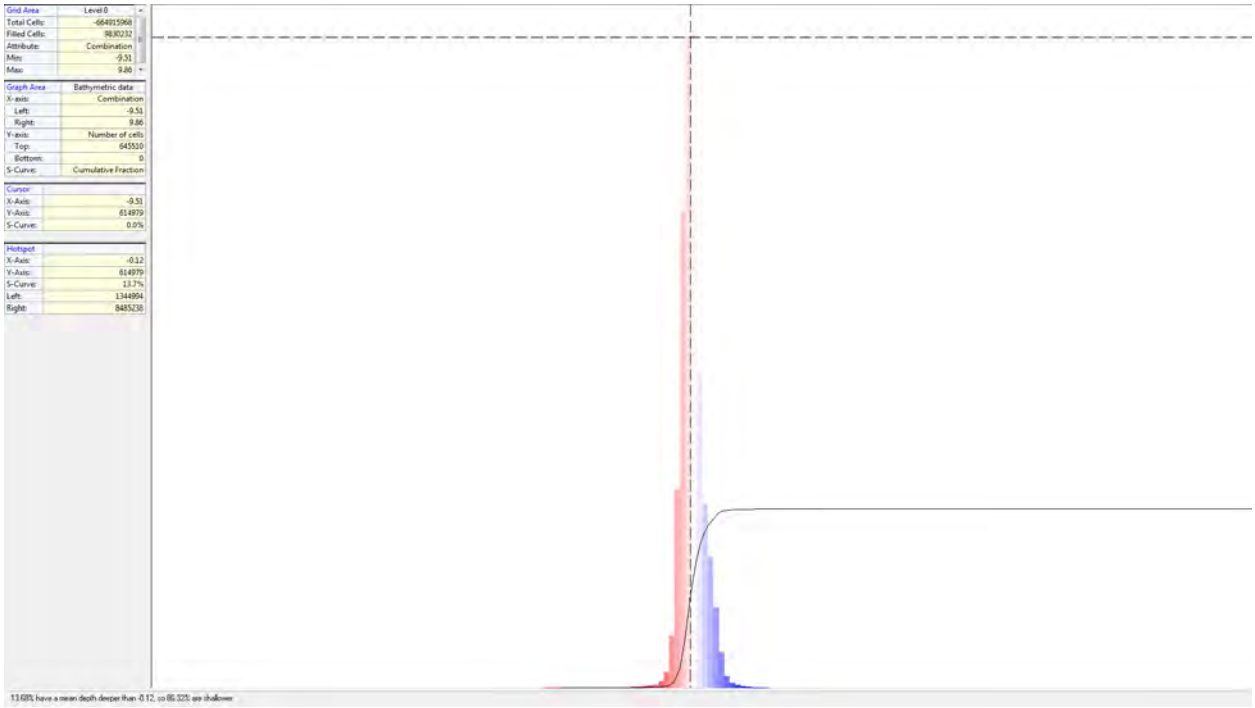


Figure 17 Difference between NOAA 2011 data and eTrac 2017 data - Normal Distribution

4. Sediment Sampling

Vessel Miss Alyssa was mobilized with a sediment sampler for sediment classification on April 14th. The following sections detail the equipment, offsets, and methods used to calibrate the system.

a. Reference Points

A WILDCO Ponar grab sample system was mobilized onto Miss Alyssa (see Figure 18). The sampler was deployed and retrieved via the onboard hydraulic winch. The IMU and GPS antennas that were used during multibeam acquisition remained mounted on the VOOP with the top center of the IMU as the Reference Point (RP). An offset from the vessel reference point to the winch was input and used to calculate the eventual, estimated sample position (see Table 5).

Figure 18 WILDCO Ponar Grab Sampler on Vessel Miss Alyssa

Table 5 Sediment Sample Reference Point offsets from Vessel Reference Point

Node: Sediment Sampler	
Object location:	MissAlyssa
Node name:	Sediment Sampler
X (Stbd = Positive)::	-1.200 ftUS
Y (Bow = Positive)::	3.650 ftUS
Z (Up = Positive)::	3.100 ftUS
A-priori SD:	0.033 ftUS

5. Narrow Band Subbottom Profiler

Vessel Miss Alyssa was mobilized for deep subbottom (up to 300 feet below seabed) subsurface, stratification acquisition on April 16th through April 20th. The following sections detail the equipment, offsets, and methods used to calibrate the systems used for deep subbottom acquisition.

a. Reference Points

A Falmouth HMS-620 Bubble Gun with single acoustic source was mobilized onto Miss Alyssa. The source is created with an electromagnetic acoustic transducer and the receiver is a hydrophone streamer. The Bubble Gun was towed from two tie points on port and starboard sides of the stern. The source was connected on a 25 m cable to the port side tie point and the streamer was connected on a 35 m cable on the starboard side tie point (see Figure 19). The IMU and GPS antennas that were used during multibeam acquisition remained mounted on the VOOP with the top center of the IMU as the Reference Point (RP). The reference points are shown in Figure 20. Offsets were measured from the vessel reference point to the tie point of the streamer, receiver. The tow point was directly in line with the IMU reference point along the starboard port axis. This allowed a simple bow, stern offset to be input (see Table 6). In addition to the tow point offsets and cable out offset was calculated in post processing using a layback test. See below for details.

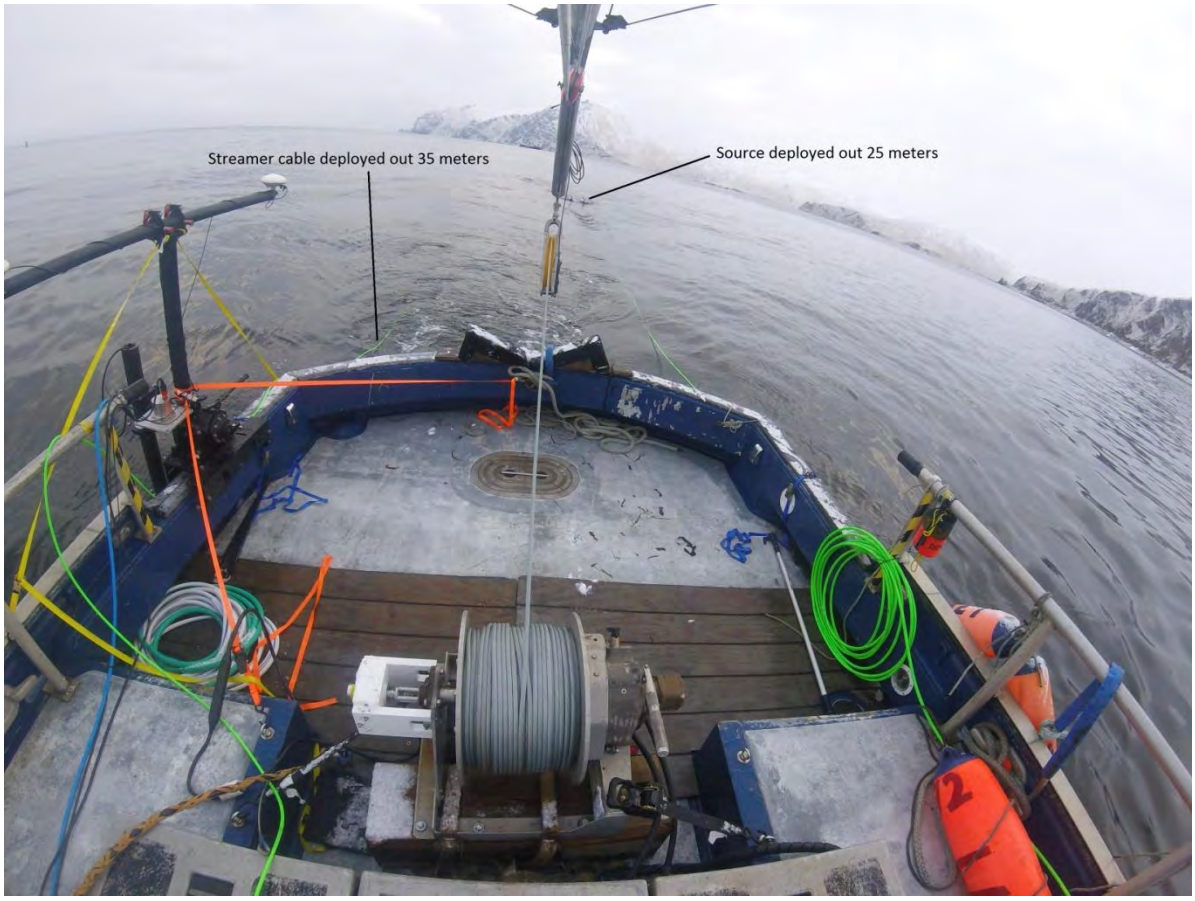


Figure 19 Bubble Gun Deployed

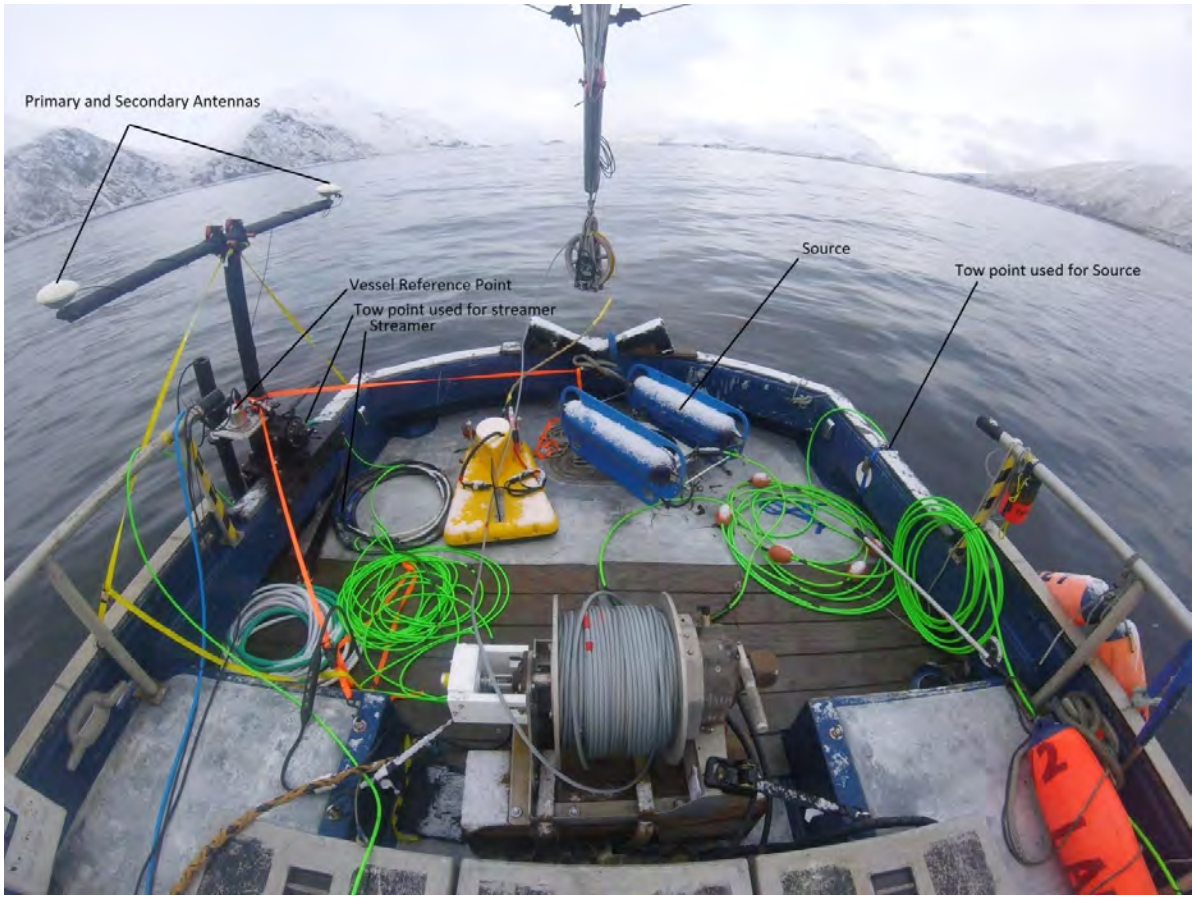


Figure 20 Bubble Gun on deck on Miss Alyssa

Table 6 Bubble Gun Reference Point offsets from Vessel Reference Point

Node: TP_BUBBLE_GUN	
Object location:	MissAlyssa
Node name:	TP_BUBBLE_GUN
X (Stbd = Positive)::	0.000 ftUS
Y (Bow = Positive)::	-1.500 ftUS
Z (Up = Positive)::	0.000 ftUS
A-priori SD:	0.033 ftUS

b. Calibration

i. Layback

A power setting calibration was completed on the system to account for the D.C offset. The resulting DC offset was +415.

A layback test was used to calibrate the cable out distance for the Bubble Gun streamer position. Multiple lines were run over the bar in opposite directions. Layback was calculated based on cable out and a caternary factor for the tow vehicle with source and the streamer as well as the measurement between the source and streamer calculated based on distance across the vessel and distance from source back to streamer. Using Sonar Wiz, targets were selected in each profile at the base of the bar and compared to each other. Through this comparison offsets were accounted for in the Bubble gun.

With the offsets entered, lines were again run over the bar and targets were again selected in each profile at the base of the bar and compared to each other. The images below (Figure 21 & Figure 22) show the targeted position at the base of the bar on the opposite run layback lines, before and after layback calibration. The post calibration lines show that the position of the bottom of the slope of the bar on both lines difference by less than 0.5 m.

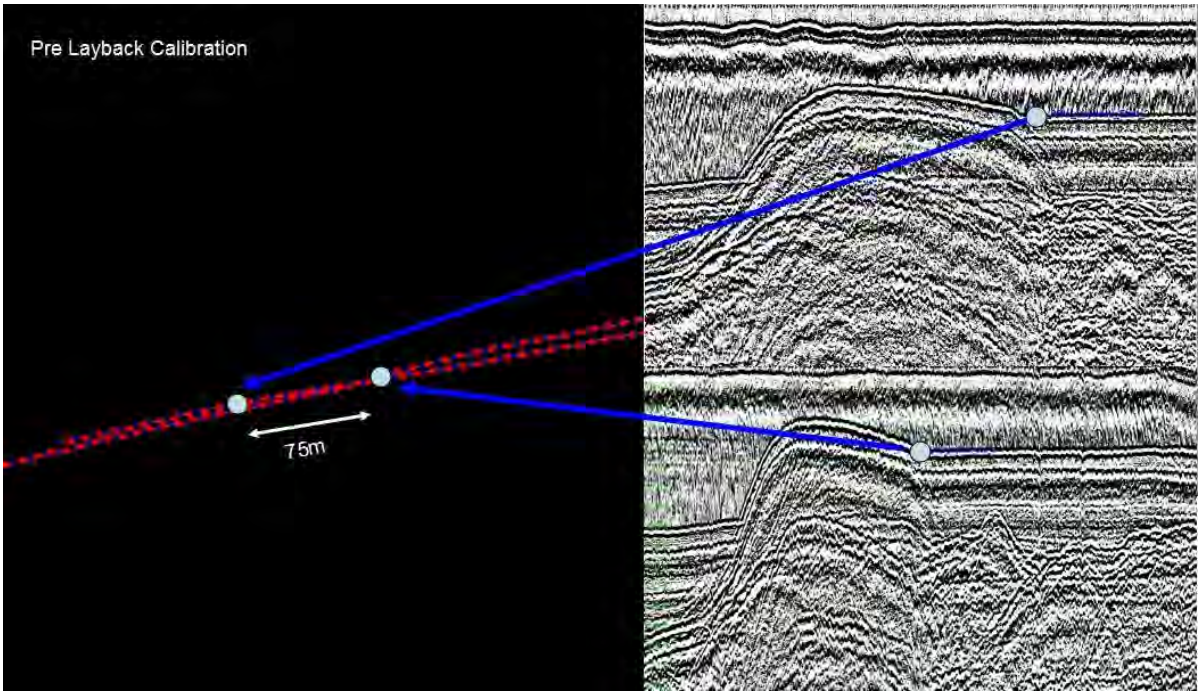


Figure 21 Pre Layback Calibration

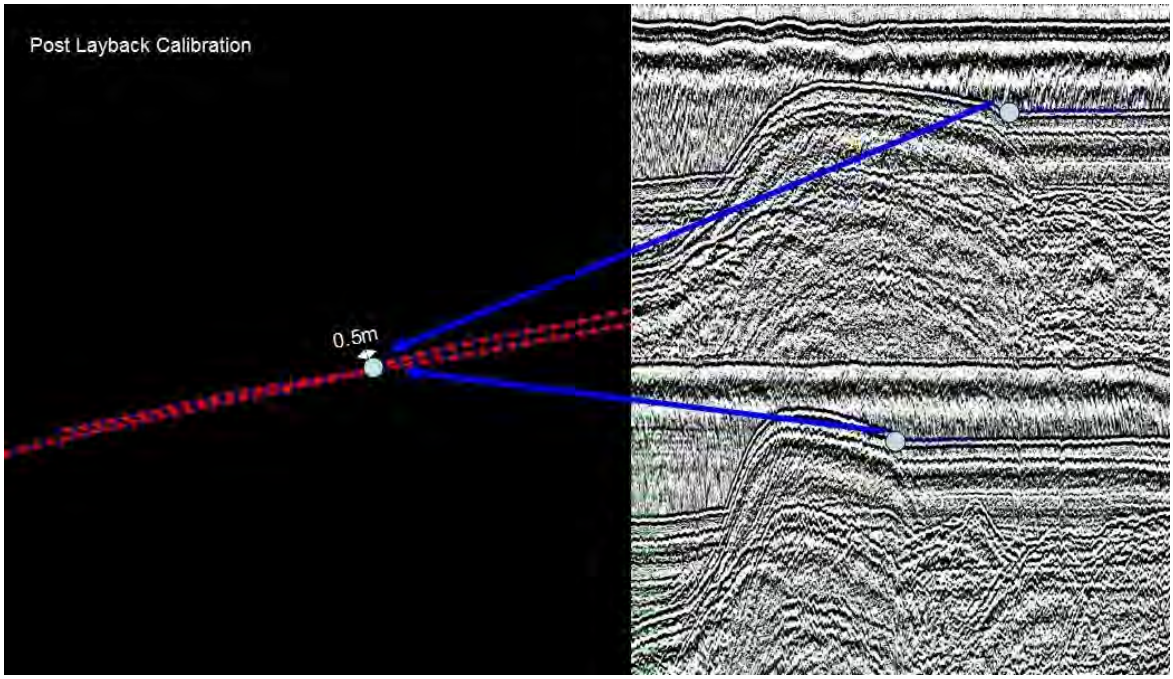


Figure 22 Post Layback Calibration

A cable out of 38 m with a percentage cable out caternary factor of 85% was found to give the most consistent positioning for the system.

The optimal settings of the system were determined during the layback calibration. Sample frequency was set to 20 kHz with AD range set to +/- 10v. A low frequency filter was set to 50 and a high frequency filter was set to 200 to filter any chirp noise. Gain was set to 18 db so that the overload indicator was always off.

c. Quality Control

i. Position

Comparison to Multibeam data

As a quality control measure targets were selected at the base of the bar in multiple profiles and compared to the Multibeam sounding grid. The resulting position of the foot of the bar slope in the Bubble Gun data was never more than 5 ft from the position as detected by the multibeam data. A comparison between the targeted position at the foot of the slope of the bar from the bubble gun data compared to the multibeam data is shown below in Figure 23.

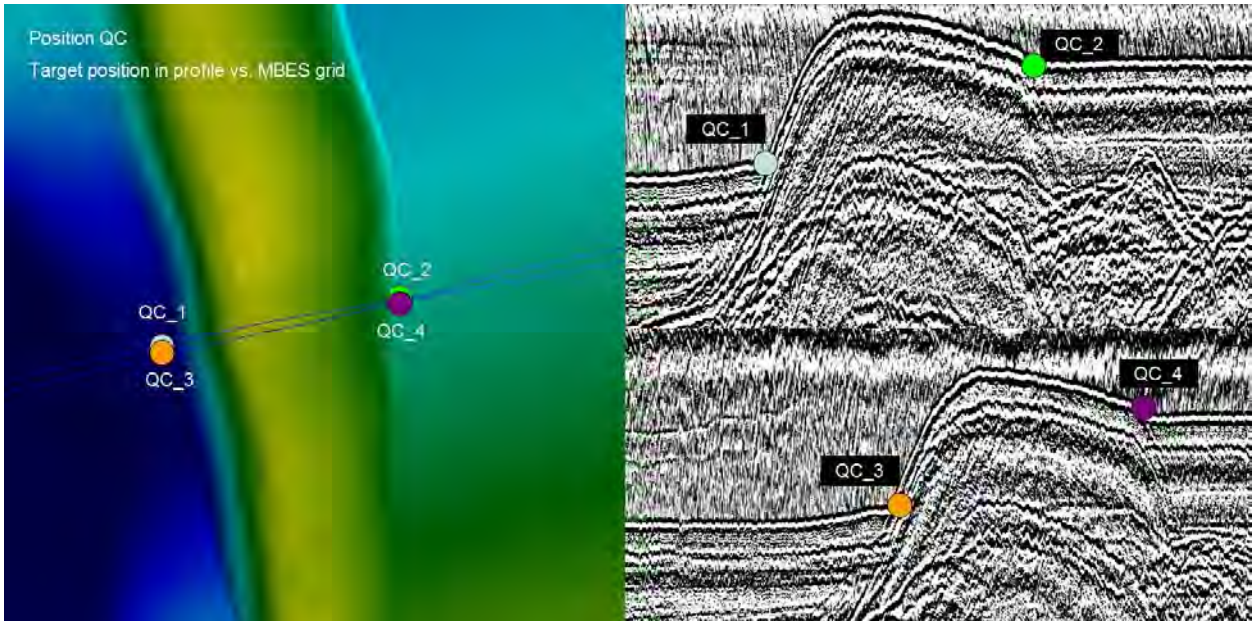


Figure 23 Positions of targets in profile vs. MBES grid

Bottom Tracking

Bottom tracking was completed for all survey lines. As a quality control measure, a point from a bottom tracked line was compared against the multibeam grid. Position and depth were able to be compared by placing the curser on the grid over the point. The output depths were perfectly aligned with the multibeam, confirming that the alignment processing was 100% successful. A comparison of elevations from the multibeam data and the bubble gun processed data is shown below in Figure 24.

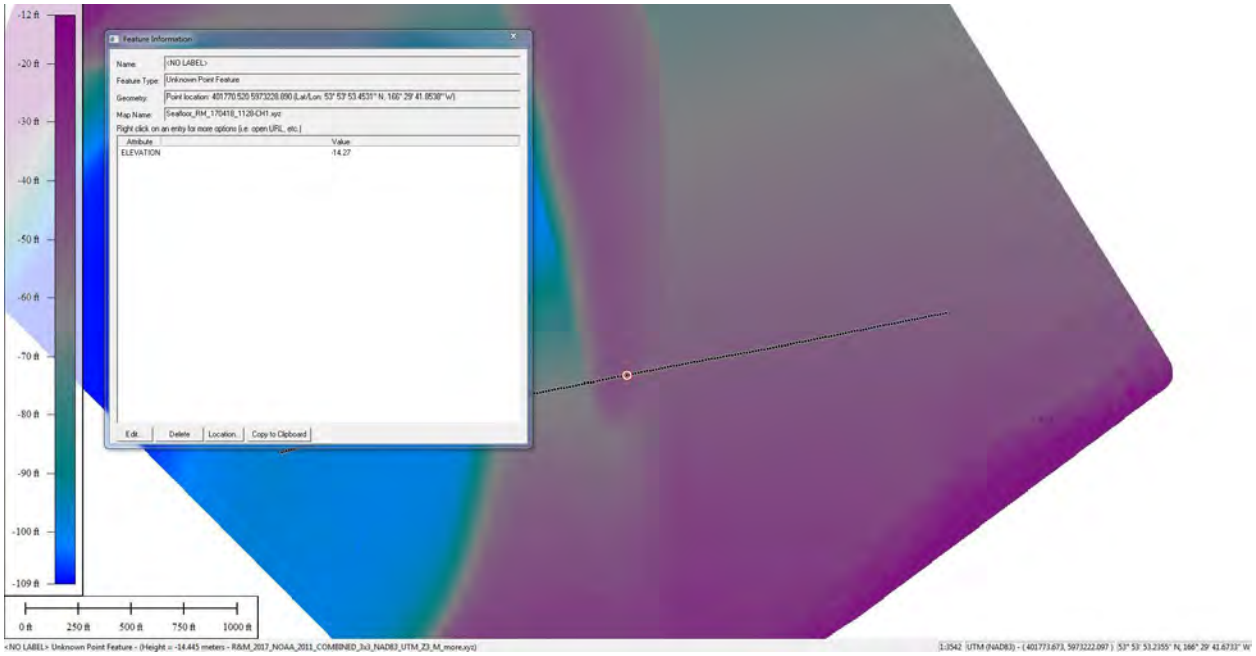


Figure 24 Bottom Tracking QC

6. USBL

Miss Alyssa was mobilized with an Ultra Short Base Line (USBL) positioning system on April 17th. The USBL was used to position the Gradiometer and Chirp subbottom system. The following sections detail the equipment, offsets, and methods used to calibrate the system.

a. Reference Points

A Link Quest 1500 was mobilized onto Miss Alyssa. The USBL was mounted onto the VOOP kit in place of the R2Sonic 2024. The IMU and GPS antennas remained mounted on the VOOP in their previous locations with the top center of the IMU chosen as the RP. An offset to the acoustic center and thus the reference point of the USBL was measured and used to position the system. Figure 25 below shows the USBL system mounted onto the VOOP USM set up. Table 7 lists the measured offsets for the USBL system from the vessel reference point.

Figure 25 USBL Mounted on end of VOOP USM

Table 7 USBL measured offsets from the vessel reference point

Node: USBL	
Object location:	MissAlyssa
Node name:	USBL
X (Stbd = Positive)::	1.170 ftUS
Y (Bow = Positive)::	-1.245 ftUS
Z (Up = Positive)::	-6.985 ftUS
A-priori SD:	0.033 ftUS

b. Calibrations

i. Position

The USBL system was calibrated using the QINSy USBL calibration utility with two known positions. The beacon was set at a known horizontal location (edge of dock that was RTK shot with a rover). For each position Miss Alyssa maneuvered around and across the transponder beacon at different angles in the Omni or tracking transducer head pattern. Upon completion of the pattern, using the QINSy USBL calibration utility a least squares calibration was run. The known point was then added into the data to complete calibration.

A beacon was hung underneath a dock and a position taken for the beacon using an RTK rover. This became the known position for the USBL calibration. The edge of a floating dock was used (see Figure 26).

Figure 26 Vessel performing USBL Calibration

Two tests were completed at two locations. Using the QINSy USBL calibration tool least squares and manual offsets, the data position results for the beacon were able to be tightened closer to the known position of the beacon. Figure 27 shows the pre and post calibration positions with a 95% error ellipsoid around the points. The error ellipsoid is green surrounding the beacon position results which are colored by the data file. The vessel position is represented by the red points. The known position is shown using a black circle around the position with a 5 ft radius. The calibration reduced the error ellipsoid to a maximum dimension of 8 ft.

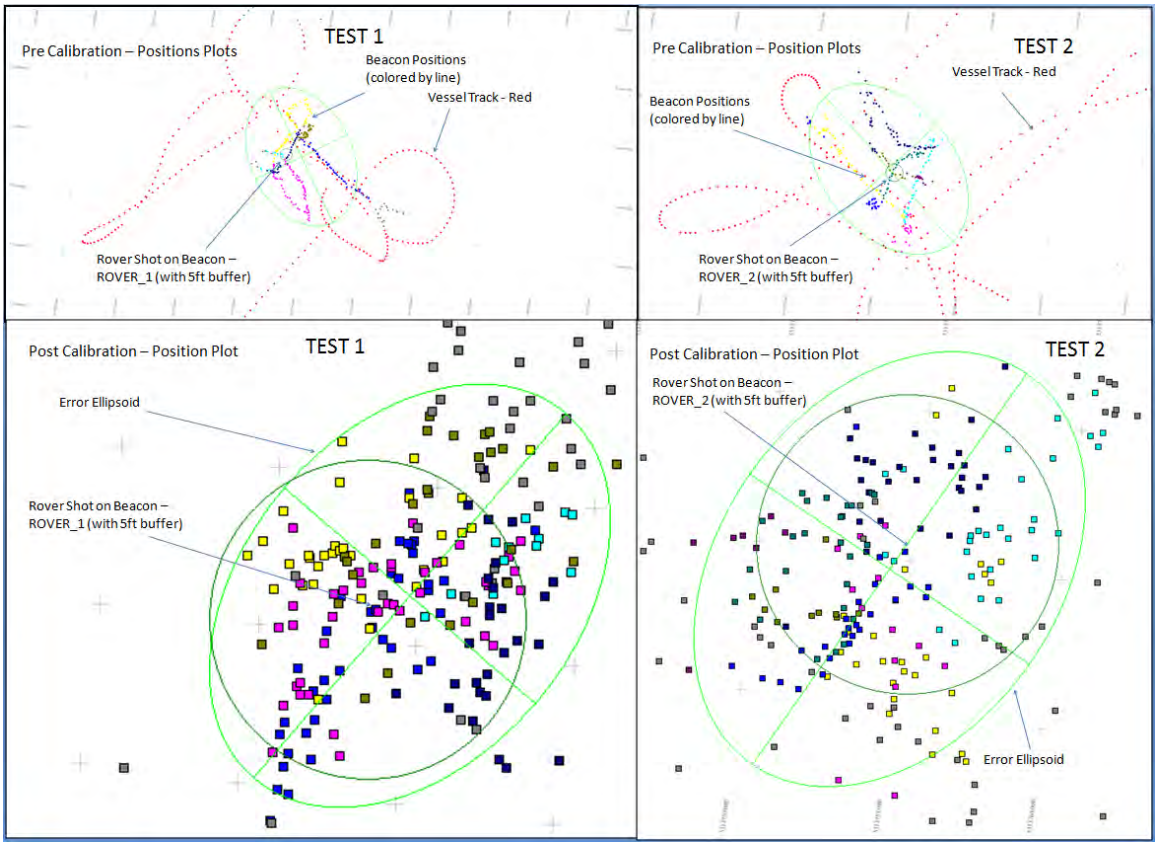


Figure 27 Beacon position plots with pre and post calibration beacon positions along with error ellipsoids.

The statistics for the error ellipsoid around the data positions for Test 1 and Test 2 are shown below in Figure 28.

USBL Target Node Positions	Test 1	
Error Ellipse	95 %	SD
Easting Center	5314279.61 ftUS	2.58 ftUS
Northing Center	1181356.52 ftUS	2.72 ftUS
Semi-Major Axis	7.57 ftUS	3.09 ftUS
Semi-Minor Axis	5.20 ftUS	2.12 ftUS
Azimuth Major Axis	40.664 °	

USBL Target Node Positions	Test 2	
Error Ellipse	95 %	SD
Easting Center	5313754.35 ftUS	2.62 ftUS
Northing Center	1180624.63 ftUS	2.96 ftUS
Semi-Major Axis	7.91 ftUS	3.23 ftUS
Semi-Minor Axis	5.57 ftUS	2.28 ftUS
Azimuth Major Axis	34.638 °	

Figure 28 Error ellipse values for Test 1 and Test 2 with maximum axis dimensions

The uncorrected and corrected beacon positions are shown in the graphs below in Figure 29. The graphs show the delta of the positions results with data for Test 1 being completely within a range of 8ft.

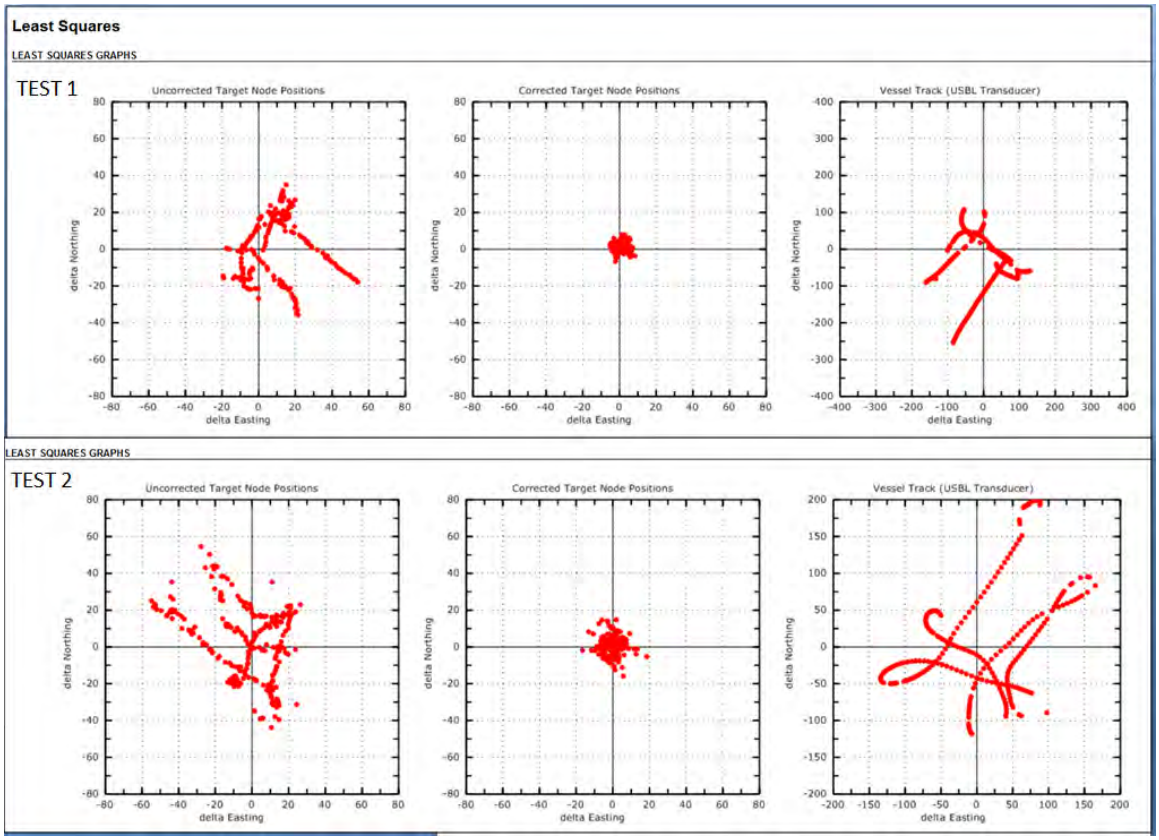


Figure 29 Least squares residual plots of the Uncorrected and Correct Beacon positions for Test 1 and Test 2

For both Test 1 and Test 2 the majority of the data was within a maximum spread of 10 ft. This is shown below in Figure 30 which shows the count of the data residuals for Test 1 and Test 2 after calibration for the Easting (X Axis) and Northing (Y axis).

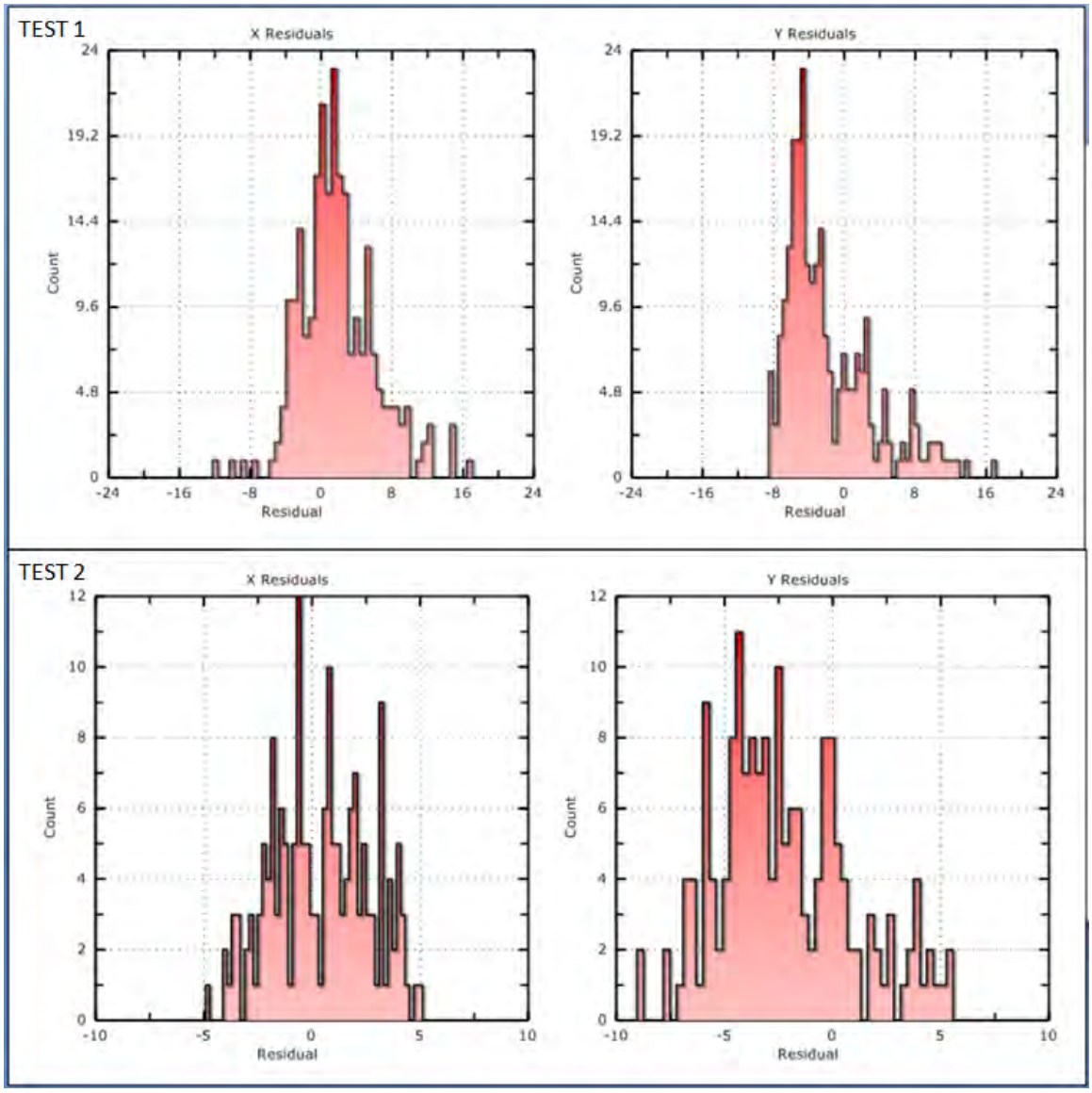


Figure 30 Post USBL calibration residual graphs for the Easting and Northing spread of data

The results from the calibration tests were averaged in order to create a final offset value. These are shown below in Table 8.

Table 8 USBL Calibration Angle Offsets for each test, averaged and then maximum delta shown

	Test 1	Test 2	Resulting	Maximum Delta
Scale Factor	0.95	0.99	0.97	0.02
Roll Angle	-1.00	-0.87	-0.94	-0.13
Pitch Angle	0.80	0.65	0.73	0.08
Heading Angle	-12.16	-12.20	-12.18	0.02

7. Cable Counter

A cable counter was mobilized as a backup positioning calculation system for the towed sensors on April 17th. The following sections detail the equipment, offsets, and methods used to calibrate the system.

a. Reference Points

The cable counter was mobilized on the sheave of the winch. The system counts the number of rotations of the sheave in order to calculate the amount of cable let out. Using the depth of the fish below the water, the amount of cable out and the course over ground of the vessel, QINSy calculates the position of the fish behind the vessel. The IMU, GPS Antennas, and the USBL were mounted on the VOOP with the top center of the IMU chosen as the RP (see Figure 31). An offset to a selected towing point on the sheave was measured from the IMU RP (see Table 9).

Figure 31 Tow Point for Cable Counter Reference Point

Table 9 Offset from Vessel RP to the Tow point Reference Point

Node: TOWPOINT

Object location:	MissAlyssa
Node name:	TOWPOINT
X (Stbd = Positive)::	-6.500 ftUS
Y (Bow = Positive)::	-7.300 ftUS
Z (Up = Positive)::	4.000 ftUS
A-priori SD:	0.033 ftUS

b. Calibrations

i. Position

The circumference of the sheave was calculated based on radius measurements. This value was then entered into the system. The cable was marked at 5 m and 10 m intervals. The system was then "set" at these measure points. As the cable was brought in and let out a comparison between the marked cable out and calculated cable out from the system were compared. Agreement within 0.1 m was found during calibration testing. During survey, every time the cable was used to raise or lower the fish, the mark was checked. If the system was reading greater than 0.2 m different to the mark the system was re calibrated.

c. USBL Quality Control - Comparison with the Cable Counter

As a quality control measure between the primary positioning (USBL) and secondary positioning (cable counter) of the Chirp, a comparison was made between the two systems while the Chirp was deployed. The USBL derived position is displayed in the QINSy shell as a node. The cable counter records the number of turns the sheave wheel took in order to calculate cable out. A calibration of this system was completed by measuring the sheave and taking a set distance of cable out. A mark was set for the exact amount of cable out (at 5 m and 10 m). Each time the winch was used to lower and raise the system the mark was checked against the cable out calculation from the cable counter. This data is used by QINSy to estimate to position of the fish towed behind the boat. The position resulting from the cable counter and the position resulting from the primary USBL system were compared as a QC. There was good agreement between the two systems. Below in Figure 32 is an image from QINSy showing a visual comparison between the position of the Chirp as calculated by the cable counter and the USBL as well as a text showing the distance range between the two calculated positions. This quality control comparison was also preformed with the gradiometer.

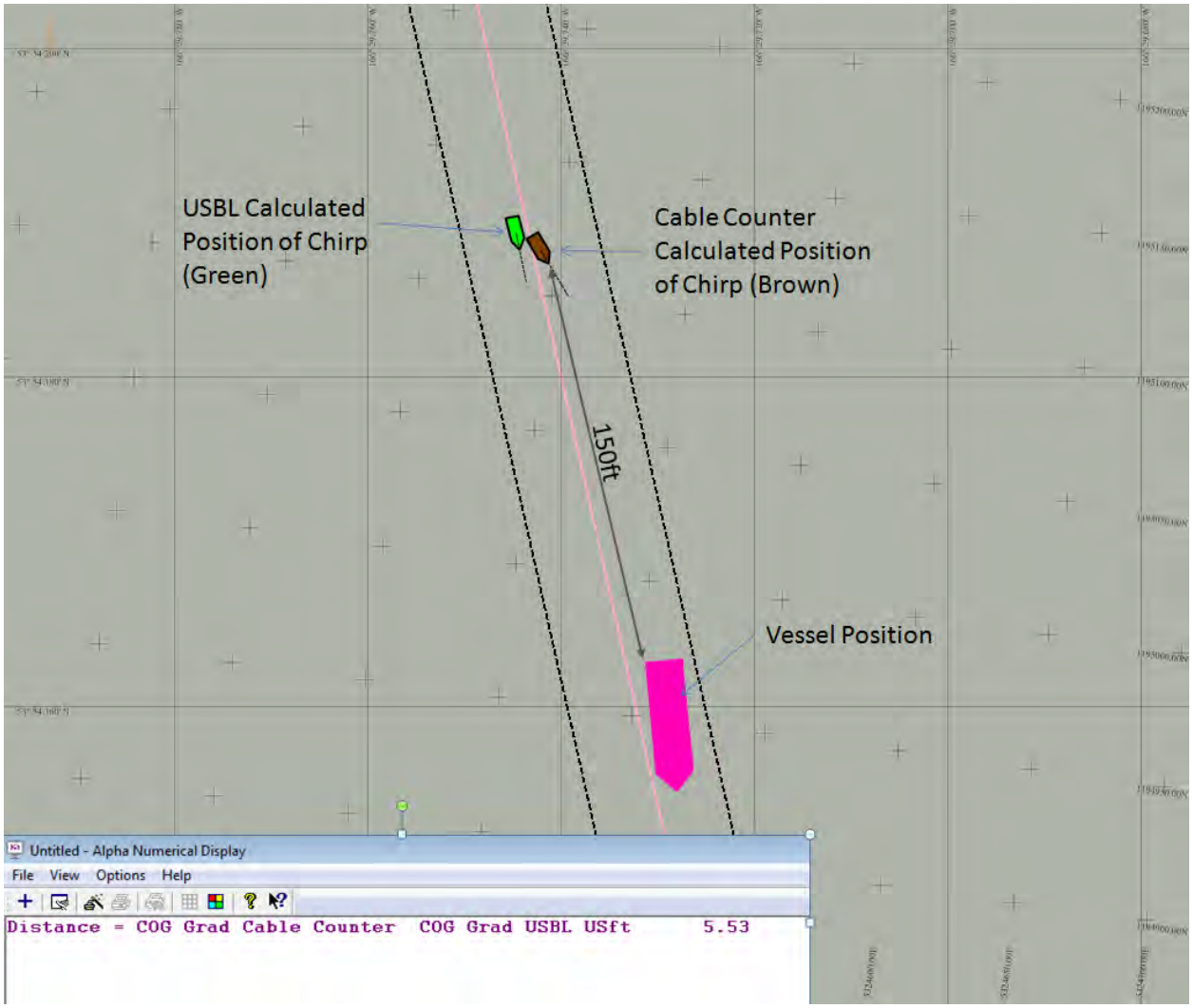


Figure 32 Image from QISNY showing the Chirp system positioned with the USBL (Green) and the Cable Counter (Brown)

8. Chirp Subbottom Profiler

Vessel Miss Alyssa was mobilized for shallow subbottom (up to 30 feet below seabed) stratification and buried object detection acquisition on April 16th through April 24th. The following sections detail the equipment, offsets, and methods used to calibrate the systems used for shallow subbottom acquisition.

a. Reference Points

An Edge Tech 3200/216s Subbottom system was mobilized onto Miss Alyssa. The Chirp system was towed on a cable from a sheave with a block off the stern of the vessel. A USBL beacon was attached to the Chirp System for primary positioning. The IMU, GPS Antennas, and the USBL were mounted on the VOOP with the top center of the IMU chosen as the RP. The cable towing the Chirp was connected to a cable counter for secondary back up positioning. The reference points are shown below in Figure 33.

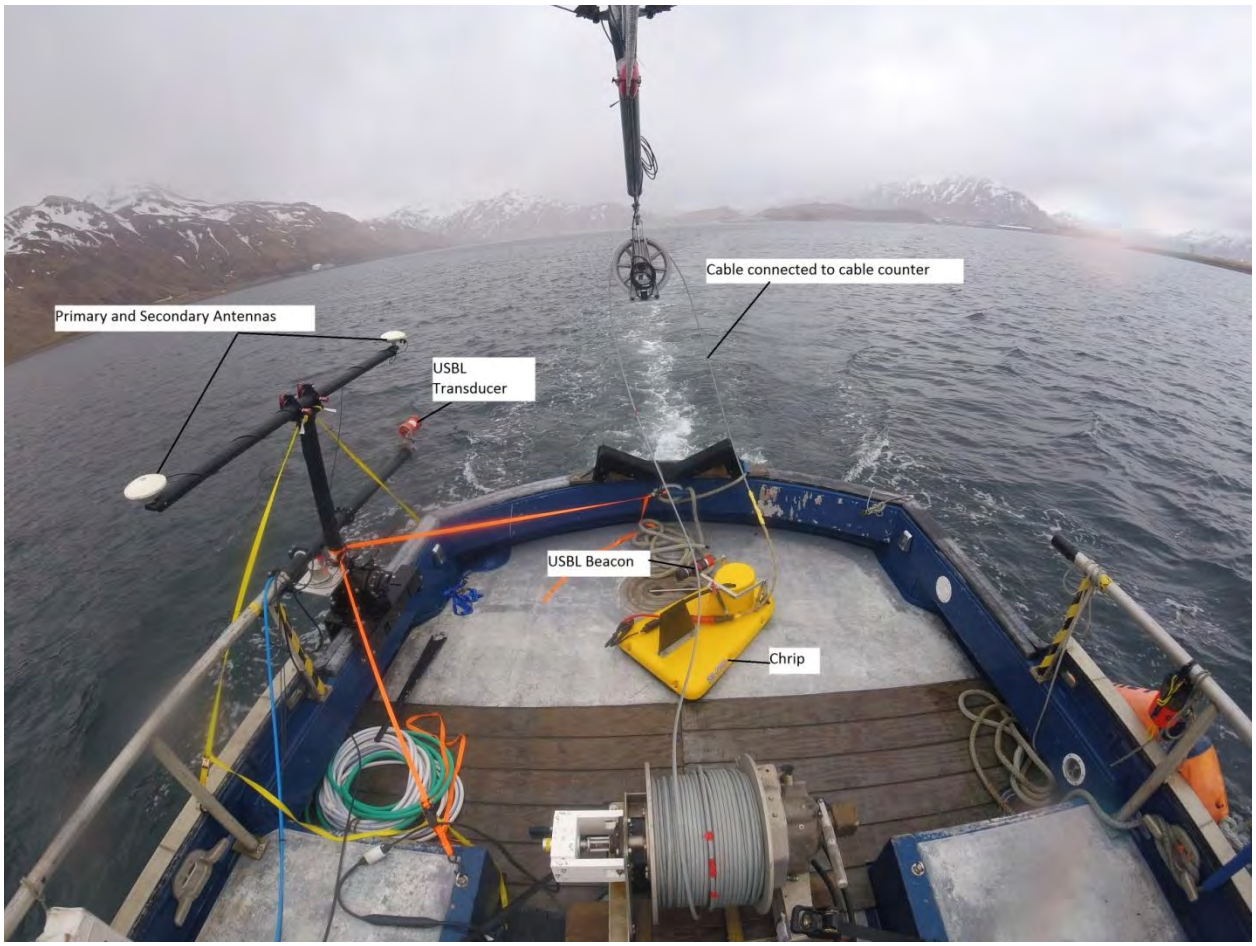


Figure 33 Chirp on deck of Miss Alyssa

The beacon was positioned on the arm of the towing mount of the chirp. The offsets from the beacon to the Chirp acoustic center and thus the reference point were measured. The resulting position of the Chirp reference point was sent to the Chirp data acquisition system. These reference points are shown below in Figure 34.

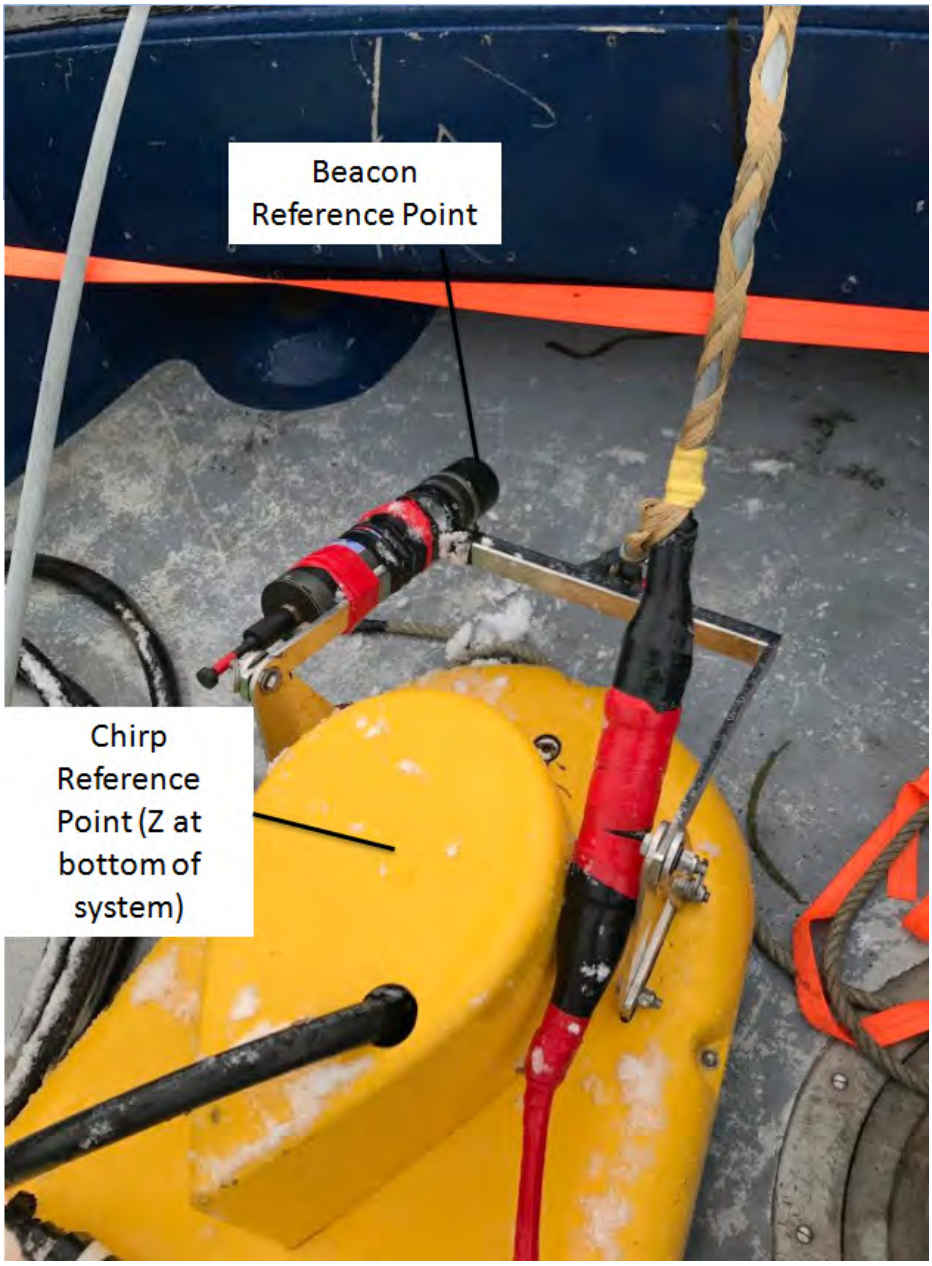


Figure 34 Beacon mounted on the Chirp towing arm. Reference point for both the beacon and Chirp are labeled

The offset from the beacon to the reference point of the Chirp are shown below in Table 10.

Table 10 Offset from Beacon to Chirp Reference Point

Node: BEACON_9	
Object location:	FISH
Node name:	BEACON_9
X (Stbd = Positive)::	0.650 ftUS
Y (Bow = Positive)::	1.100 ftUS
Z (Up = Positive)::	2.200 ftUS
A-priori SD:	0.033 ftUS

b. Settings

The Chirp system was run over a small section of the survey area to determine the optimal settings. The optimal setting for ping rate and penetration was found through testing of settings ranging in frequency and pulse length.

The optimal Frequency Sweep setting of 2-16 kHz WB 10 ms was used consistently throughout the survey. The maximum range was set to 22 m and the top 4 m was blanked. This allowed a consistent ping rate of up to 19.6 Hz and never lower than 18 Hz. At 4 knots there was an average of 3 pings every 1ft which resulted in 3 possible detection points every 1 ft, allowing for the detection of objects 1 ft x 1 ft or greater. The beam width was 17° with this setting and at the towing height of 20 ft gave a footprint of 6ft. The first return would be directly below the system and therefore it is understood that the object would have to be directly below the system to be detected, but objects up to 6 ft away could cause disturbance. The vertical resolution was 0.2 ft at this setting.

c. Quality Control

i. Position

The Chirp system had a primary (USBL) and secondary (cable counter) positioning system which enabled the Chirp system to have three positioning quality control measures, comparison to multibeam grid, bottom tracking comparison, and comparison to cable counter.

Comparison to MBES

As a quality control measure targets were selected on a small feature and compared to the Multibeam sounding grid. Figure 35 shows that the target position of the detected object in the profile is in the same position on the multibeam grid.

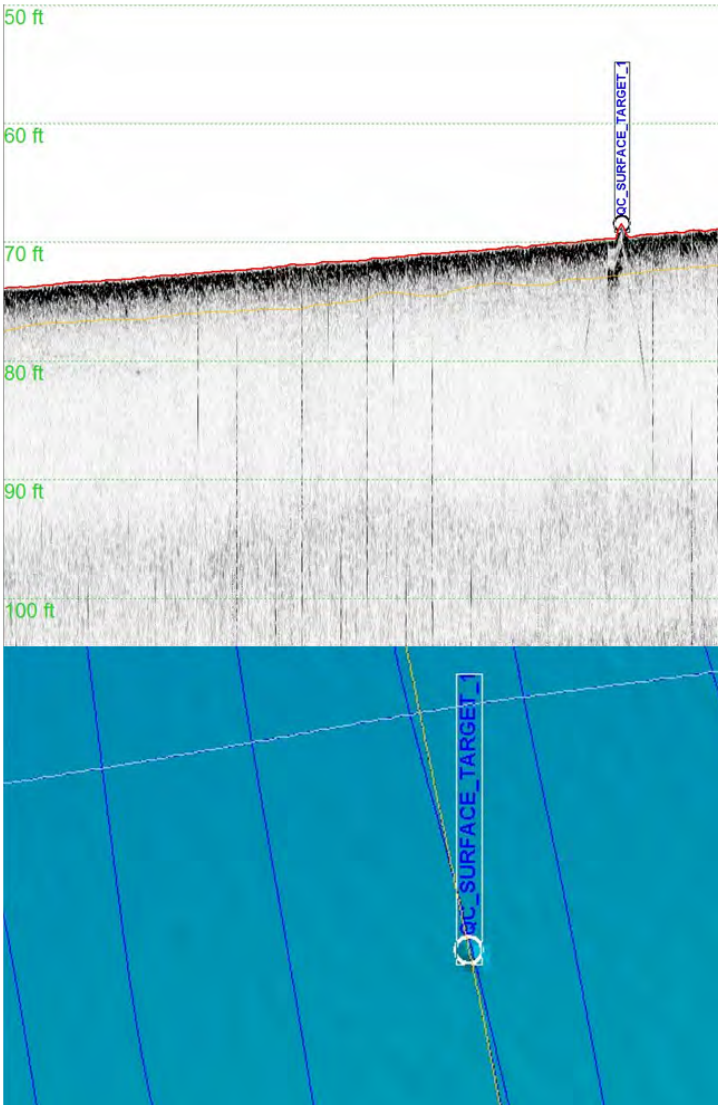


Figure 35 Position of Chirp Target in profile vs. MBES grid

Bottom Tracking

Bottom tracking was completed for all survey lines. As a quality control measure, a point from a bottom tracked line was compared against the multibeam grid. Position and depth were able to be compared by placing the curser on the grid over the point. The agreement with the multibeam demonstrated that the processing regime worked. An example of a point comparison is shown in Figure 36.

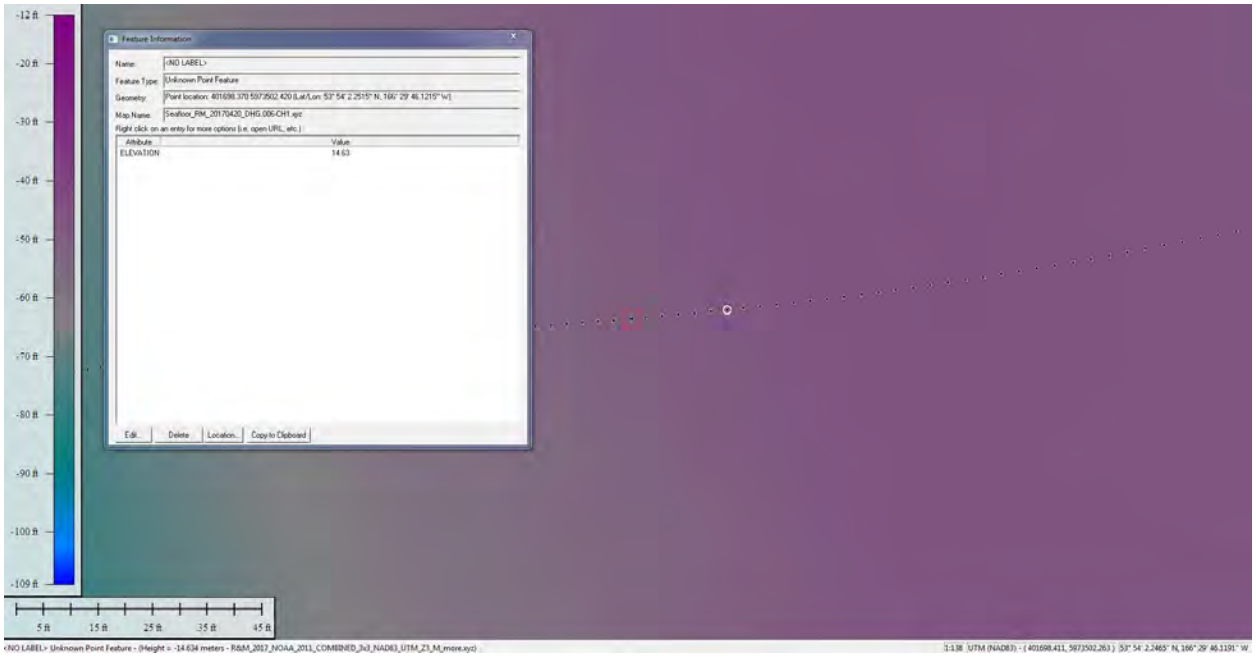


Figure 36 Bottom Tracking QC

9. Gradiometer

Vessel Miss Alyssa was mobilized with a gradiometer for ferrous material detection on April 25th. The following sections detail the equipment, offsets, and methods used to calibrate the systems used.

a. Reference Points

A Geometrics G-882 Transverse Gradient (TVG) system was mobilized onto Miss Alyssa. TVG system was towed on a cable from a sheave with a block off the stern of the vessel. A USBL beacon was attached to the TVG System for primary positioning. The IMU, GPS Antennas, and the USBL were mounted on the VOOP with the top center of the IMU chosen as the RP (see Figure 37 for an image of system and reference points). The cable towing the TVG was connected to a cable counter for secondary positioning.

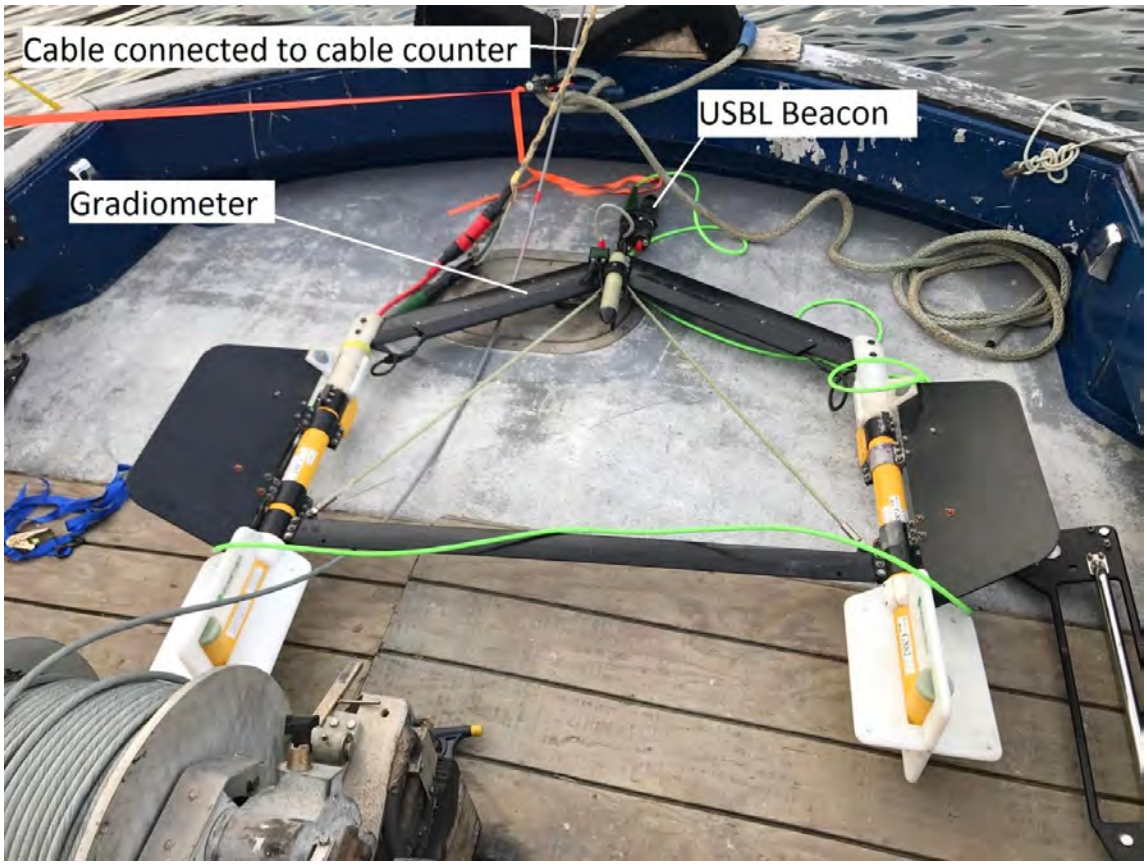


Figure 37 TVG Gradiometer on deck of Miss Alyssa

The reference point for the gradiometer system was selected as the midpoint between the 2 magnetic sensors. The beacon was positioned on the tow clamp at the front of the system (see Figure 39). The offsets to the gradiometer RP from the beacon positioning system were measured. These are shown below in Table 11 and visually in Figure 38. The altimeter and depth sensor offsets were measured from the gradiometer reference point.

Table 11 Offsets of Gradiometer RP from the Beacon

Node: BEACON_9	
Object location:	GRADIOMETER
Node name:	BEACON_9
X (Stbd = Positive)::	0.200 ftUS
Y (Bow = Positive)::	1.250 ftUS
Z (Up = Positive)::	0.000 ftUS
A-priori SD:	0.033 ftUS

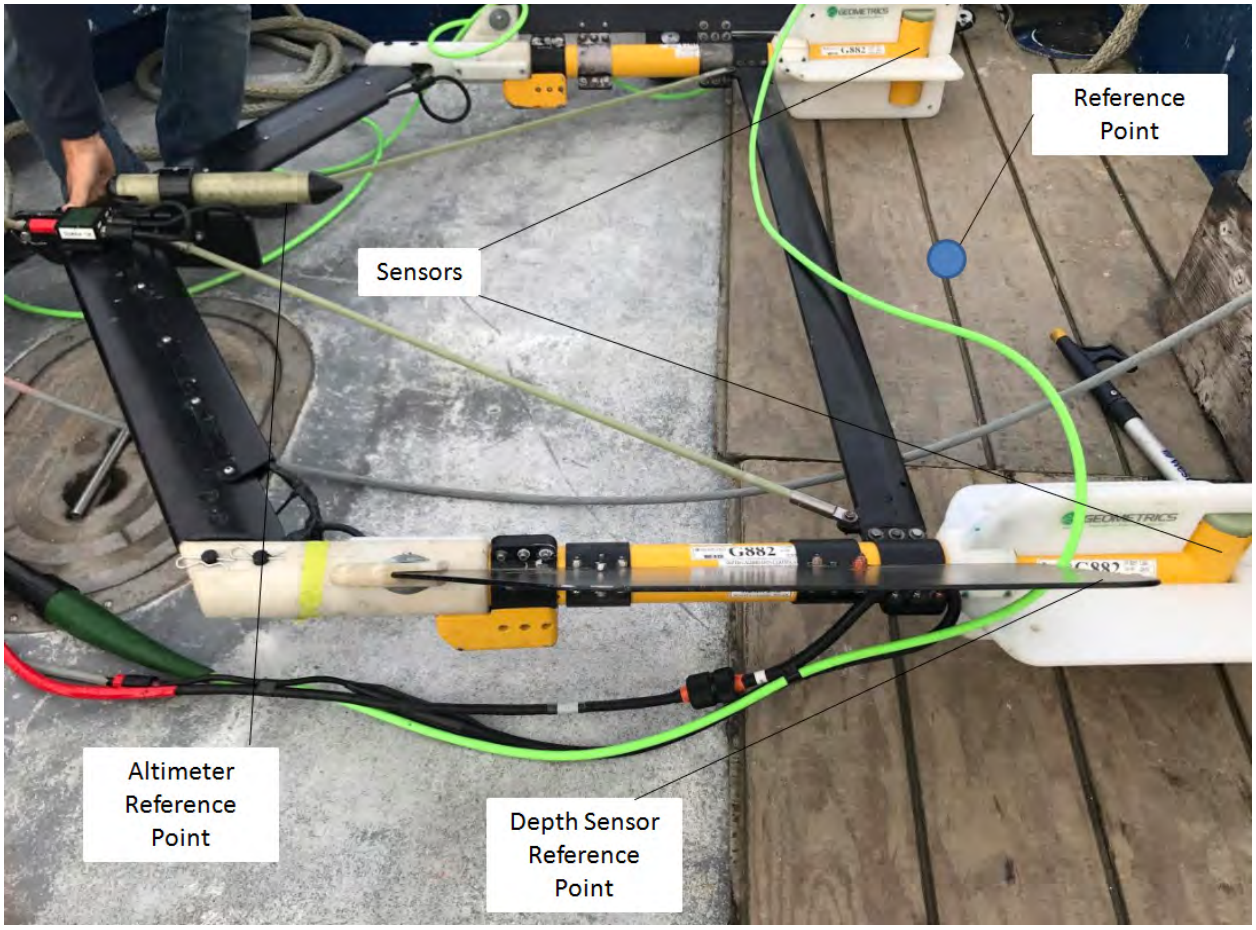


Figure 38 Gradiometer Reference Points

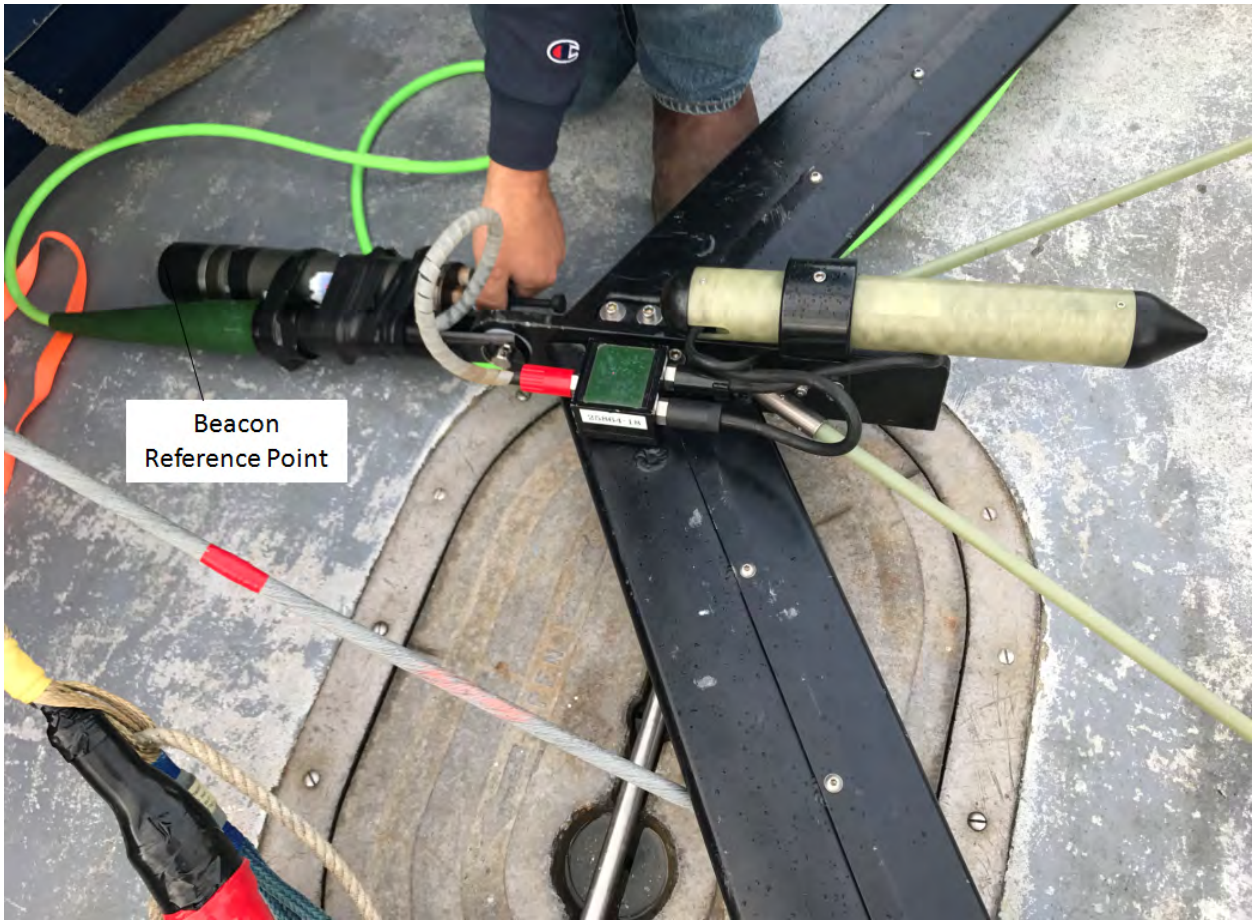


Figure 39 Beacon reference point on the Gradiometer system

i. Depth and Altimeter Sensors

The depth and altimeter sensors used for the positioning of the gradiometer were calibrated in laboratory conditions by the manufacturer. The calibration values were entered into the MagLog software. The values of the depth and altimeter were checked against the depth values from the USBL system.

b. Quality Control

i. Position

The TVG system had a primary (USBL) and secondary (cable counter) positioning system which enabled the TVG system to have two positioning quality control measures, comparison to the multibeam grid and comparison to the cable counter.

Comparison to MBES

As a quality control lines were collected over a known ferrous object (crab pot). Using the Magpick software target locations were selected at the crab pot and were compared to the location in the multibeam sounding grid. This comparison demonstrated that the sensor clearly detected a ferrous object and this could be distinguished from background magnetism. The calibration tests also revealed a level of normalized magnetism. This was recorded and used in processing to determine data that should be considered null. In addition the comparison showed agreement with the position of the object as detected by the gradiometer and the object as detected by the multibeam. A strong return

used to located an object was never more than 15 ft from the position as detected by the multibeam, but was on average less than 5ft in difference. A comparison between the gradiometer data detected position of an object and multibeam detected position of an object is shown below in Figure 40.

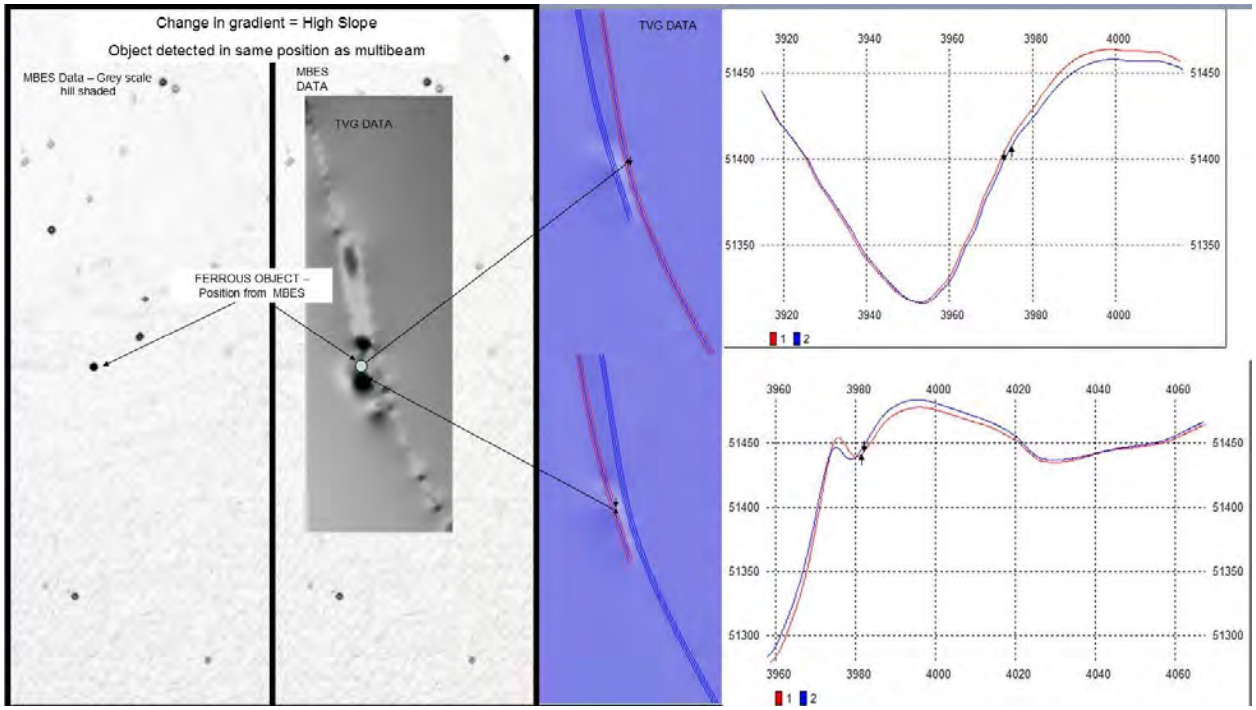


Figure 40 Position of Ferrous Object in Magpick profile and Grid vs. MBES Grid

Appendix B

Horizontal and Vertical Control Supplemental Reports

eTrac Inc
617 S Knik-Goose Bay Rd
Suite C
Wasilla, AK 99654

Phone:
Fax:
www.etracinc.com

Project file data		Coordinate System	
Name:	C:\1 - Project Files\R&M_2017_Dutch Harbor Geophysical\TRIMBLE\TBC \R&M_2017_Dutch Harbor_GNSS \R&M_2017_Dutch Harbor_GNSS.vce	Name:	United States/State Plane 1983
		Datum:	NAD 1983 (Alaska)
		Zone:	Alaska Zone 10 5010
Size:	62 KB	Geoid:	GEOID12B (Alaska)
Modified:	4/14/2017 9:42:57 AM (UTC:-8)	Vertical datum:	NAVD88
Time zone:	Alaskan Standard Time		
Reference number:			
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Baseline Processing Report

Processing Summary

Observation	From	To	Solution Type	H. Prec. (US survey foot)	V. Prec. (US survey foot)	Geodetic Az.	Ellipsoid Dist. (US survey foot)	ΔHeight (US survey foot)
SPIT --- 2620 M (B29)	SPIT	2620 M	Fixed	0.008	0.025	208°07'32"	11690.247	-12.735
SPIT --- 2620 M (B32)	SPIT	2620 M	Fixed	0.008	0.026	208°07'33"	11690.230	-12.766
SPIT --- 2620 M (B31)	SPIT	2620 M	Fixed	0.006	0.023	208°07'33"	11690.225	-12.768
SPIT --- 2620 M (B27)	SPIT	2620 M	Fixed	0.007	0.025	208°07'32"	11690.249	-12.859
2620 M --- TIDAL 19 (B36)	TIDAL 19	2620 M	Fixed	0.017	0.019	305°42'26"	942.836	-5.478
TIDAL 19 --- 2620 M (B30)	TIDAL 19	2620 M	Fixed	0.003	0.004	305°42'23"	942.831	-5.486
2620 M --- TIDAL 19 (B35)	TIDAL 19	2620 M	Fixed	0.002	0.004	305°42'22"	942.829	-5.494
TIDAL 19 --- 2620 M (B33)	TIDAL 19	2620 M	Fixed	0.002	0.003	305°42'23"	942.830	-5.484
TIDAL 19 --- 2620 M (B28)	TIDAL 19	2620 M	Fixed	0.002	0.003	305°42'23"	942.828	-5.480

SPIT --- TIDAL 19 (B37)	SPIT	TIDAL 19	Fixed	0.008	0.028	203°36'11"	11851.797	-7.280
SPIT --- TIDAL 19 (B34)	SPIT	TIDAL 19	Fixed	0.006	0.023	203°36'11"	11851.795	-7.272
SPIT --- TIDAL 19 (B26)	SPIT	TIDAL 19	Fixed	0.006	0.020	203°36'11"	11851.823	-7.346

Acceptance Summary

Processed	Passed	Flag	Fail
12	12	0	0

SPIT - 2620 M (3:42:57 PM-7:03:32 PM) (S29)

Baseline observation:	SPIT --- 2620 M (B29)
Processed:	4/14/2017 10:25:41 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.008 ft
Vertical precision:	0.025 ft
RMS:	0.041 ft
Maximum PDOP:	1.477
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/11/2017 3:42:57 PM (Local: UTC-8hr)
Processing stop time:	4/11/2017 7:03:32 PM (Local: UTC-8hr)
Processing duration:	03:20:35
Processing interval:	5 seconds

SPIT - 2620 M (1:38:02 PM-5:43:12 PM) (S32)

Baseline observation:	SPIT --- 2620 M (B32)
Processed:	4/14/2017 10:25:30 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.008 ft
Vertical precision:	0.026 ft
RMS:	0.026 ft
Maximum PDOP:	1.497
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/13/2017 1:38:02 PM (Local: UTC-8hr)
Processing stop time:	4/13/2017 5:43:12 PM (Local: UTC-8hr)
Processing duration:	04:05:10
Processing interval:	5 seconds

SPIT - 2620 M (8:55:27 AM-1:36:17 PM) (S31)

Baseline observation:	SPIT --- 2620 M (B31)
Processed:	4/14/2017 10:25:15 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.006 ft
Vertical precision:	0.023 ft
RMS:	0.019 ft
Maximum PDOP:	1.599
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/13/2017 8:55:27 AM (Local: UTC-8hr)
Processing stop time:	4/13/2017 1:36:17 PM (Local: UTC-8hr)
Processing duration:	04:40:50
Processing interval:	5 seconds

SPIT - 2620 M (10:52:42 AM-3:40:57 PM) (S27)

Baseline observation:	SPIT --- 2620 M (B27)
Processed:	4/14/2017 10:24:59 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.007 ft
Vertical precision:	0.025 ft
RMS:	0.076 ft
Maximum PDOP:	1.566
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/11/2017 10:52:42 AM (Local: UTC-8hr)
Processing stop time:	4/11/2017 3:40:57 PM (Local: UTC-8hr)
Processing duration:	04:48:15
Processing interval:	5 seconds

2620 M - TIDAL 19 (1:34:37 PM-1:36:17 PM) (S36)

Baseline observation:	2620 M --- TIDAL 19 (B36)
Processed:	4/14/2017 10:24:42 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.017 ft
Vertical precision:	0.019 ft
RMS:	0.016 ft
Maximum PDOP:	1.308
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/13/2017 1:34:37 PM (Local: UTC-8hr)
Processing stop time:	4/13/2017 1:36:17 PM (Local: UTC-8hr)
Processing duration:	00:01:40
Processing interval:	5 seconds

TIDAL 19 - 2620 M (3:42:57 PM-6:21:17 PM) (S30)

Baseline observation:	TIDAL 19 --- 2620 M (B30)
Processed:	4/14/2017 10:24:41 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.003 ft
Vertical precision:	0.004 ft
RMS:	0.025 ft
Maximum PDOP:	1.530
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/11/2017 3:42:57 PM (Local: UTC-8hr)
Processing stop time:	4/11/2017 6:21:17 PM (Local: UTC-8hr)
Processing duration:	02:38:20
Processing interval:	5 seconds

2620 M - TIDAL 19 (1:38:02 PM-5:09:02 PM) (S35)

Baseline observation:	2620 M --- TIDAL 19 (B35)
Processed:	4/14/2017 10:24:31 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.002 ft
Vertical precision:	0.004 ft
RMS:	0.017 ft
Maximum PDOP:	1.609
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/13/2017 1:38:02 PM (Local: UTC-8hr)
Processing stop time:	4/13/2017 5:09:02 PM (Local: UTC-8hr)
Processing duration:	03:31:00
Processing interval:	5 seconds

TIDAL 19 - 2620 M (8:55:27 AM-1:32:22 PM) (S33)

Baseline observation:	TIDAL 19 --- 2620 M (B33)
Processed:	4/14/2017 10:24:19 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.002 ft
Vertical precision:	0.003 ft
RMS:	0.018 ft
Maximum PDOP:	1.601
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/13/2017 8:55:27 AM (Local: UTC-8hr)
Processing stop time:	4/13/2017 1:32:22 PM (Local: UTC-8hr)
Processing duration:	04:36:55
Processing interval:	5 seconds

TIDAL 19 - 2620 M (10:29:02 AM-3:40:57 PM) (S28)

Baseline observation:	TIDAL 19 --- 2620 M (B28)
Processed:	4/14/2017 10:24:06 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.002 ft
Vertical precision:	0.003 ft
RMS:	0.017 ft
Maximum PDOP:	1.600
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/11/2017 10:29:02 AM (Local: UTC-8hr)
Processing stop time:	4/11/2017 3:40:57 PM (Local: UTC-8hr)
Processing duration:	05:11:55
Processing interval:	5 seconds

SPIT - TIDAL 19 (1:34:37 PM-5:09:02 PM) (S37)

Baseline observation:	SPIT --- TIDAL 19 (B37)
Processed:	4/14/2017 10:23:50 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.008 ft
Vertical precision:	0.028 ft
RMS:	0.025 ft
Maximum PDOP:	1.614
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/13/2017 1:34:37 PM (Local: UTC-8hr)
Processing stop time:	4/13/2017 5:09:02 PM (Local: UTC-8hr)
Processing duration:	03:34:25
Processing interval:	5 seconds

SPIT - TIDAL 19 (8:44:57 AM-1:32:22 PM) (S34)

Baseline observation:	SPIT --- TIDAL 19 (B34)
Processed:	4/14/2017 10:23:38 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.006 ft
Vertical precision:	0.023 ft
RMS:	0.016 ft
Maximum PDOP:	1.601
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/13/2017 8:44:57 AM (Local: UTC-8hr)
Processing stop time:	4/13/2017 1:32:22 PM (Local: UTC-8hr)
Processing duration:	04:47:25
Processing interval:	5 seconds

SPIT - TIDAL 19 (10:52:42 AM-6:21:17 PM) (S26)

Baseline observation:	SPIT --- TIDAL 19 (B26)
Processed:	4/14/2017 10:23:24 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.006 ft
Vertical precision:	0.020 ft
RMS:	0.066 ft
Maximum PDOP:	1.600
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	4/11/2017 10:52:42 AM (Local: UTC-8hr)
Processing stop time:	4/11/2017 6:21:17 PM (Local: UTC-8hr)
Processing duration:	07:28:35
Processing interval:	5 seconds

4/14/2017 10:43:41 AM	C:\1 - Project Files\R&M_2017_Dutch Harbor Geophysical\TRIMBLE\TBC\R&M_2017_Dutch Harbor_GNSS\R&M_2017_Dutch Harbor_GNSS.vce	Trimble Business Center

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Project File Data		**Coordinate System**	
Name:	X:\Project Files\R&M_2017_Dutch Harbor Geophysical\TRIMBLE\TBC\R&M_2017_Dutch Harbor_GNSS\R&M_2017_Dutch Harbor_GNSS.vce	Name:	United States/State Plane 1983
Size:	68 KB	Datum:	NAD 1983 (Alaska)
Modified:	4/14/2017 11:57:05 AM (UTC:-8)	Zone:	Alaska Zone 10 5010
Time zone:	Alaskan Standard Time	Geoid:	GEOID12B (Alaska)
Reference number:		Vertical datum:	NAVD88
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.005 ft

Centering Error: 0.010 ft

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 ft

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 ft

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment:	2
Network Reference Factor:	1.00
Chi Square Test (95%):	Passed
Precision Confidence Level:	95%
Degrees of Freedom:	30

Post Processed Vector Statistics

Reference Factor:	1.00
Redundancy Number:	30.00
A Priori Scalar:	1.56

Control Coordinate Comparisons

Values shown are control coordinates minus adjusted coordinates.

Point ID	ΔEasting (US survey foot)	ΔNorthing (US survey foot)	ΔElevation (US survey foot)	ΔHeight (US survey foot)
2620 M	0.004	-0.020	?	0.074
SPIT	-0.032	-0.048	?	-0.011

Control Point Constraints

Point ID	Type	East σ (US survey foot)	North σ (US survey foot)	Height σ (US survey foot)	Elevation σ (US survey foot)
TIDAL 19	Global	Fixed	Fixed	Fixed	
Fixed = 0.000003(US survey foot)					

Adjusted Grid Coordinates

Point ID	Easting (US survey foot)	Easting Error (US survey foot)	Northing (US survey foot)	Northing Error (US survey foot)	Elevation (US survey foot)	Elevation Error (US survey foot)	Constraint
2620 M	5317058.521	0.017	1184130.014	0.017	11.214	0.010	

SPIT	5321164.719	0.019	1195075.589	0.019	24.214	0.017	
TIDAL 19	5317889.747	?	1183685.028	?	16.673	?	LLh

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (US survey foot)	Height Error (US survey foot)	Constraint
2620 M	N53°52'33.47540"	W166°32'10.81990"	64.421	0.010	
SPIT	N53°54'15.12451"	W166°30'38.87940"	77.206	0.017	
TIDAL 19	N53°52'28.05077"	W166°31'58.04711"	69.905	?	LLh

Adjusted ECEF Coordinates

Point ID	X (US survey foot)	X Error (US survey foot)	Y (US survey foot)	Y Error (US survey foot)	Z (US survey foot)	Z Error (US survey foot)	3D Error (US survey foot)	Constraint
2620 M	-12023673.935	0.015	-2878564.602	0.017	16826189.845	0.013	0.026	
SPIT	-12014296.778	0.019	-2881982.436	0.019	16832276.717	0.018	0.032	
TIDAL 19	-12023931.037	?	-2879413.415	?	16825869.879	?	?	LLh

Error Ellipse Components

Point ID	Semi-major axis (US survey foot)	Semi-minor axis (US survey foot)	Azimuth
2620 M	0.021	0.021	174°
SPIT	0.024	0.024	177°

Adjusted GNSS Observations

Observation ID		Observation	A-posteriori Error	Residual	Standardized Residual
SPIT --> 2620 M (PV27)	**Az.**	208°07'33"	0.318 sec	0.276 sec	0.767
	ΔHt.	-12.785 ft	0.017 ft	0.074 ft	3.511
	Ellip Dist.	11690.235 ft	0.018 ft	-0.014 ft	-0.680
SPIT --> TIDAL 19 (PV26)	**Az.**	203°36'11"	0.333 sec	0.202 sec	0.581
	ΔHt.	-7.301 ft	0.017 ft	0.045 ft	2.663
	Ellip Dist.	11851.809 ft	0.019 ft	-0.014 ft	-0.709
SPIT --> 2620 M (PV29)	**Az.**	208°07'33"	0.318 sec	0.198 sec	0.553
	ΔHt.	-12.785 ft	0.017 ft	-0.051 ft	-2.393
	Ellip Dist.	11690.235 ft	0.018 ft	-0.012 ft	-0.589
SPIT --> TIDAL 19 (PV34)	**Az.**	203°36'11"	0.333 sec	-0.099 sec	-0.283
	ΔHt.	-7.301 ft	0.017 ft	-0.029 ft	-1.476
	Ellip Dist.	11851.809 ft	0.019 ft	0.014 ft	0.675
TIDAL 19 --> 2620 M (PV35)	**Az.**	305°42'23"	3.699 sec	0.837 sec	0.189
	ΔHt.	-5.484 ft	0.010 ft	0.009 ft	0.920
	Ellip Dist.	942.829 ft	0.017 ft	0.001 ft	0.027
SPIT --> TIDAL 19 (PV37)	**Az.**	203°36'11"	0.333 sec	-0.184 sec	-0.528
	ΔHt.	-7.301 ft	0.017 ft	-0.021 ft	-0.884
	Ellip Dist.	11851.809 ft	0.019 ft	0.011 ft	0.565
SPIT --> 2620 M (PV32)	**Az.**	208°07'33"	0.318 sec	-0.220 sec	-0.612
	ΔHt.	-12.785 ft	0.017 ft	-0.019 ft	-0.881
	Ellip Dist.	11690.235 ft	0.018 ft	0.005 ft	0.250
SPIT --> 2620 M (PV31)	**Az.**	208°07'33"	0.318 sec	-0.133 sec	-0.372
	ΔHt.	-12.785 ft	0.017 ft	-0.017 ft	-0.876
	Ellip Dist.	11690.235 ft	0.018 ft	0.010 ft	0.492
TIDAL 19 --> 2620 M (PV36)	**Az.**	305°42'23"	3.699 sec	-3.356 sec	-0.693
	ΔHt.	-5.484 ft	0.010 ft	-0.006 ft	-0.339
	Ellip Dist.	942.829 ft	0.017 ft	-0.007 ft	-0.324
TIDAL 19 --> 2620 M (PV28)	**Az.**	305°42'23"	3.699 sec	-0.143 sec	-0.032
	ΔHt.	-5.484 ft	0.010 ft	-0.004 ft	-0.425
	Ellip Dist.	942.829 ft	0.017 ft	0.001 ft	0.046

TIDAL 19 --> 2620 M (PV30)	**Az.**	305°42'23"	3.699 sec	-0.403 sec	-0.091
	ΔHt.	-5.484 ft	0.010 ft	0.001 ft	0.124
	Ellip Dist.	942.829 ft	0.017 ft	-0.002 ft	-0.097
TIDAL 19 --> 2620 M (PV33)	**Az.**	305°42'23"	3.699 sec	0.488 sec	0.110
	ΔHt.	-5.484 ft	0.010 ft	-0.001 ft	-0.056
	Ellip Dist.	942.829 ft	0.017 ft	-0.001 ft	-0.044

Covariance Terms

From Point	To Point		Components	A-posteriori Error	Horiz. Precision (Ratio)	3D Precision (Ratio)
SPIT	2620 M	**Az.**	208°07'33"	0.317 sec	1 : 644832	1 : 645663
		ΔHt.	-12.785 ft	0.017 ft		
		ΔElev.	-13.000 ft	0.017 ft		
		Ellip Dist.	11690.235 ft	0.018 ft		
TIDAL 19	2620 M	**Az.**	305°42'23"	3.700 sec	1 : 56061	1 : 55955
		ΔHt.	-5.484 ft	0.010 ft		
		ΔElev.	-5.459 ft	0.010 ft		
		Ellip Dist.	942.829 ft	0.017 ft		
TIDAL 19	SPIT	**Az.**	23°35'07"	0.332 sec	1 : 616880	1 : 617505
		ΔHt.	7.301 ft	0.017 ft		
		ΔElev.	7.541 ft	0.017 ft		
		Ellip Dist.	11851.809 ft	0.019 ft		

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Project File Data	
Name:	X:\Project Files\R&M_2017_Dutch Harbor Geophysical\TRIMBLE\TBC\R&M_2017_Dutch Harbor_GNSS\R&M_2017_Dutch Harbor_GNSS.vce
Size:	68 KB
Modified:	4/14/2017 11:57:05 AM (UTC:-8)
Time zone:	Alaskan Standard Time
Reference number:	
Description:	
Comment 1:	
Comment 2:	
Comment 3:	

Coordinate System	
Name:	United States/State Plane 1983
Datum:	NAD 1983 (Alaska)
Zone:	Alaska Zone 10 5010
Geoid:	GEOID12B (Alaska)
Vertical datum:	NAVD88

Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.005 ft

Centering Error: 0.010 ft

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 ft

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 ft

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment:	2
Network Reference Factor:	1.00
Chi Square Test (95%):	Passed
Precision Confidence Level:	95%
Degrees of Freedom:	30

Post Processed Vector Statistics

Reference Factor:	1.00
Redundancy Number:	30.00
A Priori Scalar:	1.56

Control Coordinate Comparisons

Values shown are control coordinates minus adjusted coordinates.

Point ID	ΔEasting (US survey foot)	ΔNorthing (US survey foot)	ΔElevation (US survey foot)	ΔHeight (US survey foot)
2620 M	?	?	?	0.074
SPIT	0.198	0.048	?	-0.011

Control Point Constraints

Point ID	Type	East σ (US survey foot)	North σ (US survey foot)	Height σ (US survey foot)	Elevation σ (US survey foot)
2620 M	Global	Fixed	Fixed		
TIDAL 19	Global	Fixed	Fixed	Fixed	
Fixed = 0.000003(US survey foot)					

Adjusted Grid Coordinates

Point ID	Easting (US survey foot)	Easting Error (US survey foot)	Northing (US survey foot)	Northing Error (US survey foot)	Elevation (US survey foot)	Elevation Error (US survey foot)	Constraint
2620	5317058.524	?	1184129.994	?	11.214	0.010	LL

M							
SPIT	5321164.488	0.212	1195075.494	0.210	24.214	0.017	
TIDAL 19	5317889.747	?	1183685.028	?	16.673	?	LLh

Adjusted Geodetic Coordinates

Point ID	Latitude	Longitude	Height (US survey foot)	Height Error (US survey foot)	Constraint
2620 M	N53°52'33.47520"	W166°32'10.81988"	64.421	0.010	LL
SPIT	N53°54'15.12388"	W166°30'38.88343"	77.206	0.017	
TIDAL 19	N53°52'28.05077"	W166°31'58.04711"	69.905	?	LLh

Adjusted ECEF Coordinates

Point ID	X (US survey foot)	X Error (US survey foot)	Y (US survey foot)	Y Error (US survey foot)	Z (US survey foot)	Z Error (US survey foot)	3D Error (US survey foot)	Constraint
2620 M	-12023673.951	?	-2878564.607	?	16826189.834	?	?	LL
SPIT	-12014296.884	0.173	-2881982.214	0.209	16832276.679	0.125	0.299	
TIDAL 19	-12023931.037	?	-2879413.415	?	16825869.879	?	?	LLh

Error Ellipse Components

Point ID	Semi-major axis (US survey foot)	Semi-minor axis (US survey foot)	Azimuth
SPIT	0.265	0.262	70°

Adjusted GNSS Observations

Transformation Parameters

Azimuth Rotation: 3.402 sec **(95%)** 3.699 sec

Scale Factor: 0.99998687 **(95%)** 0.00001791

Observation ID		Observation	A-posteriori Error	Residual	Standardized Residual
SPIT --> 2620 M (PV27)	**Az.**	208°07'33"	0.318 sec	0.276 sec	0.767
	ΔHt.	-12.785 ft	0.017 ft	0.074 ft	3.511
	Ellip Dist.	11690.235 ft	0.018 ft	-0.014 ft	-0.680
SPIT --> TIDAL 19 (PV26)	**Az.**	203°36'11"	0.333 sec	0.202 sec	0.581
	ΔHt.	-7.301 ft	0.017 ft	0.045 ft	2.663
	Ellip Dist.	11851.809 ft	0.019 ft	-0.014 ft	-0.709
SPIT --> 2620 M (PV29)	**Az.**	208°07'33"	0.318 sec	0.198 sec	0.553
	ΔHt.	-12.785 ft	0.017 ft	-0.051 ft	-2.393
	Ellip Dist.	11690.235 ft	0.018 ft	-0.012 ft	-0.589
SPIT --> TIDAL 19 (PV34)	**Az.**	203°36'11"	0.333 sec	-0.099 sec	-0.283
	ΔHt.	-7.301 ft	0.017 ft	-0.029 ft	-1.476
	Ellip Dist.	11851.809 ft	0.019 ft	0.014 ft	0.675
TIDAL 19 --> 2620 M (PV35)	**Az.**	305°42'23"	3.699 sec	0.837 sec	0.189
	ΔHt.	-5.484 ft	0.010 ft	0.009 ft	0.920
	Ellip Dist.	942.829 ft	0.017 ft	0.001 ft	0.027
SPIT --> TIDAL 19 (PV37)	**Az.**	203°36'11"	0.333 sec	-0.184 sec	-0.528
	ΔHt.	-7.301 ft	0.017 ft	-0.021 ft	-0.884
	Ellip Dist.	11851.809 ft	0.019 ft	0.011 ft	0.565
SPIT --> 2620 M (PV32)	**Az.**	208°07'33"	0.318 sec	-0.220 sec	-0.612
	ΔHt.	-12.785 ft	0.017 ft	-0.019 ft	-0.881
	Ellip Dist.	11690.235 ft	0.018 ft	0.005 ft	0.250
SPIT --> 2620 M (PV31)	**Az.**	208°07'33"	0.318 sec	-0.133 sec	-0.372
	ΔHt.	-12.785 ft	0.017 ft	-0.017 ft	-0.876
	Ellip Dist.	11690.235 ft	0.018 ft	0.010 ft	0.492
TIDAL 19 --> 2620 M (PV36)	**Az.**	305°42'23"	3.699 sec	-3.356 sec	-0.693
	ΔHt.	-5.484 ft	0.010 ft	-0.006 ft	-0.339
		17 of 25			

	Ellip Dist.	942.829 ft	0.017 ft	-0.007 ft	-0.324
TIDAL 19 --> 2620 M (PV28)	**Az.**	305°42'23"	3.699 sec	-0.143 sec	-0.032
	ΔHt.	-5.484 ft	0.010 ft	-0.004 ft	-0.425
	Ellip Dist.	942.829 ft	0.017 ft	0.001 ft	0.046
TIDAL 19 --> 2620 M (PV30)	**Az.**	305°42'23"	3.699 sec	-0.403 sec	-0.091
	ΔHt.	-5.484 ft	0.010 ft	0.001 ft	0.124
	Ellip Dist.	942.829 ft	0.017 ft	-0.002 ft	-0.097
TIDAL 19 --> 2620 M (PV33)	**Az.**	305°42'23"	3.699 sec	0.488 sec	0.110
	ΔHt.	-5.484 ft	0.010 ft	-0.001 ft	-0.056
	Ellip Dist.	942.829 ft	0.017 ft	-0.001 ft	-0.044

Covariance Terms

From Point	To Point		Components	A-posteriori Error	Horiz. Precision (Ratio)	3D Precision (Ratio)
SPIT	2620 M	**Az.**	208°07'29"	3.723 sec	1 : 55492	1 : 55412
		ΔHt.	-12.785 ft	0.017 ft		
		ΔElev.	-13.000 ft	0.017 ft		
		Ellip Dist.	11690.082 ft	0.211 ft		
TIDAL 19	2620 M	**Az.**	305°42'20"	0.000 sec	1 : 0	1 : 15847832
		ΔHt.	-5.484 ft	0.010 ft		
		ΔElev.	-5.459 ft	0.010 ft		
		Ellip Dist.	942.817 ft	0.000 ft		
TIDAL 19	SPIT	**Az.**	23°35'04"	3.678 sec	1 : 56303	1 : 56220
		ΔHt.	7.301 ft	0.017 ft		
		ΔElev.	7.541 ft	0.017 ft		
		Ellip Dist.	11851.653 ft	0.210 ft		

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Project File Data		Coordinate System	
Name:	C:\1 - Project Files\R&M_2017_Dutch Harbor Geophysical\TRIMBLE\TBC\R&M_2017_Dutch Harbor_GNSS\R&M_2017_Dutch Harbor_GNSS.vce	Name:	United States/State Plane 1983
Size:	62 KB	Datum:	NAD 1983 (Alaska)
Modified:	4/14/2017 9:42:57 AM (UTC:-8)	Zone:	Alaska Zone 10 5010
Time zone:	Alaskan Standard Time	Geoid:	GEOID12B (Alaska)
Reference number:		Vertical datum:	NAVD88
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

GNSS Loop Closure Results

Summary

Legs in loop: 3
Number of Loops: 60
Number Passed: 60
Number Failed: 0

	Length (US survey foot)	Δ3D (US survey foot)	ΔHoriz (US survey foot)	ΔVert (US survey foot)	PPM
Pass/Fail Criteria					50
Best		0.003	0.001	0.000	0.119
Worst		0.120	0.052	-0.109	4.913
Average Loop	24484.983	0.051	0.021	0.044	2.095
Standard Error	0.017	0.063	0.026	0.057	1.480

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Wasilla, AK 99654

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Project File Data		Coordinate System	
Name:		Name:	United States/State Plane 1983
Size:		Datum:	NAD 1983 (Alaska)
Modified:	4/10/2017 6:06:34 PM (UTC:-8)	Zone:	Alaska Zone 1 5001
Time zone:	Alaskan Standard Time	Geoid:	GEOID12B (Alaska)
Reference number:		Vertical datum:	NAVD88
Description:			
Comment 1:			
Comment 2:			
Comment 3:			

Level Report

Imported file: DUTCH GEO 2017.GSI

Instrument:
Creation option: Level coordinates
Description usage: Ignored

Run - 0002 Raw Observations

Standard error per kilometer of double leveling: 0.00230 ft
Standard error per turn/station setup: 0.00000 ft
Raw Misclosure: 0.00630 ft
Σ BS Distances: 1600.946 ft
Σ FS Distances: 1555.798 ft
Run Length: 3156.744 ft
Reduction: Adjusted Values

Create	Point ID	BS	HI	IS	FS	Δ Elevation	Raw Elevation	Correction	Adj. Elevation	Type	Distance	Description
☑	TIDAL 19	☑ 1.91750 ft	18.34450 ft			0.00000 ft	16.427 ft	0.00000 ft	16.427 ft	Benchmark	38.175 ft	
☑	TP1				☑ 6.02770 ft	-4.11020 ft	12.317 ft	-0.00029 ft	12.317 ft	Computed	109.635 ft	
	TP1	☑ 4.34620 ft	16.66300 ft								230.005 ft	
☑	TP2				☑ 5.58000 ft	-1.23380 ft	11.083 ft	-0.00103 ft	11.082 ft	Computed	138.703 ft	
	TP2	☑ 4.24750 ft	15.33050 ft								217.999 ft	
☑	TP3				☑ 4.95700 ft	-0.70950 ft	10.374 ft	-0.00196 ft	10.372 ft	Computed	246.503 ft	
	TP3	☑ 4.62910	15.00260								45.865 ft	

		ft	ft									
☑	2620 M				☑ 4.03520 ft	0.59390 ft	10.967 ft	-0.00210 ft	10.965 ft	Computed	26.824 ft	
	2620 M	☑ 4.03460 ft	15.00200 ft								26.874 ft	
☑	TP4				☑ 4.81470 ft	-0.78010 ft	10.187 ft	-0.00223 ft	10.185 ft	Computed	39.075 ft	
	TP4	☑ 4.38750 ft	14.57480 ft								210.407 ft	
☑	TP5				☑ 4.19950 ft	0.18800 ft	10.375 ft	-0.00300 ft	10.372 ft	Computed	174.601 ft	
	TP5	☑ 4.75620 ft	15.13150 ft								23.941 ft	
☑	2620 P				☑ 3.41030 ft	1.34590 ft	11.721 ft	-0.00320 ft	11.718 ft	Computed	73.734 ft	
	2620 P	☑ 3.41050 ft	15.13170 ft								73.738 ft	
☑	TP6				☑ 5.15010 ft	-1.73960 ft	9.982 ft	-0.00347 ft	9.978 ft	Computed	62.879 ft	
	TP6	☑ 4.94330 ft	14.92490 ft								244.903 ft	
☑	TP7				☑ 4.62130 ft	0.32200 ft	10.304 ft	-0.00443 ft	10.299 ft	Computed	233.714 ft	
	TP7	☑ 5.25240 ft	15.55600 ft								241.699 ft	
☑	TP8				☑ 3.71440 ft	1.53800 ft	11.842 ft	-0.00540 ft	11.836 ft	Computed	248.030 ft	
	TP8	☑ 4.60040 ft	16.44200 ft								147.077 ft	
☑	TP9				☑ 3.89230 ft	0.70810 ft	12.550 ft	-0.00598 ft	12.544 ft	Computed	141.518 ft	
	TP9	☑ 5.84790 ft	18.39760 ft								100.264 ft	
	TIDAL 19				☑ 1.96430 ft	3.88360 ft	16.433 ft	-0.00630 ft	16.427 ft	Benchmark	60.584 ft	

Run - 0002 (N7) Reduced Coordinates

Point ID	Status	Elevation
TIDAL 19	Enabled	16.42700 ft
TP1	Enabled	12.31651 ft
TP2	Enabled	11.08197 ft
TP3	Enabled	10.37154 ft
2620 M	Enabled	10.96530 ft
TP4	Enabled	10.18507 ft
TP5	Enabled	10.37230 ft
2620 P	Enabled	11.71800 ft
TP6	Enabled	9.97813 ft
TP7	Enabled	10.29917 ft
TP8	Enabled	11.83620 ft
TP9	Enabled	12.54372 ft

Run - 0003 Raw Observations

Standard error per kilometer of double leveling:	0.00230 ft
Standard error per turn/station setup:	0.00000 ft
Raw Misclosure:	0.00000 ft
Σ BS Distances:	428.757 ft
Σ FS Distances:	452.191 ft
Run Length:	880.948 ft
Reduction:	Adjusted Values

Create	Point ID	BS	HI	IS	FS	Δ Elevation	Raw Elevation	Correction	Adj. Elevation	Type	Distance	Description
☑	TIDAL 19	☑ 2.03330 ft	18.46030 ft			0.00000 ft	16.427 ft	0.00000 ft	16.427 ft	Benchmark	59.924 ft	
☑	TP10				☑ 5.06470 ft	-3.03140 ft	13.396 ft	0.00000 ft	13.396 ft	Computed	62.186 ft	
	TP10	☑ 5.35900 ft	18.75460 ft								124.177 ft	
☑	TP11				☑ 4.46900 ft	0.89000 ft	14.286 ft	0.00000 ft	14.286 ft	Computed	121.154 ft	
	TP11	☑ 5.40040 ft	19.68600 ft								37.242 ft	
☑	TIDAL 16				☑ 1.32060 ft	4.07980 ft	18.365 ft	0.00000 ft	18.365 ft	Computed	34.167 ft	
	TIDAL 16	☑ 1.32020 ft	19.68560 ft								34.173 ft	
☑	TP12				☑ 5.40870 ft	-4.08850 ft	14.277 ft	0.00000 ft	14.277 ft	Computed	37.130 ft	
	TP12	☑ 4.36380 ft	18.64070 ft								118.083 ft	
☑	TP13				☑ 5.11980 ft	-0.75600 ft	13.521 ft	0.00000 ft	13.521 ft	Computed	116.529 ft	
	TP13	☑ 5.05830 ft	18.57920 ft								55.159 ft	
	TIDAL 19				☑ 2.15220 ft	2.90610 ft	16.427 ft	0.00000 ft	16.427 ft	Benchmark	81.025 ft	

Run - 0003 (N8) Reduced Coordinates

Point ID	Status	Elevation
TP10	Enabled	13.39560 ft
TP11	Enabled	14.28560 ft
TIDAL 16	Enabled	18.36540 ft
TP12	Enabled	14.27690 ft
TP13	Enabled	13.52090 ft

Shared Solution

PID:	BBBB51
Designation:	946 2620 TIDAL 19
Stamping:	NO 19 1975
Stability:	May hold, commonly subject to ground movement
Setting:	Mat foundation or concrete slab other than pavement
Mark Condition:	G
Description:	
Observed:	2017-04-11T18:08:00Z See Also 2016-06-14
Source:	OPUS - page5 1209.04

Close-up View

REF_FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID12B)	UNITS: m	SET PROFILE	DETAILS

LAT:	53° 52' 28.05077"	± 0.020 m
LON:	-166° 31' 58.04711"	± 0.018 m
ELL HT:	21.307	± 0.013 m
X:	-3664901.510	± 0.024 m
Y:	-877646.964	± 0.016 m
Z:	5128535.396	± 0.014 m
ORTHO HT:	5.083	± 0.022 m

	UTM 3	SPC 5010(AK10)
NORTHING:	5970642.885m	360787.918m
EASTING:	399227.853m	1620896.037m
CONVERGENCE:	-1.23818018°	7.54463093°
POINT SCALE:	0.99972461	1.00001286
COMBINED FACTOR:	0.99972127	1.00000952

CONTRIBUTED BY

greg

eTrac Inc.

Horizon View

The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Shared Solution

PID:	BBFP54
Designation:	946 2620 M
Stamping:	2620 M 1992
Stability:	Most reliable; expected to hold position well
Setting:	Set into or on top of metal pipe driven into ground
Description:	The bench mark is set between 7th and 8th 4" x 4" vertical fence supports from the northern-most harbor side corner of the wood picket fence that surrounds the Russian Orthodox Church -- the Church of the Holy Ascension, 34.70 m (113.8 ft) NE of the northern-most corner of the church, 5.50 m (18.0 ft) SW of the centerline of the road that fronts the harbor, and 0.80 m (2.6 ft) east of the north corner of the wood picket fence with an attached witness post located inside the church property.
Observed:	2017-04-11T18:29:00Z
Source:	OPUS - page5 1209.04

Close-up View

REF_FRAME:	EPOCH:	SOURCE:	UNITS:	SET	
NAD_83(2011)	2010.0000	NAVD88 (Computed using GEOID12B)	m	PROFILE	DETAILS

LAT:	53° 52' 33.47520"	± 0.019	m
LON:	-166° 32' 10.81988"	± 0.019	m
ELL HT:	19.658	± 0.018	m
X:	-3664823.163	± 0.023	m
Y:	-877388.250	± 0.015	m
Z:	5128632.937	± 0.016	m
ORTHO HT:	3.441	± 0.032	m

	UTM 3	SPC 5010(AK10)
NORTHING:	5970815.556m	360923.544m
EASTING:	398998.242m	1620642.679m
CONVERGENCE:	-1.24107052°	7.54180345°
POINT SCALE:	0.99972518	1.00001334
COMBINED FACTOR:	0.99972210	1.00001026

CONTRIBUTED BY

greg

eTrac Inc.

Horizon View

The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.

Appendix C

Geodatabase

Surface Unknown Objects with Ferrous Return							
		NAD 83 US State Plane AK Zone 10			Dimensions in USft		
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Max Dimensions (HeightxWidthxLength)	Description	Potential UXO
800001	DHG_2017_UKF_001	1195283.384	5324951.773	69.00	0.7'x5.2'x5.5'	Round Mound (Outer Box)	NO
800002	DHG_2017_UKF_002	1195180.919	5324646.649	67.73	3'x7.2'x7.5'	Irregular shaped objects	YES
800003	DHG_2017_UKF_003	1195868.950	5324753.357	72.65	1'x8'x8'	Mound with some structure. Likely netting or cable	NO
800004	DHG_2017_UKF_004	1195767.379	5324408.551	55.08	5'x4.9'x5.3'	Large sphere feature (Outer Box).	YES
800005	DHG_2017_UKF_005	1195405.909	5324743.219	70.36	1.25'x7.3'x11.5'	Large semi buried object (Outer Box).	YES
800006	DHG_2017_UKF_006	1195404.047	5325247.361	67.55	2'x7.5'x8.5'	Object with straight lines and flat sides (Outer Box).	NO
800007	DHG_2017_UKF_007	1195365.618	5324554.875	70.61	2'x2'x4.5'	Small egg shaped object at base of slope.	YES
800008	DHG_2017_UKF_008	1195276.463	5325252.245	65.43	3'x4.5'x8'	Irregular structure with some linear features and other features that rise up.	NO
800009	DHG_2017_UKF_009	1195167.334	5323888.933	63.34	1.5'x2.5'x3.6'	Irregular object that leaves a shadow and has some flat faces possibly an anchor and chain.	NO
800010	DHG_2017_UKF_010	1194984.774	5323969.268	66.03	4'x5.5'x8'	Large rounded object	YES
800011	DHG_2017_UKF_011	1194907.125	5323956.488	70.96	3'x6'x8'	Object with shadow flat side angled into bottom some straight edges	NO
800012	DHG_2017_UKF_012	1194786.951	5324119.340	60.14	2.5'x5.8'x8.3'	Two straight parallel objects off the bottom with shadows	NO
800013	DHG_2017_UKF_013	1194564.882	5324160.519	80.96	4'x1.8'x4'	Tall structure with few soundings and sounding beneath it.	YES
800014	DHG_2017_UKF_014	1194415.305	5324241.720	79.87	2.5'x5'x7'	Irregular object	YES
800015	DHG_2017_UKF_015	1194157.450	5324928.236	57.92	1.5'x4'x11'	Debris	NO
800016	DHG_2017_UKF_016	1194149.039	5324965.196	58.10	1'x2'x2.5'	Round small object	YES
800017	DHG_2017_UKF_017	1194141.074	5324199.316	84.28	15'x10'x18'	Large Object Possible buoy with chain	NO
800018	DHG_2017_UKF_018	1194878.858	5323835.015	70.09	3'x7.5'x7.5'	3 parallel line structures (Outer Box)	NO
800019	DHG_2017_UKF_019	1193986.100	5324470.330	60.69	0.63'x1.7'x2.3'	Round Feature	YES
800020	DHG_2017_UKF_020	1194364.480	5324382.130	47.73	1'x2.7'x5.7'	Round Feature	YES
800021	DHG_2017_UKF_021	1194428.240	5324821.510	54.96	1.82'x2.8'x8.52'	Round feature with flat angled side	YES
800022	DHG_2017_UKF_022	1194865.120	5324773.130	66.62	0.73'x1.5'x3.3'	Round Feature	YES
800023	DHG_2017_UKF_023	1195007.020	5324619.550	53.28	2.67'x3.7'x13.35'	Round Feature	YES
800024	DHG_2017_UKF_024	1194088.150	5324493.890	49.88	1'x1.8'x3.6'	Small narrow oblong mound	YES
800025	DHG_2017_UKF_025	1194195.650	5324684.620	49.15	0.5'x3.2'x6.7'	Shallow oval shaped mound	YES
800026	DHG_2017_UKF_026	1195231.190	5324382.130	48.92	1'x2'x2.5'	Small square with flat top	NO
800027	DHG_2017_UKF_027	1195307.890	5324591.130	70.26	1'x2.7'x3.6'	Small mound at edge of bar that has large depression around it	NO
800028	DHG_2017_UKF_028	1193840.197	5324263.386	96.28	2.5'x6.3'x6.5'	Square flat top object	NO
800029	DHG_2017_UKF_029	1194229.000	5324898.920	58.90	1.2'x3.8'x7.1'	Rounded object on edge of bar	YES
800030	DHG_2017_UKF_030	1195516.860	5323708.700	42.92	1.2'x3'x3.5'	Oval shaped object (Outer Box)	YES
800031	DHG_2017_UKF_031	1194200.670	5324211.370	97.10	1'x4'x13'	3 egg shaped mounds	YES

See Volume 2 of 2 - Drawings Sheet 5 for location

Surface Unknown Objects Outter Box						
		NAD 83 US State Plane AK Zone 10			Dimensions in USft	
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Max Dimensions (HeightxWidthxLength)	Description
66001	DHG_2017_UKO_001	1196189.194	5324857.468	72.06	2'x6.5'x7.5'	jagged object
66002	DHG_2017_UKO_002	1195955.194	5324390.054	67.81	2.5'x4.5'x6.2'	irregular structure on edge of bar
66003	DHG_2017_UKO_003	1195923.377	5324624.051	70.37	2.5'x5.5'x5.5'	loose square object with raised rail over a mound
66004	DHG_2017_UKO_004	1195575.794	5323292.736	35.14	1.75'x3.5'x4'	very rounded
66005	DHG_2017_UKO_005	1195318.515	5325292.932	67.89	0.7'x5.5'x5.5'	very rounded
66006	DHG_2017_UKO_006	1194870.606	5323575.943	66.88	1.5'x4'x4'	round object with flat top
66007	DHG_2017_UKO_007	1193371.633	5324081.185	98.99	2'x4.7'x5.5'	flat top object
66008	DHG_2017_UKO_008	1194066.828	5323901.428	100.44	2.5'x8'x8'	irregular structure
66009	DHG_2017_UKO_009	1193985.624	5324101.948	100.30	3.5'x7'x8'	irregular structure
66010	DHG_2017_UKO_010	1193659.240	5323774.057	96.48	6'x6.5'x8.6'	irregular structure
66011	DHG_2017_UKO_011	1193360.338	5324569.616	66.37	2.5'x6.5'x7.2'	three parallel lines of a frame next to bar
66012	DHG_2017_UKO_012	1193062.825	5323818.630	94.75	5'x11'x13'	irregular shape
66013	DHG_2017_UKO_013	1193514.336	5323655.171	95.43	6'x8'x10'	large debris
66014	DHG_2017_UKO_014	1192663.479	5324177.136	88.86	4'x8.7'x9.5'	mound with some structure
66015	DHG_2017_UKO_015	1193049.681	5324327.749	63.50	2'x2'x5'	irregular structure
66016	DHG_2017_UKO_016	1193814.282	5326070.595	49.06	1'x2'x4.3'	egg shaped
66017	DHG_2017_UKO_017	1193820.314	5325205.247	53.03	1'x5'x10'	egg shaped
66018	DHG_2017_UKO_018	1193921.175	5324092.483	97.36	5'x6'x11'	irregular debris with not much structure
66019	DHG_2017_UKO_019	1193898.987	5324053.294	99.63	3'x2'x8'	debris protruding at an angle
66020	DHG_2017_UKO_020	1193802.189	5324089.752	99.74	4'x8'x10'	irregular object
66021	DHG_2017_UKO_021	1193588.468	5323875.727	98.73	3'x6.5'x10'	mound with debris
66022	DHG_2017_UKO_022	1193622.602	5323714.785	94.85	6'x7'x14'	debris with flat surfaces
66023	DHG_2017_UKO_023	1193508.730	5323832.379	100.17	1'x2'x5'	cylindrical object
66024	DHG_2017_UKO_024	1194683.682	5325709.140	59.60	1'x4'x6'	low oval mound
66025	DHG_2017_UKO_025	1194646.714	5325691.680	58.83	1.8'x3.5'x5.6'	egg shaped object with a protruding feature on one side
66026	DHG_2017_UKO_026	1194050.154	5323706.629	100.46	2'x3.6'x7.5'	oval shaped
66027	DHG_2017_UKO_027	1194007.386	5323919.604	100.66	2'x2'x8'	irregular object
66028	DHG_2017_UKO_028	1194005.667	5323832.889	100.33	2.5'x7'x10'	frame or netting
66029	DHG_2017_UKO_029	1193979.053	5323789.366	99.51	3'x7'x13'	oval shaped object with soundings below it on bottom
66030	DHG_2017_UKO_030	1194094.169	5323671.957	100.29	3'x2'x10'	thin linear structure with small debris next to it
66031	DHG_2017_UKO_031	1194099.967	5323510.253	100.76	1'x5'x7'	three short round mounds
66032	DHG_2017_UKO_032	1194148.507	5323639.914	100.84	2'x4.5'x4.5'	small round object
66033	DHG_2017_UKO_033	1194156.019	5323560.350	101.26	1'x3.3'x6.3'	flat debris in a depression
66034	DHG_2017_UKO_034	1194140.618	5323782.126	100.97	1'x2.8'x5'	oval debris with good return and shadow
66035	DHG_2017_UKO_035	1196356.142	5324291.449	72.23	1'x4.8'x9.5'	long and tear drop shaped object
66036	DHG_2017_UKO_036	1196457.627	5324577.031	70.79	2.5'x9.5'x7'	irregular object
66037	DHG_2017_UKO_037	1196606.239	5324943.494	74.75	1'x8'x8'	irregular object
66038	DHG_2017_UKO_038	1196320.632	5324326.721	71.94	1.2'x3.5'x3.5'	flat object with sloped top
66039	DHG_2017_UKO_039	1196283.085	5324526.643	71.57	1.25'x5.5'x6.5'	egg shaped object with somewhat flat surface
66040	DHG_2017_UKO_040	1196324.269	5324685.895	72.74	1'x7'x7.5'	mound with structure
66041	DHG_2017_UKO_041	1196202.746	5324545.071	70.26	2.3'x6.5'x6.5'	straight line structure
66042	DHG_2017_UKO_042	1196099.325	5324786.329	70.20	3'x8'x11.5'	frame like structure
66043	DHG_2017_UKO_043	1196034.375	5325157.268	72.73	1.2'x7.5'x8'	short mound with short soft object protruding up

66044	DHG_2017_UKO_044	1195967.726	5324791.670	71.36	2'x5'x7'	object with shadow
66045	DHG_2017_UKO_045	1195830.476	5324480.380	71.88	1'x7.8'x9.5'	multiple long objects
66046	DHG_2017_UKO_046	1195706.579	5324791.497	70.70	3.5'x1.5'x3.5'	small structure
66047	DHG_2017_UKO_047	1195526.723	5324827.916	68.70	4'x4'x8'	mound with a structure rising 4 ft above bottom
66048	DHG_2017_UKO_048	1195481.029	5324956.113	69.36	2.5'x3.2'x6'	low square mound with structure that rises 2.5ft up
66049	DHG_2017_UKO_049	1195128.490	5325061.892	65.95	2'x2.5'x2.5'	round object with a flat top
66050	DHG_2017_UKO_050	1194900.892	5325428.019	63.72	0.5'x7.5'x7.5'	irregular shapped mound
66051	DHG_2017_UKO_051	1194694.779	5323446.356	67.64	2.5'x3.5'x5.5'	object with angled flat surface and straight lines
66052	DHG_2017_UKO_052	1194684.336	5323863.972	79.09	3'x5.5'x7.5'	object with angled flat surface and straight lines
66053	DHG_2017_UKO_053	1194517.440	5323662.017	98.03	3'x6.4'x8.3'	irregular shaped debris
66054	DHG_2017_UKO_054	1194516.843	5323627.087	94.46	7.5'x5'x10'	stacked flat objects looks like shelves
66055	DHG_2017_UKO_055	1194451.446	5323935.347	91.89	3'x4.8'x10'	irregular mound
66056	DHG_2017_UKO_056	1194396.623	5323589.181	101.35	1'x2'x7'	straight object with an angled flat surface
66057	DHG_2017_UKO_057	1194212.935	5323520.674	100.41	2'x8'x8.7'	clustered debris
66058	DHG_2017_UKO_058	1194197.429	5323419.862	101.50	1'x4'x9'	long oval object
66059	DHG_2017_UKO_059	1193944.021	5323541.453	100.72	1'x3'x7'	oval shaped mound with some structure
66060	DHG_2017_UKO_060	1193844.597	5323802.432	99.64	5'x9'x10'	angular object with protruding features
66061	DHG_2017_UKO_061	1193406.769	5323722.516	99.26	1'x1.5'x7.5'	long object in a depression
66062	DHG_2017_UKO_062	1193400.753	5323778.977	99.60	1'x1.5'x5.3'	small egg shaped object
66063	DHG_2017_UKO_063	1196619.190	5324685.730	73.29	1.75'x14'x11'	large irregular mound
66064	DHG_2017_UKO_064	1196379.357	5325155.115	72.31	3'x6'x6.5'	debris
66065	DHG_2017_UKO_065	1196278.861	5325229.339	73.90	1'x8.5'x13'	cone shaped object with some flat surfaces and a mound at end of cone
66066	DHG_2017_UKO_066	1196172.032	5324392.300	72.03	0.8'x1.3'x6.5'	flat object laying on the bottom with soft shadow
66067	DHG_2017_UKO_067	1196160.912	5324686.467	71.81	1'x3.5'x5'	egg shaped object
66068	DHG_2017_UKO_068	1196120.995	5324399.551	71.86	0.75'x3'x8'	cylindrical object
66069	DHG_2017_UKO_069	1196160.547	5325235.616	73.96	0.75'x7.5'x8'	short egg shaped mound in a flat area
66070	DHG_2017_UKO_070	1196113.839	5325254.144	73.17	1.2'x4.6'x8.5'	oval shaped object with a depression in the middle
66071	DHG_2017_UKO_071	1195994.113	5324930.546	73.54	0.75'x3.5'x6.8'	short egg shaped mound in a flat area with small depression
66072	DHG_2017_UKO_072	1195719.615	5325491.673	70.18	0.7'x4'x16'	low oval mound
66073	DHG_2017_UKO_073	1195666.955	5325305.962	70.46	0.75'x1.5'x1.5'	very small object
66074	DHG_2017_UKO_074	1195663.234	5325260.344	70.02	1.5'x2.5'x4'	egg shaped object
66075	DHG_2017_UKO_075	1195539.736	5325464.646	68.37	1.5'x2'x4'	oval mound
66076	DHG_2017_UKO_076	1195456.143	5325425.255	68.43	1'x3'x3.5'	small egg shaped mound
66077	DHG_2017_UKO_077	1195449.248	5325383.027	67.94	1.3'x1'x2'	small object
66078	DHG_2017_UKO_078	1195166.413	5325503.475	64.09	2'x2.5'x5.5'	small object protruding from bottom
66079	DHG_2017_UKO_079	1195081.313	5325653.530	64.25	0.6'x4.5'x4.5'	round object
66080	DHG_2017_UKO_080	1193121.191	5323943.169	98.04	2'x4'x6'	irregular object
66081	DHG_2017_UKO_081	1192853.760	5324012.360	98.34	0.3'x2.6'x5.4'	oval object
66082	DHG_2017_UKO_082	1192835.980	5323850.670	99.30	0.3'x2.2'x5.1'	oval object
66083	DHG_2017_UKO_083	1193157.062	5323692.353	97.43	2'x4'x8'	oval flat top object with hard return and shadow
66084	DHG_2017_UKO_084	1193283.561	5323957.832	100.43	0.6'x7.5'x7.8'	object protruding from round mound
66085	DHG_2017_UKO_085	1193318.219	5324038.265	99.36	0.7'x8.3'x13.2'	oval object
66086	DHG_2017_UKO_086	1193409.270	5324102.800	100.59	0.4'x3.4'x5.5'	irregular object
66087	DHG_2017_UKO_087	1193451.380	5323934.770	100.47	0.5'x3.3'x9.6'	egg shaped object
66088	DHG_2017_UKO_088	1193437.100	5323792.480	100.26	0.4'x2.8'x5.3'	oval with flat top
66089	DHG_2017_UKO_089	1193525.150	5324097.580	100.61	0.75'x2.6'x7.5'	oval shaped object

66090	DHG_2017_UKO_090	1193729.508	5324409.792	88.77	0.75'x2.5'x2.5'	low round object with flat top
66091	DHG_2017_UKO_091	1193707.075	5323984.459	100.82	1'x5'x7'	low round mound in depression
66092	DHG_2017_UKO_092	1193721.780	5324165.870	101.08	0.6'x2.5'x4.9'	small flat top object
66093	DHG_2017_UKO_093	1193714.540	5323915.000	100.86	1'x8.1'x12.1'	large egg shaped mound
66094	DHG_2017_UKO_094	1193680.820	5323497.764	97.84	2.5'x2.8'x3.5'	debris
66095	DHG_2017_UKO_095	1194069.060	5324054.320	102.29	0.7'x5.1'x12.3'	oval mound in depression
66096	DHG_2017_UKO_096	1193865.130	5324106.810	101.97	0.5'x10.2'x12.4'	two round irregular objects
66097	DHG_2017_UKO_097	1194796.962	5323649.223	73.89	0.7'x2'x4'	debris
66098	DHG_2017_UKO_098	1194482.740	5323636.840	101.58	0.5'x7.6'x13.7'	irregular debris
66099	DHG_2017_UKO_099	1194442.480	5323612.730	101.50	0.55'x6.1'x2.4'	oval mound
66100	DHG_2017_UKO_100	1193908.860	5323880.460	101.87	0.5'x7.05'x8.02'	debris
66101	DHG_2017_UKO_101	1192557.000	5324122.460	95.37	0.3'x5.4'x13.2'	collection of debris
66102	DHG_2017_UKO_102	1192889.618	5323775.426	98.91	0.75'x2.7'x3.8'	small flat top object in depression
66103	DHG_2017_UKO_103	1194564.186	5323577.800	99.56	1'x2'x5'	short oval mound
66104	DHG_2017_UKO_104	1194433.840	5323431.753	98.40	2'x5'x5'	round mound with some structure
66105	DHG_2017_UKO_105	1194389.367	5323412.156	100.45	1'x5'x5'	debris mound
66106	DHG_2017_UKO_106	1194319.208	5323489.003	101.24	1'x7'x8'	irregular debris
66107	DHG_2017_UKO_107	1194468.143	5323681.756	101.44	0.75'x2'x4'	short small oval mound
66108	DHG_2017_UKO_108	1194423.000	5323702.270	102.04	0.35'x6.2'x10.1'	irregular shaped debris
66109	DHG_2017_UKO_109	1194439.480	5323776.080	101.49	0.5'x4.2'x6.2'	egg shaped mound

See Volume 2 of 2 - Drawings Sheet 5 for location

Surface Unknown Non Ferrous Objects Inner Box						
		NAD 83 US State Plane AK Zone 10			Dimensions in USft	
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Max Dimensions (HeightxWidthxLength)	Description
9900001	DHG_2017_UKI_001	1195302.784	5324680.136	69.60	1.5'x4.5'x5.2'	structure with uneaven top and round shape
9900002	DHG_2017_UKI_002	1195241.676	5324602.917	69.88	1.5'x2.5'x2.5'	small object with flat top
9900003	DHG_2017_UKI_003	1194506.525	5324880.144	61.94	1.5'x3.5'x4.5'	not well defined object may be net or other soft object
9900004	DHG_2017_UKI_004	1194389.773	5324177.090	93.19	1.4'x4'x6'	oval shaped
9900005	DHG_2017_UKI_005	1195043.552	5324005.982	59.52	2'x1.7'x3.3'	flat top object
9900006	DHG_2017_UKI_006	1194064.884	5324211.894	98.07	2.5'x4.5'x8'	irregular debris
9900007	DHG_2017_UKI_007	1193782.425	5324259.207	96.16	1'x1.2'x3'	small object
9900008	DHG_2017_UKI_008	1195060.890	5324685.760	68.39	1'x3.5'x9.6'	egg shaped object at edge of bar

See Volume 2 of 2 - Drawings Sheet 5 for location

Crab pots						
		NAD 83 US State Plane AK Zone 10			Dimensions in USft	
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Max Dimensions (HeightxWidthxLength)	Description
550001	DHG_2017_CRB_001	1196575.113	5324564.058	71.65	2.8'x7'x7'	partial crab pot structure
550002	DHG_2017_CRB_002	1196569.277	5325010.539	72.96	3'x8'x8'	crab pot
550003	DHG_2017_CRB_003	1196322.217	5325025.044	72.22	2.5'x7.5'x8.5'	crab pot
550004	DHG_2017_CRB_004	1196315.251	5325047.852	72.05	2'x7.5'x7.7'	crab pot
550005	DHG_2017_CRB_005	1196272.758	5324252.020	64.10	3'x7'x7'	flat top frame structure along edge of bar
550006	DHG_2017_CRB_006	1196201.965	5324657.250	69.09	5'x8'x8'	frame
550007	DHG_2017_CRB_007	1196200.076	5324309.389	69.45	2'x6.5'x7'	flat top with some frame along edge of the bar
550008	DHG_2017_CRB_008	1196084.394	5323556.543	36.05	2.5'x6'x6'	square top crab pot frame
550009	DHG_2017_CRB_009	1196051.640	5324879.359	71.60	2.5'x7'x7.5'	square top structure
550010	DHG_2017_CRB_010	1196043.896	5324414.942	70.27	2.5'x6.5'x7.3'	crab pot with protruding object
550011	DHG_2017_CRB_011	1195965.678	5325053.294	72.45	1.8'x5'x5'	square top structure sitting at angle
550012	DHG_2017_CRB_012	1195939.119	5325312.569	70.20	2.5'x6.5'x7.2'	square top structure sitting at angle
550013	DHG_2017_CRB_013	1195901.963	5325052.672	69.95	3'x7'x7'	square with frame
550014	DHG_2017_CRB_014	1195883.018	5325346.869	69.87	3'x7.5'x7.5'	crab pot
550015	DHG_2017_CRB_015	1195869.575	5324739.260	71.05	2.5'x7'x7'	crab pot sitting at angle
550016	DHG_2017_CRB_016	1195844.170	5324978.882	70.00	3.5'x6.5'x6.5'	crab pot
550017	DHG_2017_CRB_017	1195802.710	5324443.162	70.45	3'x6.5'x7.3'	crab pot
550018	DHG_2017_CRB_018	1195515.613	5325439.171	67.43	2.2'x6'x6'	crab pot
550019	DHG_2017_CRB_019	1195471.715	5325003.355	68.24	3'x5.5'x6.5'	frame structure
550020	DHG_2017_CRB_020	1195414.035	5324500.169	58.53	3.5'x6.5'x7'	crab pot
550021	DHG_2017_CRB_021	1195343.700	5323788.460	56.81	2.5'x7.5'x7.5'	square structure with flat top
550022	DHG_2017_CRB_022	1195331.084	5325428.482	66.43	2'x5'x5'	round crab pot with flat top
550023	DHG_2017_CRB_023	1195199.441	5324744.847	67.37	3'x7.2'x7.2'	crab pot
550024	DHG_2017_CRB_024	1194713.713	5325015.288	61.69	3'x7'x7'	crab pot
550025	DHG_2017_CRB_025	1194680.335	5323712.556	81.85	2.5'x8'x8'	flat square top crab pot
550026	DHG_2017_CRB_026	1194636.123	5323773.160	84.85	2.5'x8'x8'	flat square top crab pot
550027	DHG_2017_CRB_027	1194612.647	5324858.227	61.68	3'x7'x7'	crab pot
550028	DHG_2017_CRB_028	1194541.124	5323402.358	78.33	3'x8.5'x8.5'	crab pot
550029	DHG_2017_CRB_029	1194398.647	5324773.664	51.12	3.5'x5'x5'	crab pot
550030	DHG_2017_CRB_030	1194375.428	5324550.905	43.68	3'x7.5'x7.5'	crab pot
550031	DHG_2017_CRB_031	1194321.724	5325435.072	57.25	1.3'x4.4'x5.2'	crab pot
550032	DHG_2017_CRB_032	1194314.272	5324058.405	95.91	2.5'x8'x8'	crab pot
550033	DHG_2017_CRB_033	1194256.783	5323683.424	99.59	3'x8.2'x8.2'	crab pot
550034	DHG_2017_CRB_034	1194180.916	5325089.036	56.44	2.5'x6'x6'	crab pot
550035	DHG_2017_CRB_035	1194175.045	5324153.055	97.31	2.5'x7.3'x7.3'	crab pot
550036	DHG_2017_CRB_036	1194149.204	5325269.550	54.57	2.5'x6.5'x6.5'	crab pot
550037	DHG_2017_CRB_037	1194148.810	5324930.946	56.56	2.5'x6.5'x6.5'	crab pot
550038	DHG_2017_CRB_038	1193879.652	5324999.169	53.97	2'x4'x4'	Small crab pot near bar
550039	DHG_2017_CRB_039	1193860.197	5323780.523	99.41	2.5'x9.5'x10'	flat top structure
550040	DHG_2017_CRB_040	1193784.184	5324033.648	99.36	3'x8'x9'	flat top structure
550041	DHG_2017_CRB_041	1193699.928	5324750.820	43.53	2.5'x6.3'x7.5'	corroded crab pot
550042	DHG_2017_CRB_042	1193610.459	5325607.941	47.16	2.5'x6'x6'	crab pot
550043	DHG_2017_CRB_043	1193518.800	5323544.412	97.57	3'x7'x7'	crab pot

550044	DHG_2017_CRB_044	1193012.009	5324763.336	55.45	2'x5.5'x6'	Small crab pot near end of bar
550045	DHG_2017_CRB_045	1193009.568	5324167.392	94.42	2.9'x7'x7'	crab pot
550046	DHG_2017_CRB_046	1192688.626	5324222.805	77.92	2.5'x8'x8'	crab pot
550047	DHG_2017_CRB_047	1192634.459	5324151.317	90.63	3'x7.5'x8.5'	crab pot
550048	DHG_2017_CRB_048	1192605.923	5324175.533	89.24	1.5'x4.5'x5'	crab pot

See Volume 2 of 2 - Drawings Sheet 5 for location

Tires						
		NAD 83 US State Plane AK Zone 10			Dimensions in USft	
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Max Dimensions (HeightxWidthxLength)	Description
710001	DHG_2017_TR_001	1193635.975	5323565.454	100.05	0.5'x7.5'x7.5'	Tire
710002	DHG_2017_TR_002	1193460.241	5323628.958	99.33	1'x8'x8'	Tire
710003	DHG_2017_TR_003	1196111.272	5324932.141	72.84	1.2'x6'x6'	Tire
710004	DHG_2017_TR_004	1195356.390	5323693.740	58.10	0.5'x6.3'x6.3'	Tire

See Volume 2 of 2 - Drawings Sheet 5 for location

Boulders				
NAD 83 US State Plane AK Zone 10			Dimensions in USft	
Northing	Easting	Depth (shoal point on object)	Max Dimensions (HeightxWidthxLength)	Description
1194123.296	5324610.062	45.77	1'x3'x8.3'	Boulder
1193924.284	5324953.713	56.06	0.75'x3'x2'	Boulder
1194123.296	5324610.062	45.77	1'x3'x8.3'	Boulder
1193924.284	5324953.713	56.06	0.75'x3'x2'	Boulder
1196750.940	5325007.560	76.35	0.5'x5'x7'	Boulder
1196720.858	5324973.366	75.70	1'x2.6'x3.4'	Boulder
1196648.880	5325082.980	76.04	0.4'x4.5'x9.5'	Boulder
1196557.780	5324962.390	75.15	0.4'x3.5'x5'	Boulder
1196495.670	5324977.740	74.77	0.4'x2.5'x6.8'	Boulder
1196400.480	5324991.860	74.39	0.3'x6.8'x7.3'	Boulder
1196283.054	5324917.607	73.66	0.5'x6'x6'	Boulder
1196195.190	5324977.682	71.28	2.5'x5.6'x6.7'	Boulder
1196243.741	5324352.302	72.02	0.5'x3'x4'	Boulder
1196156.023	5324815.846	72.78	1'x7'x12'	Boulder
1196012.290	5324791.010	72.87	0.75'x3.6'x5.2'	Boulder
1195780.260	5324874.370	73.45	0.5'x4.6'x5.2'	Boulder
1195727.369	5325061.589	71.94	0.7'x4'x5'	Boulder
1195509.176	5325336.411	68.80	1'x4'x4'	Boulder
1195041.250	5324802.430	68.12	0.5'x6'x6'	Boulder
1194920.140	5325129.650	65.27	0.5'x8.4'x10.3'	Boulder
1193418.190	5323914.030	100.68	0.4'x2.2'x4.7'	Boulder
1193641.030	5324066.590	101.00	0.75'x2.6'x5.8'	Boulder
1193666.226	5324397.650	84.31	2.5'x2.8'x5.5'	Boulder
1193666.226	5324397.650	84.31	2.5'x2.8'x5.5'	Boulder
1193720.260	5323682.940	101.15	0.25'x2.8'x4.8'	Boulder
1193864.800	5323696.250	101.42	0.5'x3.96'x6.75'	Boulder
1194130.840	5323988.020	102.35	0.5'x7.3'x13.2'	Boulder
1194219.850	5324242.580	97.35	0.5'x2.3'x6.6'	Boulder
1194096.110	5324032.930	101.82	0.75'x2.8'x4.6'	Boulder
1194152.940	5324080.990	100.84	0.5'x3.8'x6.7'	Boulder
1194138.990	5324079.400	100.83	0.5'x4'x5.3'	Boulder
1194172.190	5323987.390	102.13	0.4'x2.6'x5.8'	Boulder
1194106.590	5323955.990	102.30	0.7'x3'x7'	Boulder
1194293.130	5323992.140	100.74	0.7'x5.2'x7.8'	Boulder
1193858.890	5324327.100	96.06	1'x3.3'x5.1'	Boulder
1193948.160	5324281.680	99.62	0.5'x2.6'x5.5'	Boulder
1193883.080	5324372.360	95.88	0.8'x3'x6'	Boulder
1194865.500	5323989.200	73.44	1'x2.1'x4.6'	Boulder
1194265.520	5323604.930	101.81	0.4'x4.6'x6.8'	Boulder
1192585.370	5323947.640	98.24	0.6'x2.4'x5.6'	Boulder
1194690.370	5323994.660	82.24	0.45'x2.8'x5.1'	Boulder
1194397.170	5323298.250	85.16	1'x4'x4'	Boulder
1194209.391	5323813.694	100.74	0.7'x5.2'x7.8'	Boulder

Inner Box Subbottom Uknown Ferrous Objects							
		NAD 83 US State Plane AK Zone 10				Dimensions in USft	
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Depth of burial (surface depth - object depth)	Estimated Size (largest dimension)	Description
62001	DHG_2017_ISUKF_001	1194201.12	5325090.44	61.37	2.31	4-8ft	Unknown large buried object with high ferrous return
62002	DHG_2017_ISUKF_002	1194185.62	5324179.55	102.64	3.48	2-4ft	Unknown object with ferrous return
62003	DHG_2017_ISUKF_003	1194178.63	5324966.44	66.49	7.18	2-4ft	Unknown object with ferrous return
62004	DHG_2017_ISUKF_004	1194151.79	5324955.46	64.78	5.74	2-4ft	Unknown object with ferrous return
62005	DHG_2017_ISUKF_005	1194382.10	5324422.64	55.99	9.64	2-4ft	Unknown object with ferrous return
62006	DHG_2017_ISUKF_006	1195271.37	5324645.72	73.56	2.38	4-8ft	Unknown debris with ferrous return

See Volume 2 of 2 - Drawings Sheet 5 & 6 for location

Inner Box Subbottom Unkown Non Ferrous Objects - likely boulders							
		NAD 83 US State Plane AK Zone 10				Dimensions in USft	
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Depth of burial (surface depth - object depth)	Estimated Size (largest dimension)	Description
156001	DHG_2017_ISUKNF_008	1195519.55	5324650.73	86.56	13.13	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156002	DHG_2017_ISUKNF_009	1194138.59	5325102.70	79.46	21.20	8-12ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156003	DHG_2017_ISUKNF_010	1194216.68	5325080.88	78.89	19.63	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156004	DHG_2017_ISUKNF_011	1194211.08	5325082.23	75.50	16.32	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156005	DHG_2017_ISUKNF_012	1194225.80	5325075.59	81.95	22.60	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156006	DHG_2017_ISUKNF_013	1194145.35	5325107.70	68.61	10.29	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156007	DHG_2017_ISUKNF_014	1194194.25	5325128.80	78.77	20.07	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156008	DHG_2017_ISUKNF_015	1194655.81	5323969.16	106.15	21.95	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156009	DHG_2017_ISUKNF_016	1194661.72	5323972.91	106.86	22.96	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156010	DHG_2017_ISUKNF_017	1194201.27	5325134.98	82.35	23.57	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156011	DHG_2017_ISUKNF_018	1194183.96	5325042.72	79.79	20.65	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156012	DHG_2017_ISUKNF_019	1193878.35	5324294.38	113.56	14.90	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156013	DHG_2017_ISUKNF_020	1194522.42	5324942.06	76.01	12.73	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156014	DHG_2017_ISUKNF_021	1195609.96	5324589.88	95.42	21.62	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156015	DHG_2017_ISUKNF_022	1194307.86	5325104.56	92.29	32.23	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156016	DHG_2017_ISUKNF_023	1194157.66	5325007.20	66.41	7.37	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156017	DHG_2017_ISUKNF_024	1193885.79	5324347.01	102.07	4.76	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156018	DHG_2017_ISUKNF_025	1194153.35	5325008.85	67.33	8.35	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156019	DHG_2017_ISUKNF_026	1195174.73	5324690.41	74.43	4.23	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156020	DHG_2017_ISUKNF_027	1195198.56	5324712.70	76.10	5.84	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156021	DHG_2017_ISUKNF_028	1193886.57	5324298.04	106.42	7.71	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156022	DHG_2017_ISUKNF_029	1194436.43	5324991.61	70.78	8.62	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156023	DHG_2017_ISUKNF_030	1194353.75	5325062.90	63.56	2.73	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156024	DHG_2017_ISUKNF_031	1195378.06	5324599.34	78.88	6.93	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156025	DHG_2017_ISUKNF_032	1194343.00	5325082.68	77.85	17.24	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156026	DHG_2017_ISUKNF_033	1195458.15	5324681.27	83.09	10.53	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156027	DHG_2017_ISUKNF_034	1194365.18	5325059.35	76.81	15.85	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156028	DHG_2017_ISUKNF_035	1194311.07	5324155.98	117.92	21.15	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156029	DHG_2017_ISUKNF_036	1194130.69	5324997.30	75.69	16.90	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156030	DHG_2017_ISUKNF_037	1194321.43	5324152.37	123.18	26.62	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156031	DHG_2017_ISUKNF_038	1194035.09	5325001.26	83.38	25.62	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156032	DHG_2017_ISUKNF_039	1194247.09	5325078.46	60.91	1.37	2-4ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156033	DHG_2017_ISUKNF_040	1194353.39	5325086.45	72.92	12.27	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156034	DHG_2017_ISUKNF_041	1194387.51	5325048.77	91.62	30.40	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156035	DHG_2017_ISUKNF_042	1194110.33	5324985.99	71.19	12.50	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156036	DHG_2017_ISUKNF_043	1193881.17	5324337.35	105.23	7.72	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156037	DHG_2017_ISUKNF_044	1194170.83	5325029.51	64.41	5.27	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156038	DHG_2017_ISUKNF_045	1194101.66	5325036.69	66.14	7.84	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156039	DHG_2017_ISUKNF_046	1194555.08	5324910.82	71.29	7.64	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156040	DHG_2017_ISUKNF_047	1194982.48	5324759.20	72.18	3.85	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156041	DHG_2017_ISUKNF_048	1194980.65	5324751.68	76.22	7.82	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156042	DHG_2017_ISUKNF_049	1194089.77	5325126.34	65.80	8.16	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156043	DHG_2017_ISUKNF_050	1194589.12	5324027.69	111.76	24.38	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156044	DHG_2017_ISUKNF_051	1194167.26	5324475.18	55.29	5.56	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156045	DHG_2017_ISUKNF_052	1194135.38	5324175.22	101.99	1.95	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156046	DHG_2017_ISUKNF_053	1194131.31	5324919.28	60.19	2.22	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder

156047	DHG_2017_ISUKNF_054	1194192.68	5325151.49	90.90	32.33	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156048	DHG_2017_ISUKNF_055	1194132.50	5324914.64	66.20	8.70	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156049	DHG_2017_ISUKNF_056	1195670.29	5324562.67	92.38	18.96	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156050	DHG_2017_ISUKNF_057	1194554.02	5324889.63	82.76	19.07	3-6ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156051	DHG_2017_ISUKNF_058	1194235.70	5324221.00	103.45	5.64	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder
156052	DHG_2017_ISUKNF_059	1194169.04	5325058.28	60.50	1.53	1-3ft	Unknown Non Ferrous Object in Inner Box - Likely a boulder

See Volume 2 of 2 - Drawings Sheet 5 for location

Outer Box Subbottom Object - likely boulders							
		NAD 83 US State Plane AK Zone 10				Dimensions in USft	
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Depth of burial (surface depth - object depth)	Estimated Size (largest dimension)	Description
181300	DHG_2017_OSUK_060	1195395.80	5325213.17	83.94	14.46	4-6ft	Unknown Object in Outer Box - Likely a boulder
181301	DHG_2017_OSUK_061	1194834.25	5325420.56	85.19	21.62	4-6ft	Unknown Object in Outer Box - Likely a boulder
181302	DHG_2017_OSUK_062	1195402.59	5325271.64	74.71	5.32	4-6ft	Unknown Object in Outer Box - Likely a boulder
181303	DHG_2017_OSUK_063	1195078.46	5324887.96	87.34	18.73	2-4ft	Unknown Object in Outer Box - Likely a boulder
181304	DHG_2017_OSUK_064	1196081.58	5324641.09	83.69	10.88	2-4ft	Unknown Object in Outer Box - Likely a boulder
181305	DHG_2017_OSUK_065	1195314.09	5325404.6	81.35	13.36	2-4ft	Unknown Object in Outer Box - Likely a boulder
181306	DHG_2017_OSUK_066	1194640.66	5325086.89	77.45	13.96	2-4ft	Unknown Object in Outer Box - Likely a boulder
181307	DHG_2017_OSUK_067	1194647.86	5325115.68	77.33	13.92	2-4ft	Unknown Object in Outer Box - Likely a boulder
181308	DHG_2017_OSUK_068	1195095.82	5324903.82	85.81	17.18	2-4ft	Unknown Object in Outer Box - Likely a boulder
181309	DHG_2017_OSUK_069	1194862.28	5324966.28	82.36	16.16	2-4ft	Unknown Object in Outer Box - Likely a boulder
181310	DHG_2017_OSUK_070	1194836.14	5325022.69	75.91	10.32	2-4ft	Unknown Object in Outer Box - Likely a boulder
181311	DHG_2017_OSUK_071	1195166.50	5325035.78	85.49	17.10	2-4ft	Unknown Object in Outer Box - Likely a boulder
181312	DHG_2017_OSUK_072	1194893.48	5324972.05	79.97	13.55	2-4ft	Unknown Object in Outer Box - Likely a boulder
181313	DHG_2017_OSUK_073	1193957.37	5325016.04	77.05	20.23	2-4ft	Unknown Object in Outer Box - Likely a boulder
181314	DHG_2017_OSUK_074	1195068.60	5324924.15	73.27	5.03	2-4ft	Unknown Object in Outer Box - Likely a boulder
181315	DHG_2017_OSUK_075	1195518.32	5325475.33	82.46	12.92	2-4ft	Unknown Object in Outer Box - Likely a boulder
181316	DHG_2017_OSUK_076	1194585.35	5325127.06	72.10	9.43	2-4ft	Unknown Object in Outer Box - Likely a boulder
181317	DHG_2017_OSUK_077	1193044.67	5325537.18	52.39	9.35	2-4ft	Unknown Object in Outer Box - Likely a boulder
181318	DHG_2017_OSUK_078	1194111.78	5325875.38	61.95	7.72	2-4ft	Unknown Object in Outer Box - Likely a boulder
181319	DHG_2017_OSUK_079	1195369.75	5325302.34	76.60	7.65	2-4ft	Unknown Object in Outer Box - Likely a boulder
181320	DHG_2017_OSUK_080	1196273.77	5324473.75	105.40	32.79	2-4ft	Unknown Object in Outer Box - Likely a boulder
181321	DHG_2017_OSUK_081	1196265.80	5324469.9	104.27	31.68	2-4ft	Unknown Object in Outer Box - Likely a boulder
181322	DHG_2017_OSUK_082	1192956.82	5324343.88	63.57	2.39	1-2ft	Unknown Object in Outer Box - Likely a boulder
181323	DHG_2017_OSUK_083	1194631.54	5325055.87	75.23	11.76	1-2ft	Unknown Object in Outer Box - Likely a boulder
181324	DHG_2017_OSUK_084	1194637.64	5325149.31	74.87	11.84	1-2ft	Unknown Object in Outer Box - Likely a boulder
181325	DHG_2017_OSUK_085	1195055.25	5324915.74	77.89	9.69	1-2ft	Unknown Object in Outer Box - Likely a boulder
181326	DHG_2017_OSUK_086	1195144.21	5325083.09	79.18	11.18	1-2ft	Unknown Object in Outer Box - Likely a boulder
181327	DHG_2017_OSUK_087	1195441.70	5324720.51	85.51	13.39	1-2ft	Unknown Object in Outer Box - Likely a boulder
181328	DHG_2017_OSUK_088	1195517.73	5325710.72	93.36	25.05	1-2ft	Unknown Object in Outer Box - Likely a boulder
181329	DHG_2017_OSUK_089	1196093.77	5324692.75	89.45	16.45	1-2ft	Unknown Object in Outer Box - Likely a boulder
181330	DHG_2017_OSUK_090	1195662.82	5324544.14	74.79	1.35	1-2ft	Unknown Object in Outer Box - Likely a boulder
181331	DHG_2017_OSUK_091	1194926.11	5323828.94	99.38	27.94	1-2ft	Unknown Object in Outer Box - Likely a boulder
181332	DHG_2017_OSUK_092	1195109.35	5323021.68	61.41	3.29	1-2ft	Unknown Object in Outer Box - Likely a boulder
181333	DHG_2017_OSUK_093	1194819.39	5323850.67	105.53	30.18	1-2ft	Unknown Object in Outer Box - Likely a boulder
181334	DHG_2017_OSUK_094	1193811.52	5325562.96	62.96	10.84	1-2ft	Unknown Object in Outer Box - Likely a boulder
181335	DHG_2017_OSUK_095	1192972.52	5324290.48	72.88	5.29	1-2ft	Unknown Object in Outer Box - Likely a boulder
181336	DHG_2017_OSUK_096	1194916.18	5325009.3	72.73	6.30	1-2ft	Unknown Object in Outer Box - Likely a boulder
181337	DHG_2017_OSUK_097	1193765.75	5324119.49	108.80	6.93	1-2ft	Unknown Object in Outer Box - Likely a boulder
181338	DHG_2017_OSUK_098	1194144.06	5325321.68	68.01	10.85	1-2ft	Unknown Object in Outer Box - Likely a boulder
181339	DHG_2017_OSUK_099	1194436.56	5323741.72	109.46	7.20	1-2ft	Unknown Object in Outer Box - Likely a boulder
181340	DHG_2017_OSUK_100	1195380.40	5325330.11	85.86	16.94	1-2ft	Unknown Object in Outer Box - Likely a boulder
181341	DHG_2017_OSUK_101	1194702.61	5324983.76	67.88	3.27	2-4ft	Unknown Object in Outer Box - Likely a boulder

See Volume 2 of 2 - Drawings Sheet 5 for location

Outer Box Subbottom Object - unnatural in shape							
		NAD 83 US State Plane AK Zone 10				Dimensions in USft	
ID	Object ID	Northing	Easting	Depth (shoal point on object)	Depth of burial (surface depth - object depth)	Estimated Size (largest dimension)	Description
191000	DHG_2017_OSUKO_101	1194317.48	5325394.35	78.80	6.17	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191001	DHG_2017_OSUKO_102	1193823.50	5326111.18	70.61	6.22	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191002	DHG_2017_OSUKO_103	1193798.76	5326078.85	55.36	1.61	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191003	DHG_2017_OSUKO_104	1194845.26	5325382.91	65.77	0.59	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191004	DHG_2017_OSUKO_105	1196156.57	5324657.70	79.72	2.06	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191005	DHG_2017_OSUKO_106	1195449.35	5325337.44	72.07	0.80	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191006	DHG_2017_OSUKO_107	1195671.48	5325247.51	74.78	1.03	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191007	DHG_2017_OSUKO_108	1193820.77	5326055.52	52.28	0.57	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191008	DHG_2017_OSUKO_109	1195661.60	5325273.76	73.23	0.62	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191009	DHG_2017_OSUKO_110	1193693.69	5325152.18	54.82	0.58	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191010	DHG_2017_OSUKO_111	1193523.81	5325529.04	51.59	0.82	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191011	DHG_2017_OSUKO_112	1194749.14	5325008.71	67.61	0.83	2-4ft	Unknown Object in Outer Box - Non Natural Feature
191012	DHG_2017_OSUKO_113	1195553.94	5325295.13	71.28	0.28	2-4ft	Unknown Object in Outer Box - Non Natural Feature

See Volume 2 of 2 - Drawings Sheet 5 for location

Ferrous Areas Without Object				
		NAD 83 US State Plane AK Zone 10		
ID	Object ID	Northing	Easting	Description
660001	DHG_2017_FA_001	1194510.21	5324658.88	rocky area
660002	DHG_2017_FA_002	1194495.51	5324283.06	flat area
660003	DHG_2017_FA_003	1194600.33	5324245.35	flat area
660004	DHG_2017_FA_004	1195302.14	5324372.54	rocky area
660005	DHG_2017_FA_005	1194894.35	5324602.00	mixed rocky and flat area
660006	DHG_2017_FA_006	1194923.75	5324692.12	rocky area
660007	DHG_2017_FA_007	1194868.78	5324378.29	rocky Area
660008	DHG_2017_FA_008	1194919.28	5324491.42	small rocks in flat area
660009	DHG_2017_FA_009	1194707.08	5324291.37	rocky area

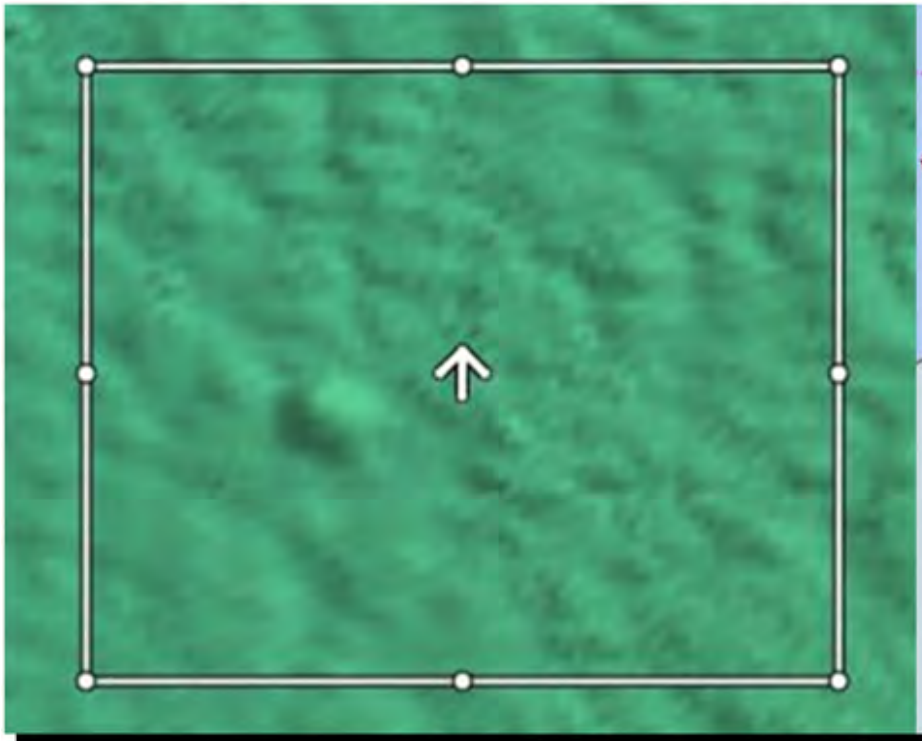
See Volume 2 of 2 - Drawings Sheet 5 & 6 for location

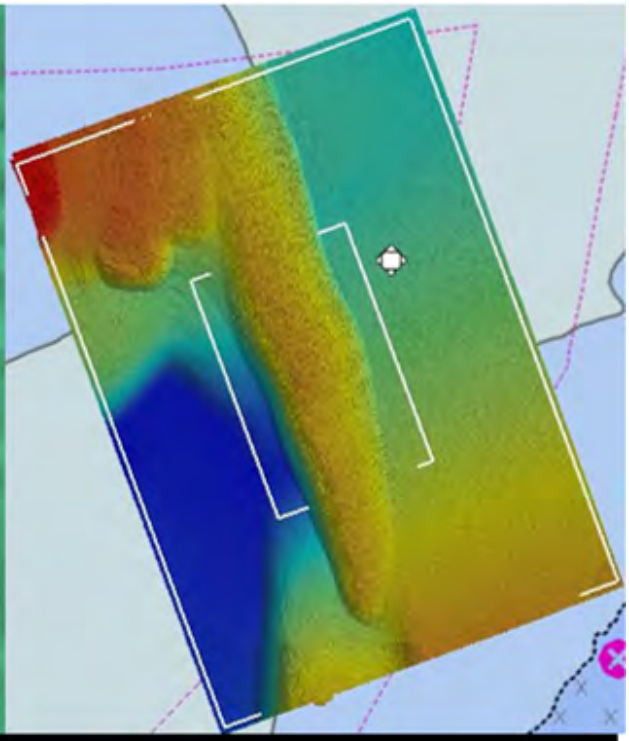
Appendix D

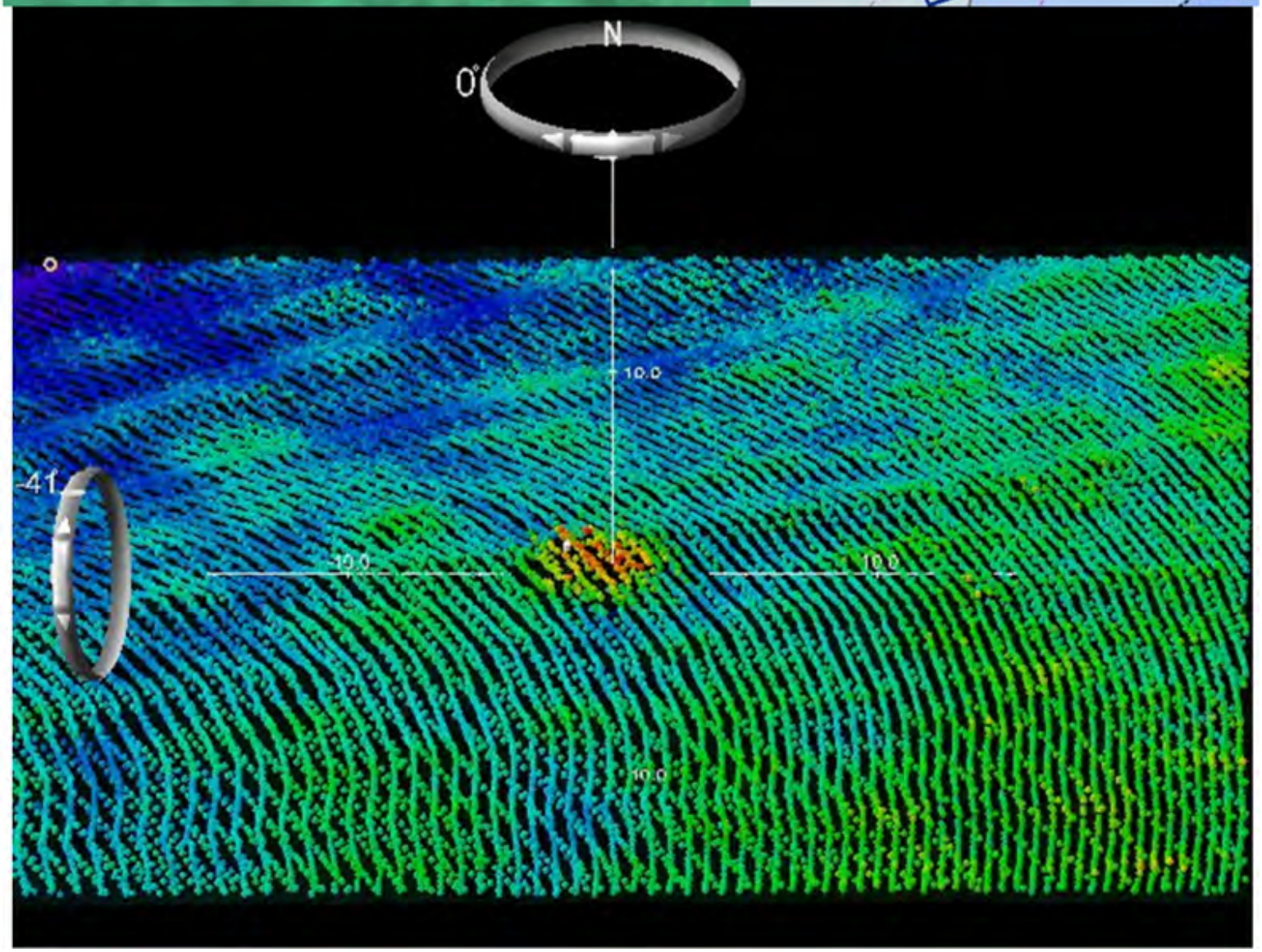
Feature Images

Surface Objects:

Ferrous Unknown Objects



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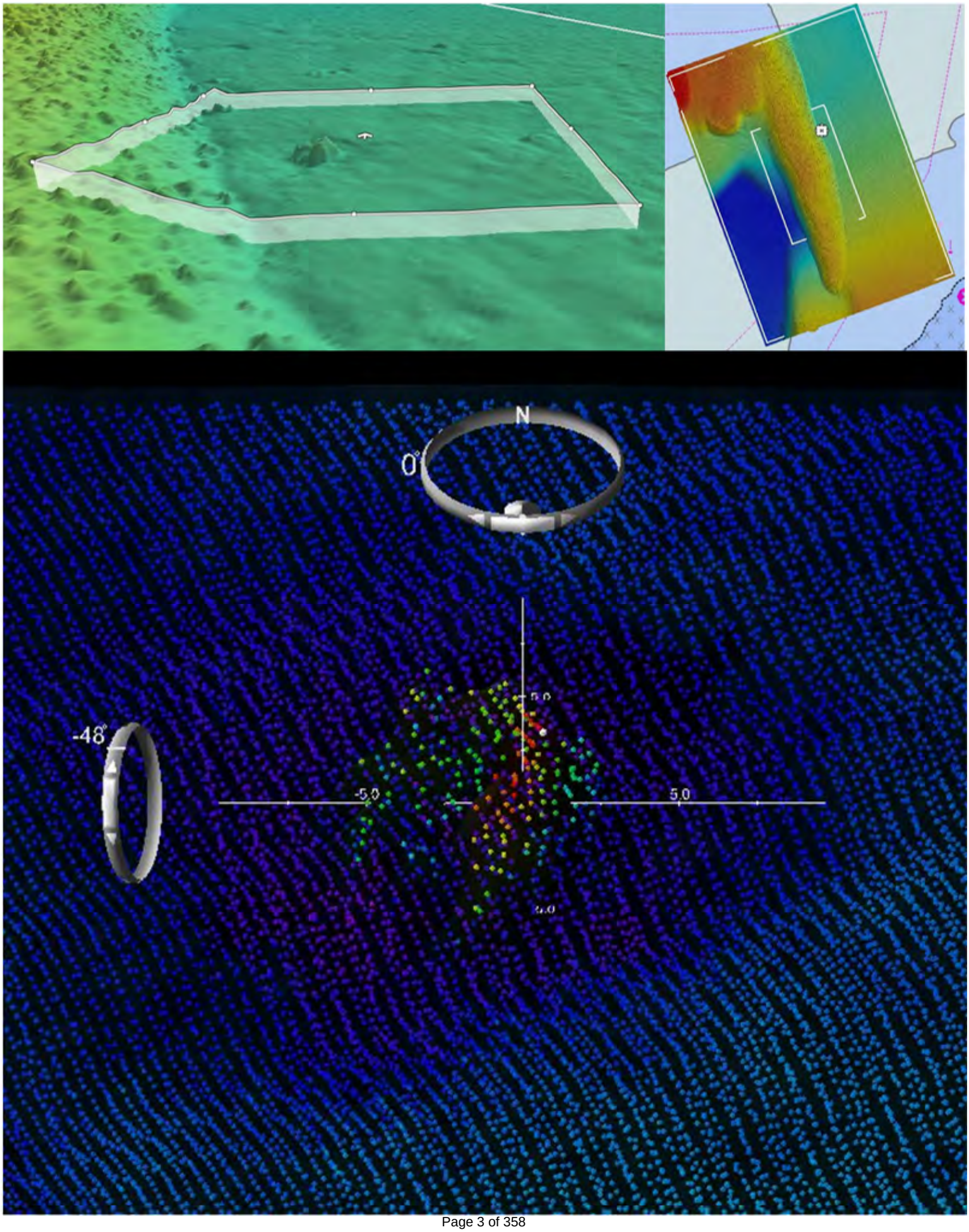
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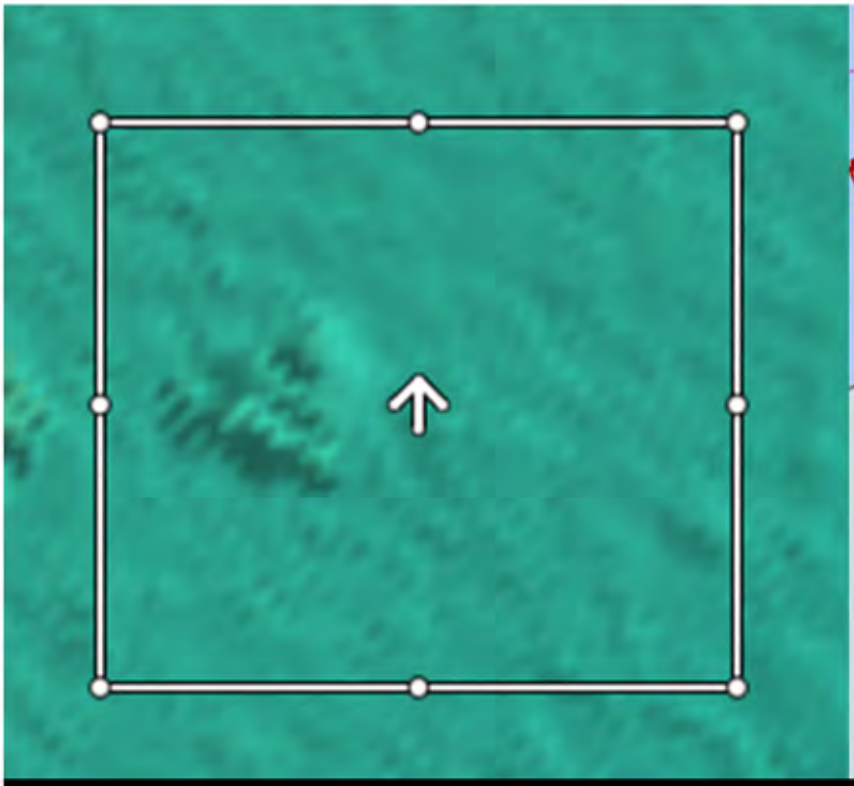

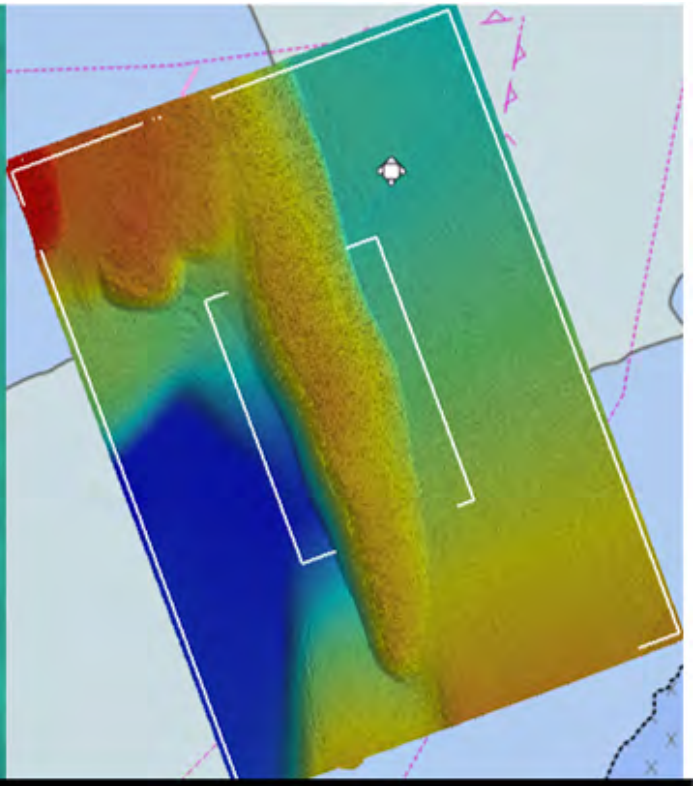

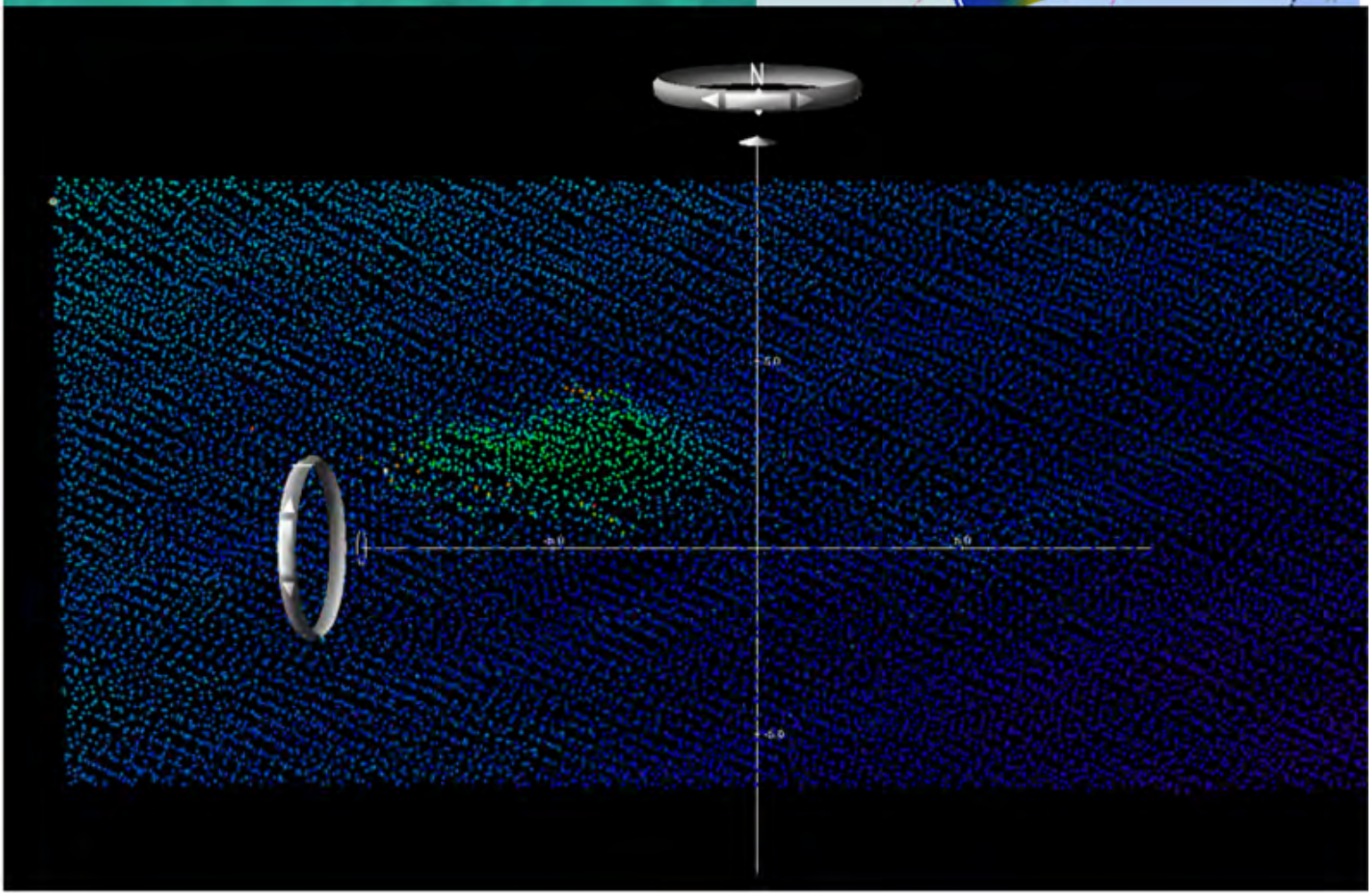
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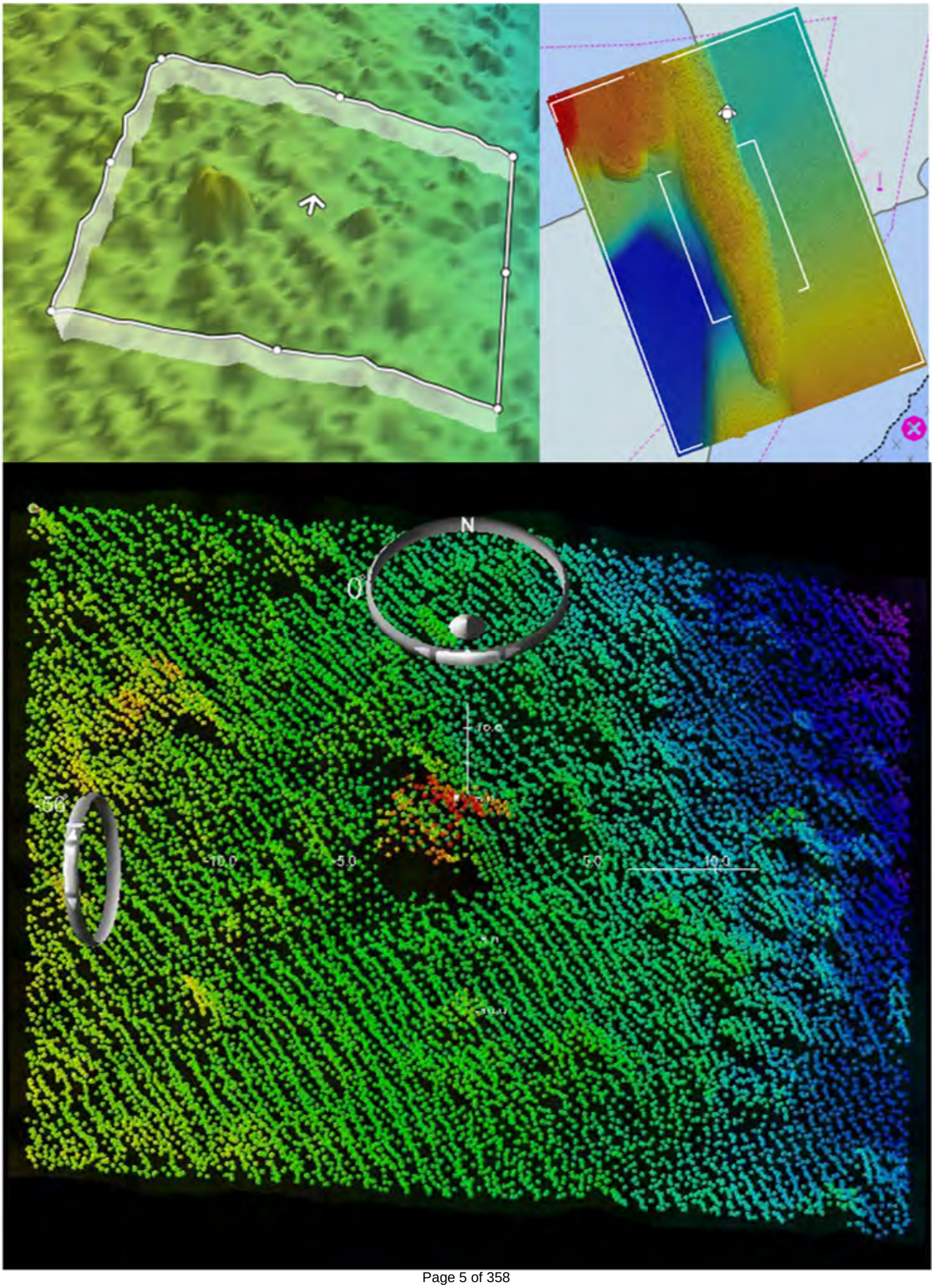
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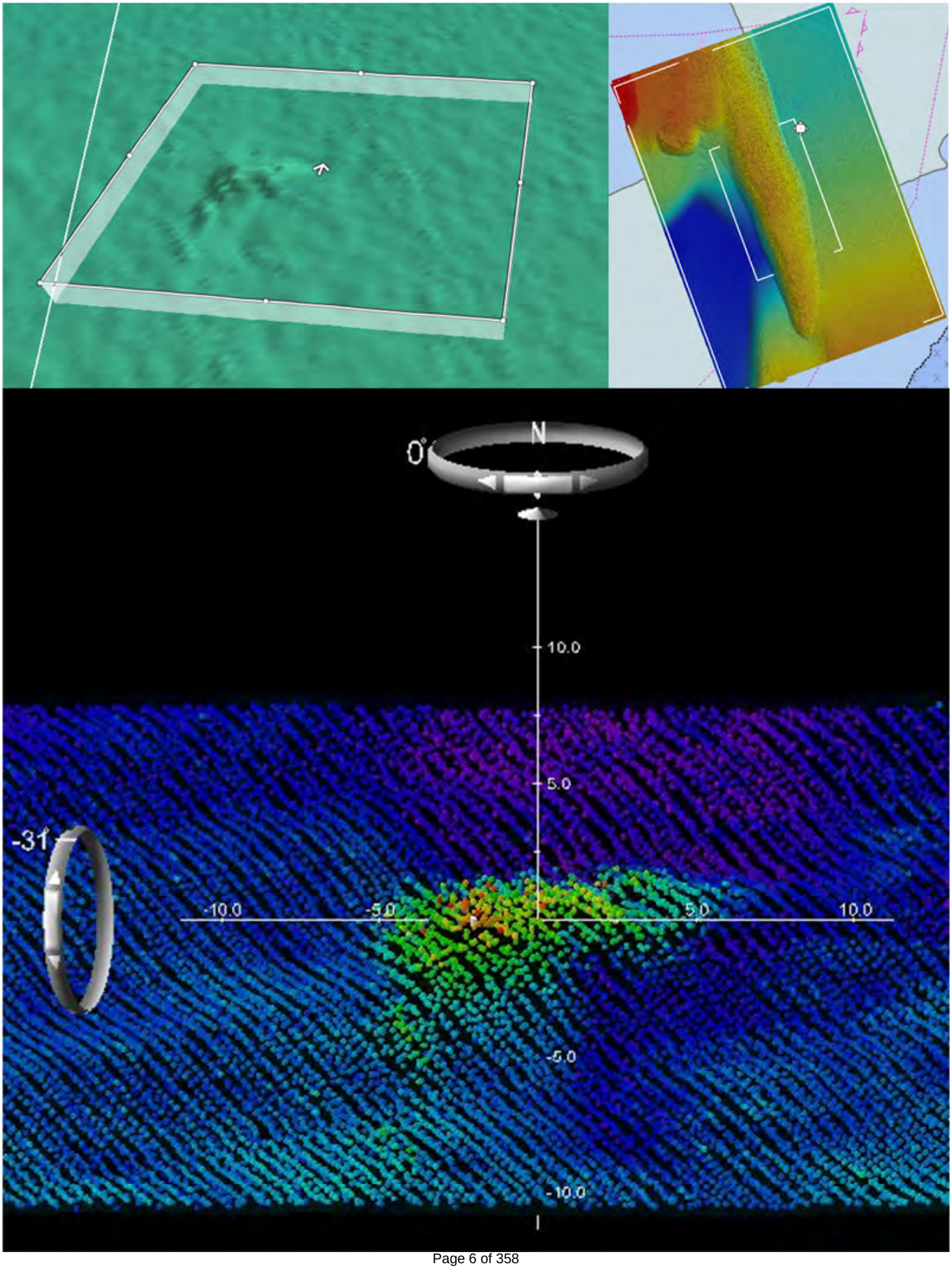
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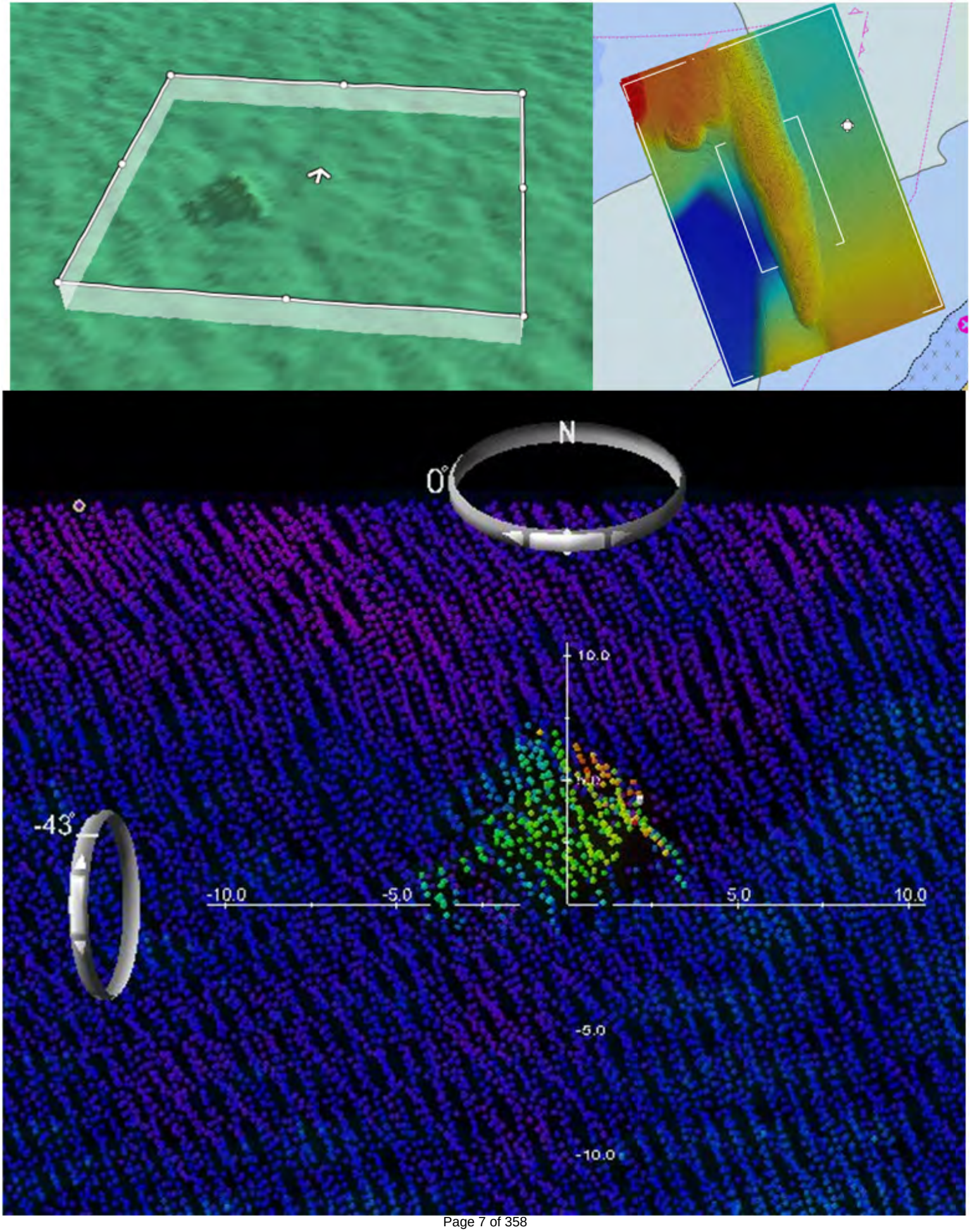
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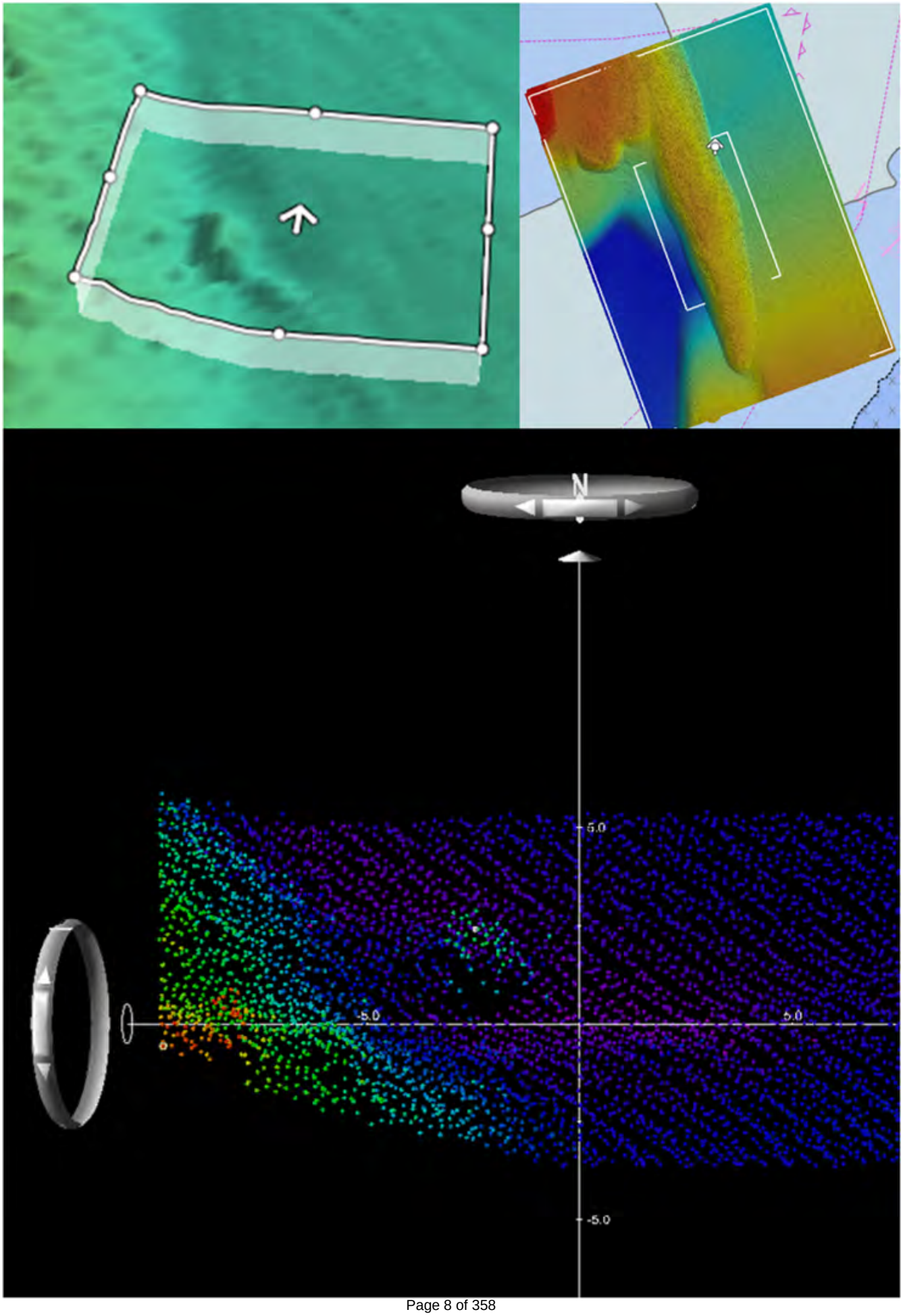
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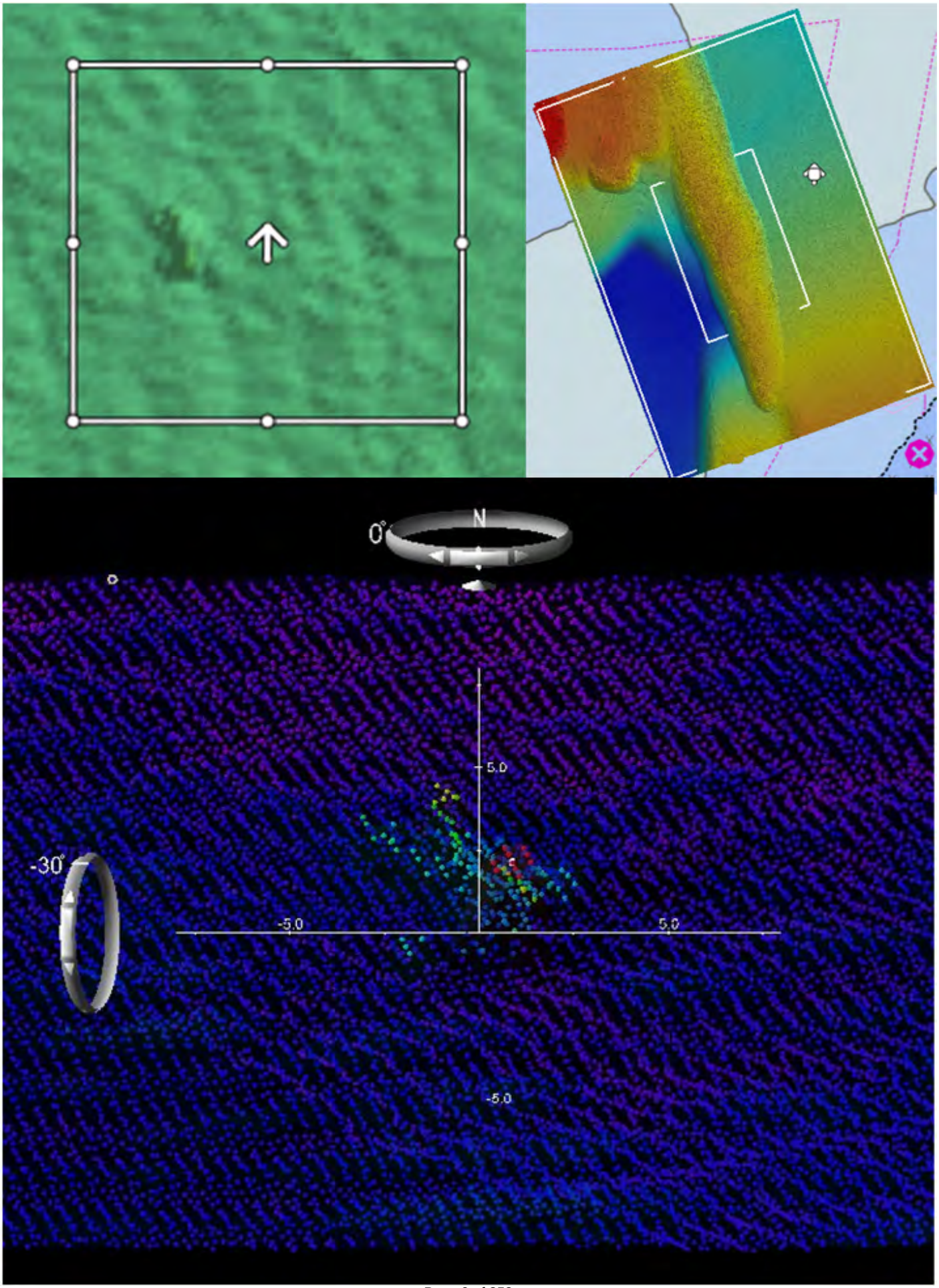
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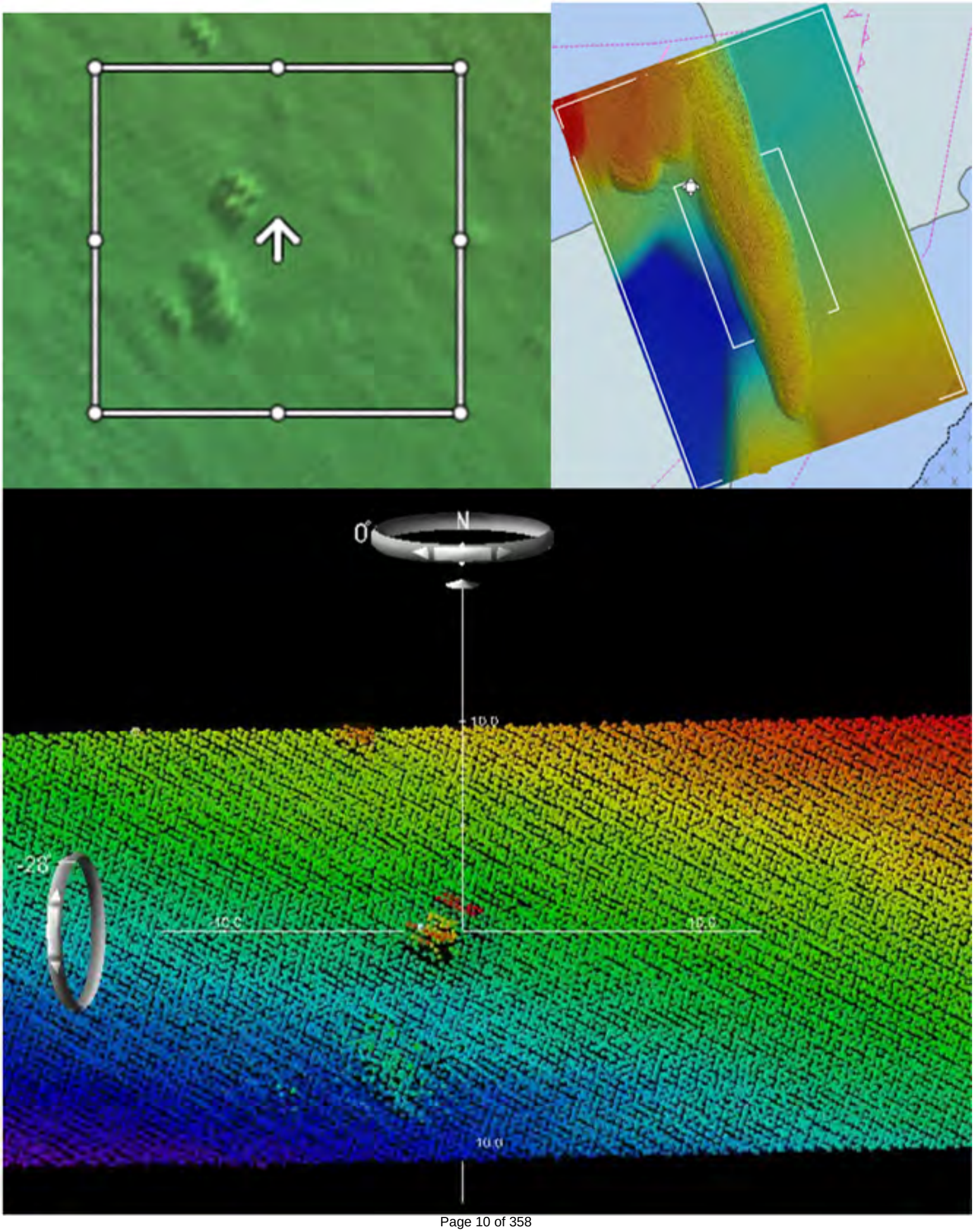
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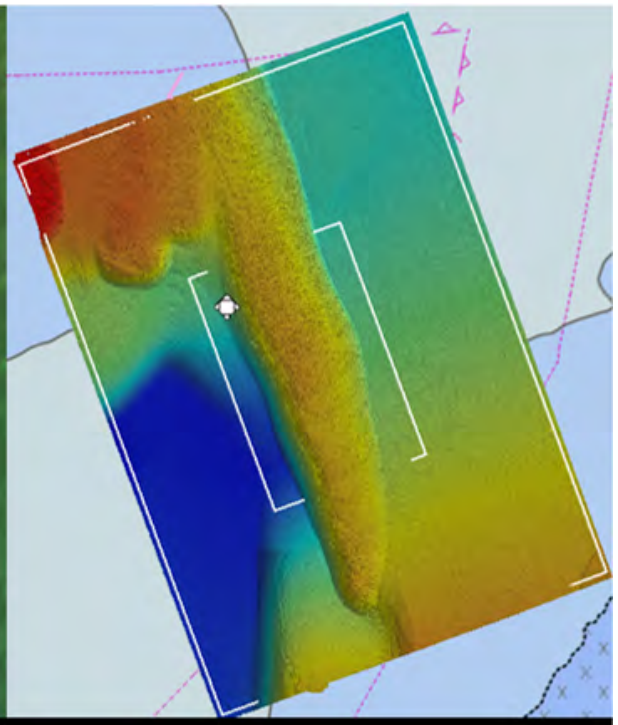

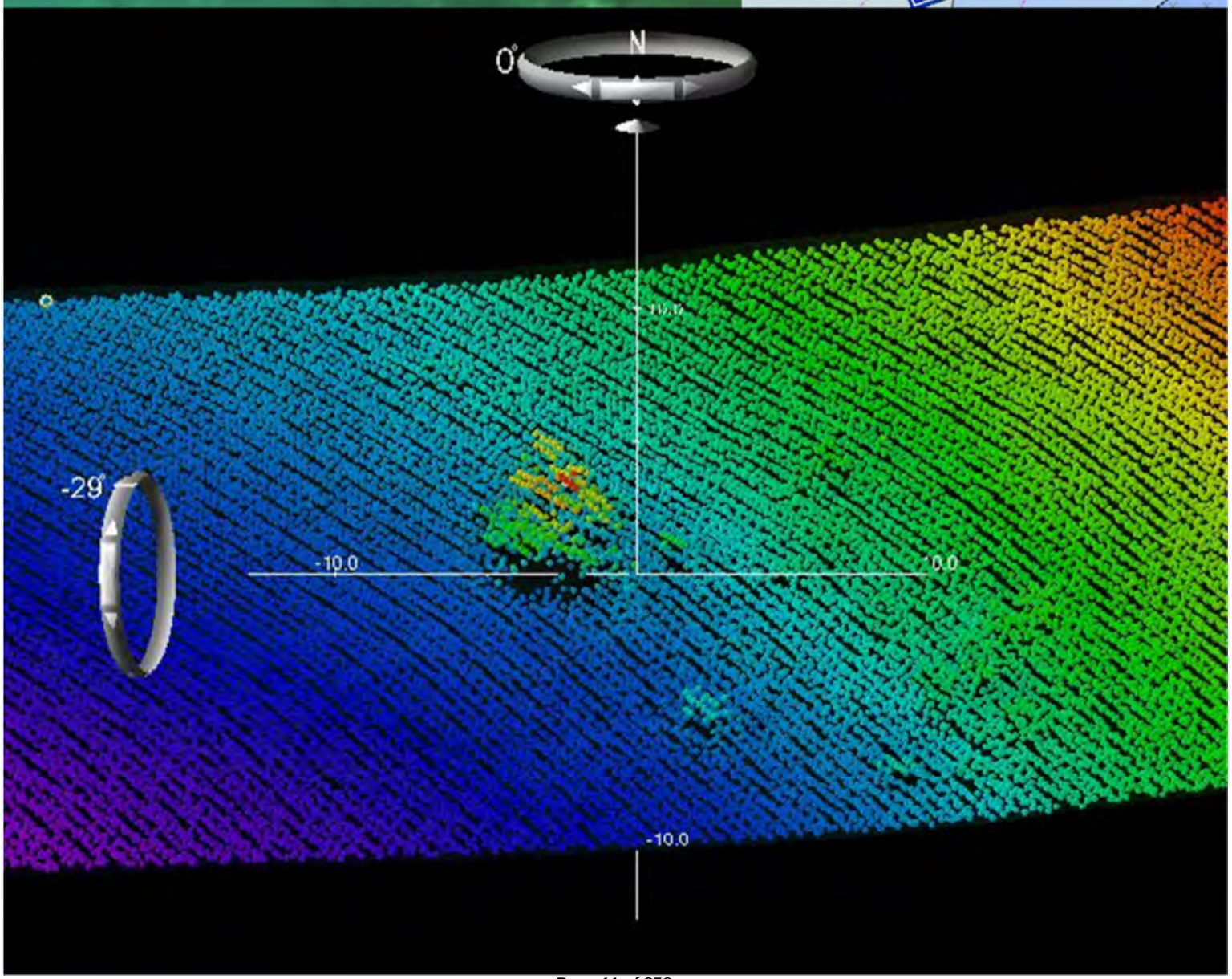
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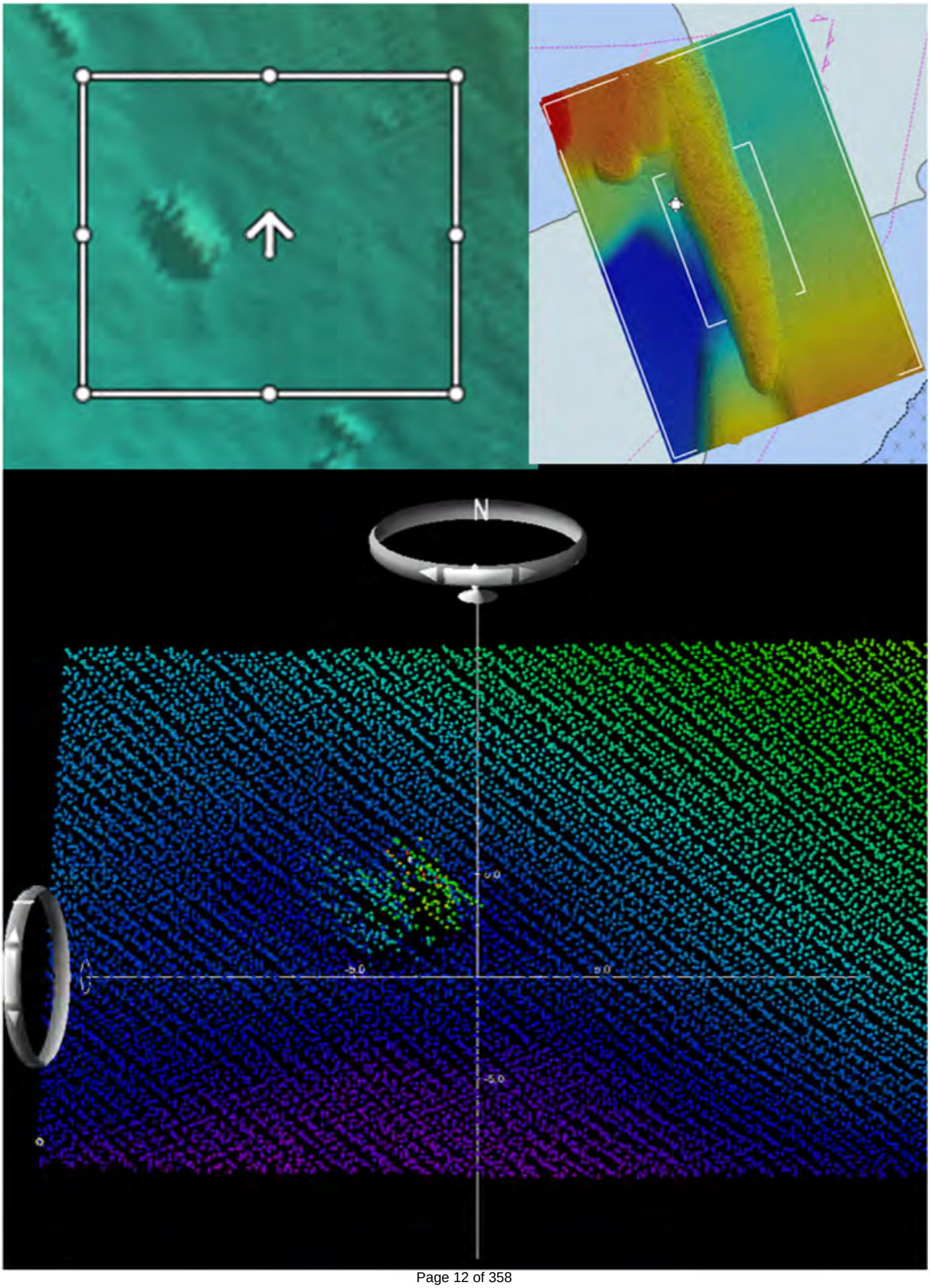
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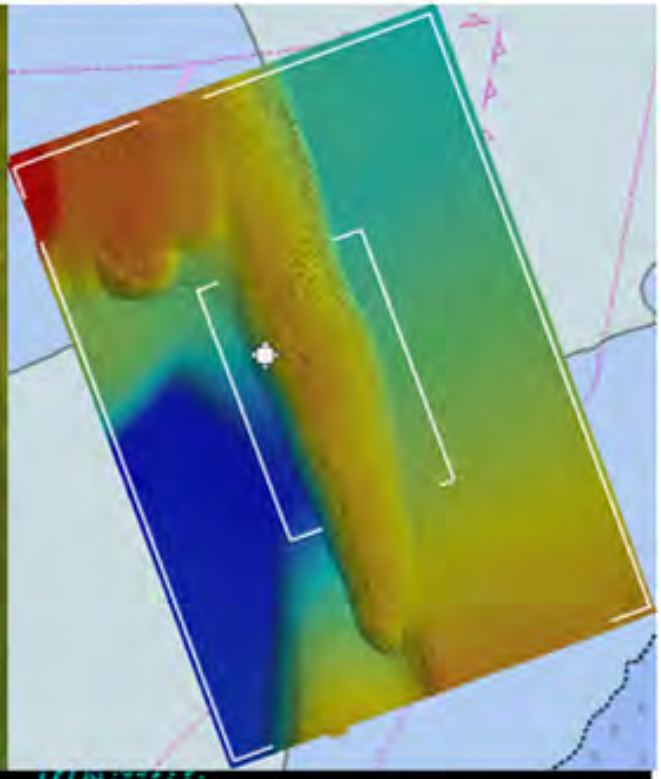

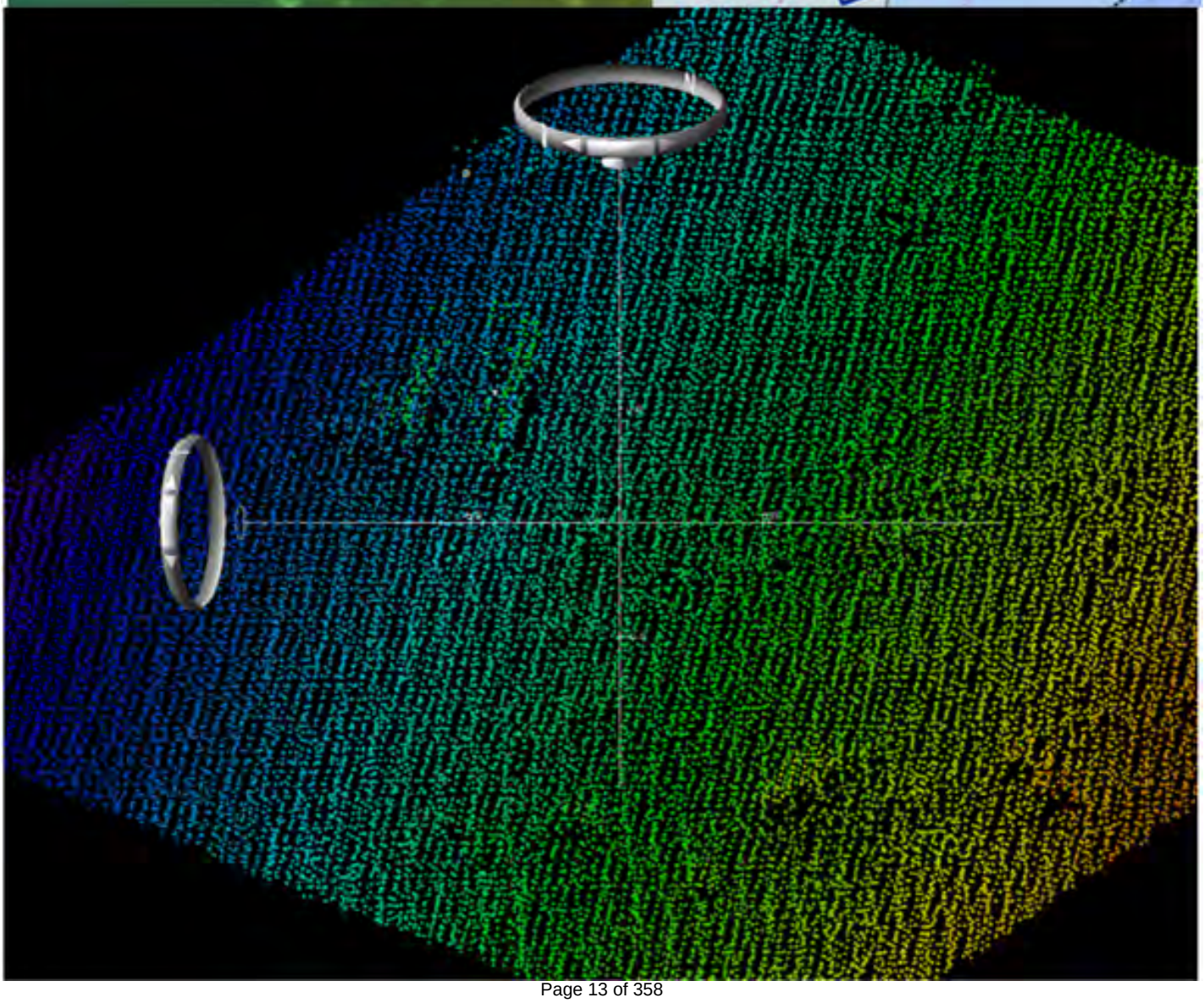

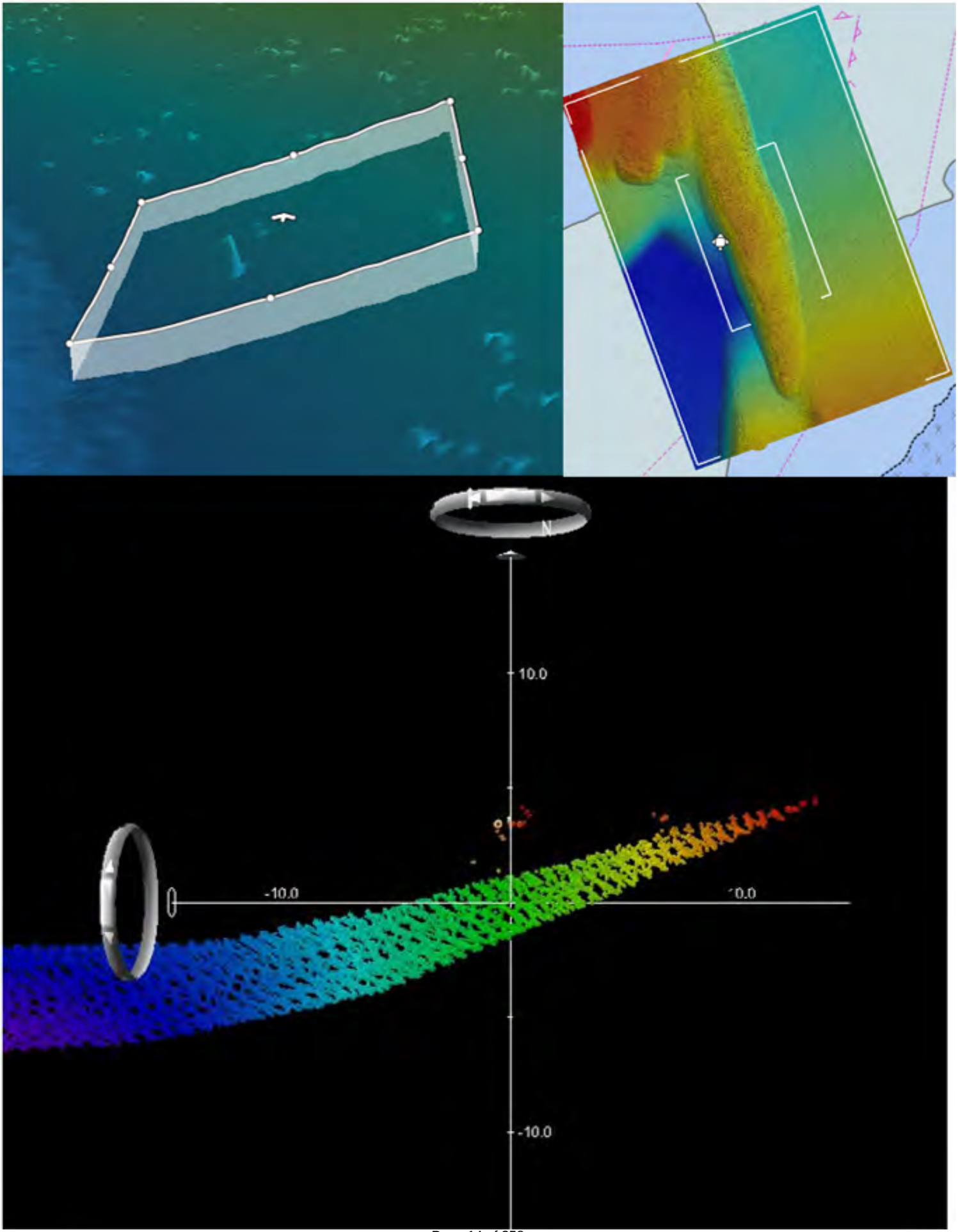
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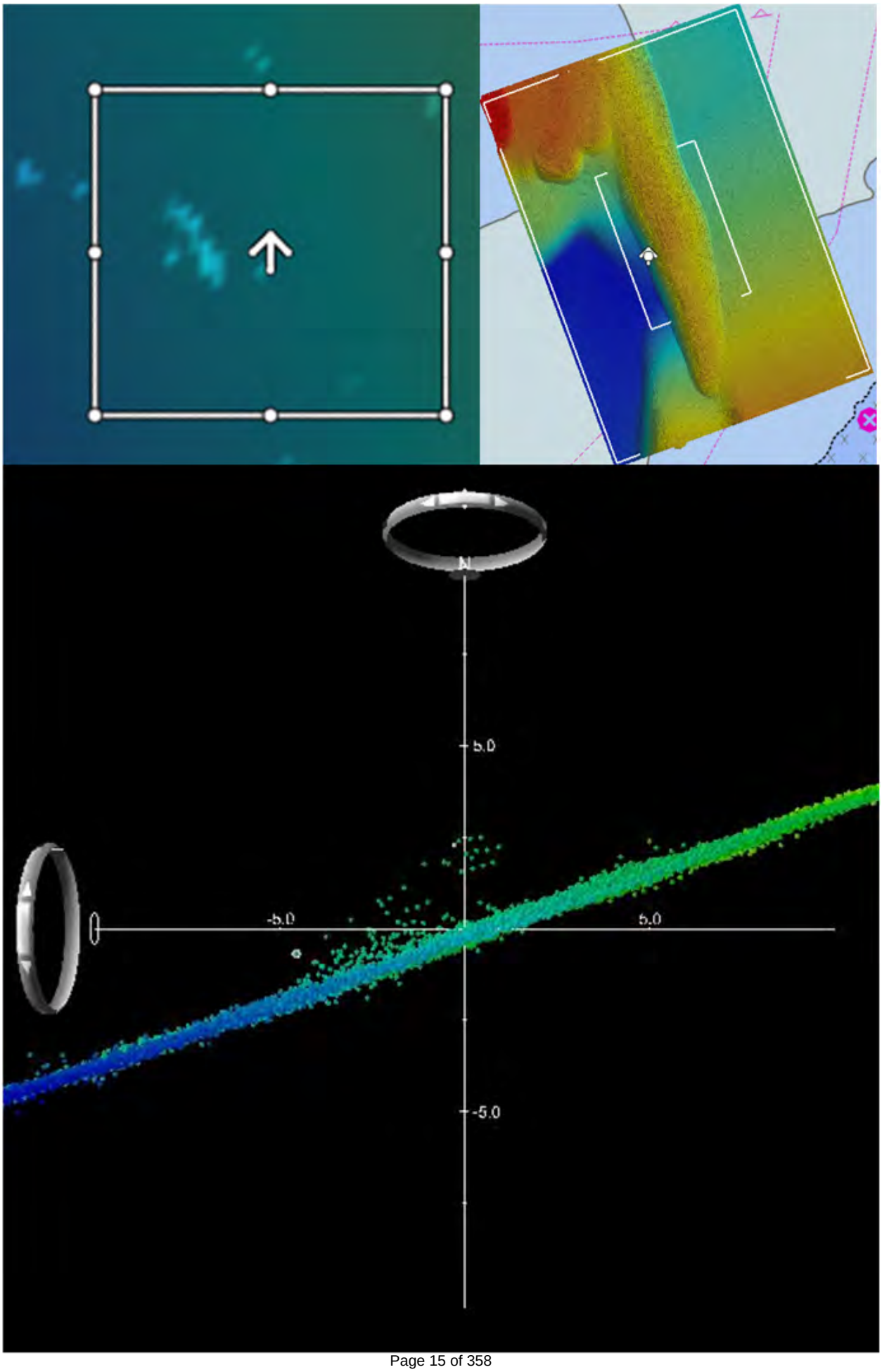
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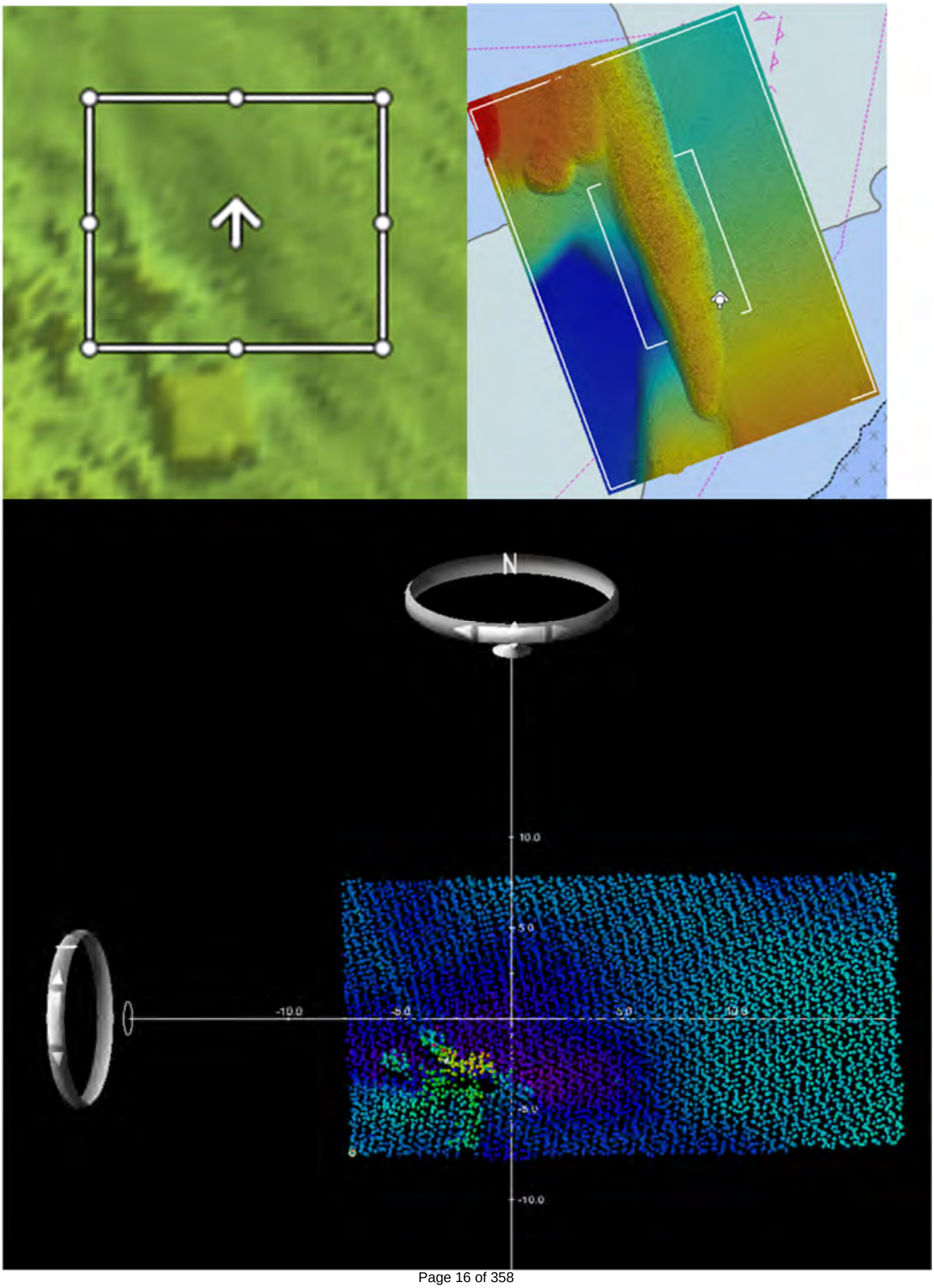
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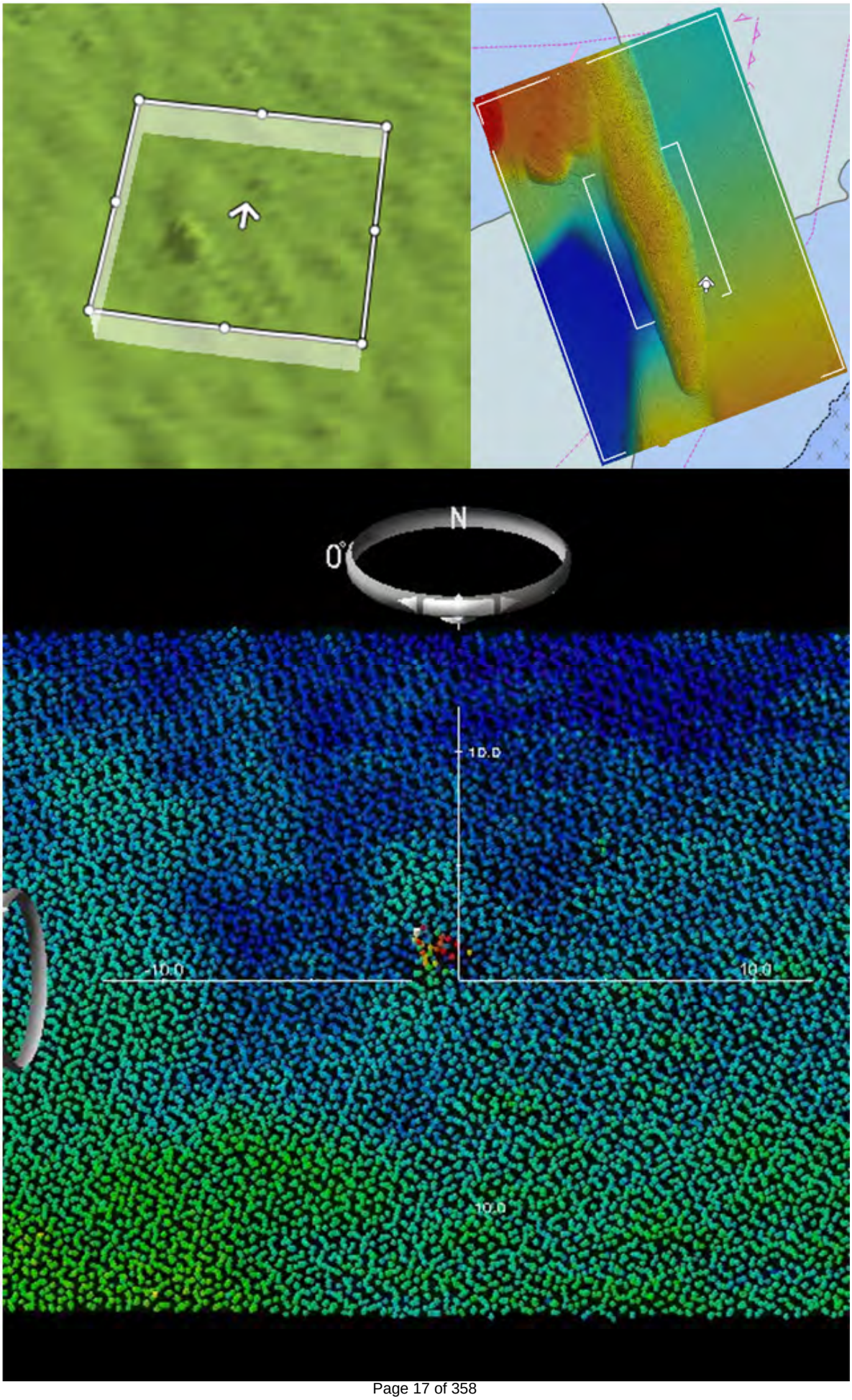
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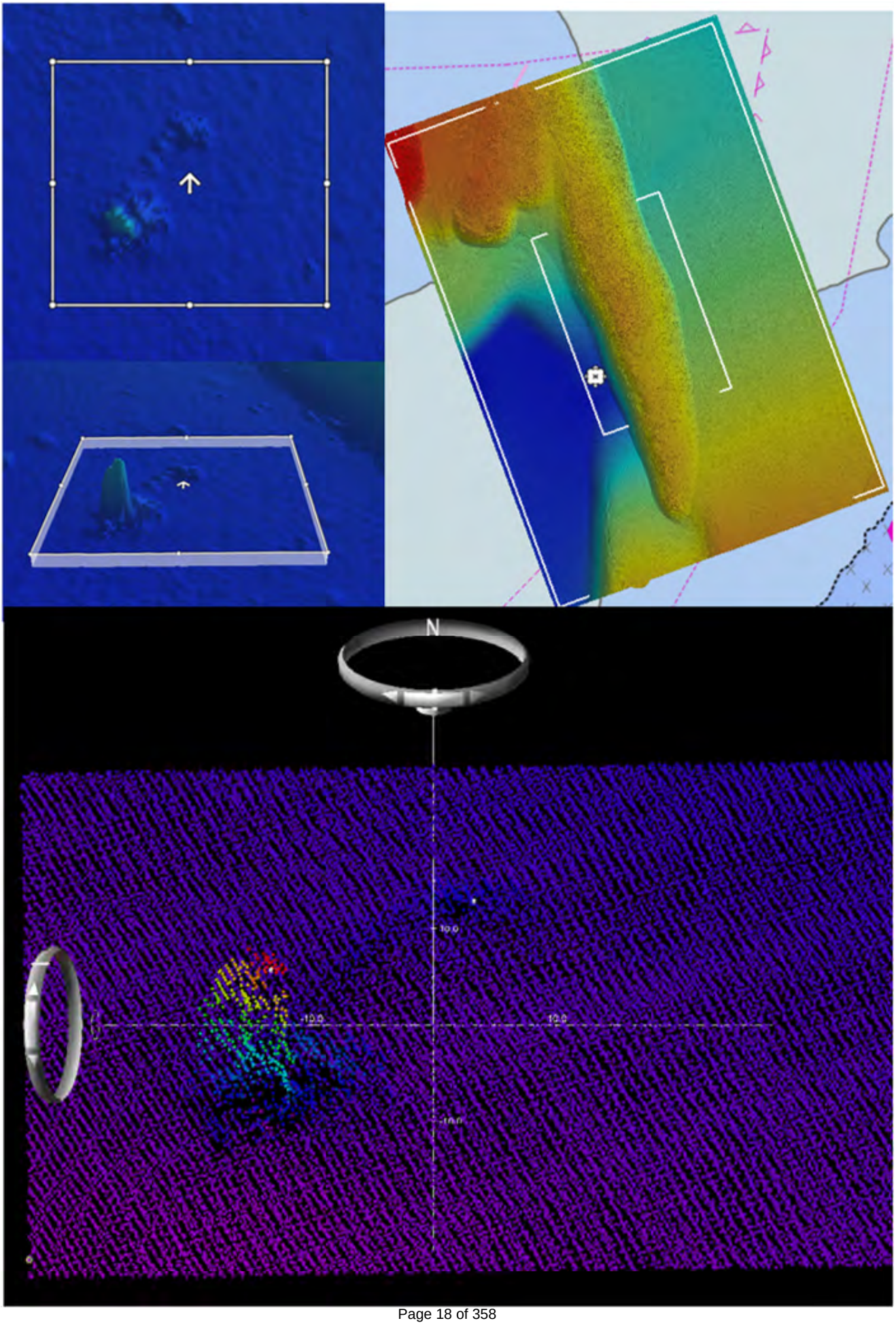
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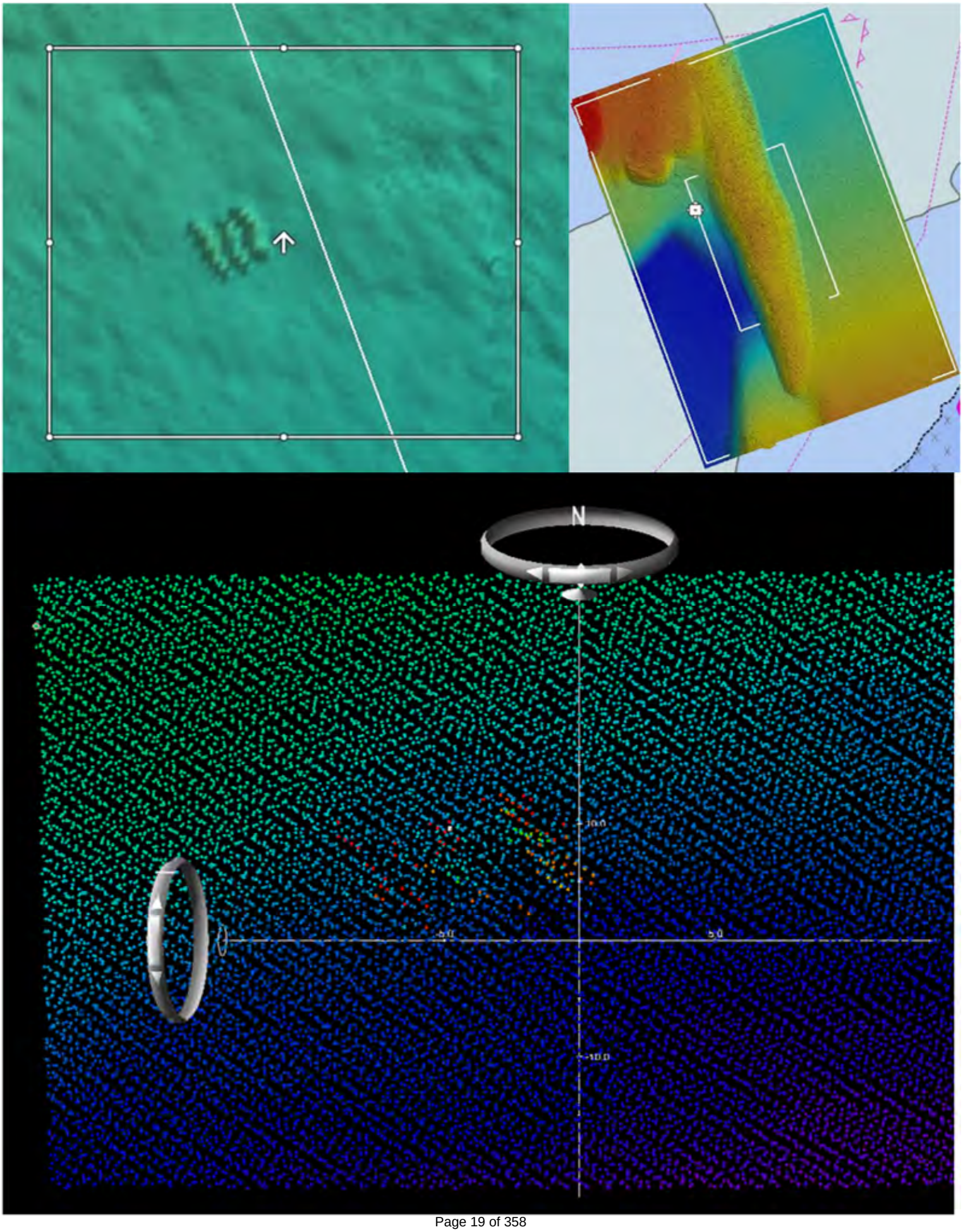
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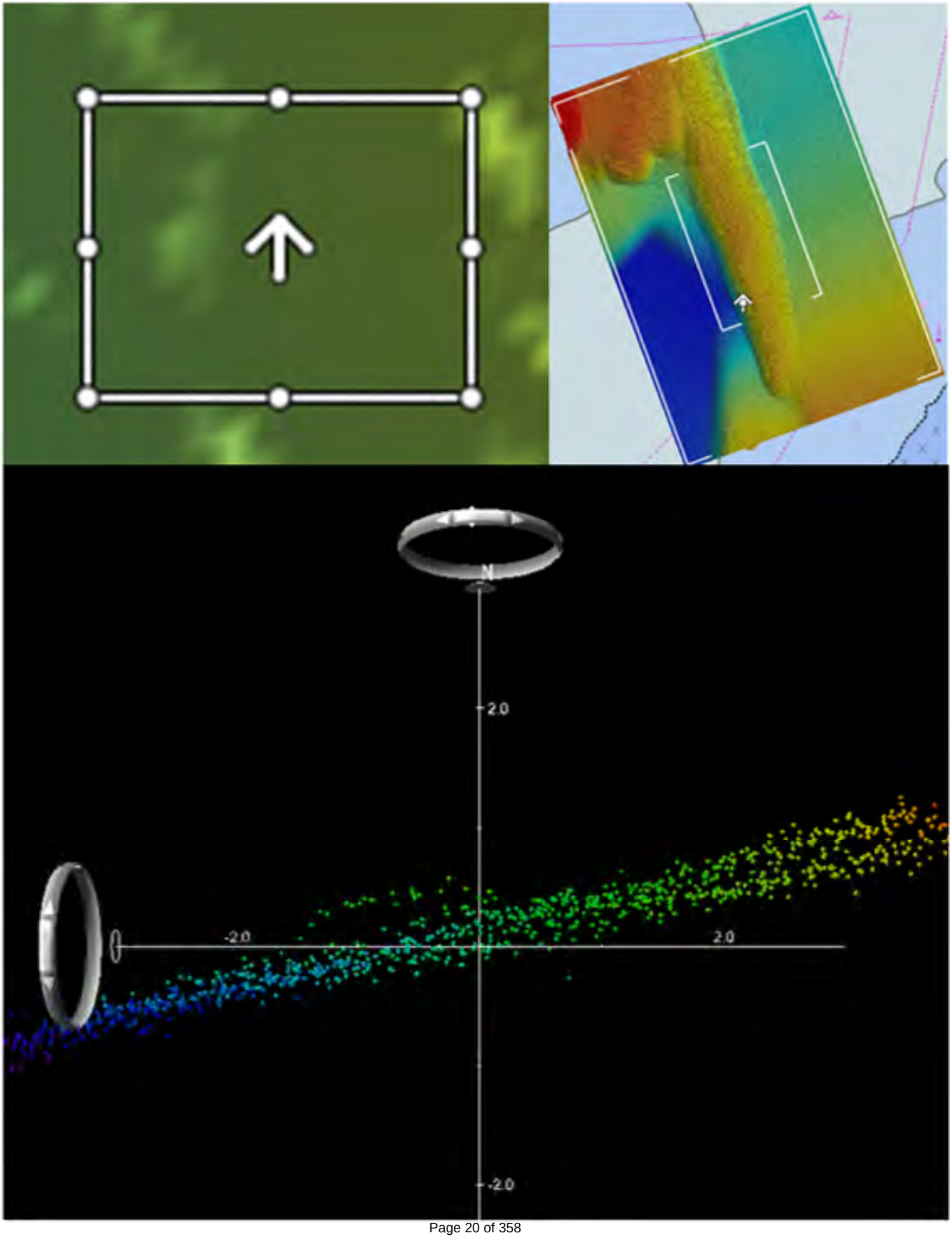
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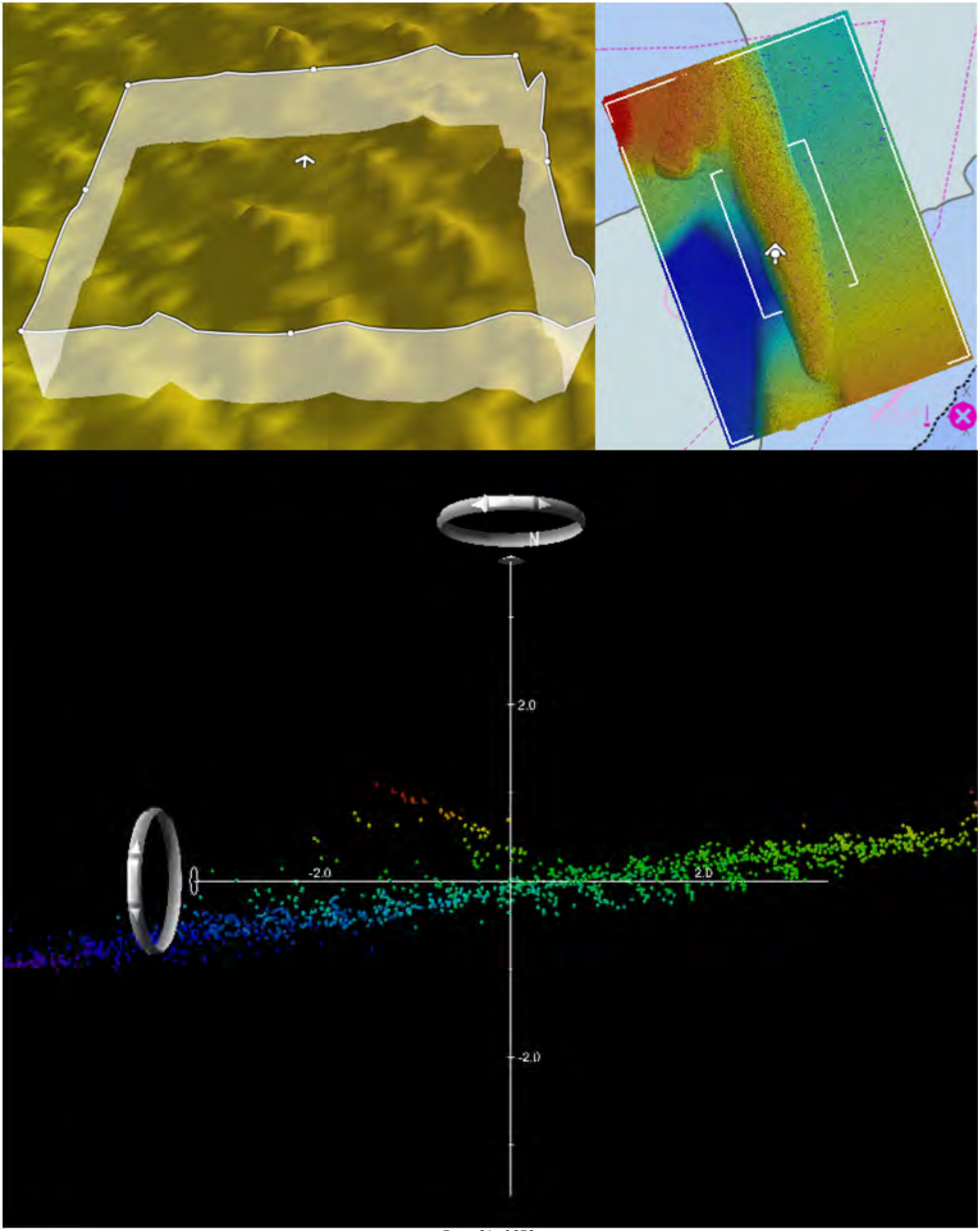
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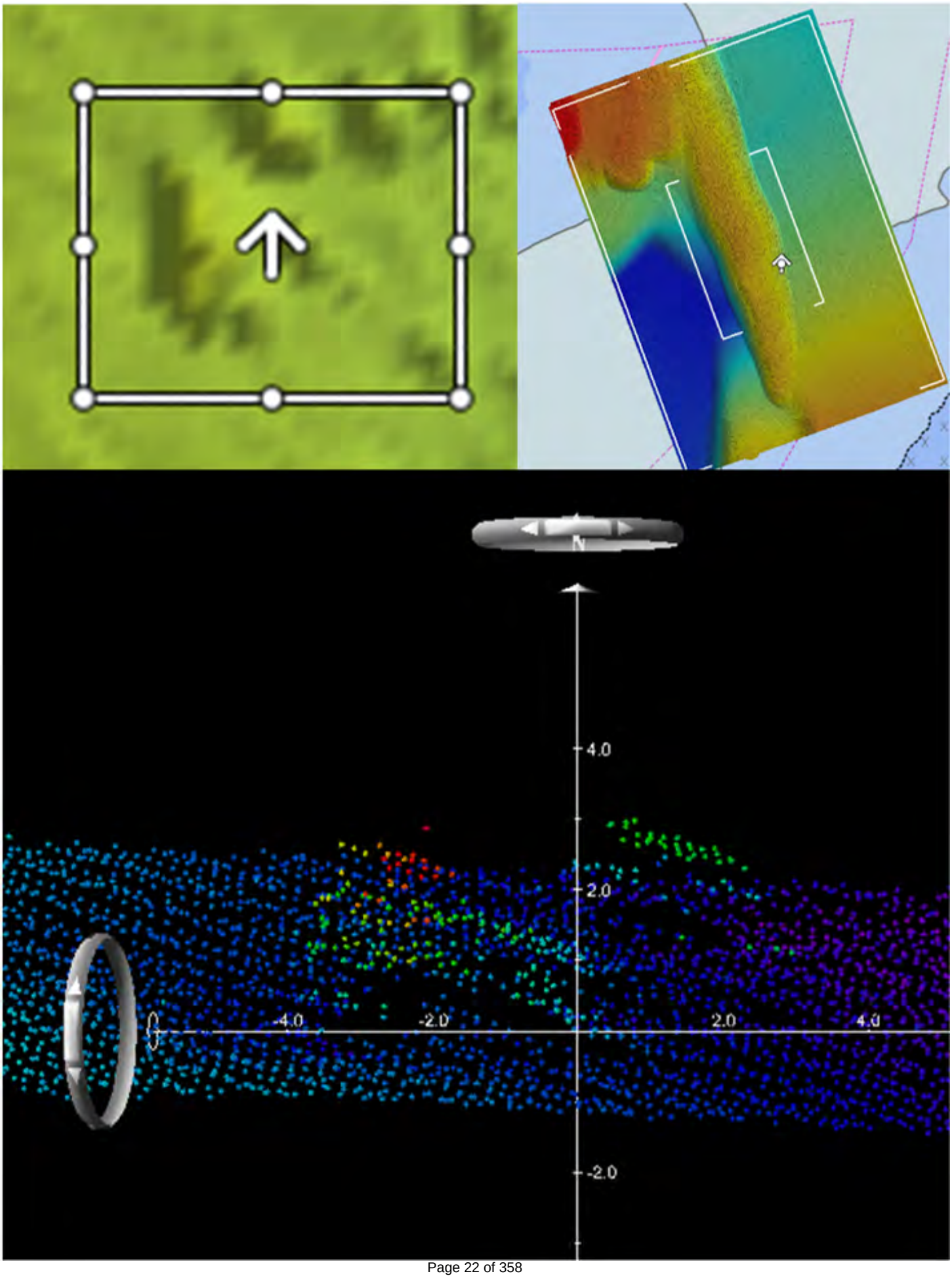
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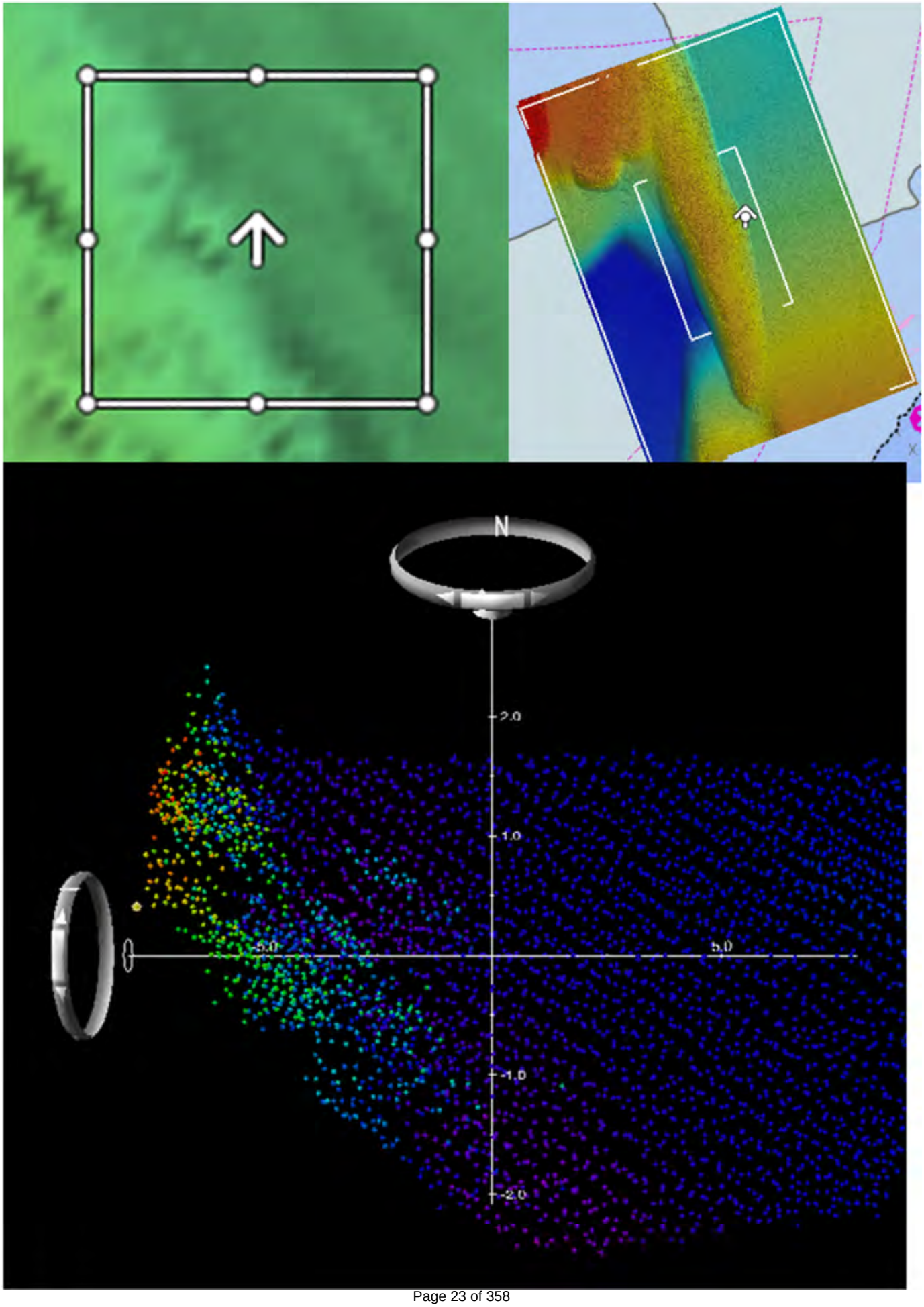
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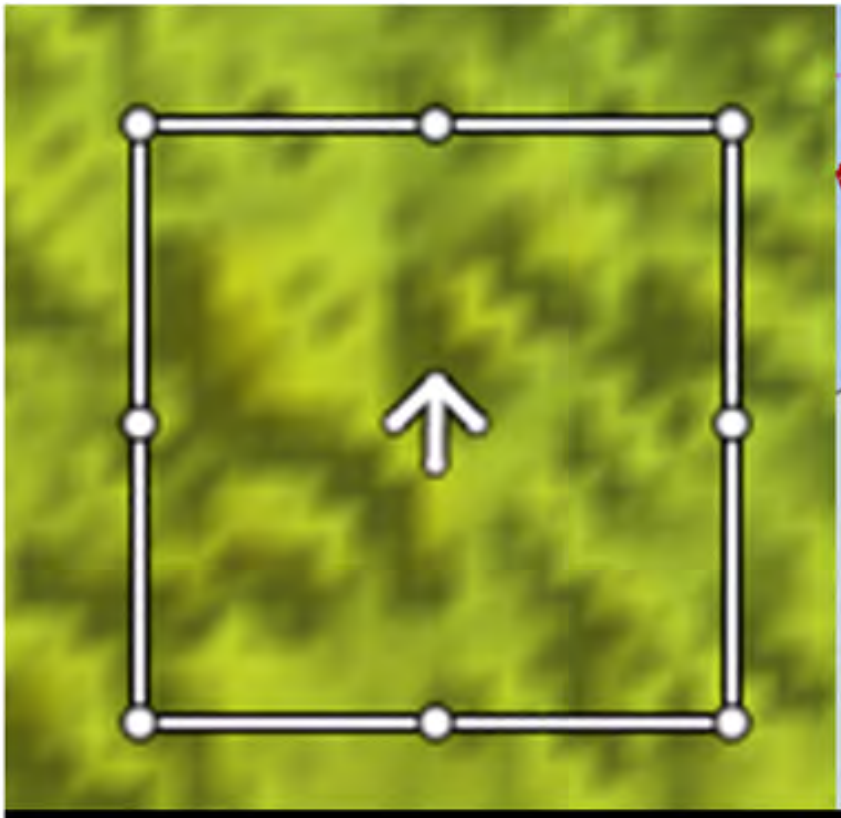

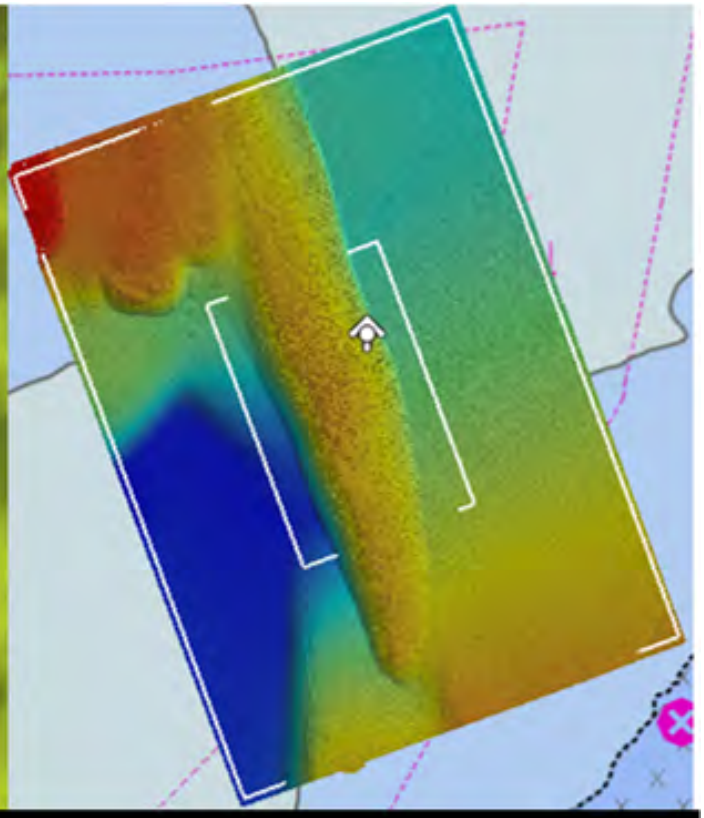

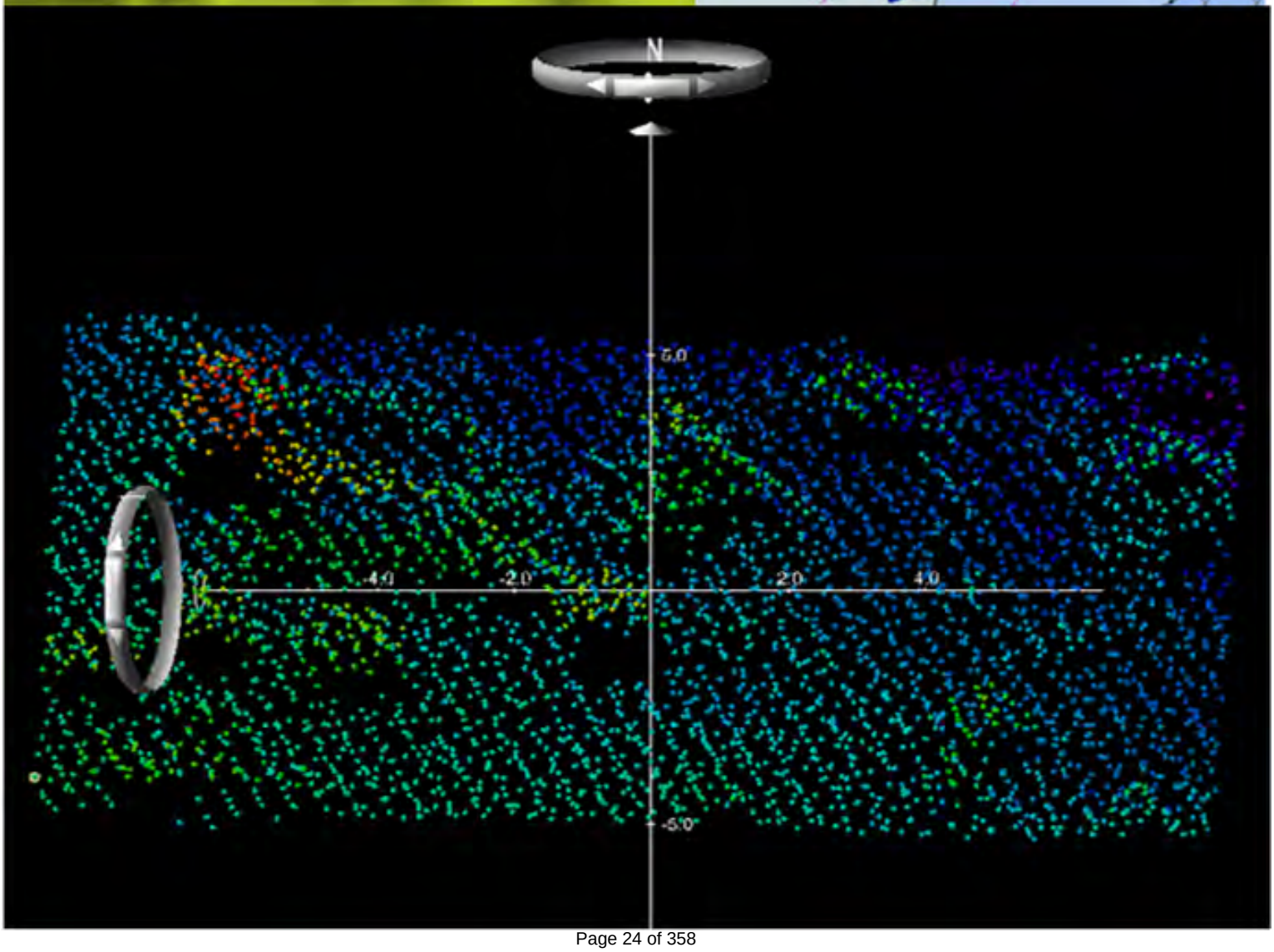
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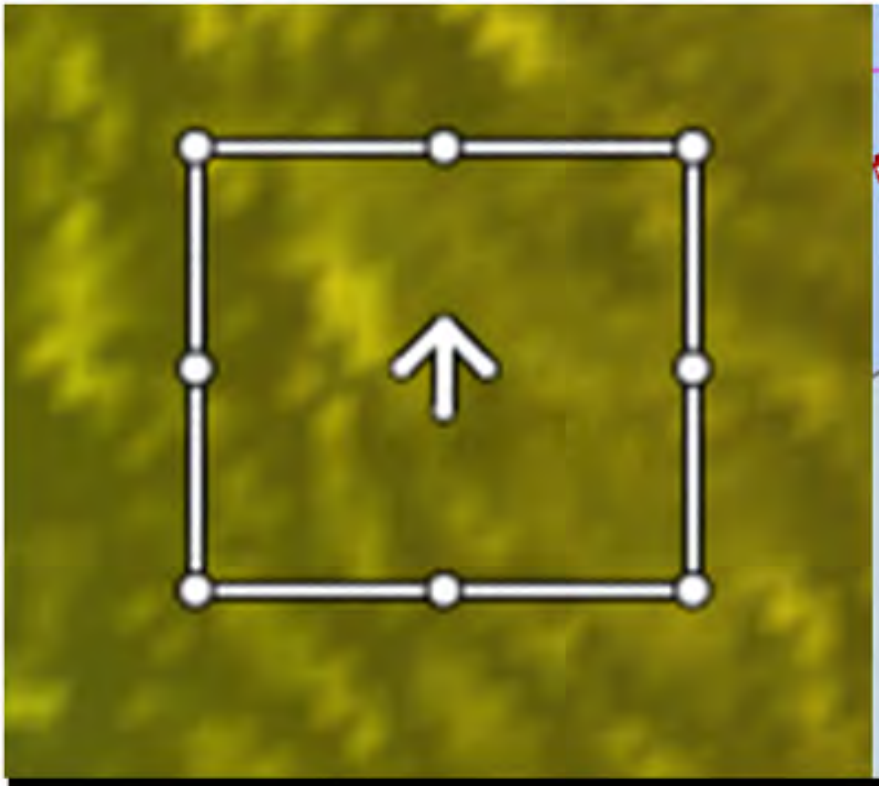

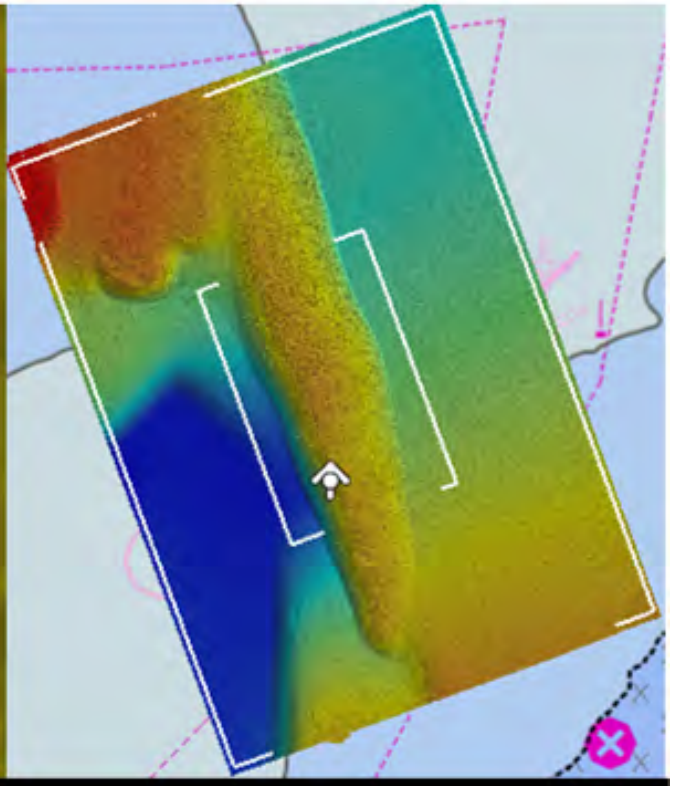

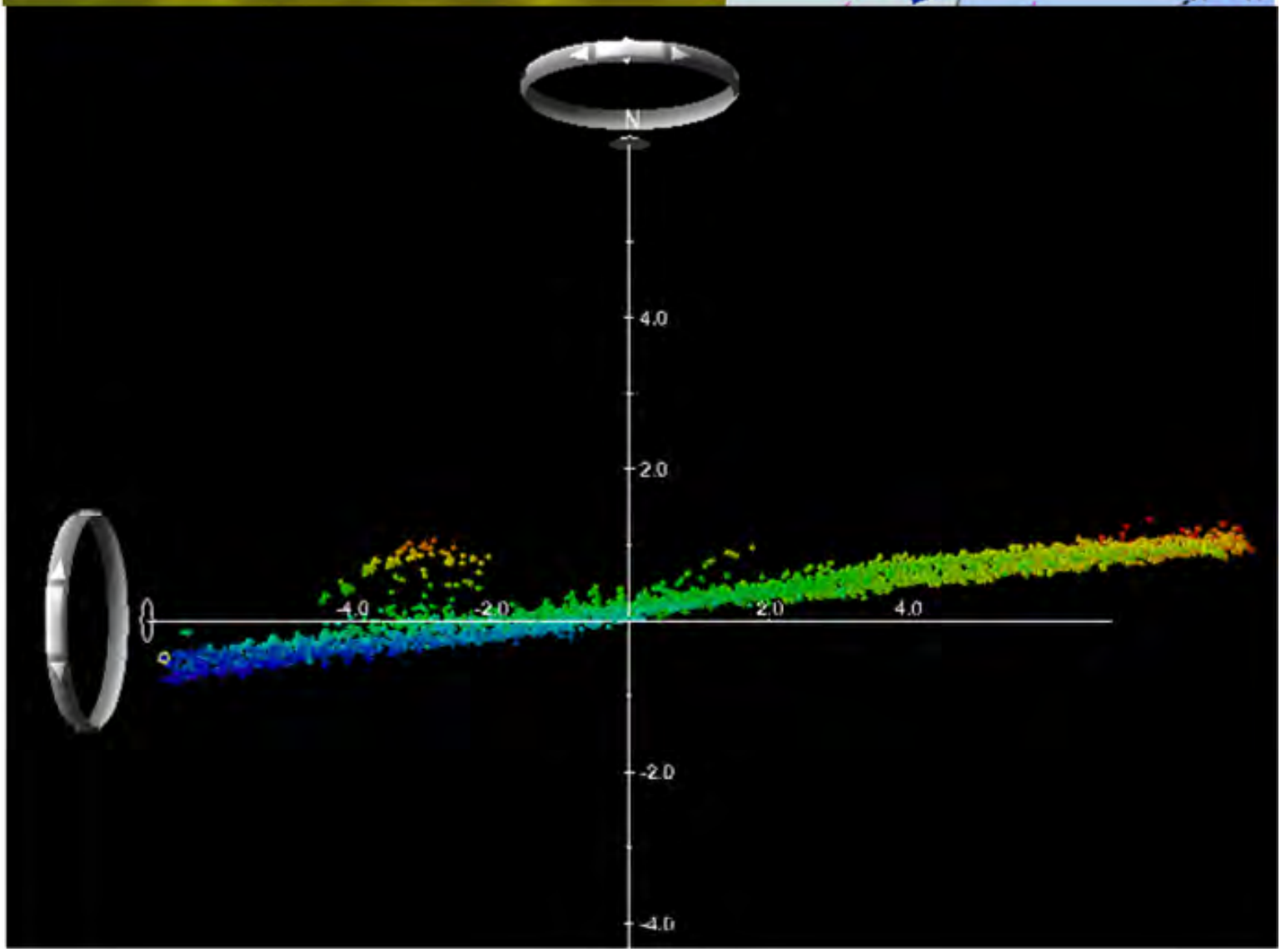
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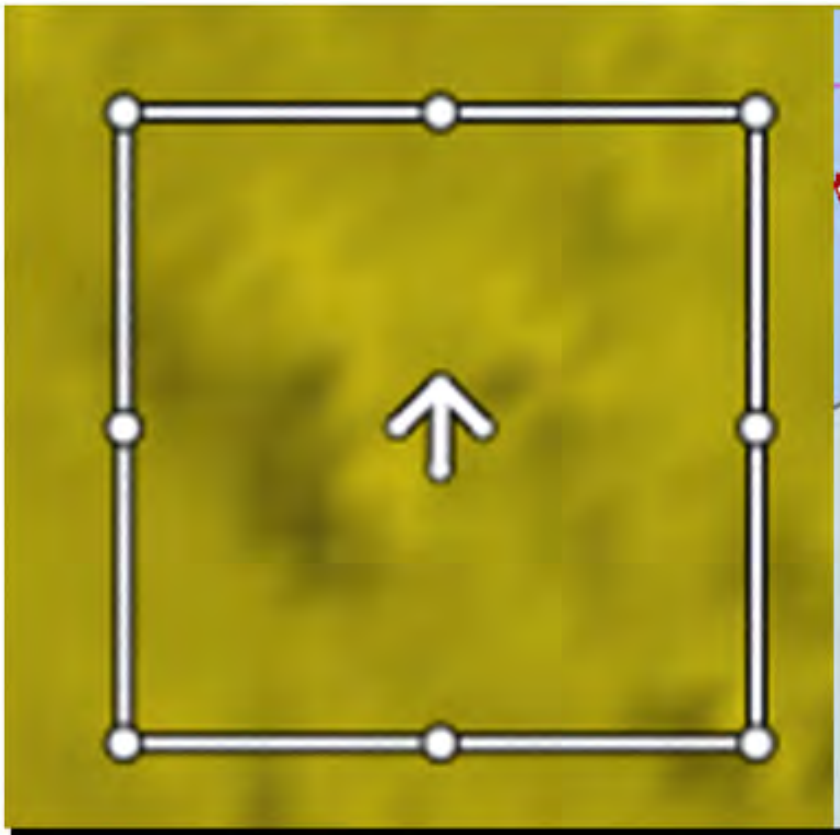

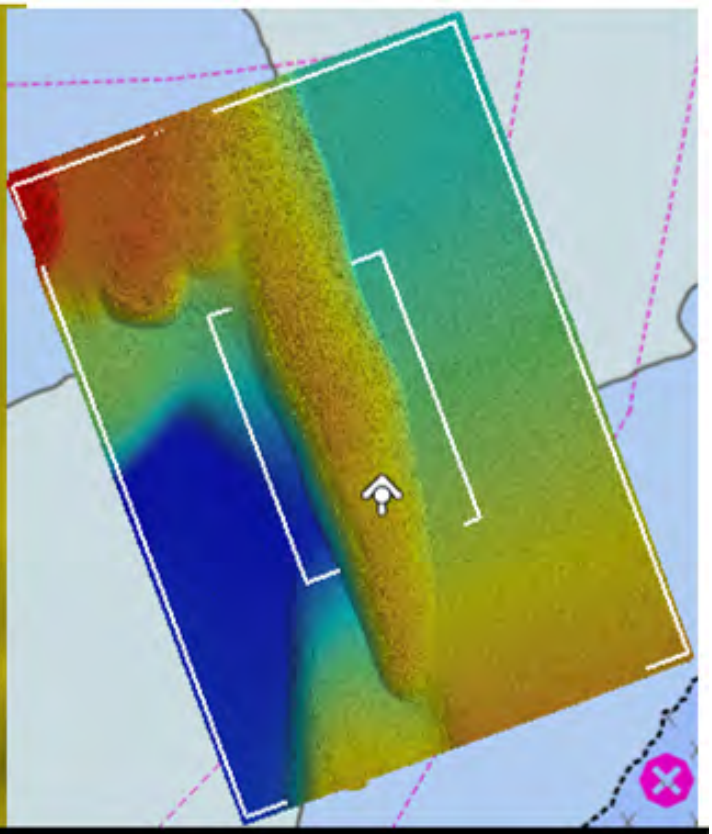

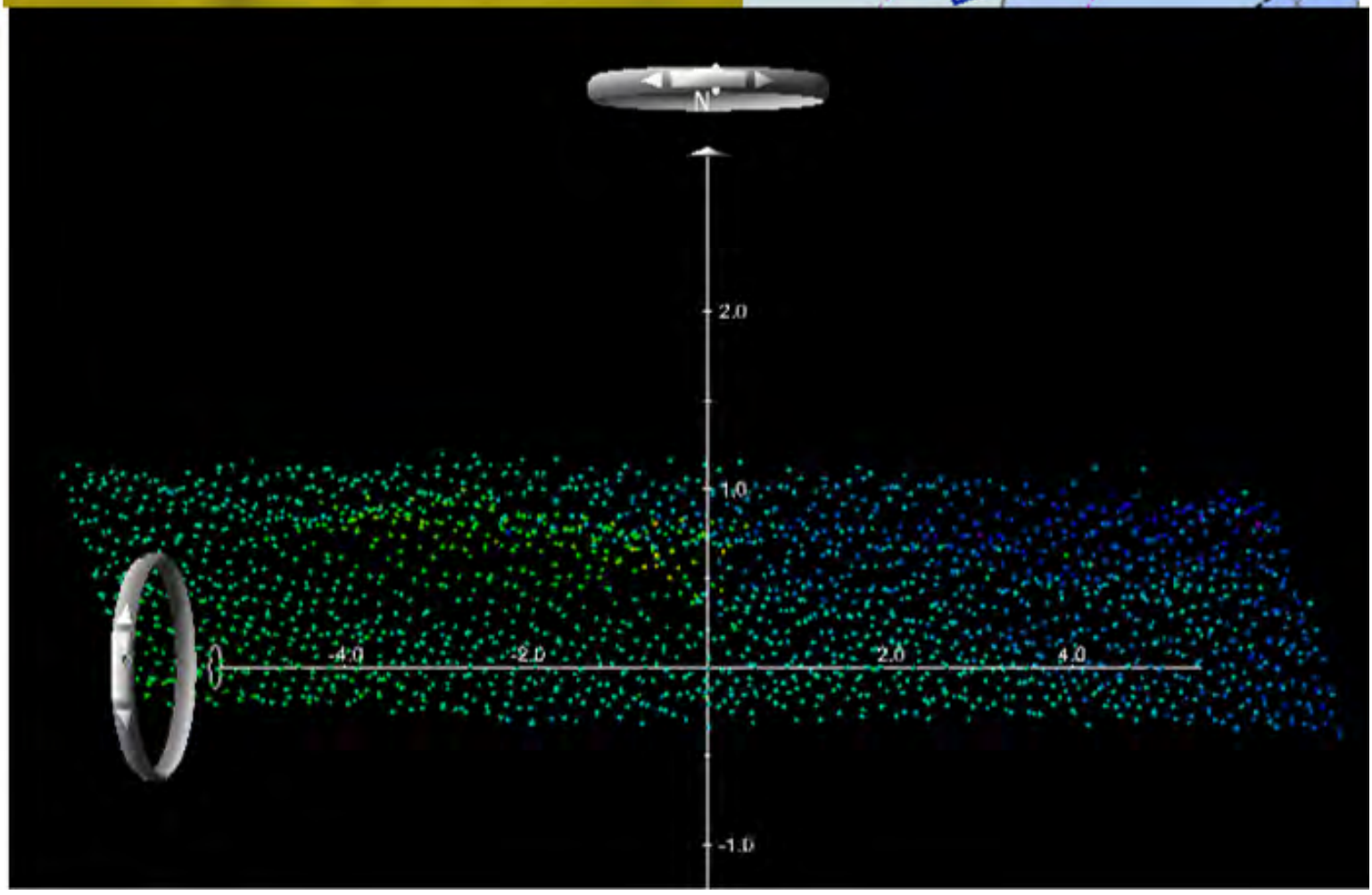
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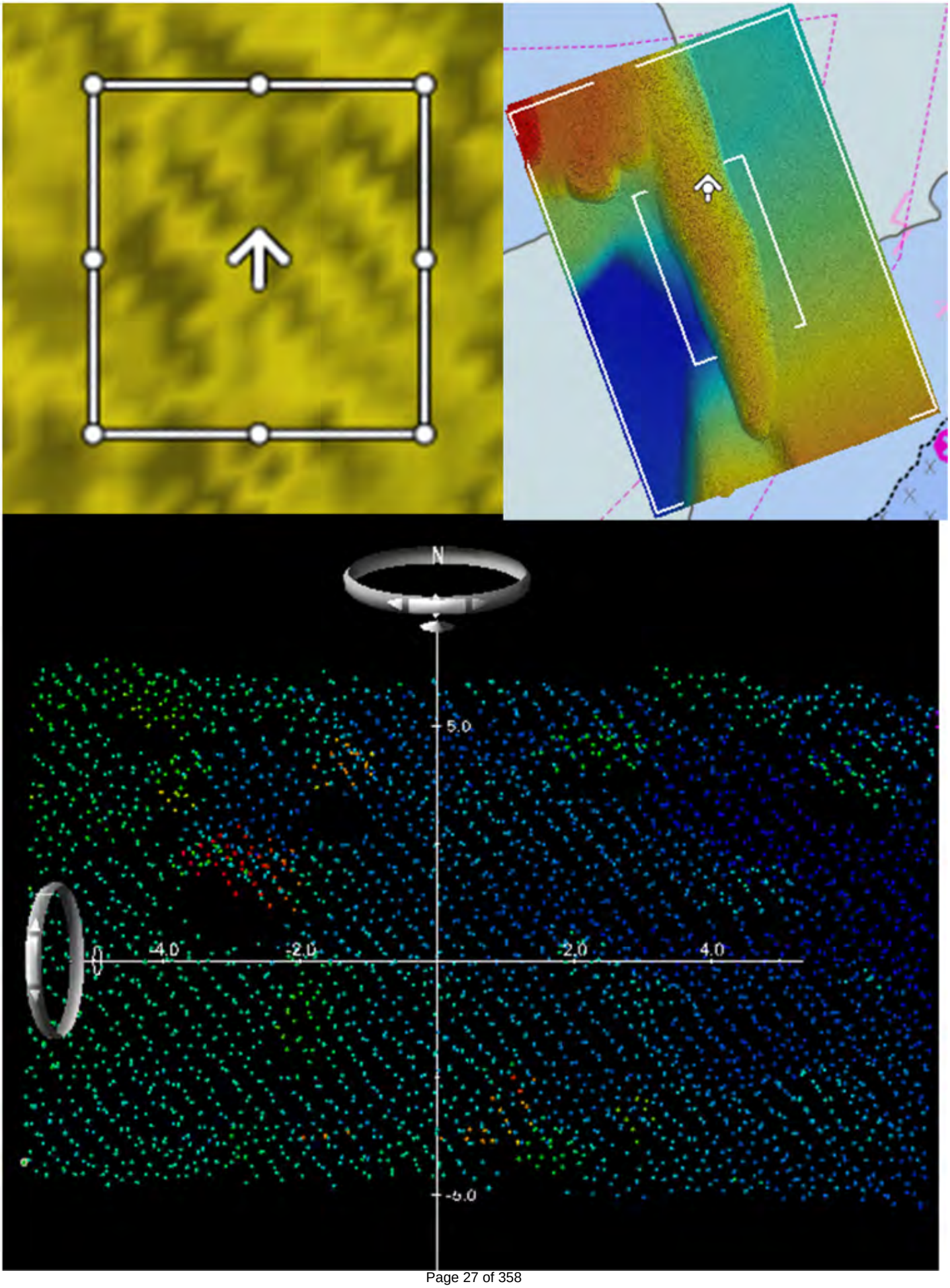
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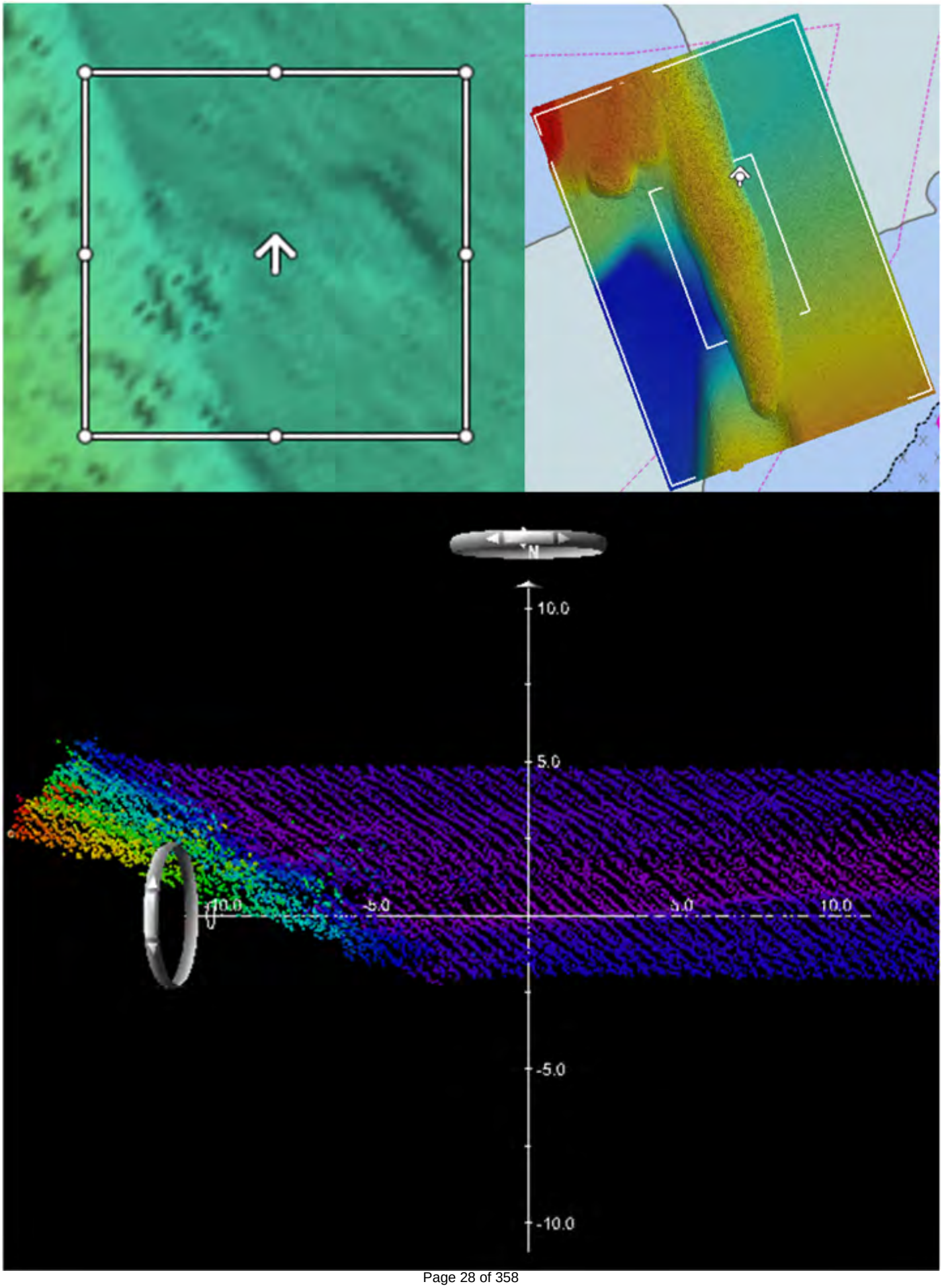
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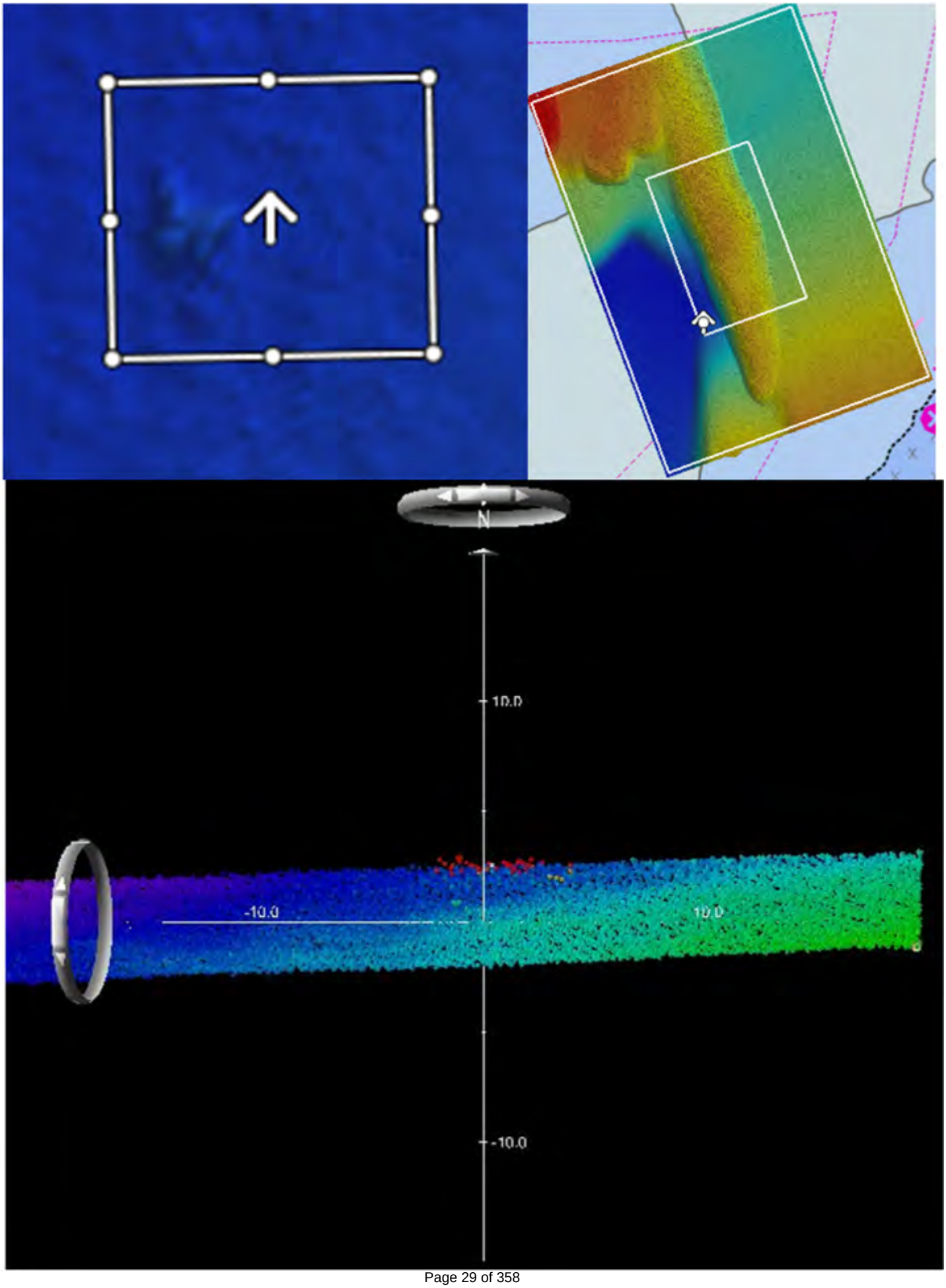
10.0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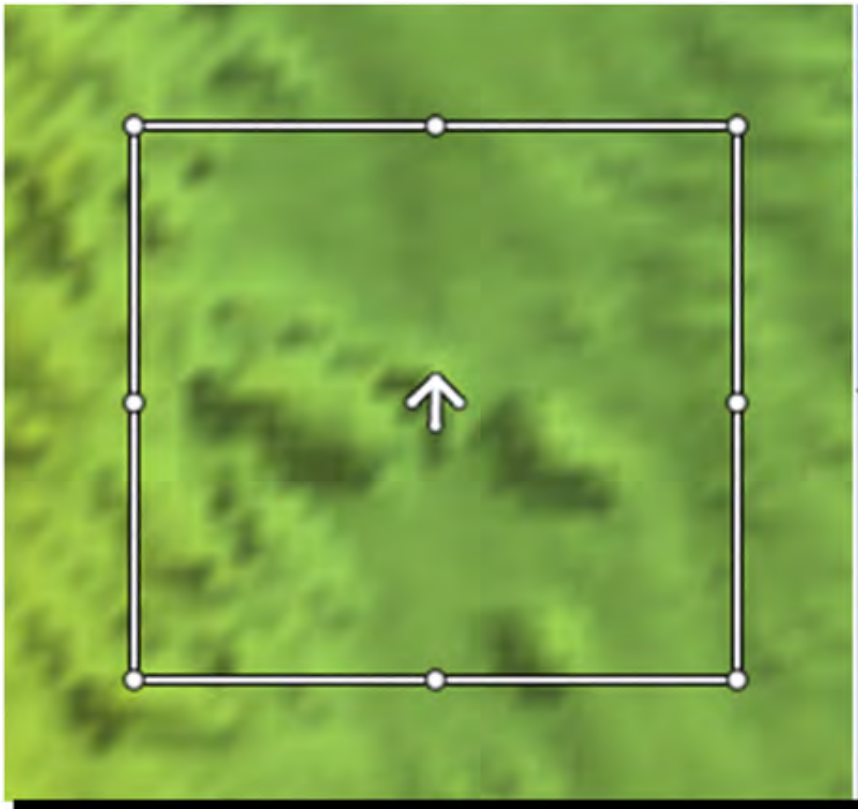

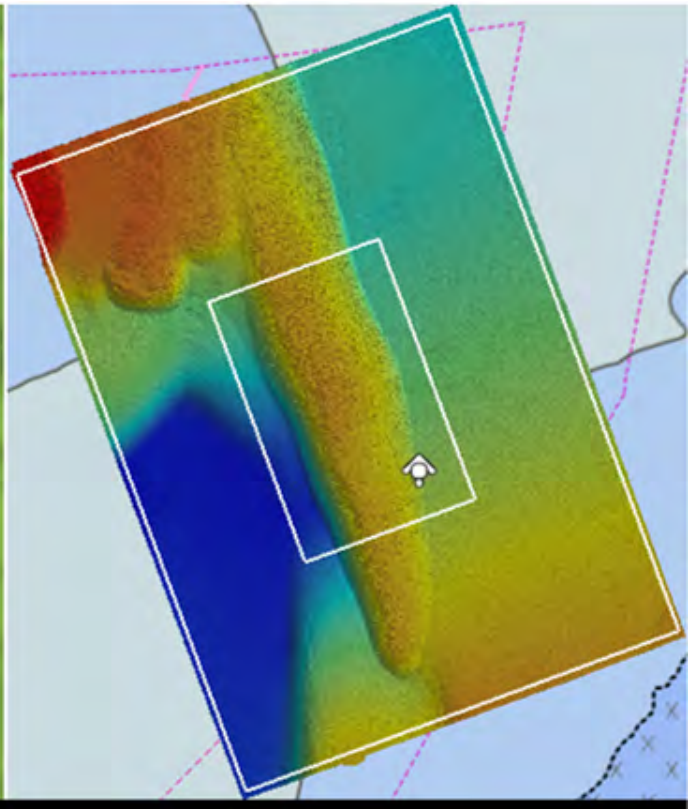

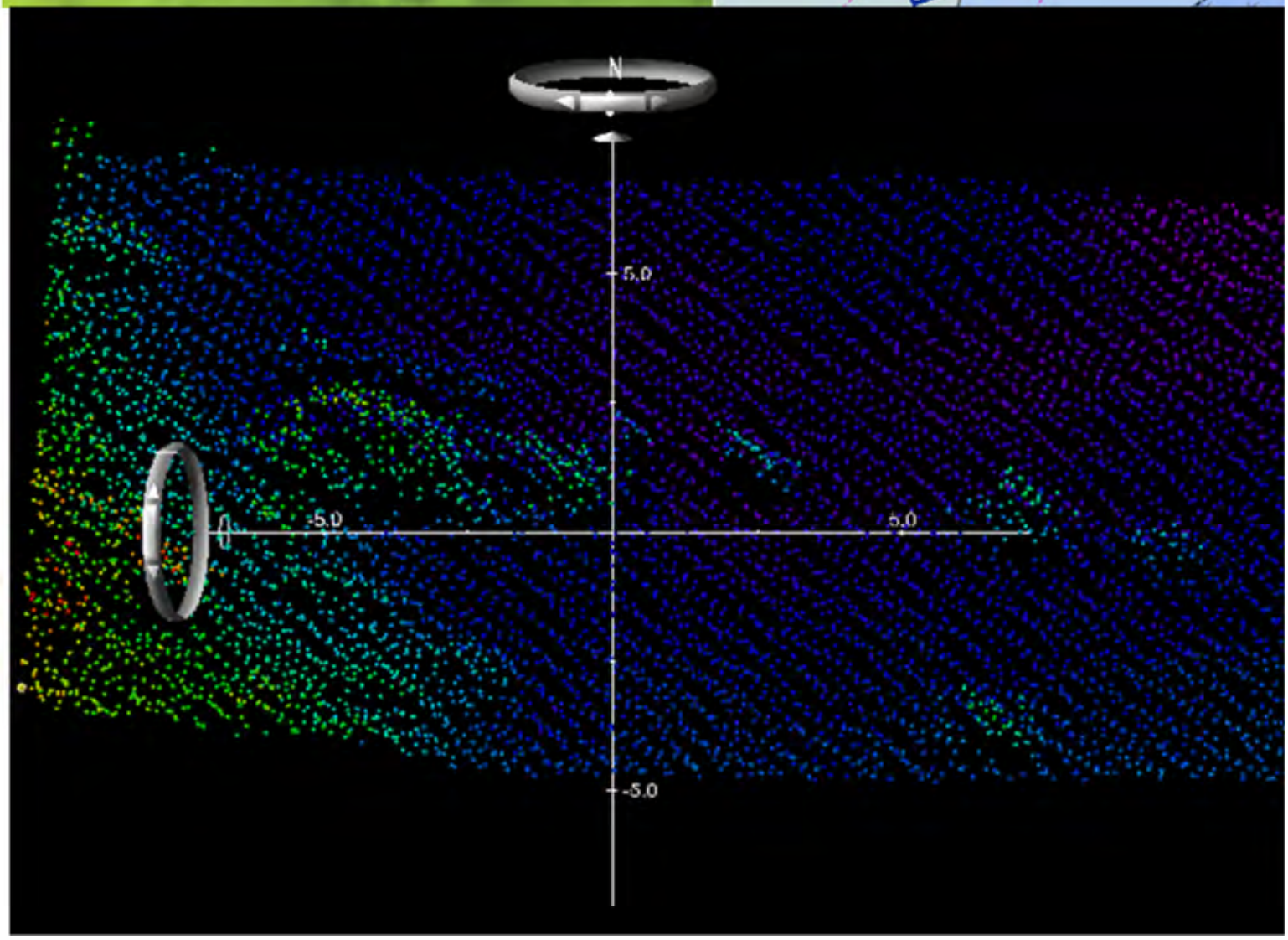
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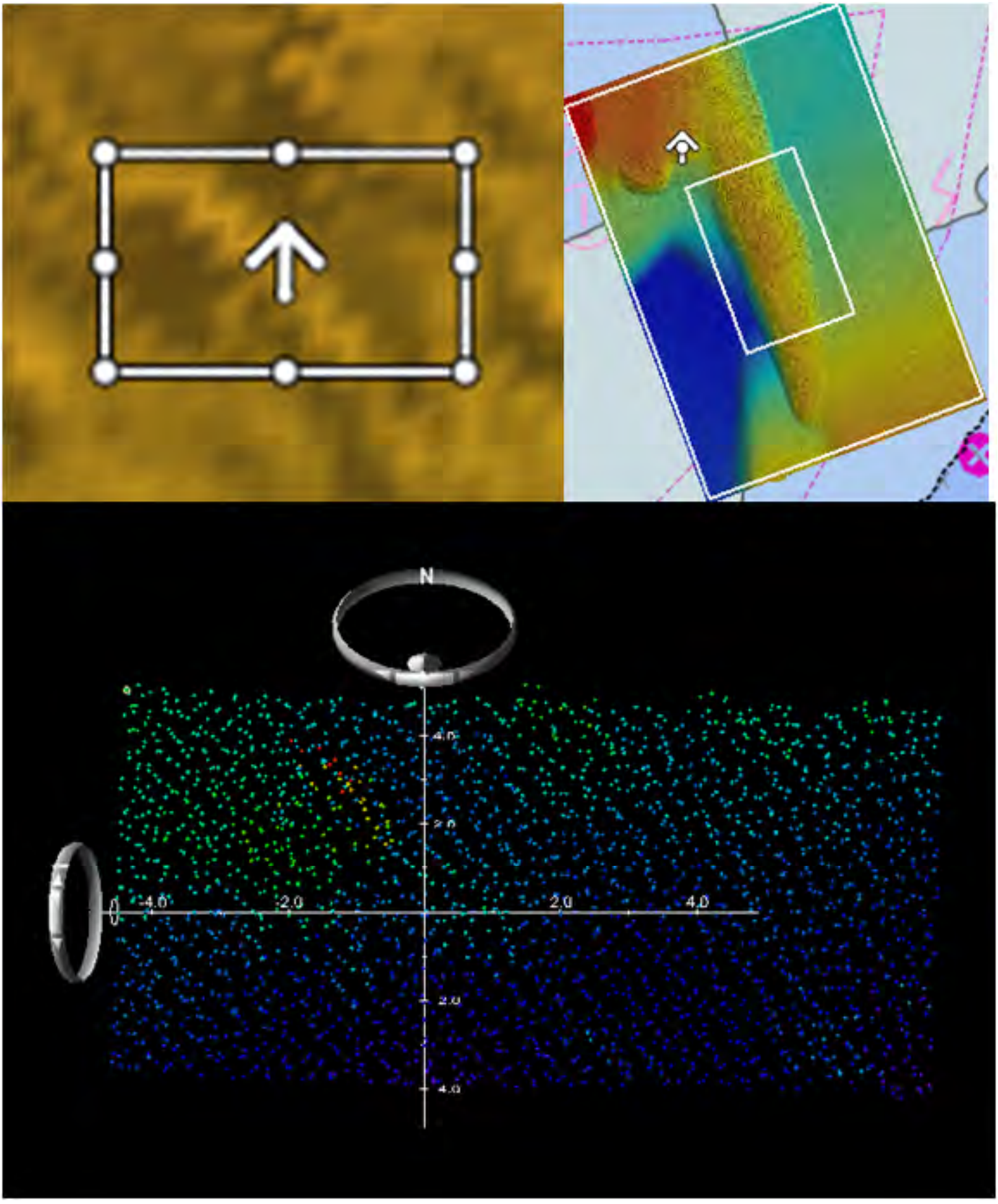
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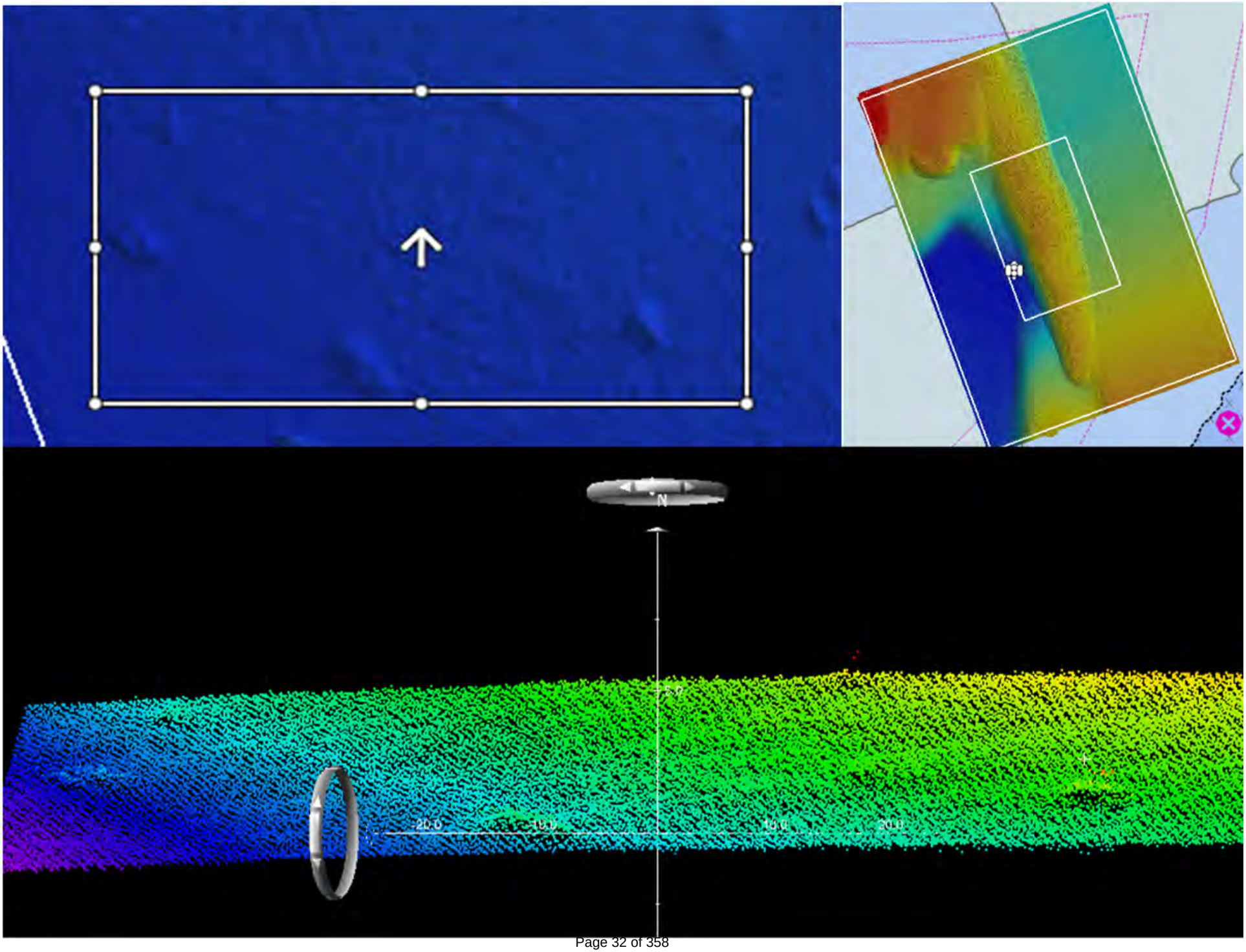
-2.0
-4.0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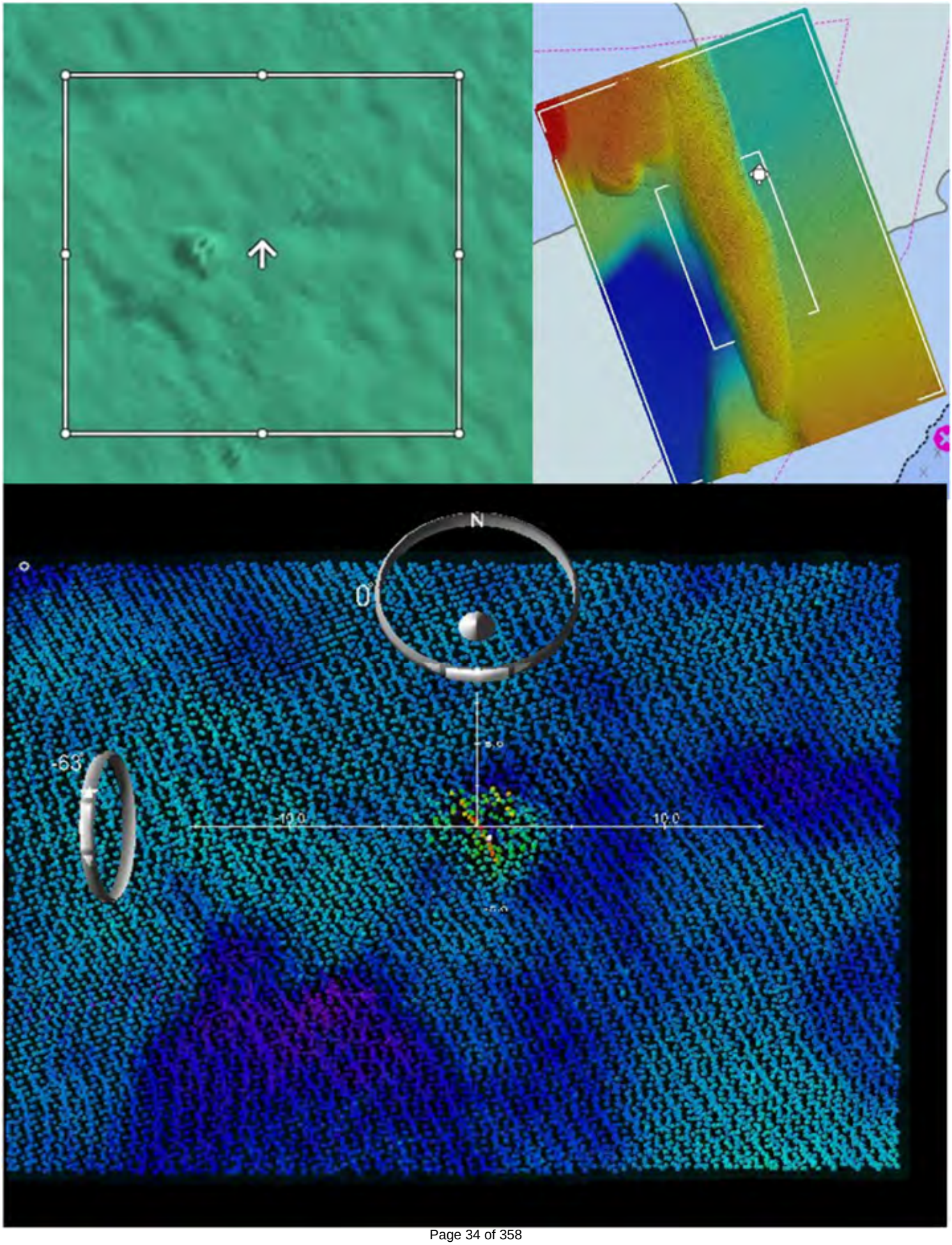
20.0

Surface Objects:

Non Ferrous Inner Box Unknown Objects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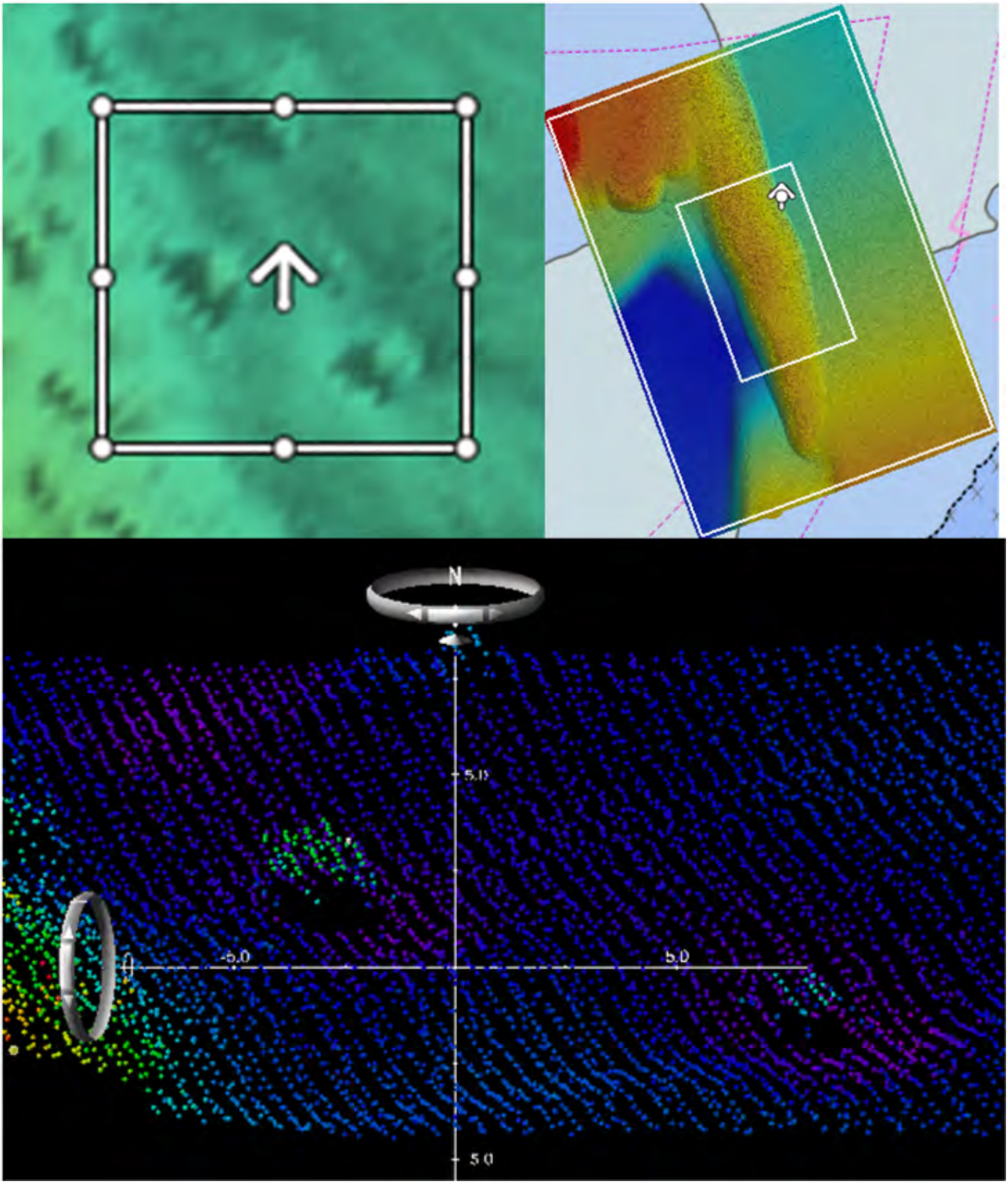
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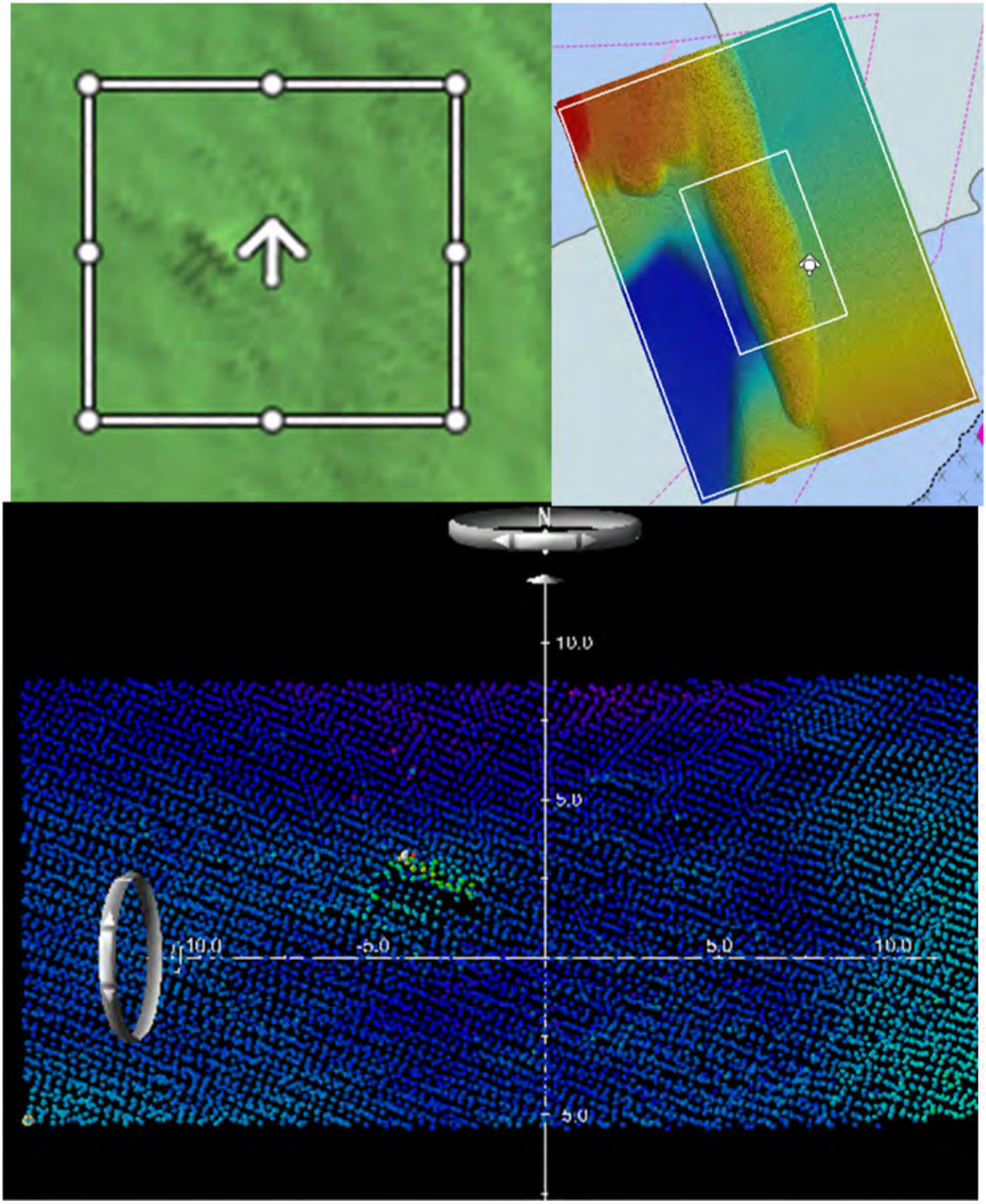
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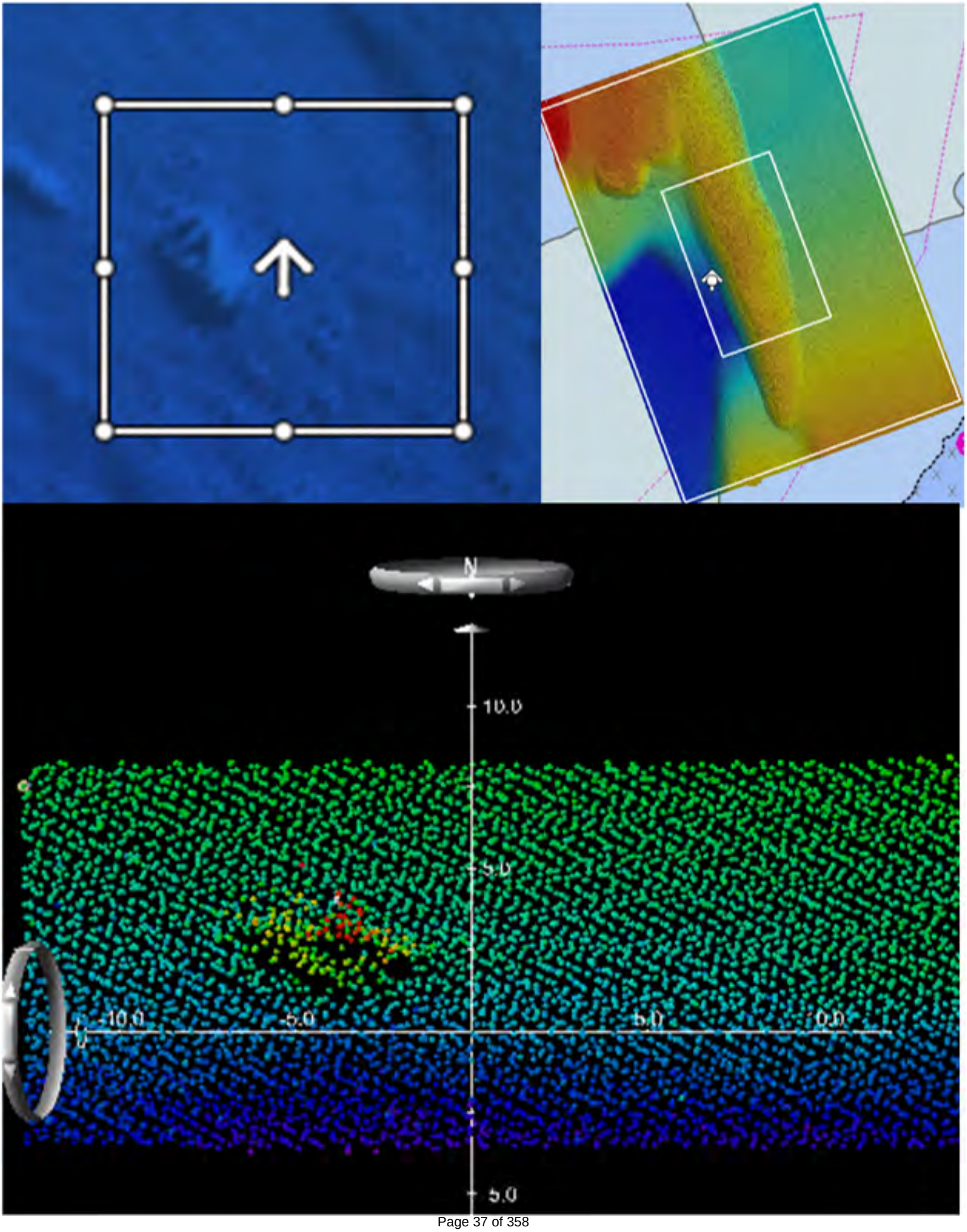
-5.0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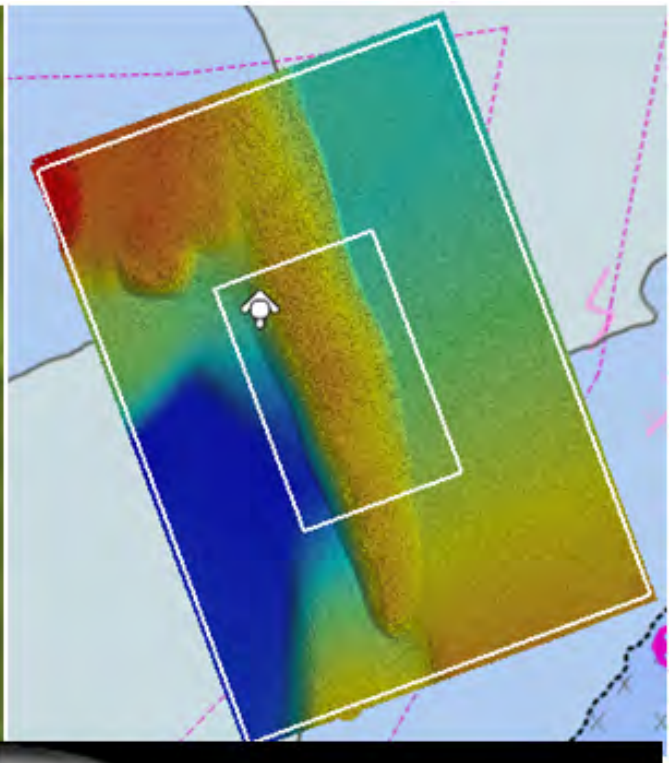

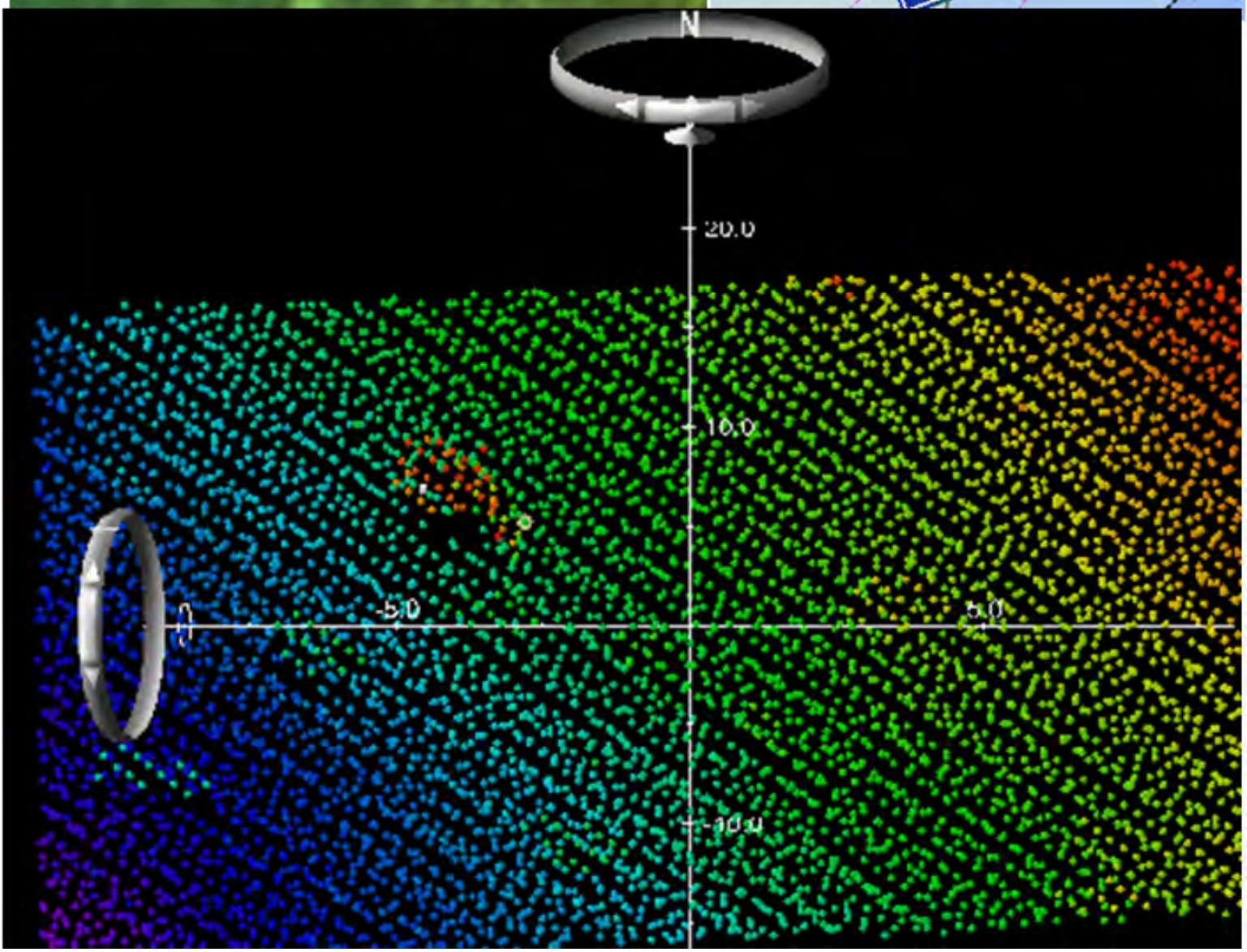
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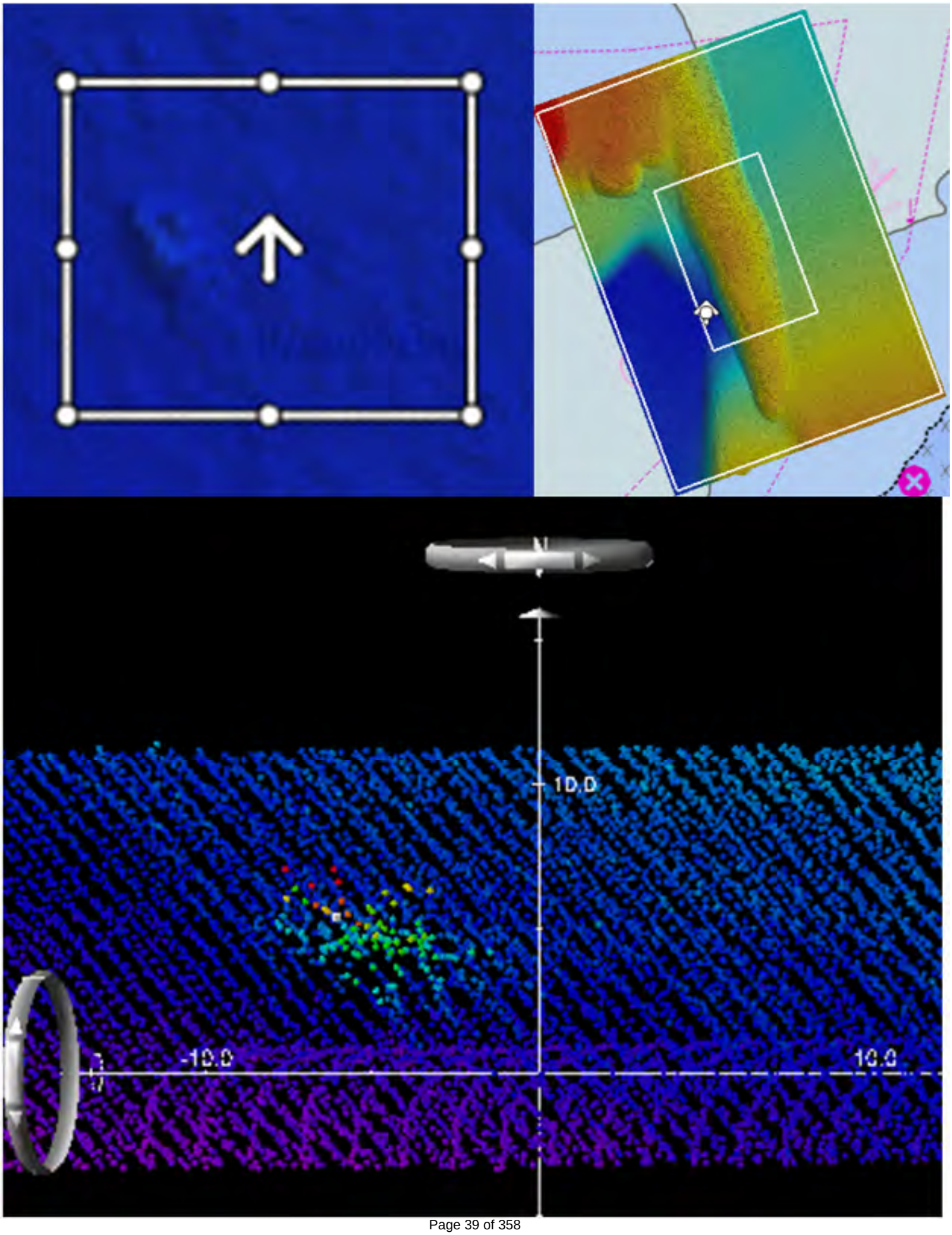
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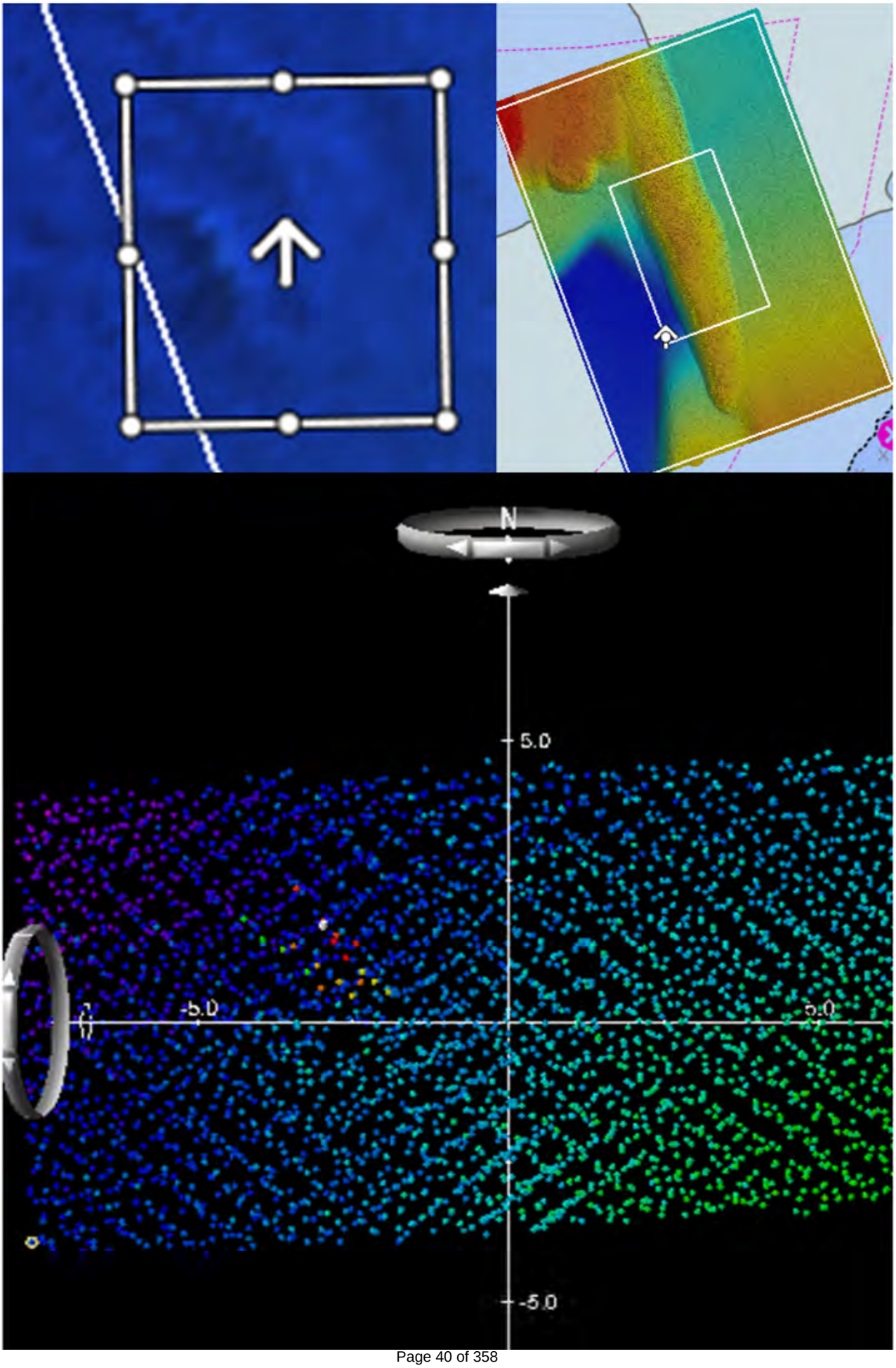
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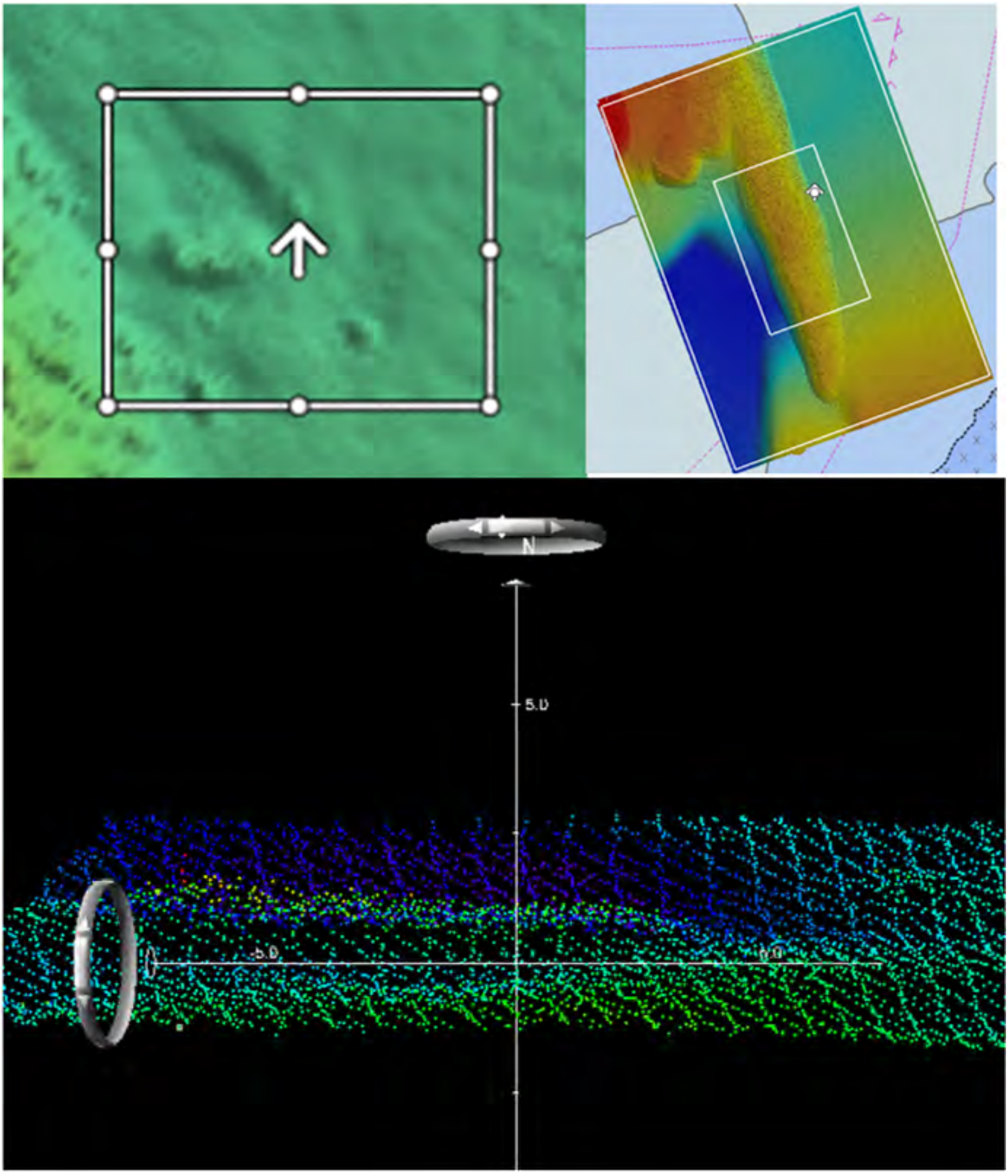
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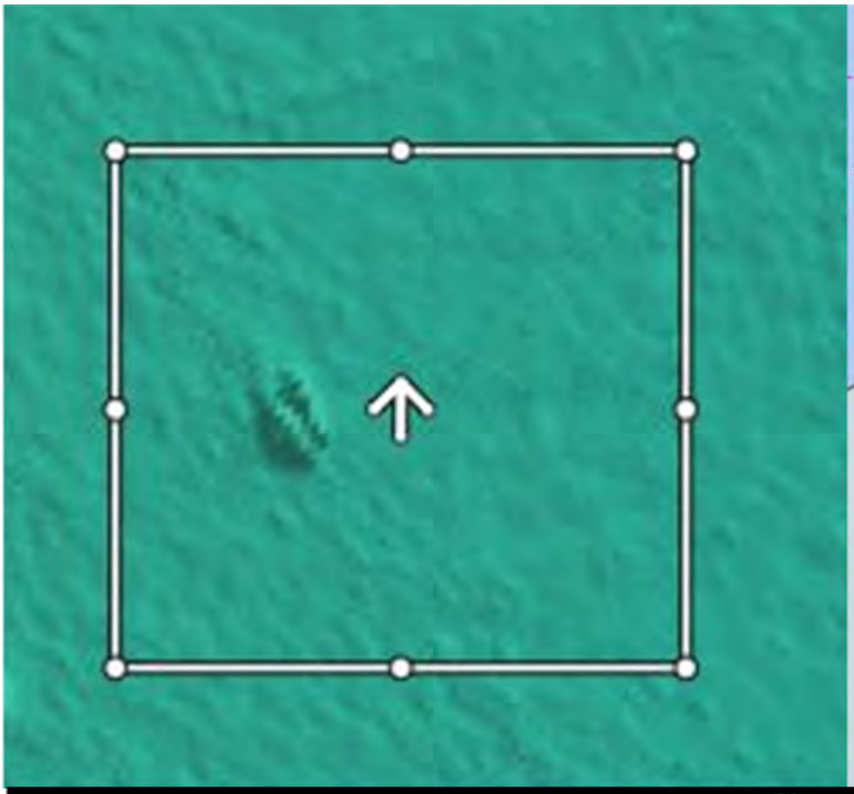
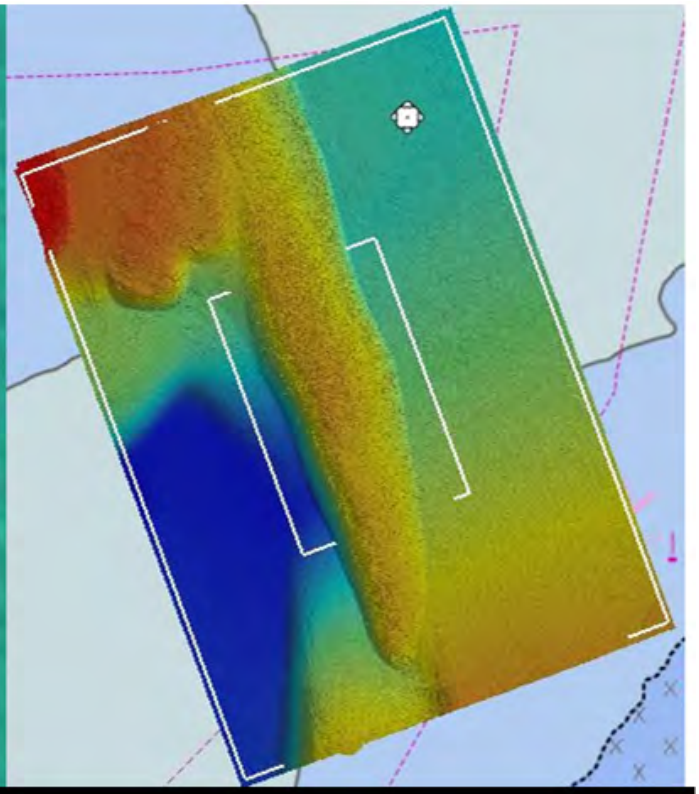
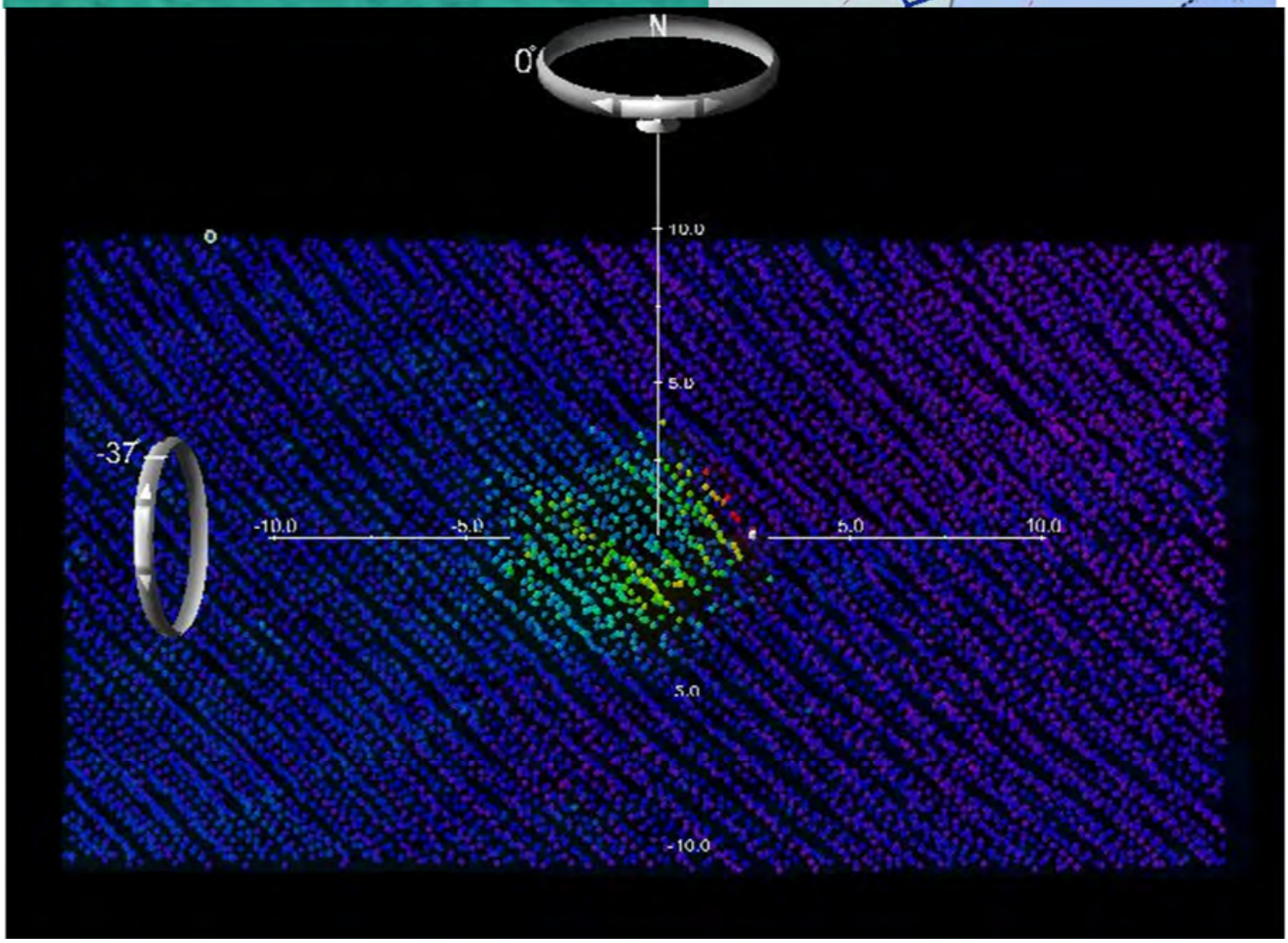
Surface Objects:

Non Ferrous Outer Box Unknown Objects



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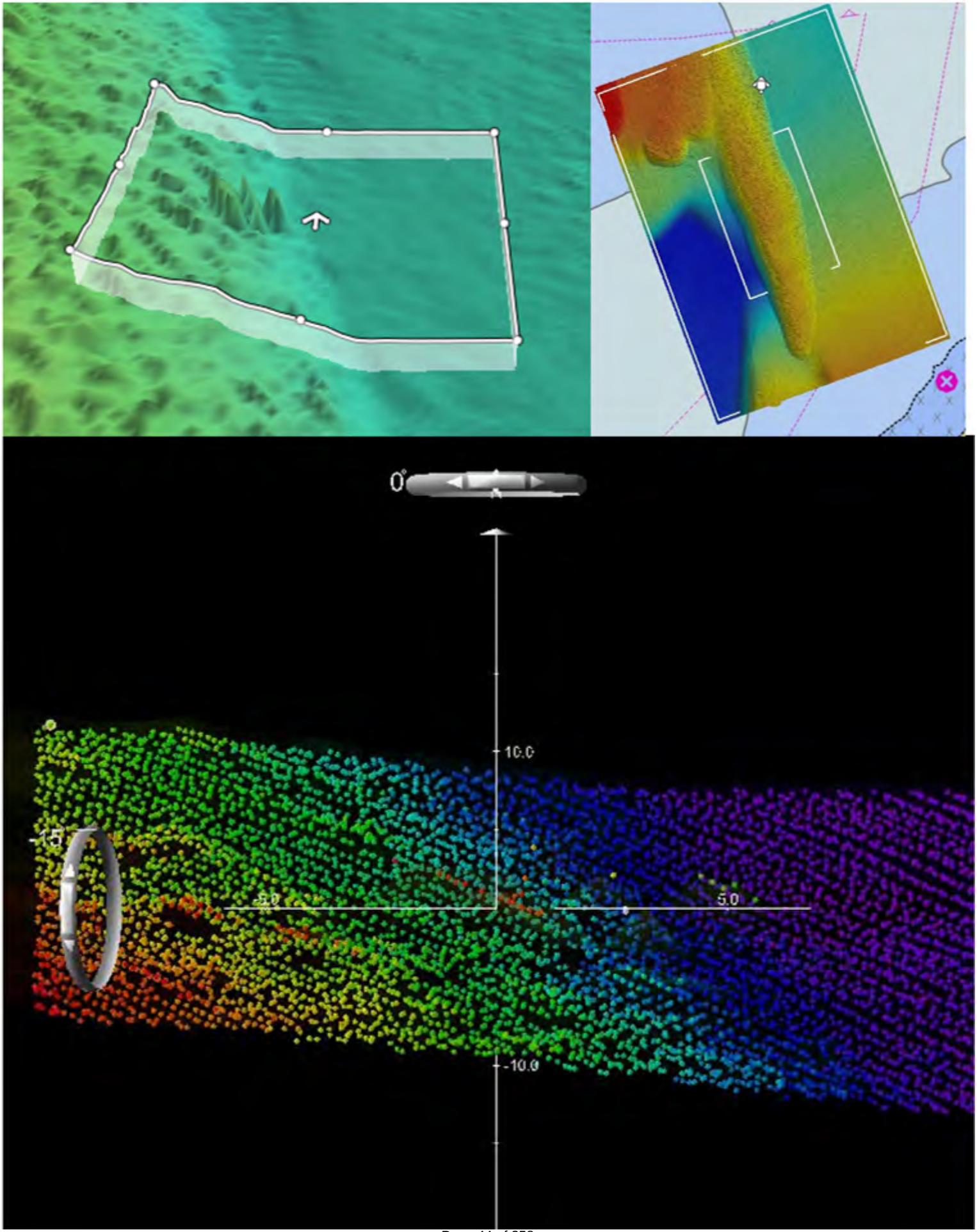
5.0
10.0
5.0
-10.0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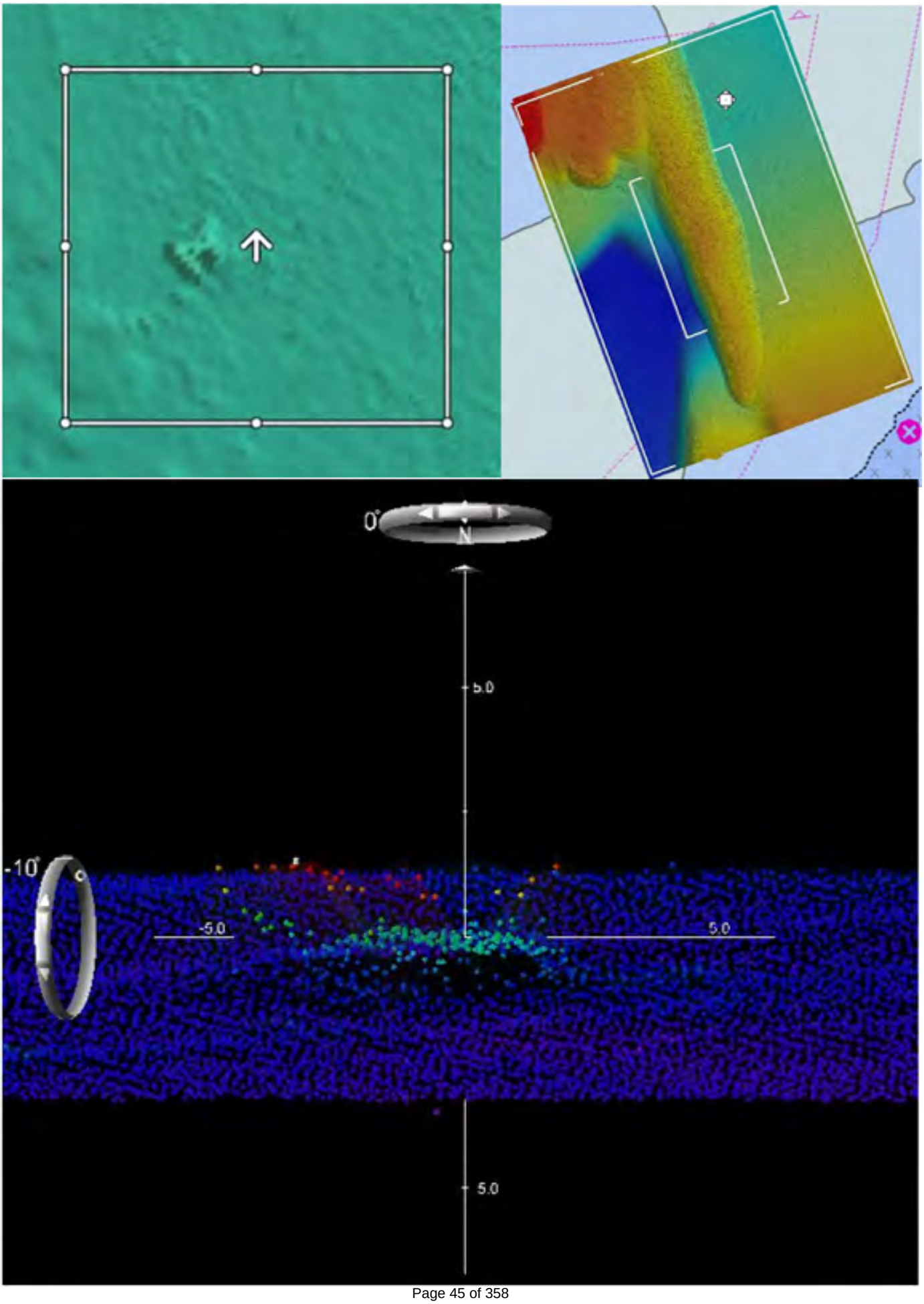
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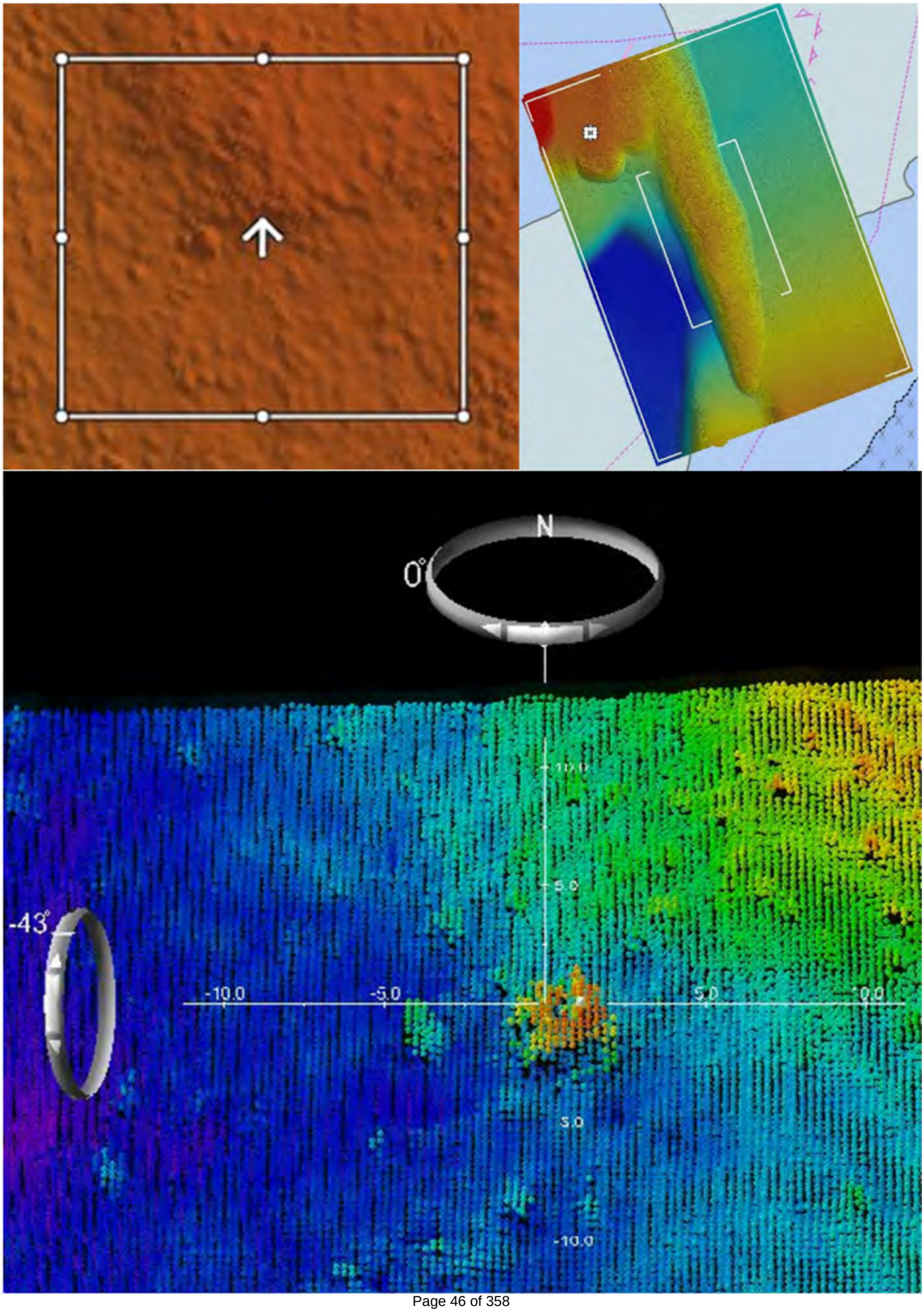
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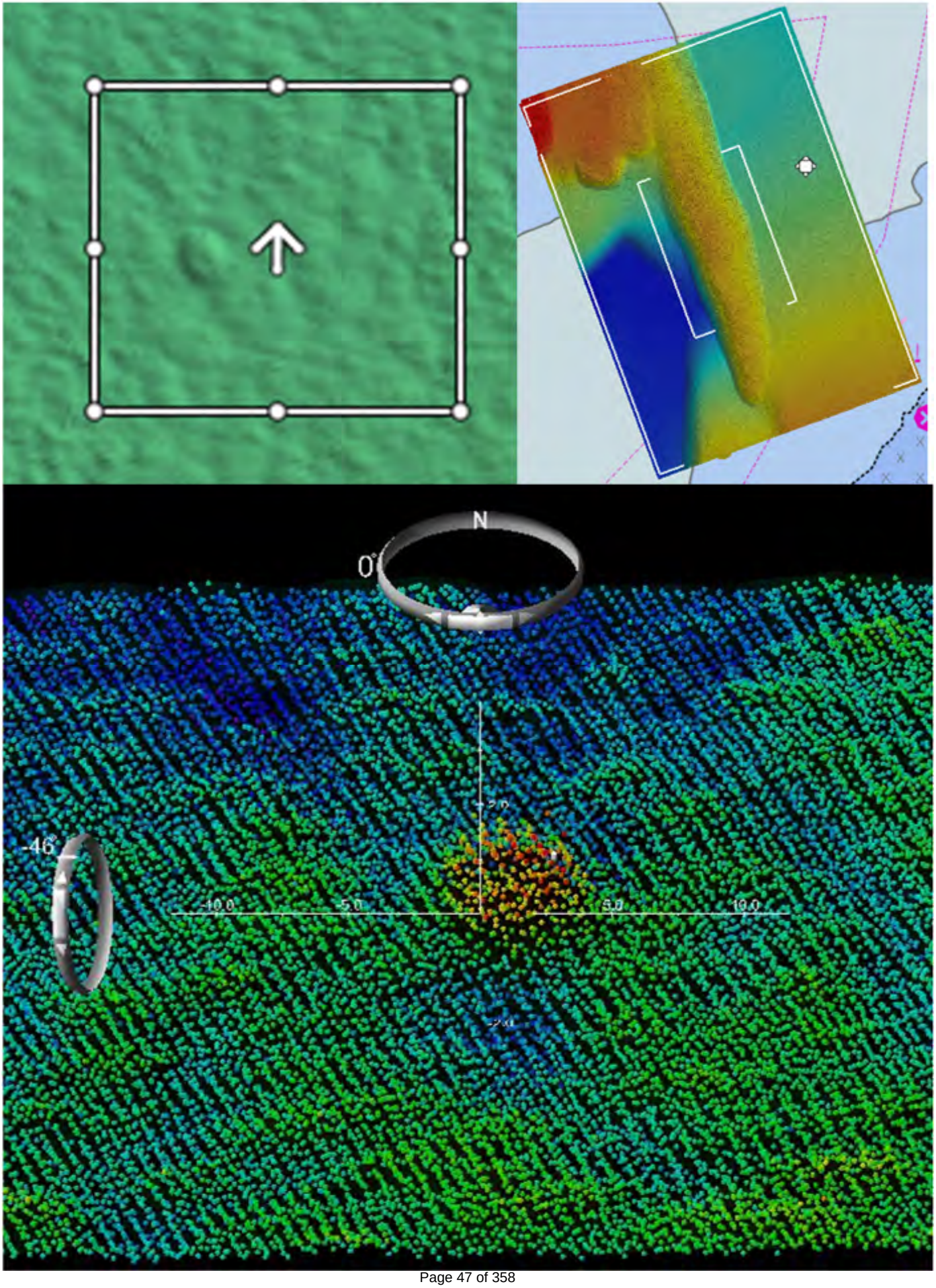
-10.0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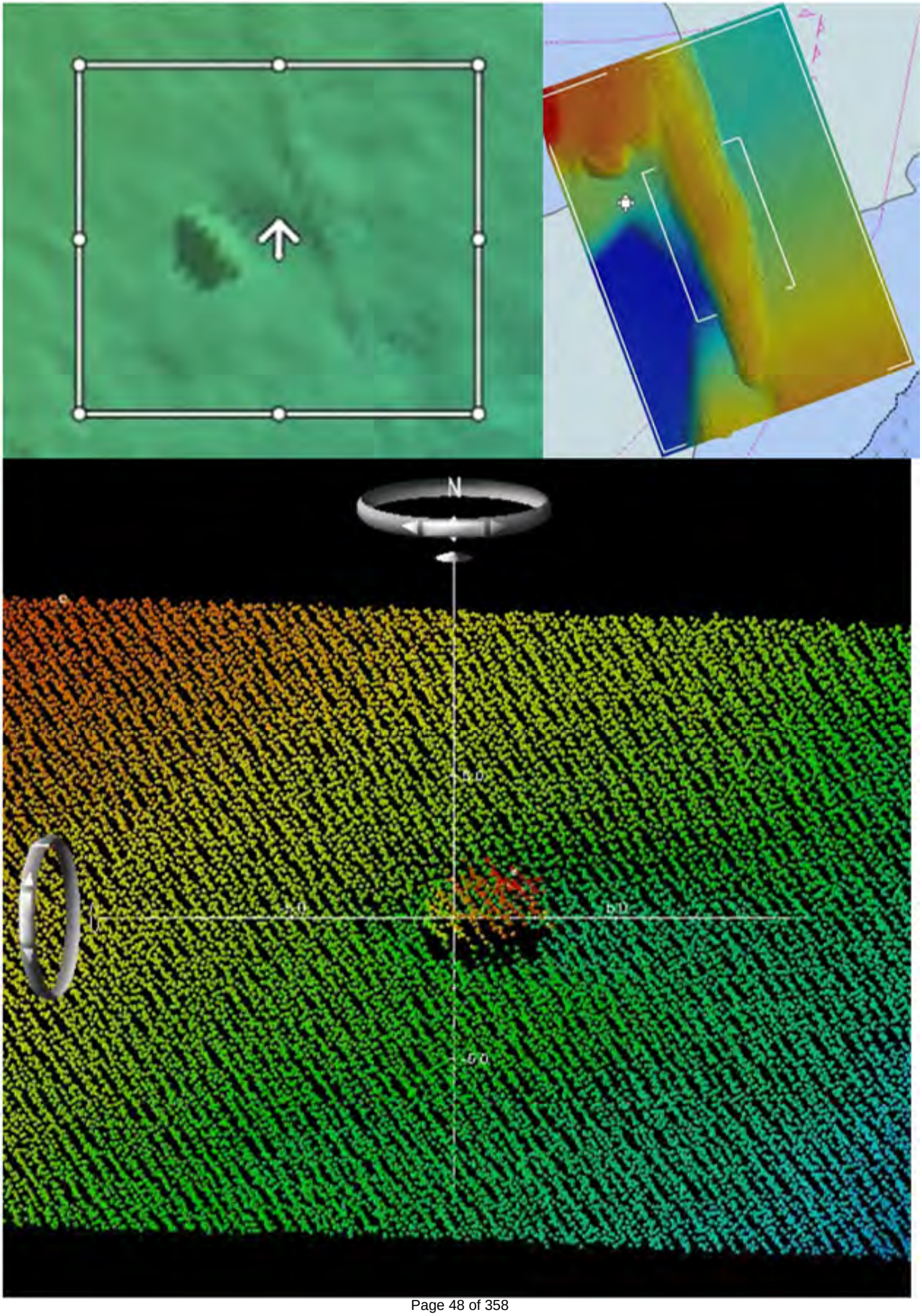
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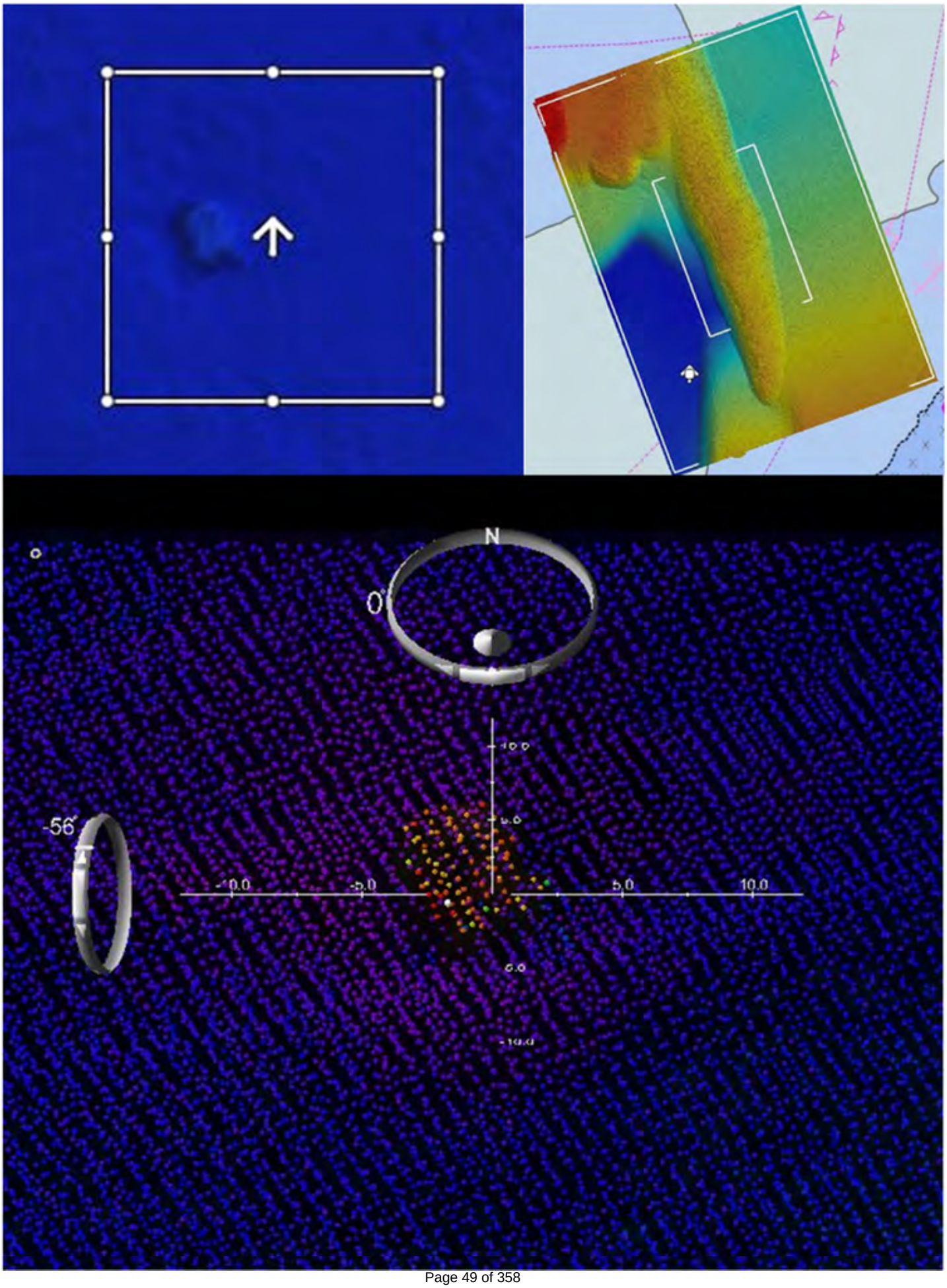
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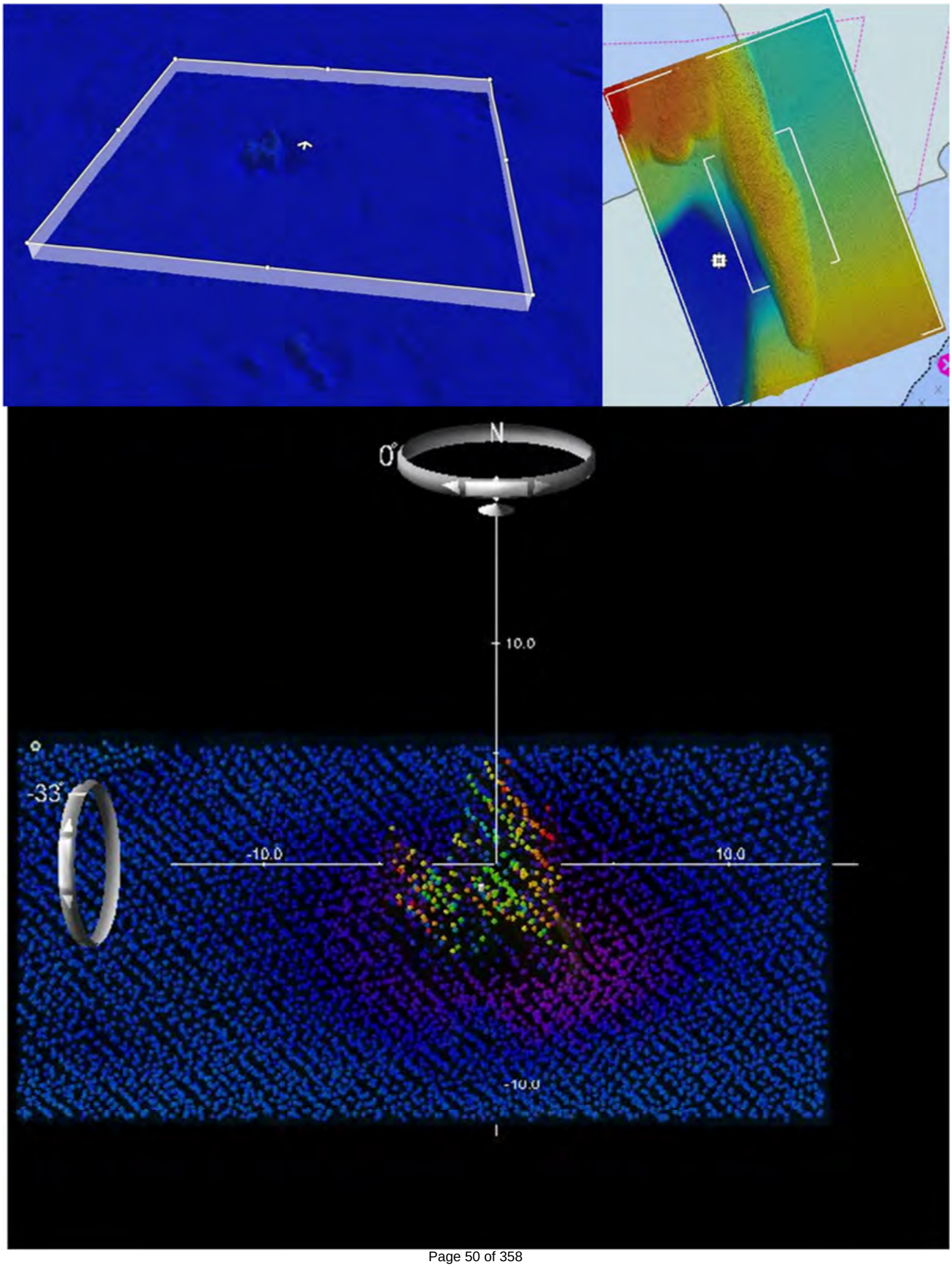
0.0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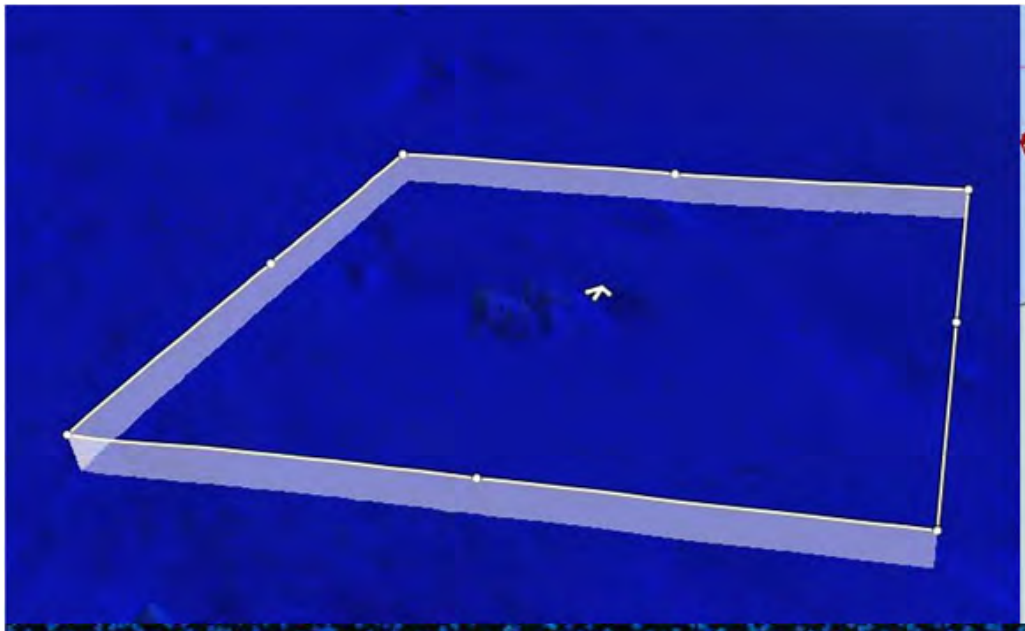

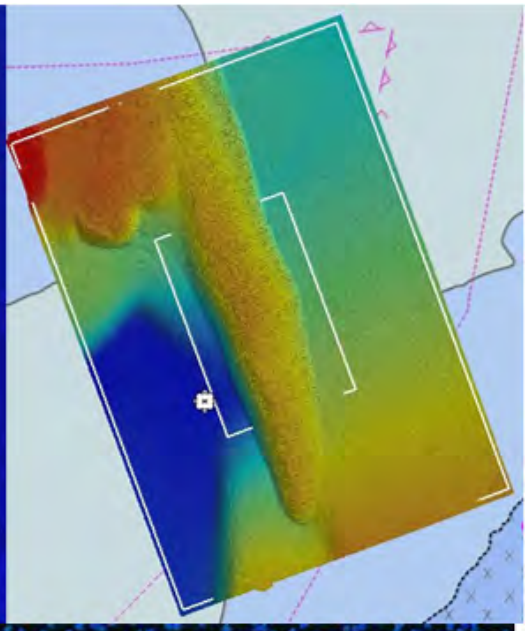

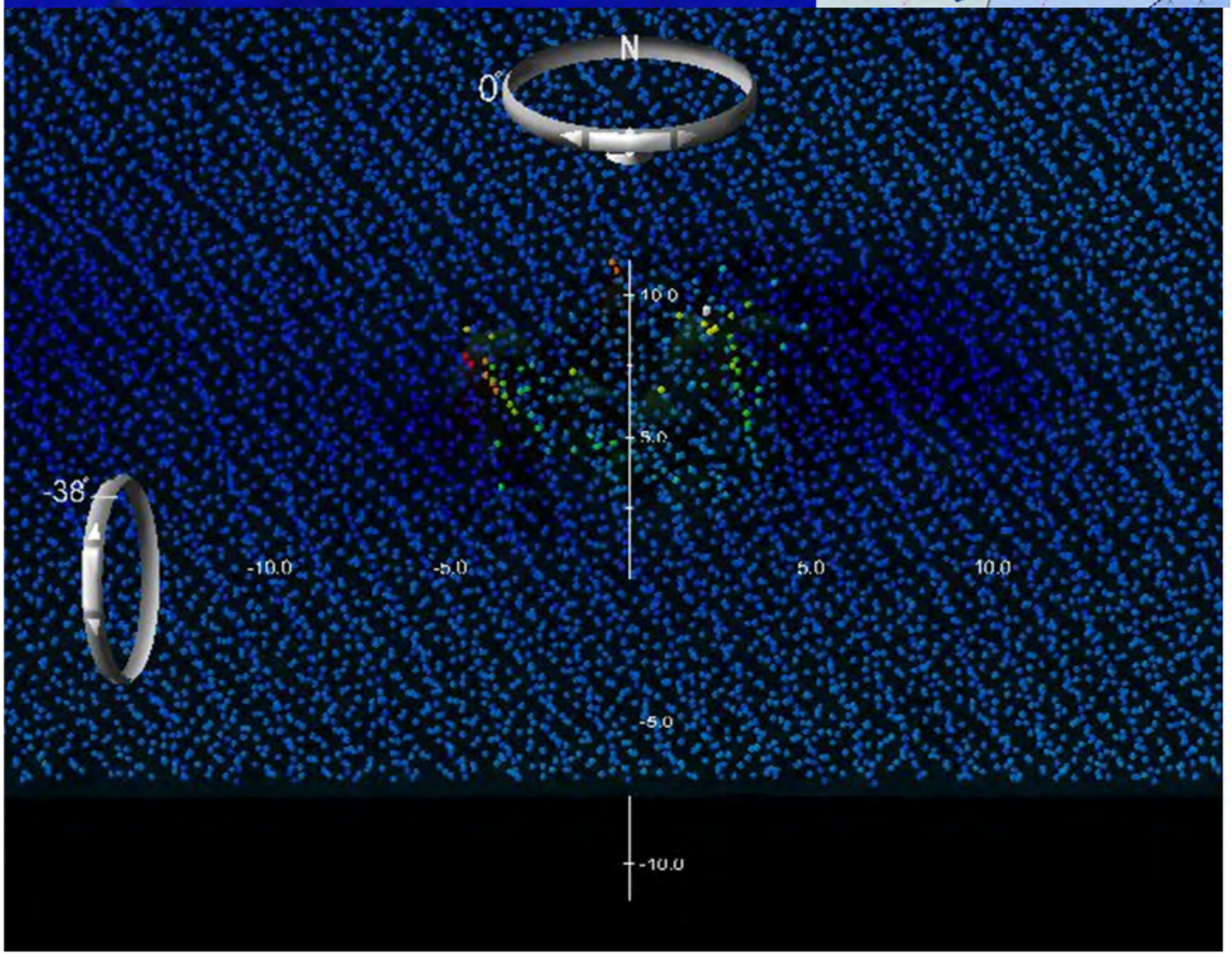
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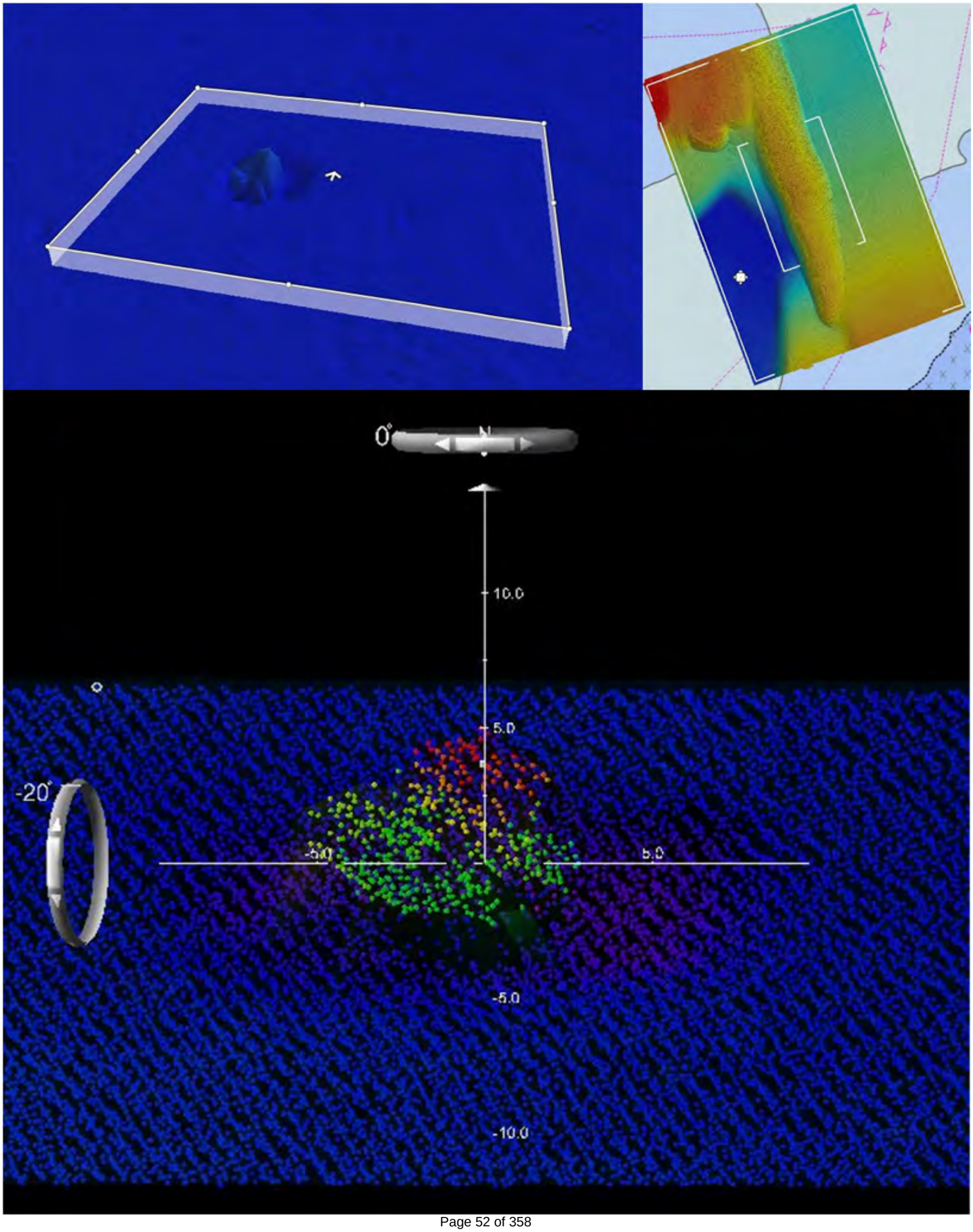
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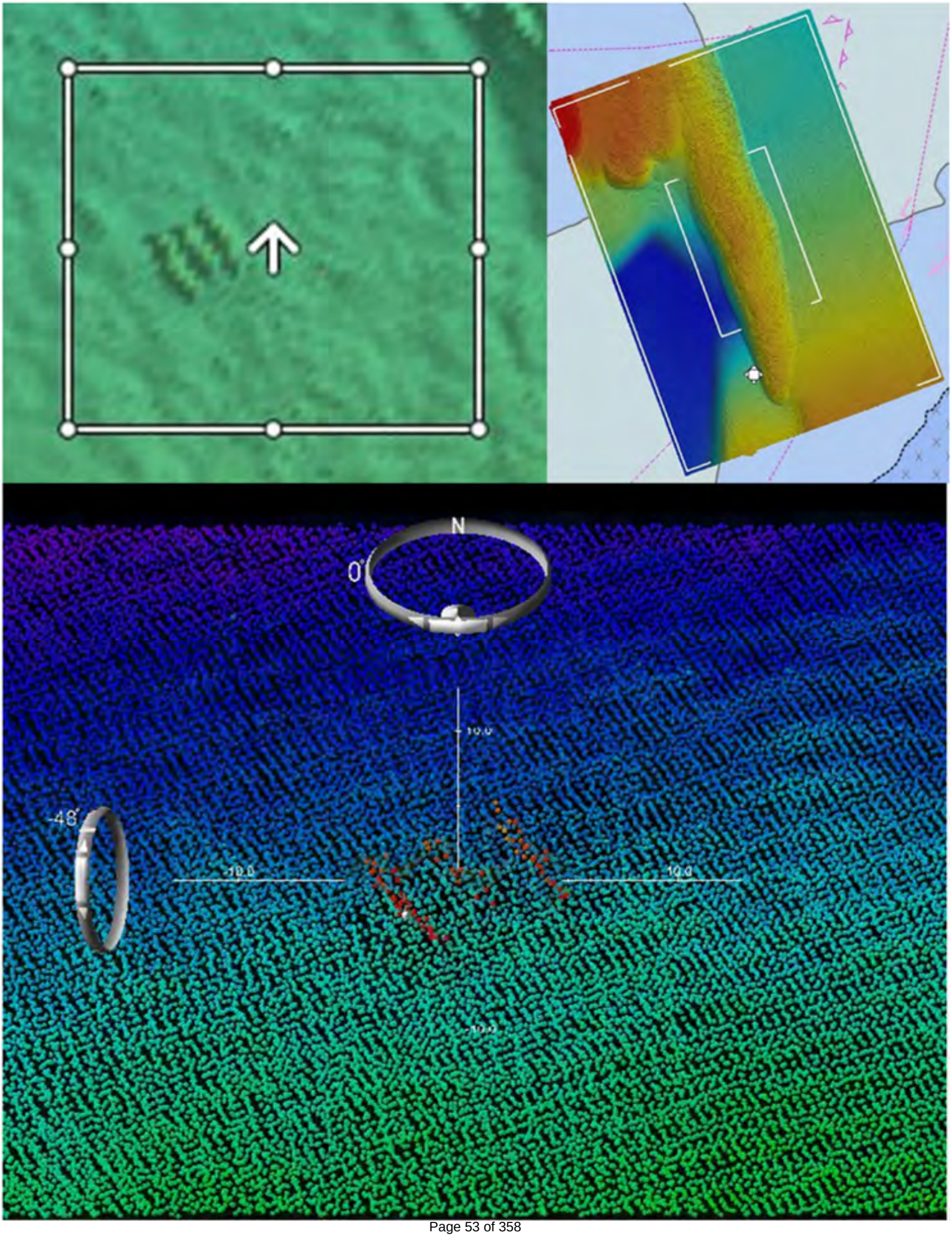
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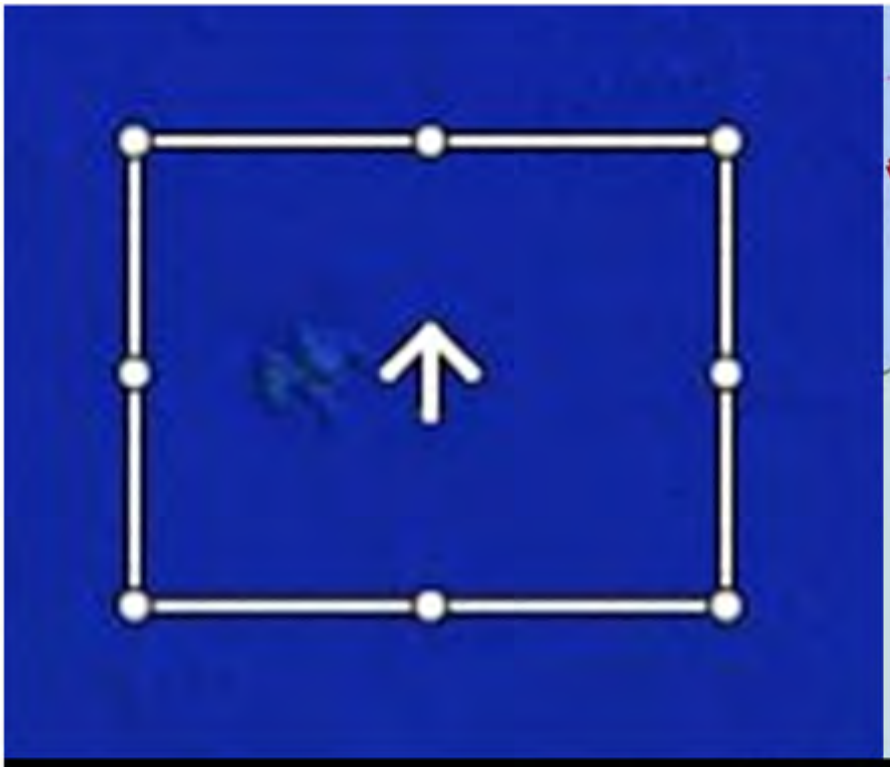

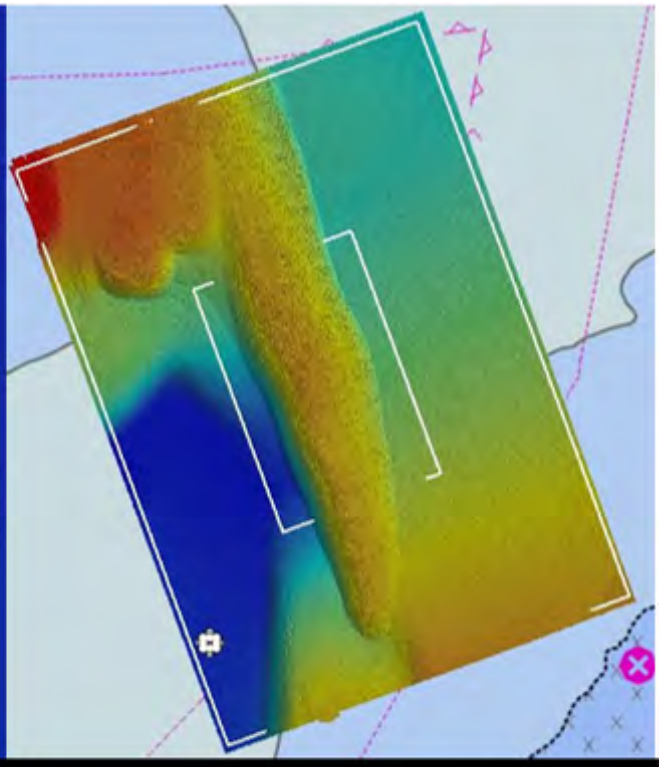

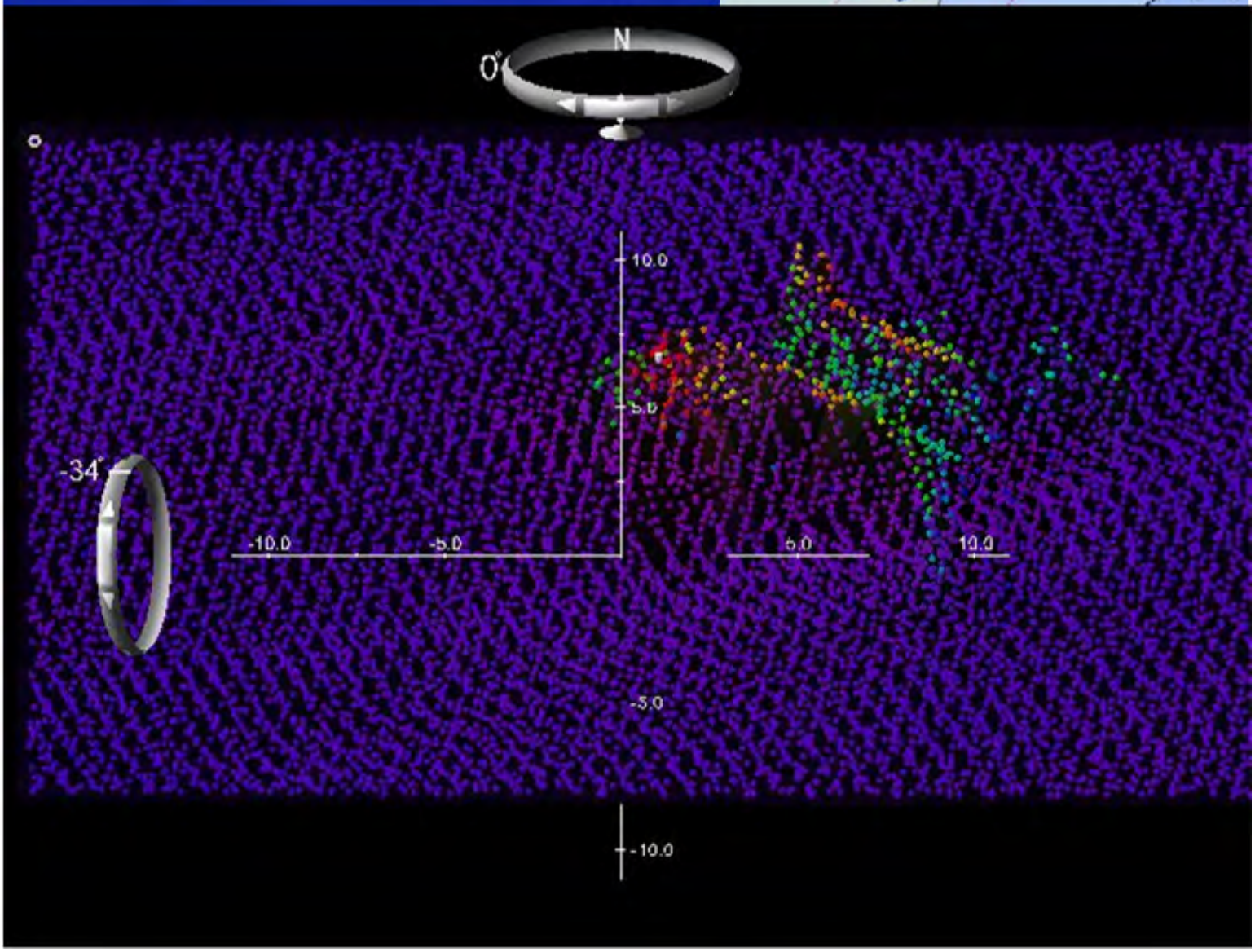
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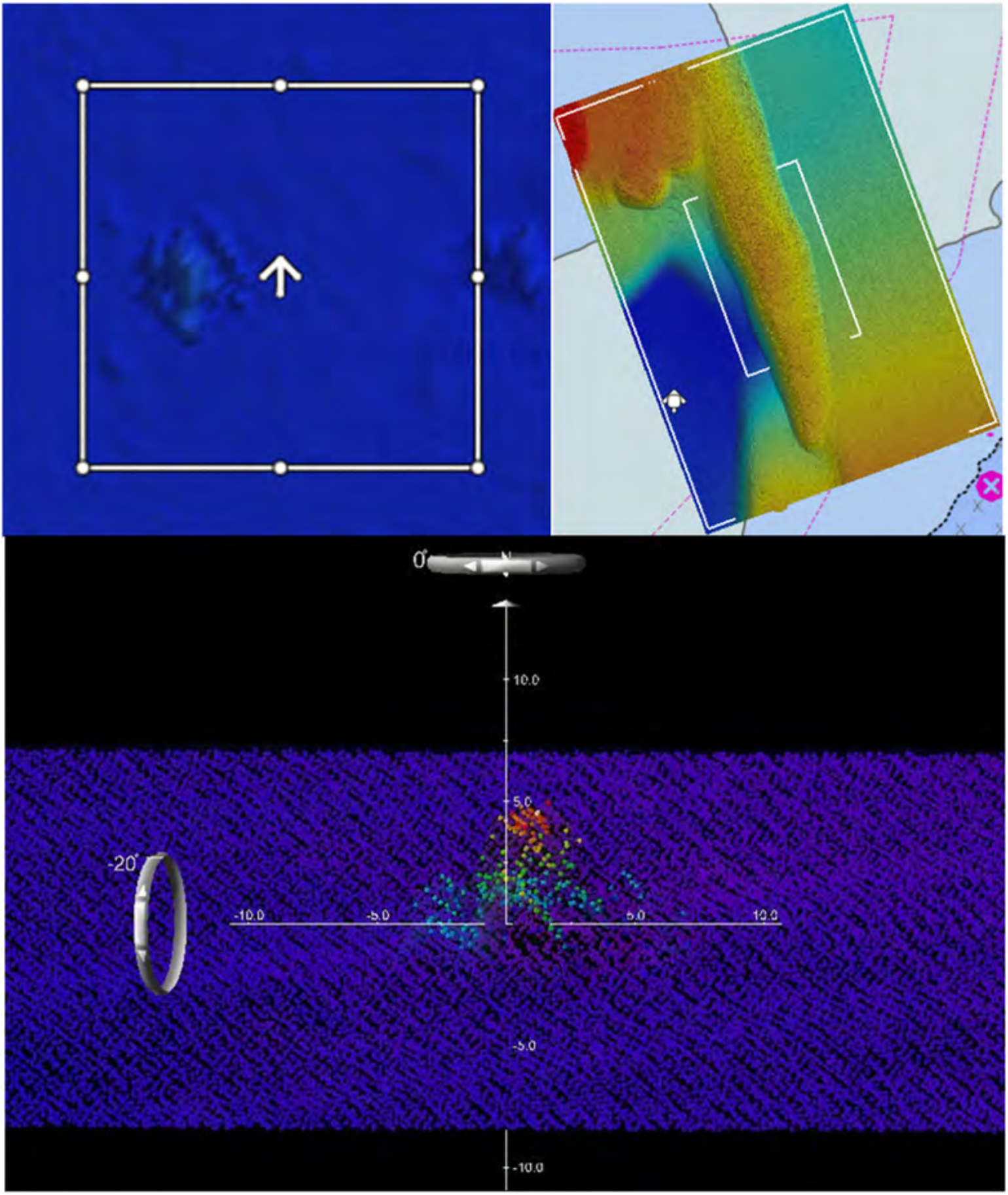
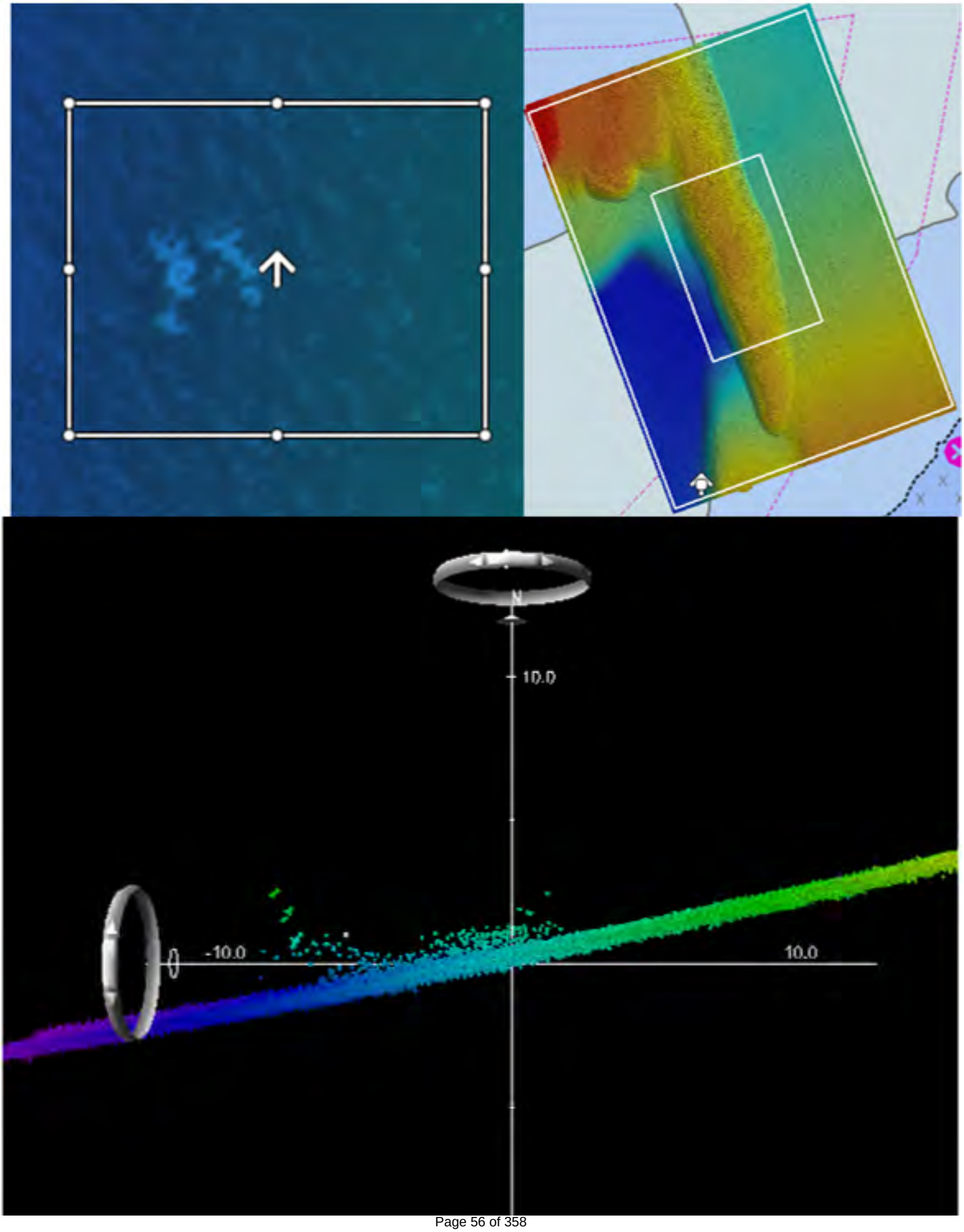
UKO_013

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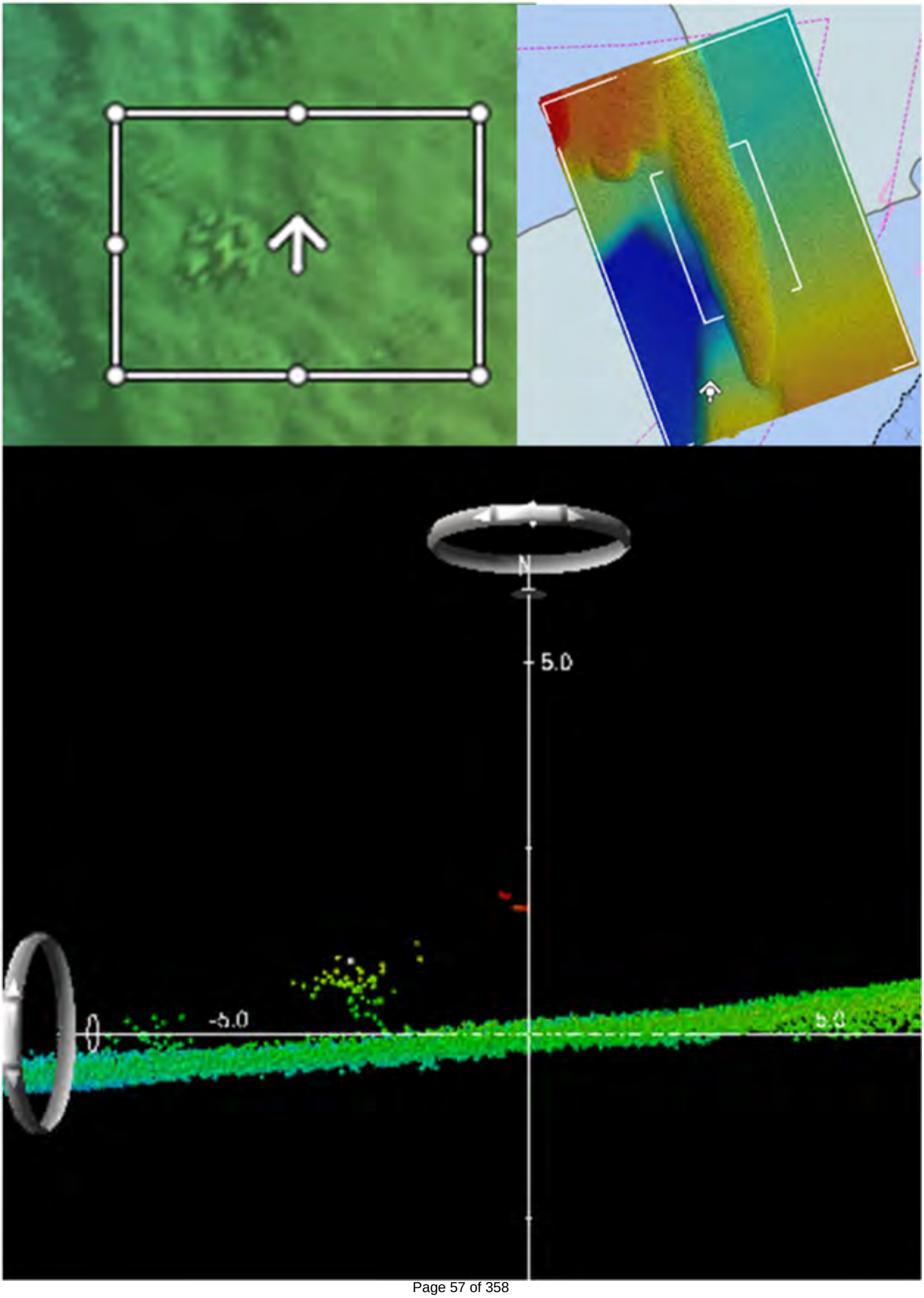
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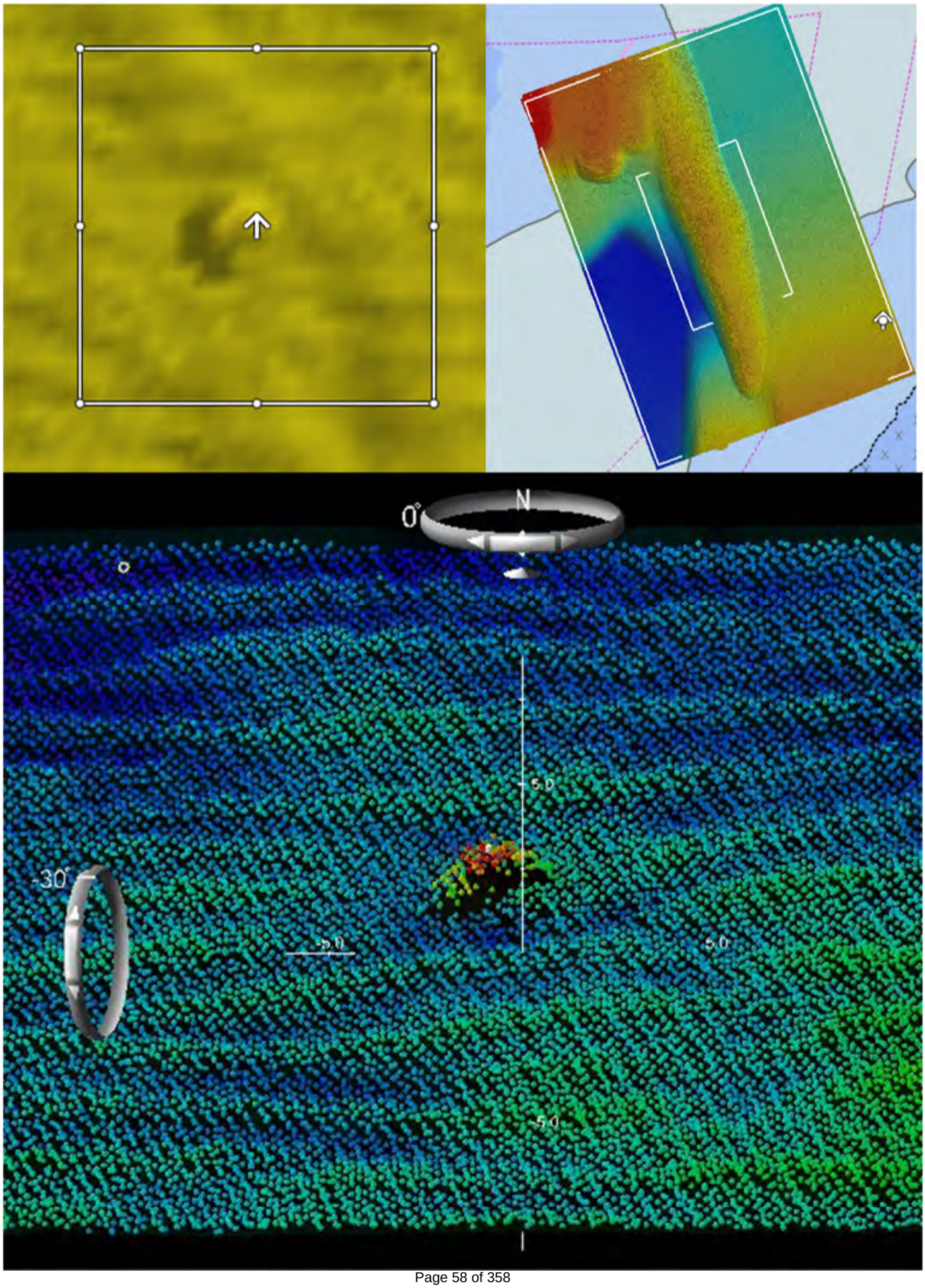
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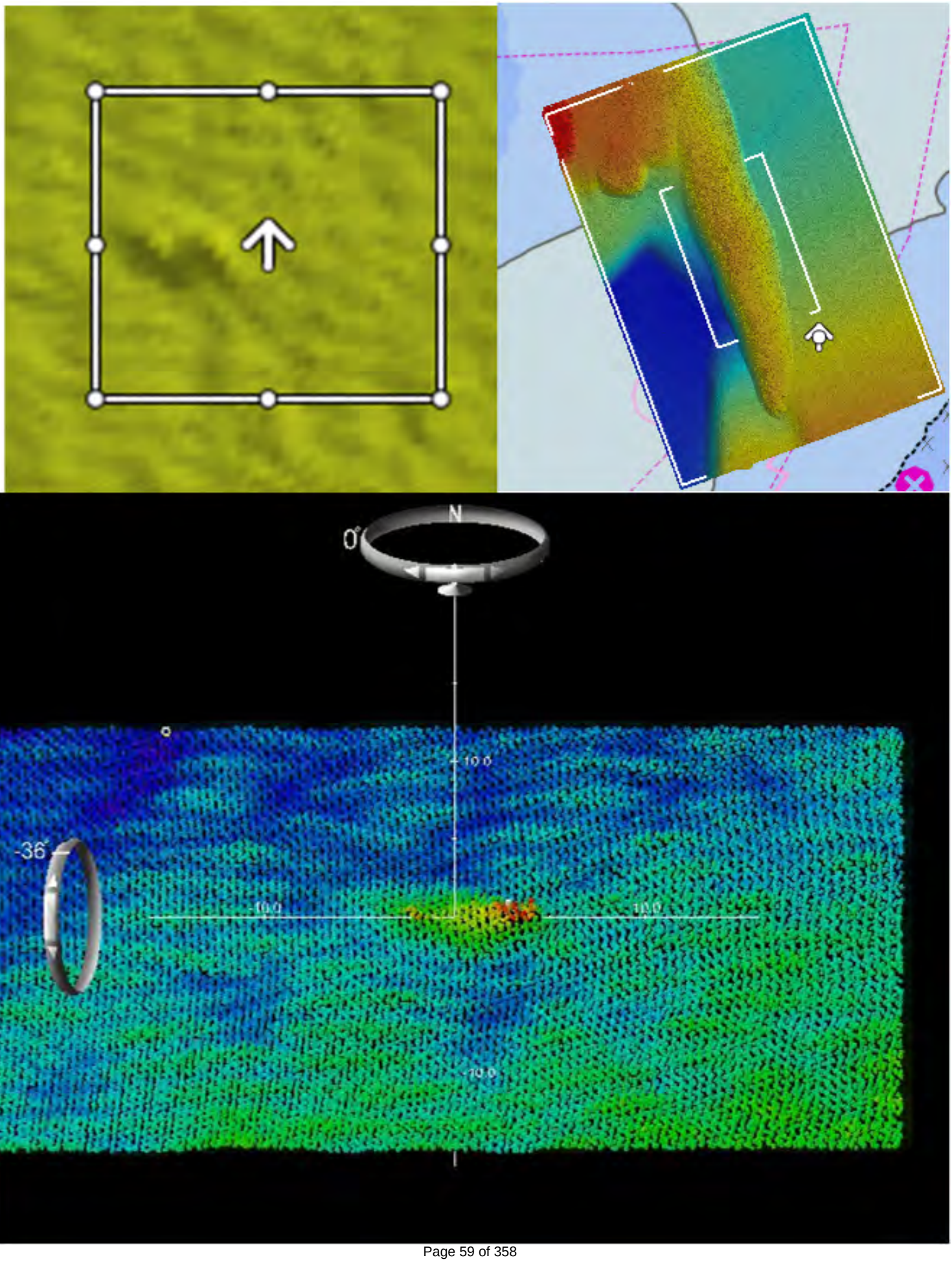
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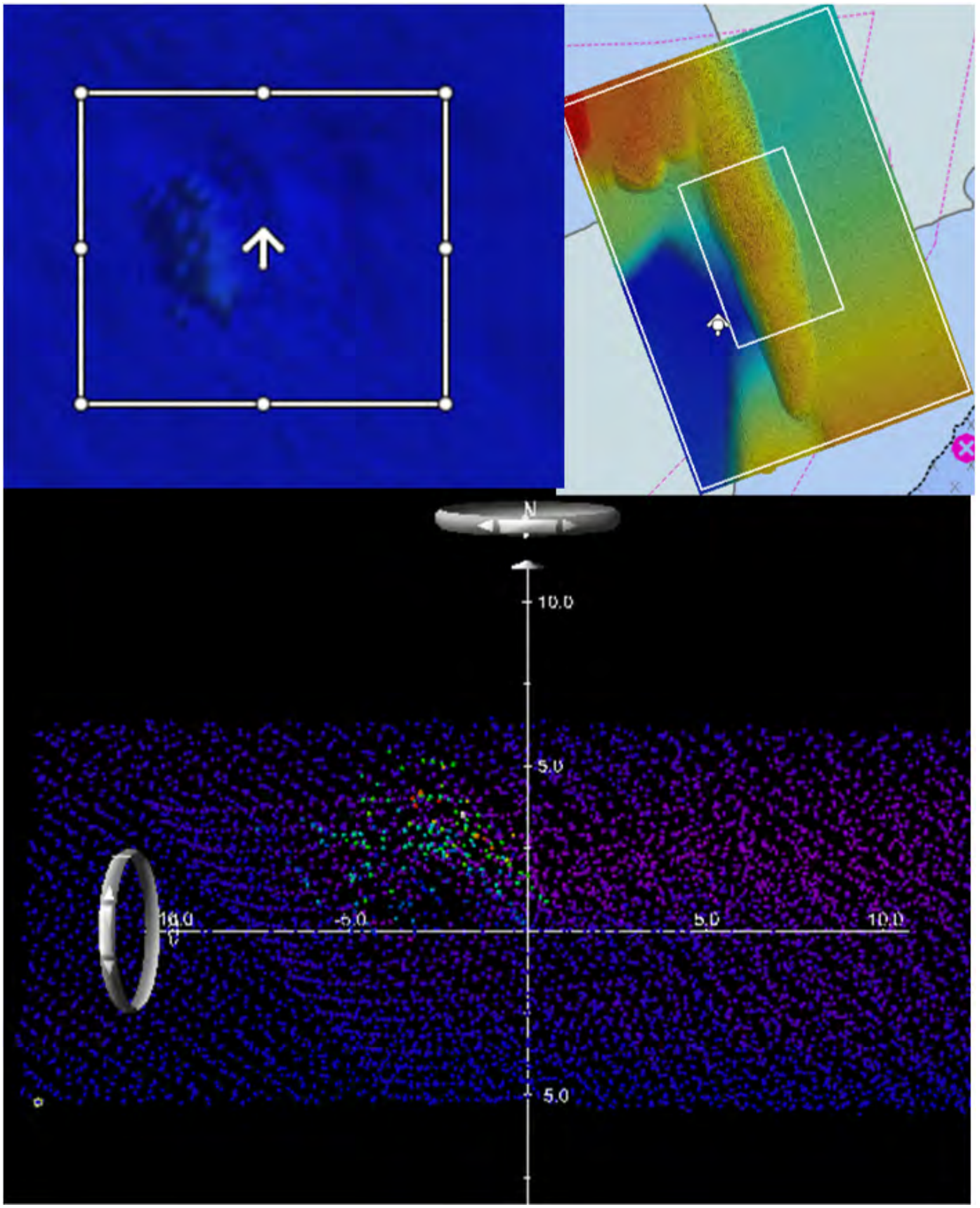
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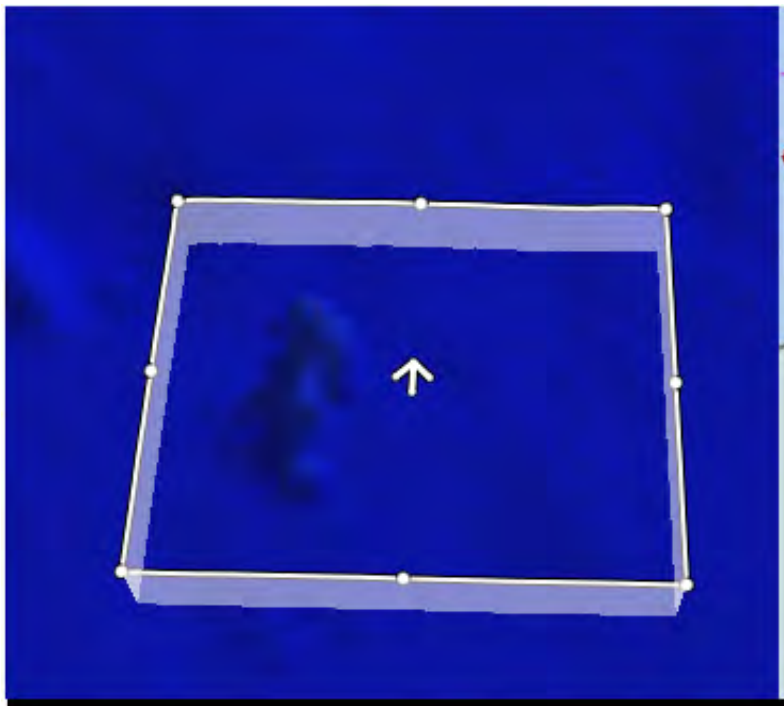

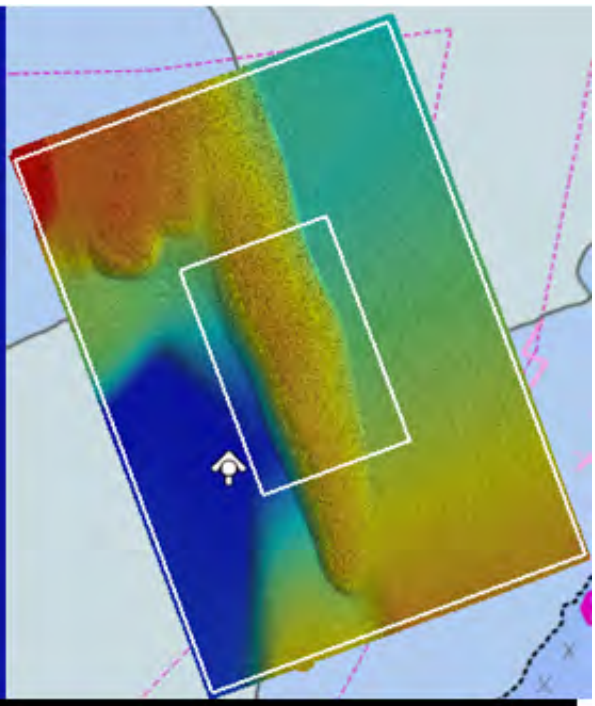

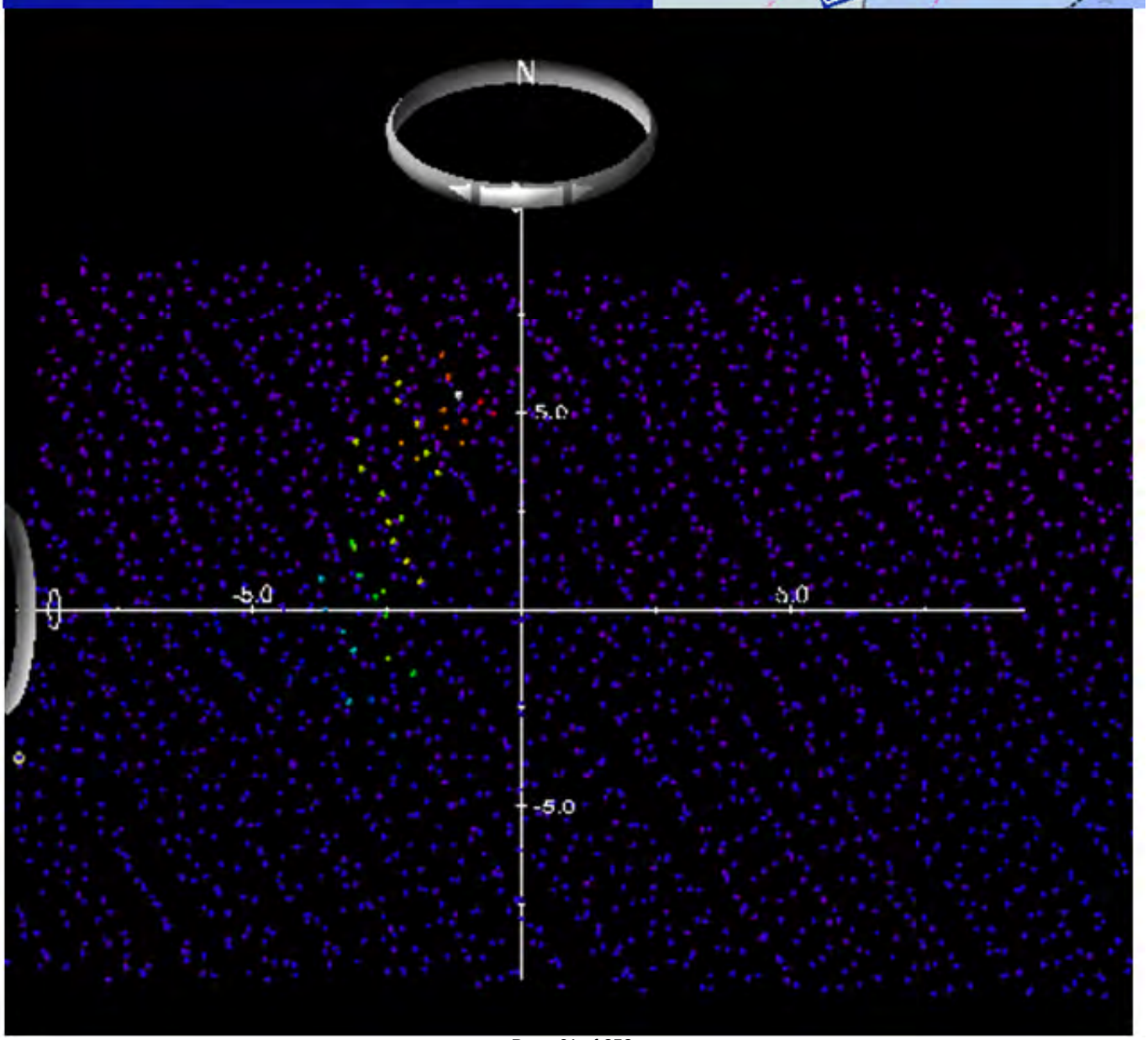
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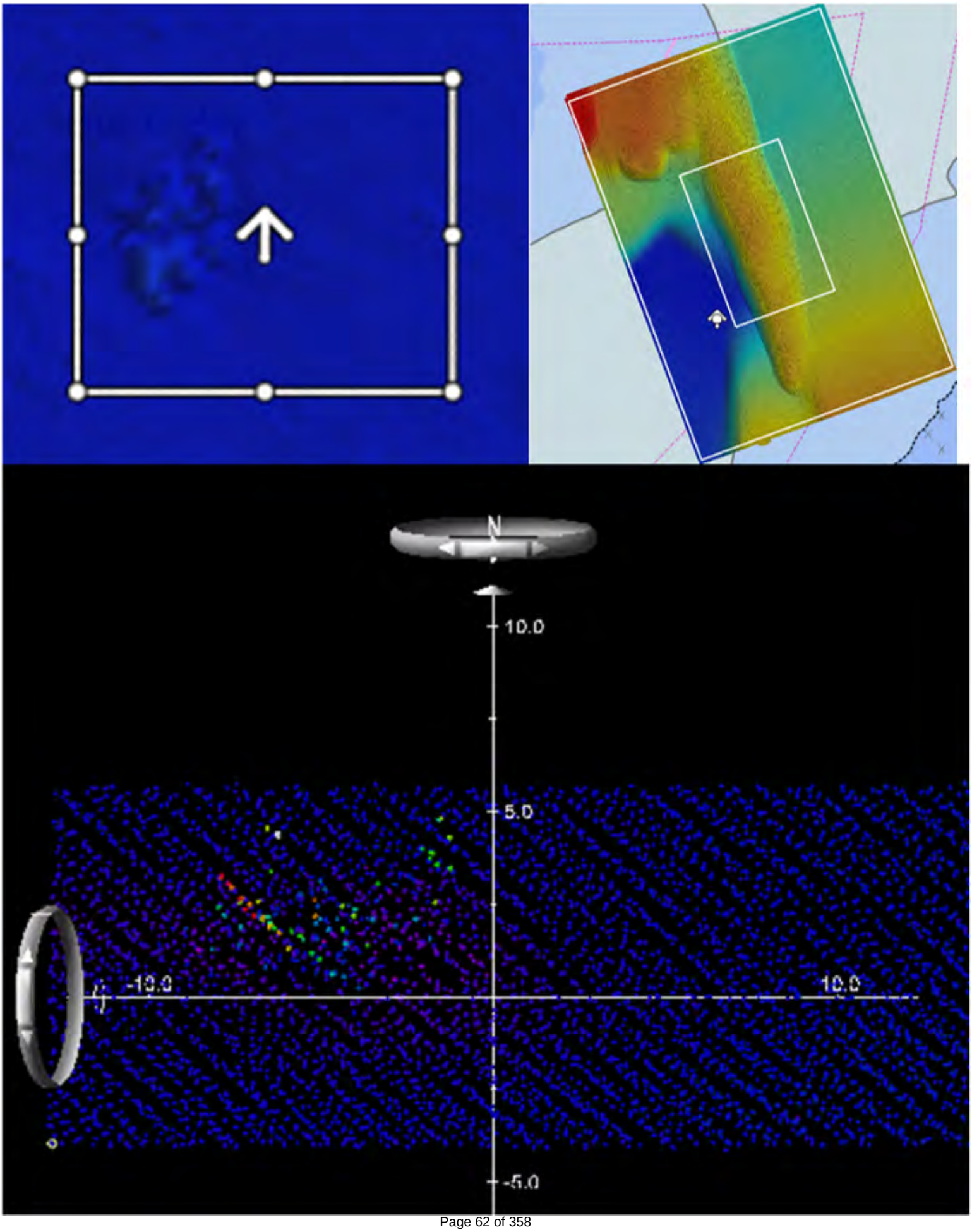
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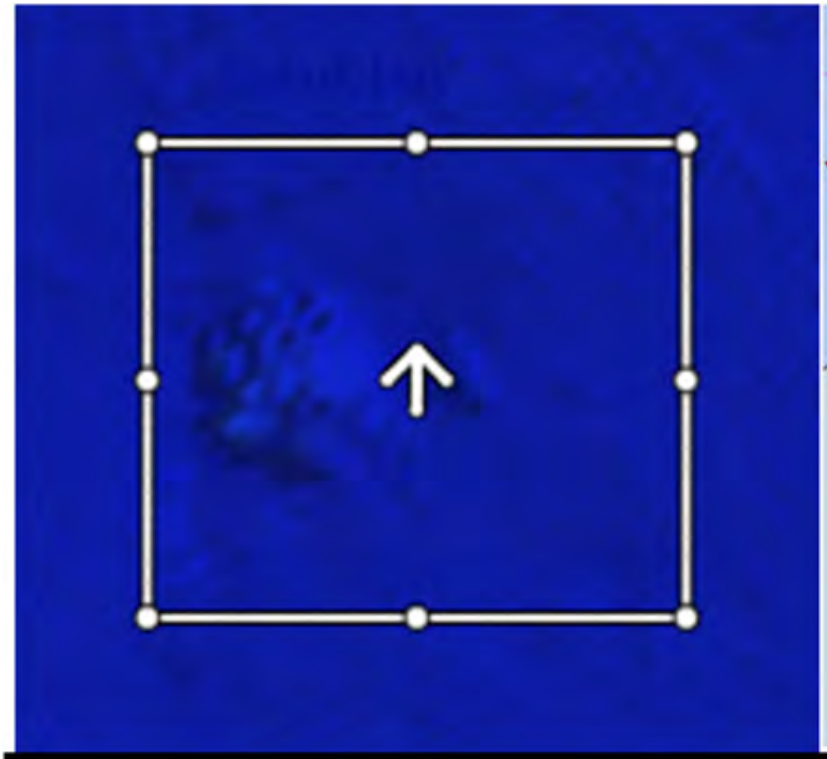

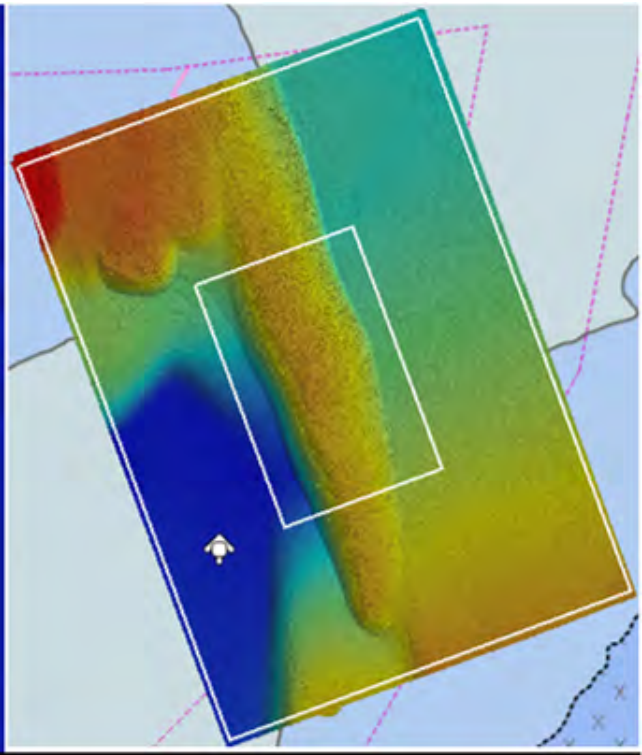

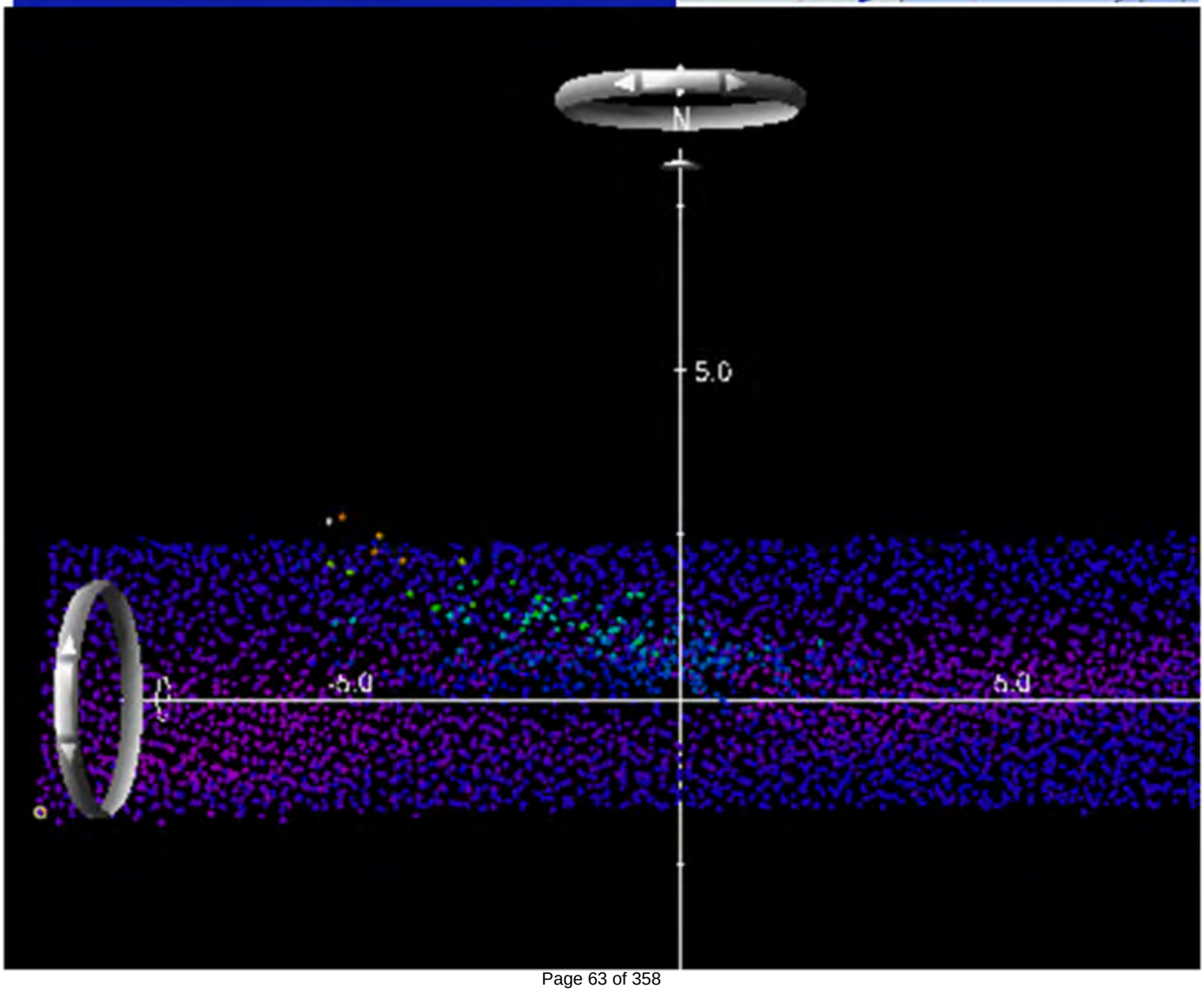
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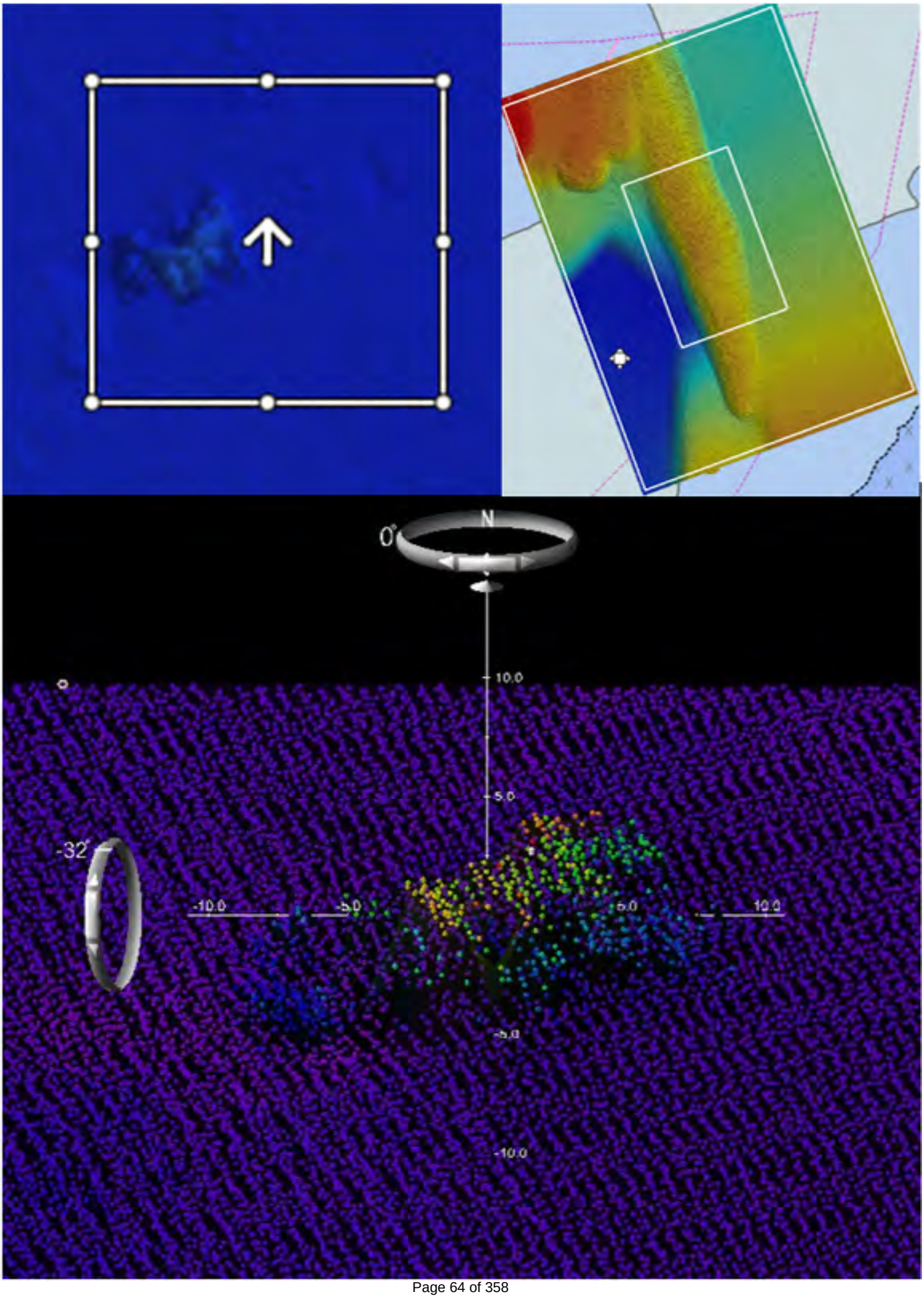
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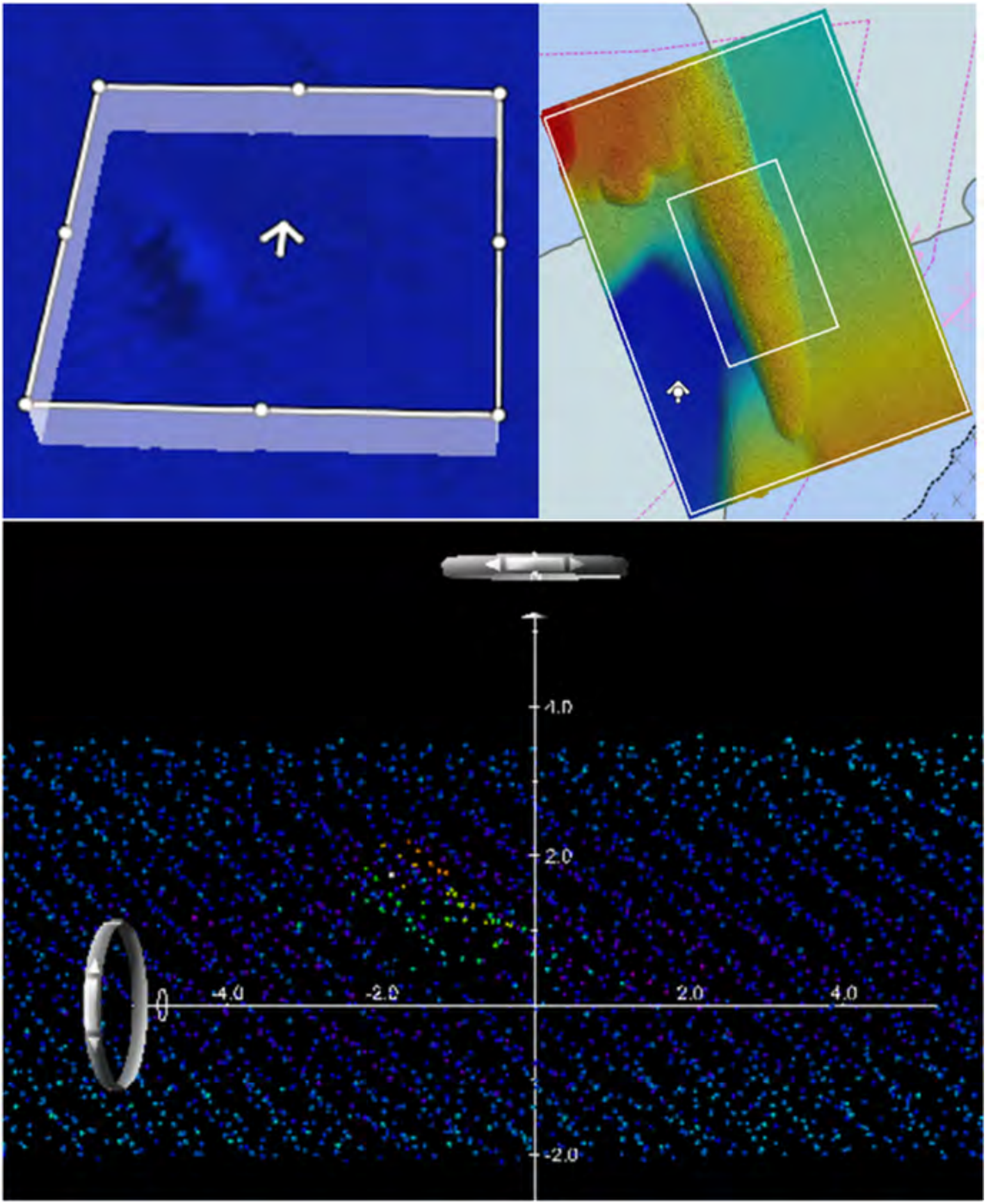
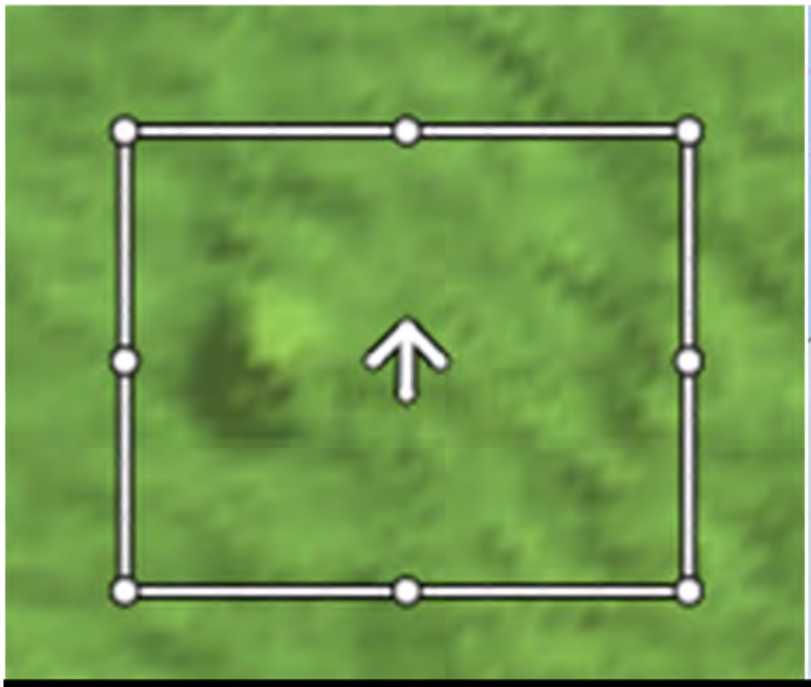
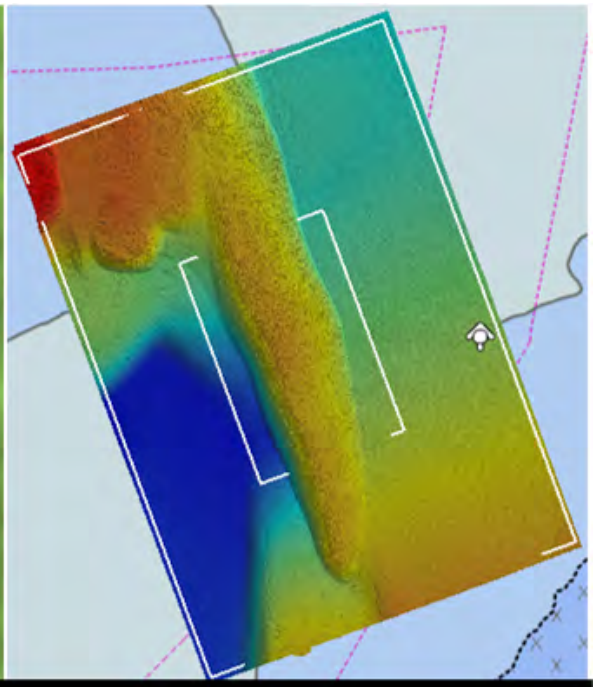
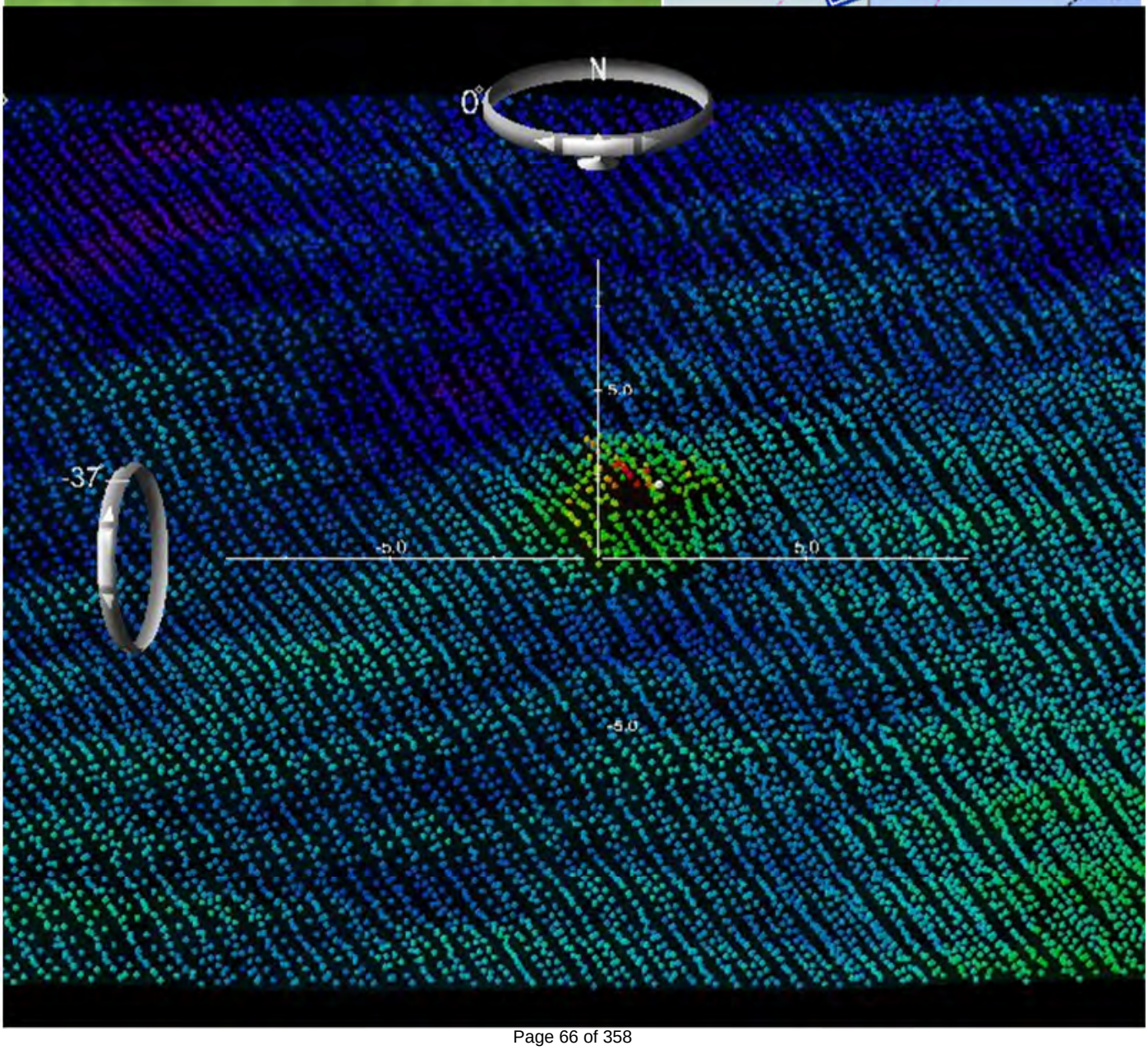
UKO_023





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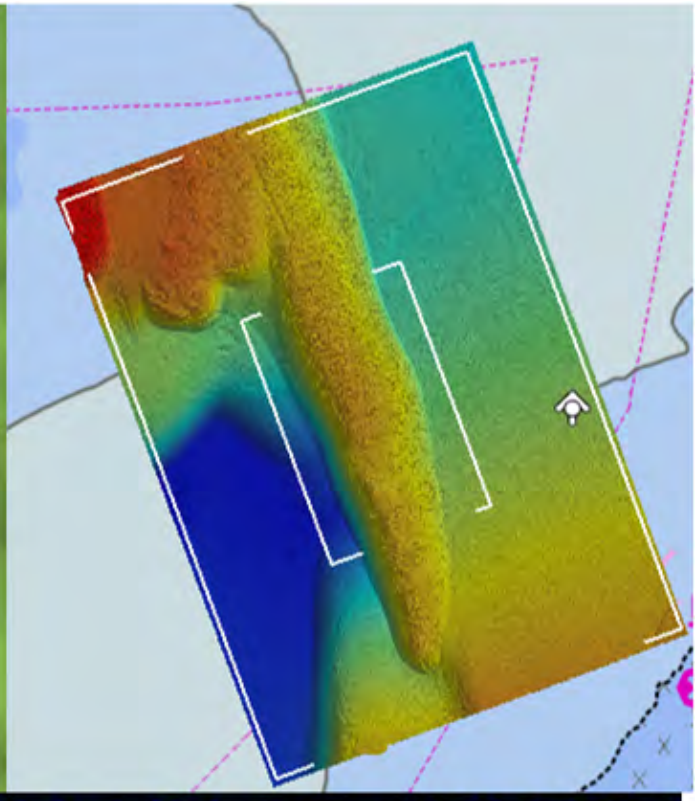

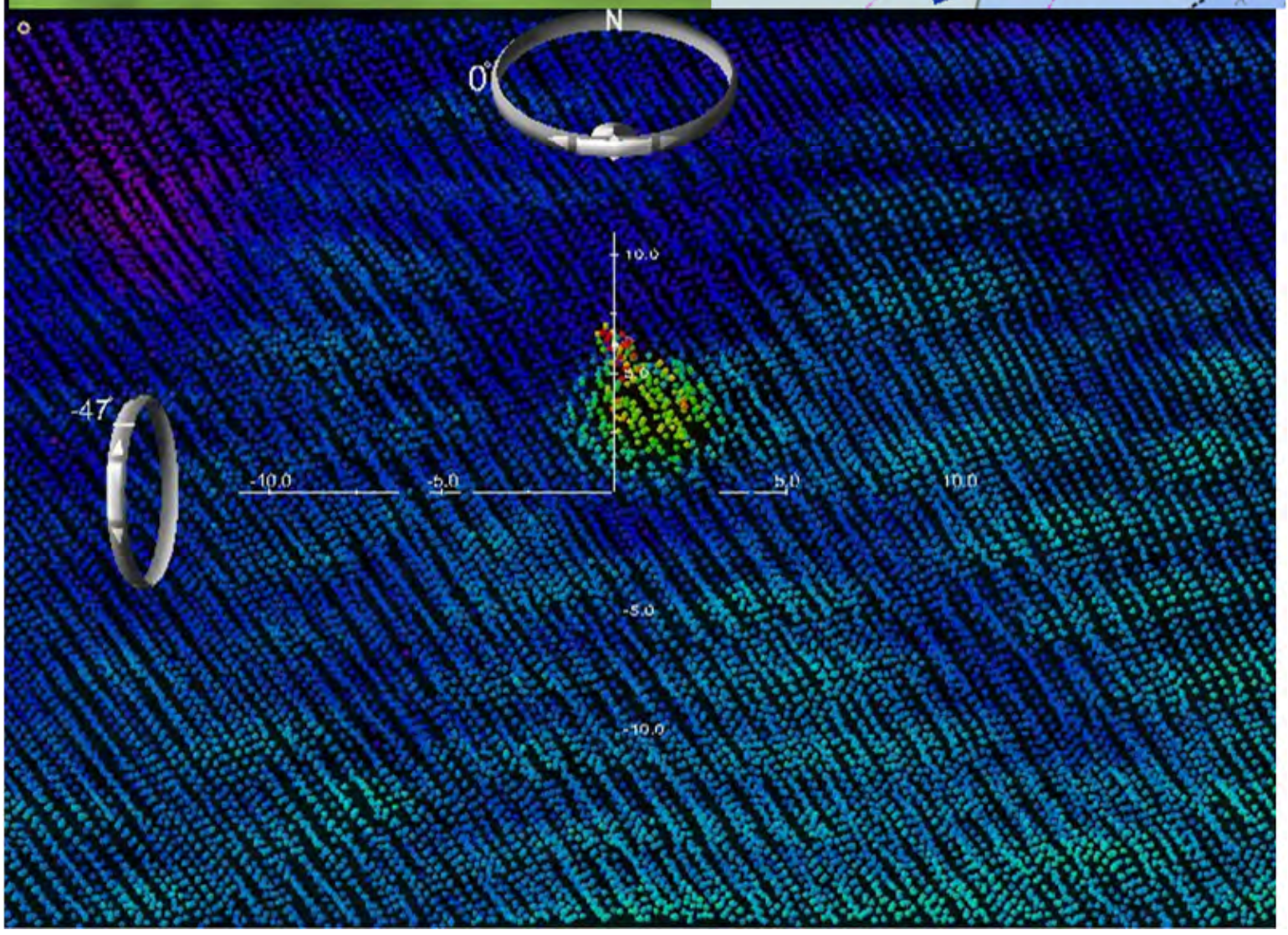
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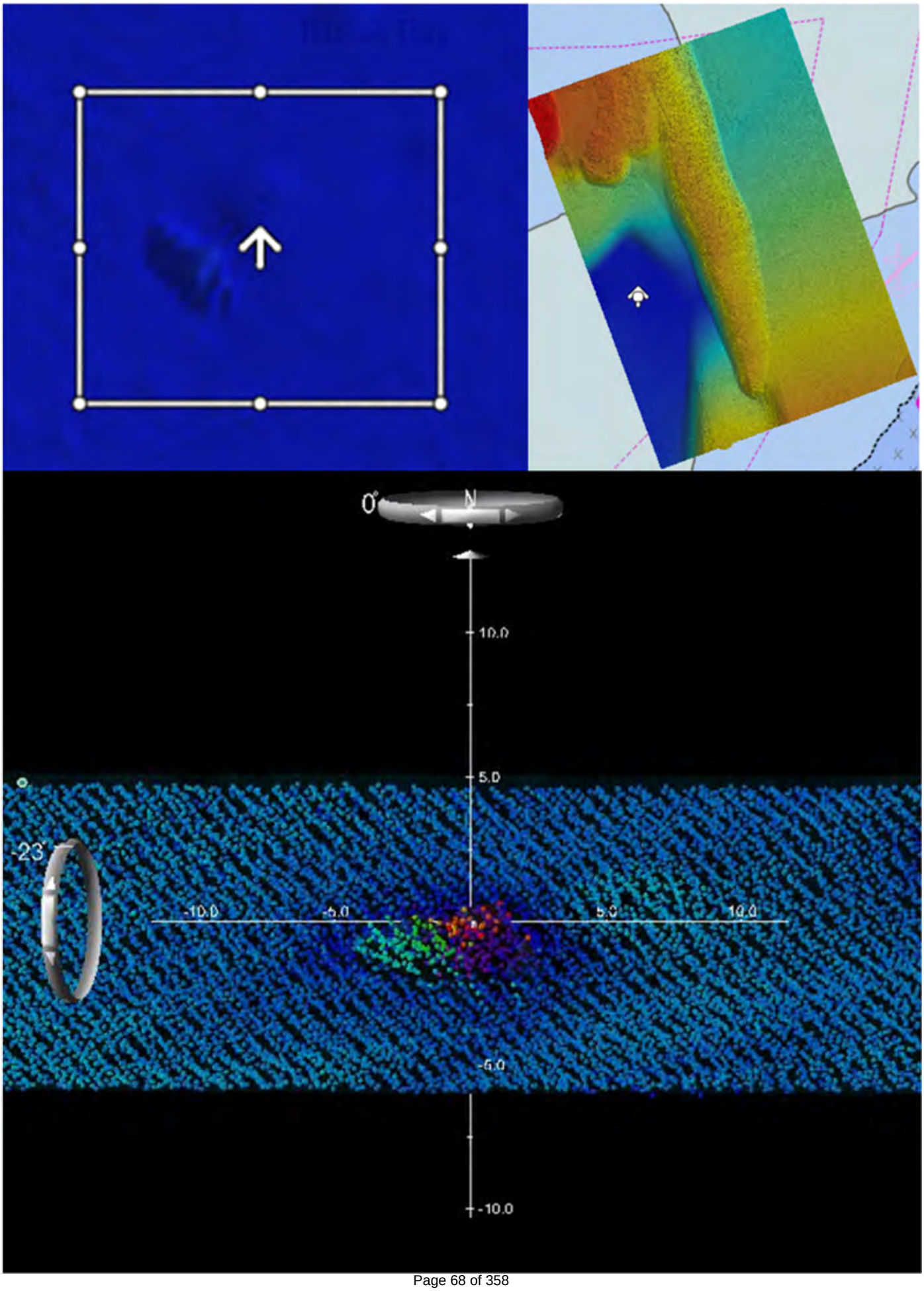
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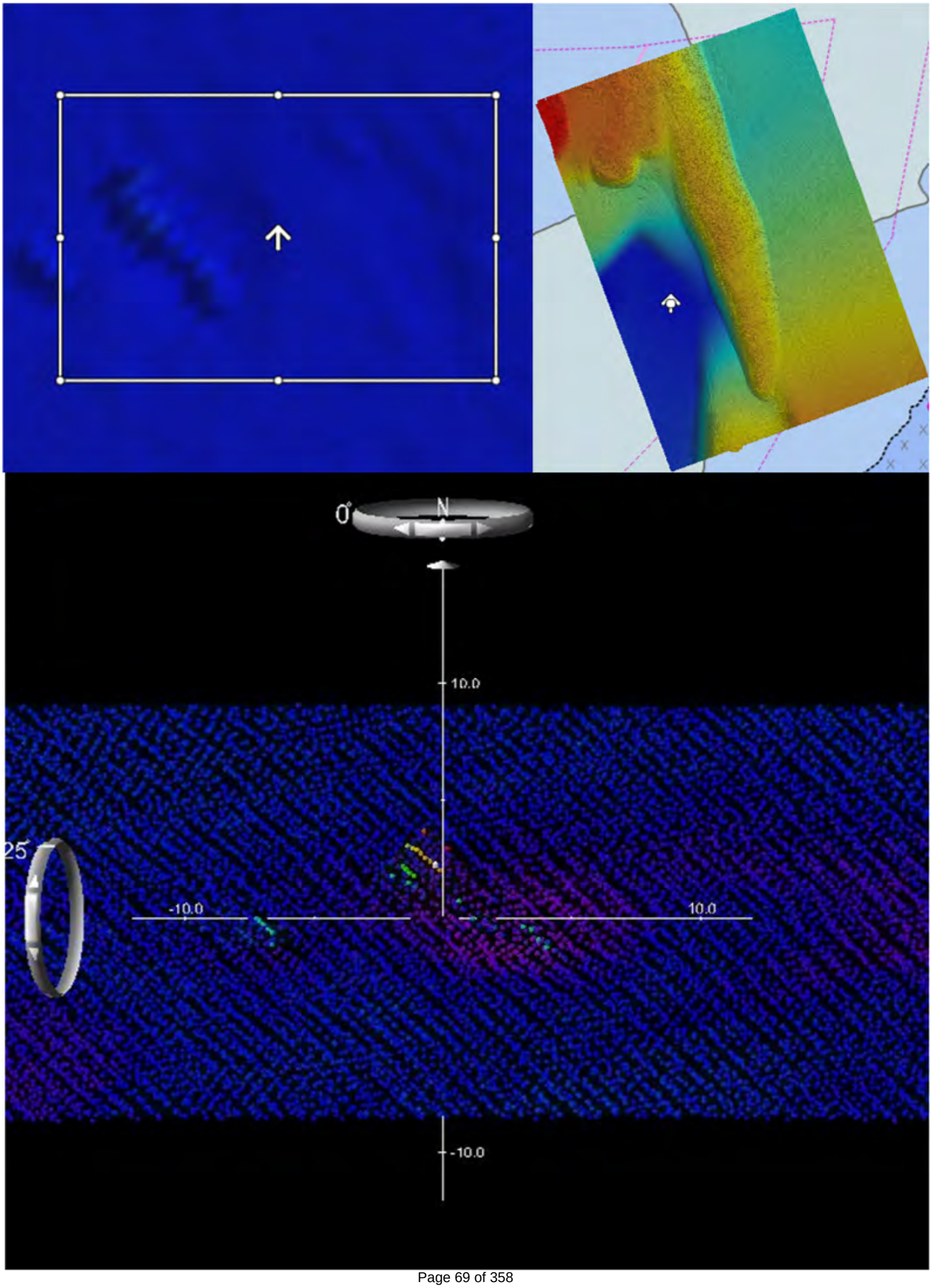
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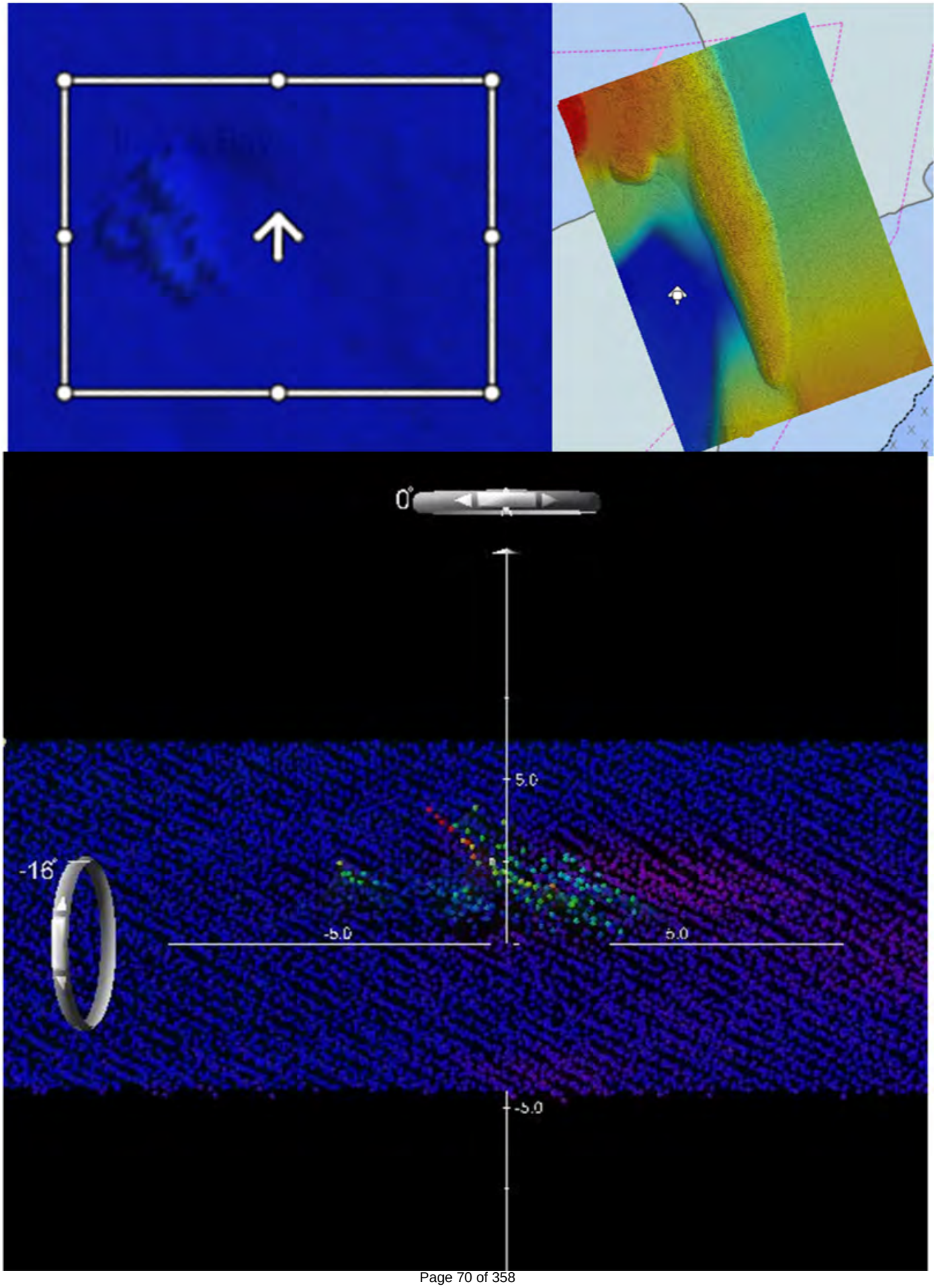
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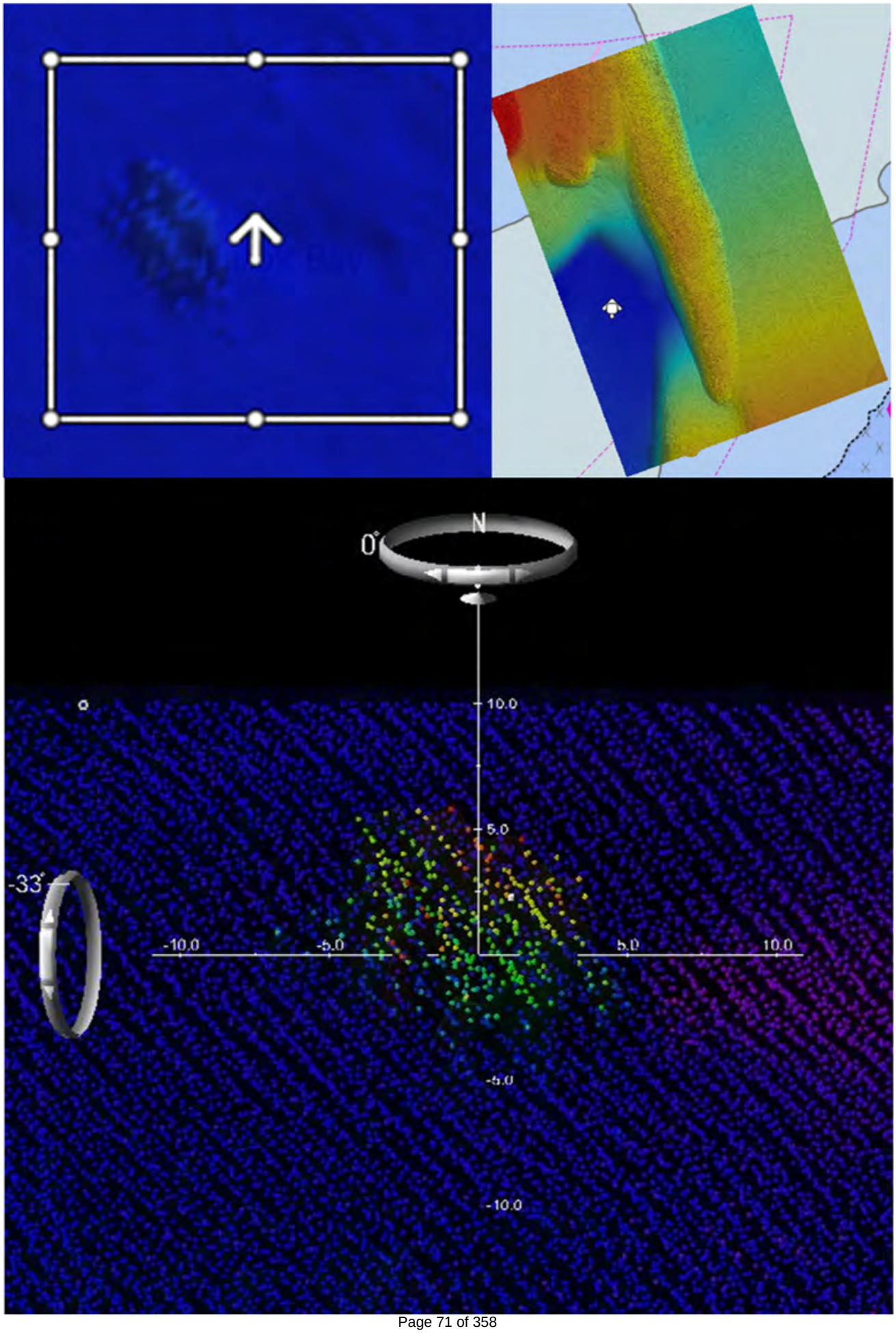
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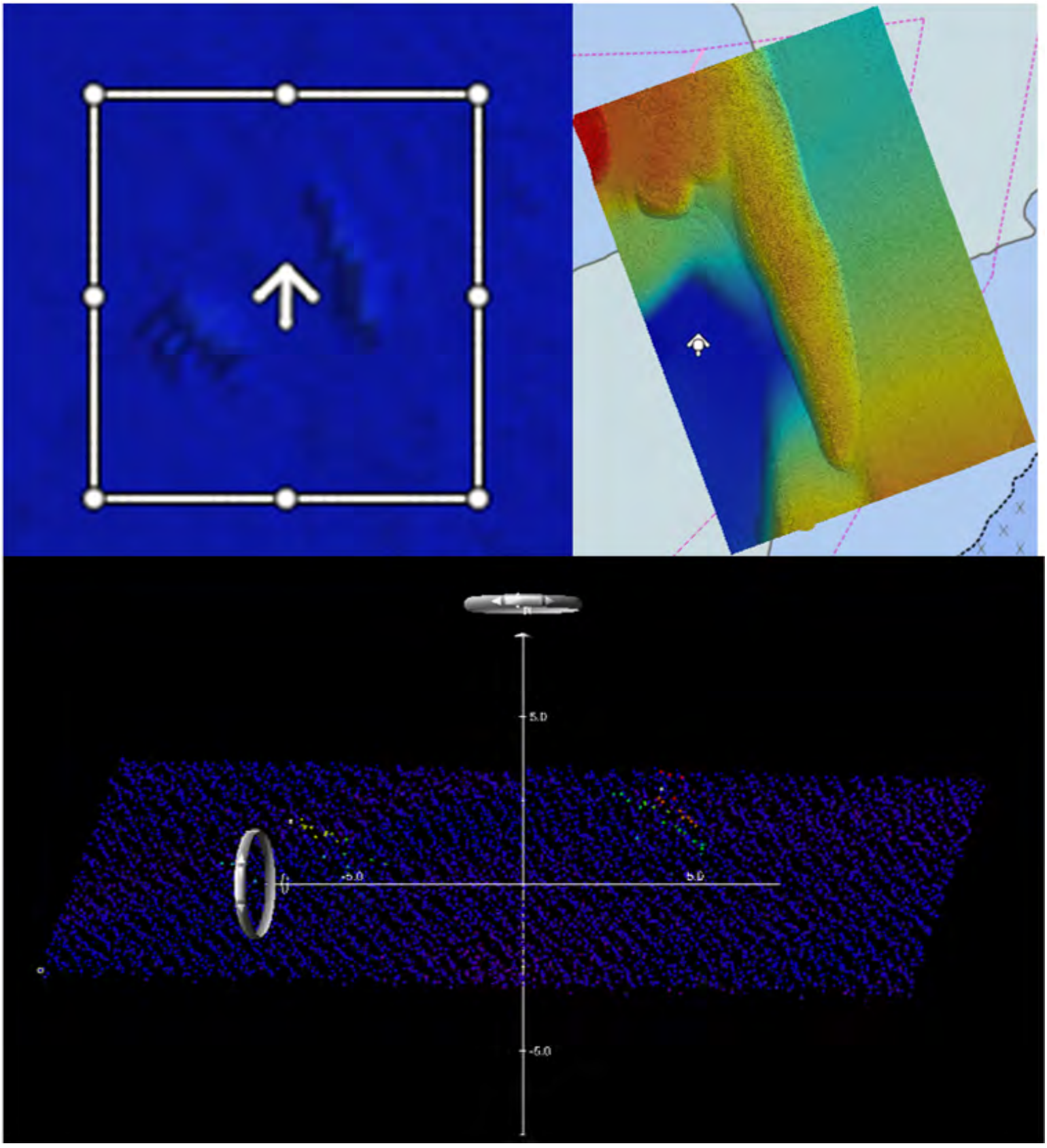
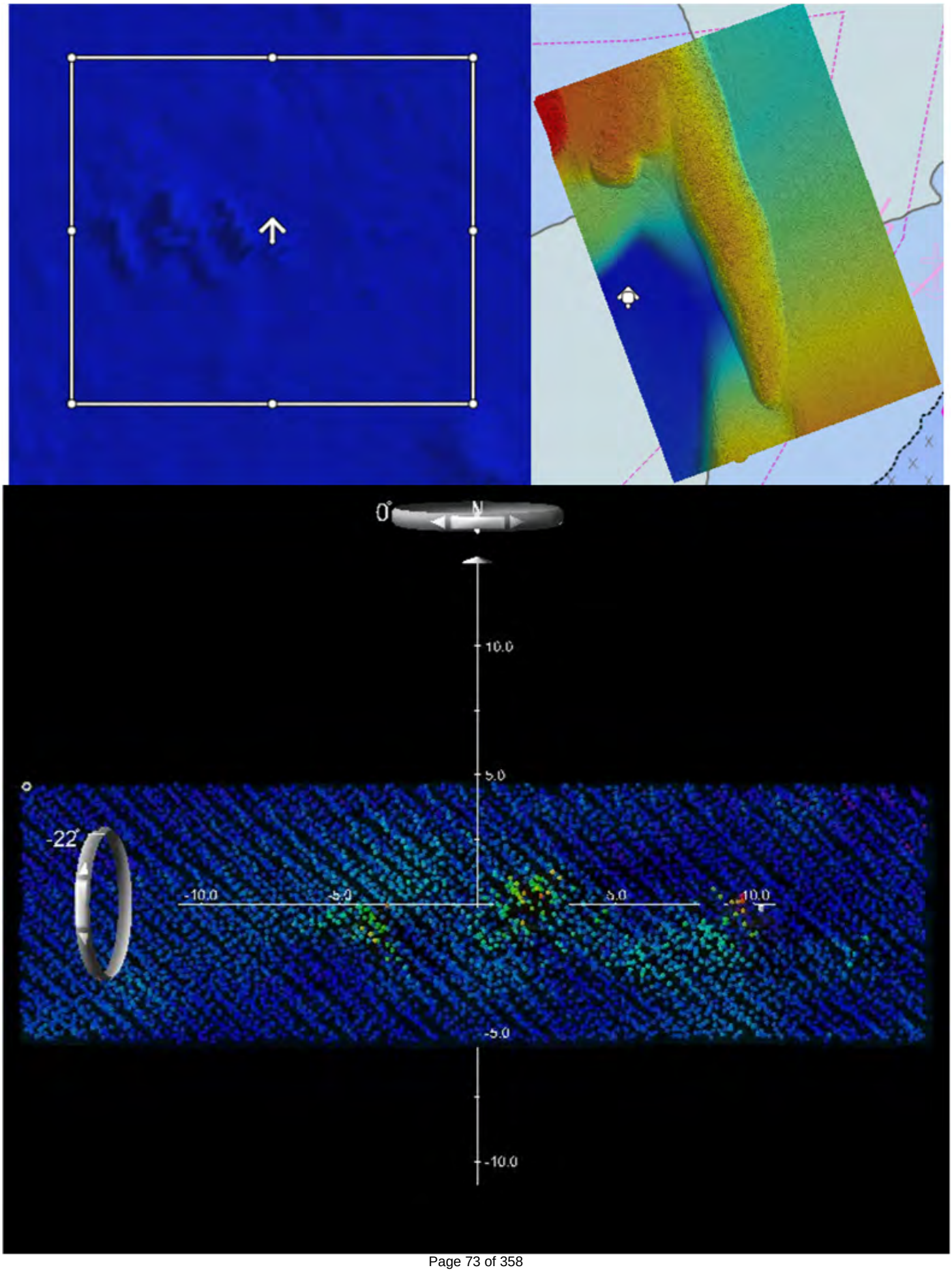
UKO_030

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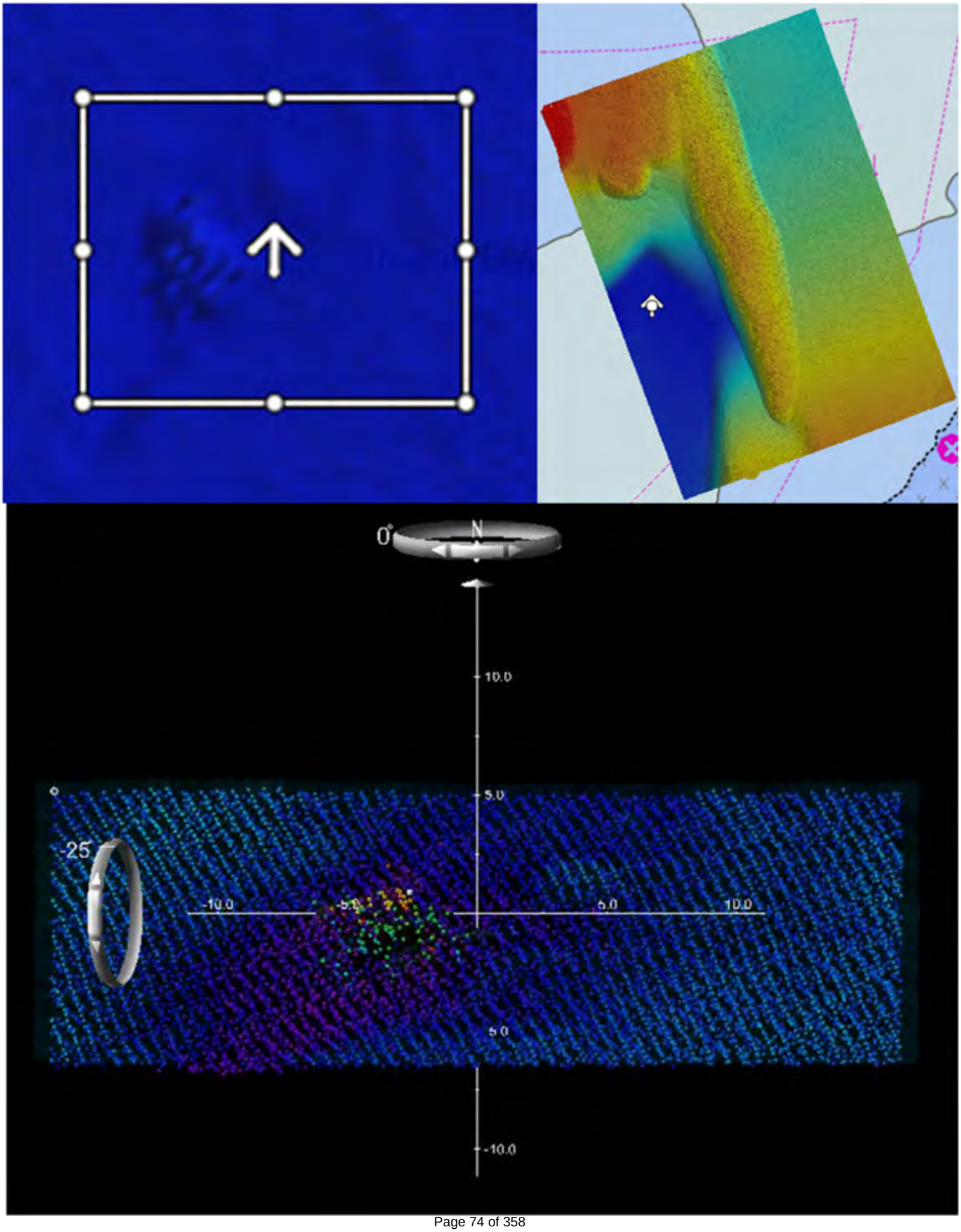
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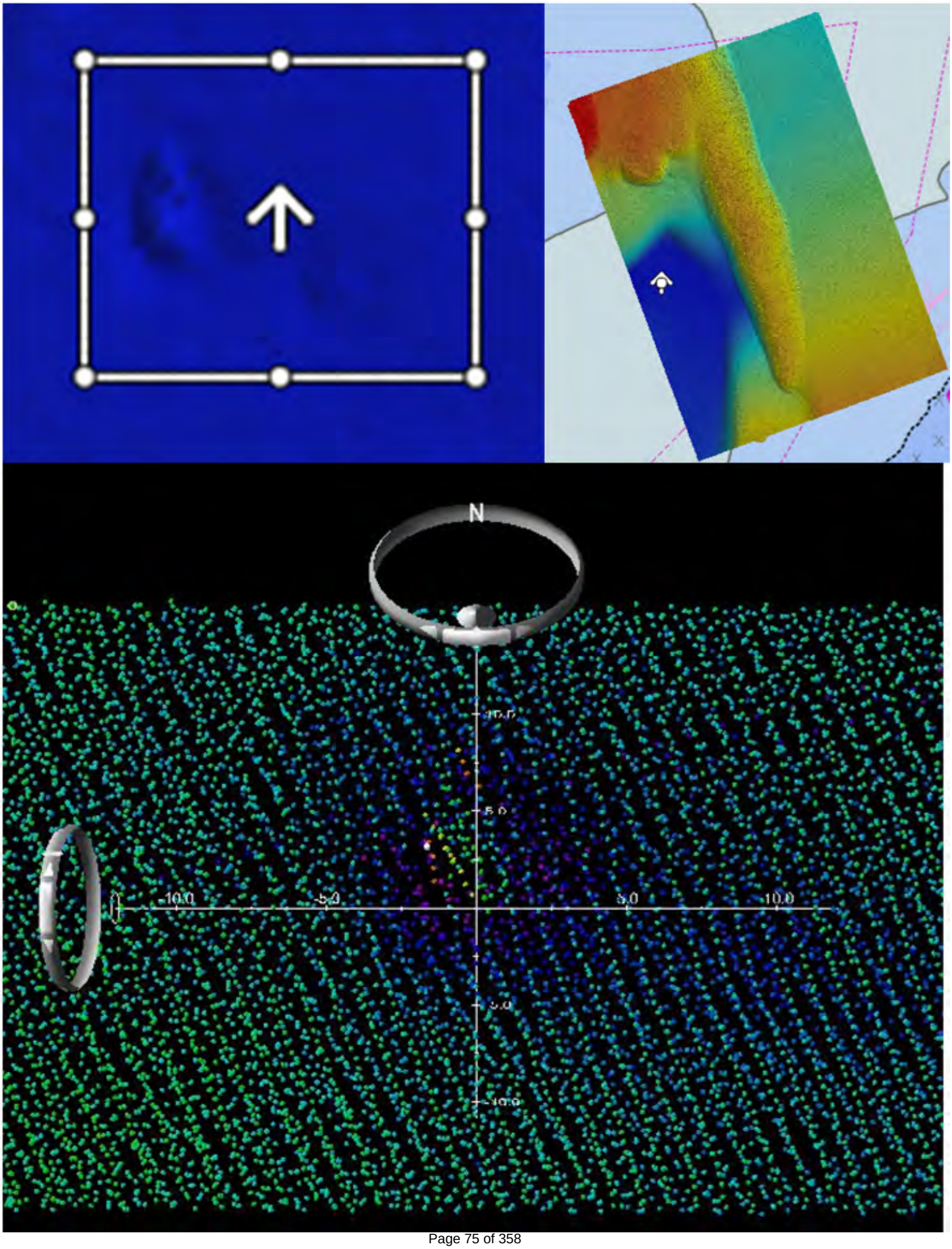
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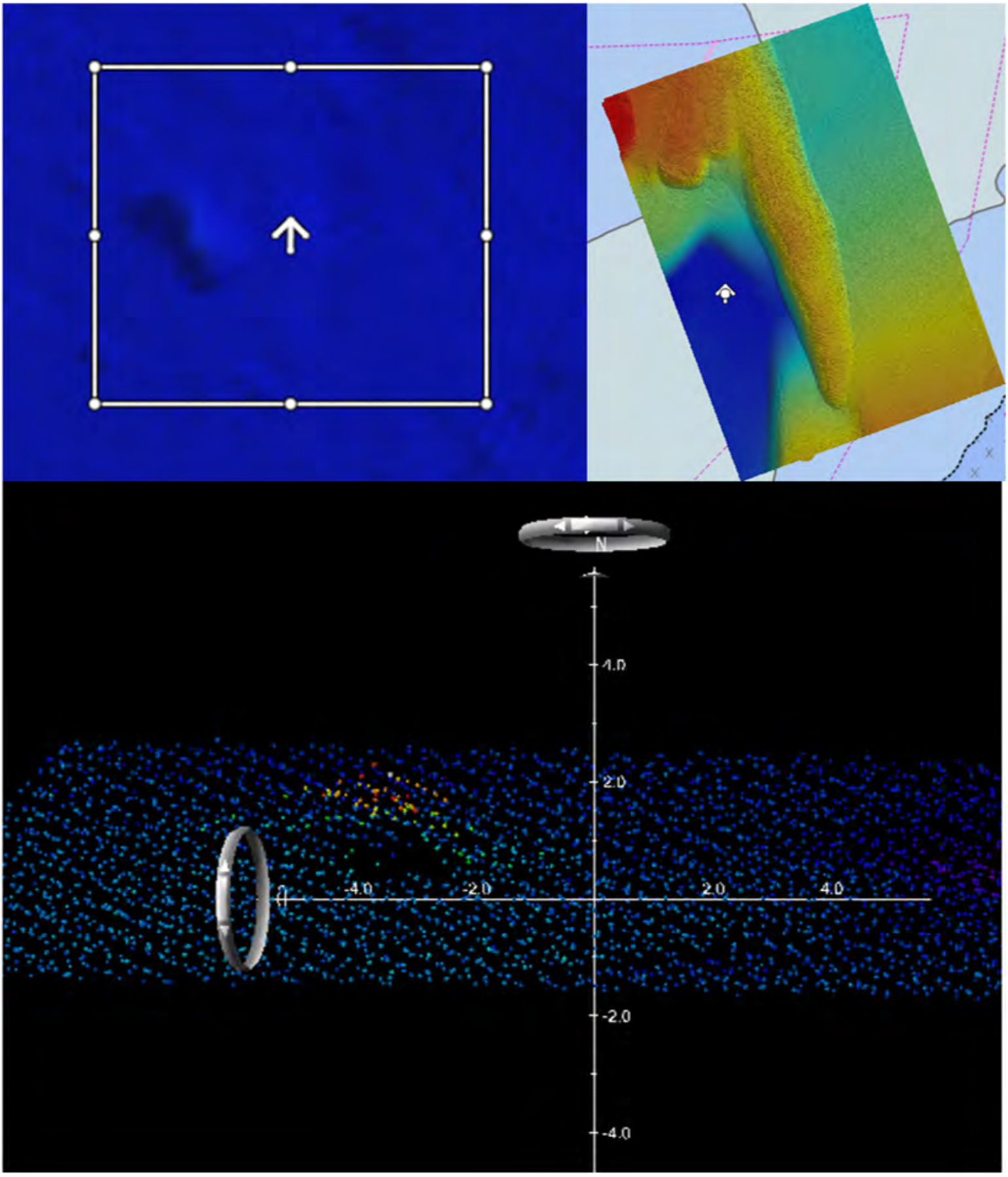
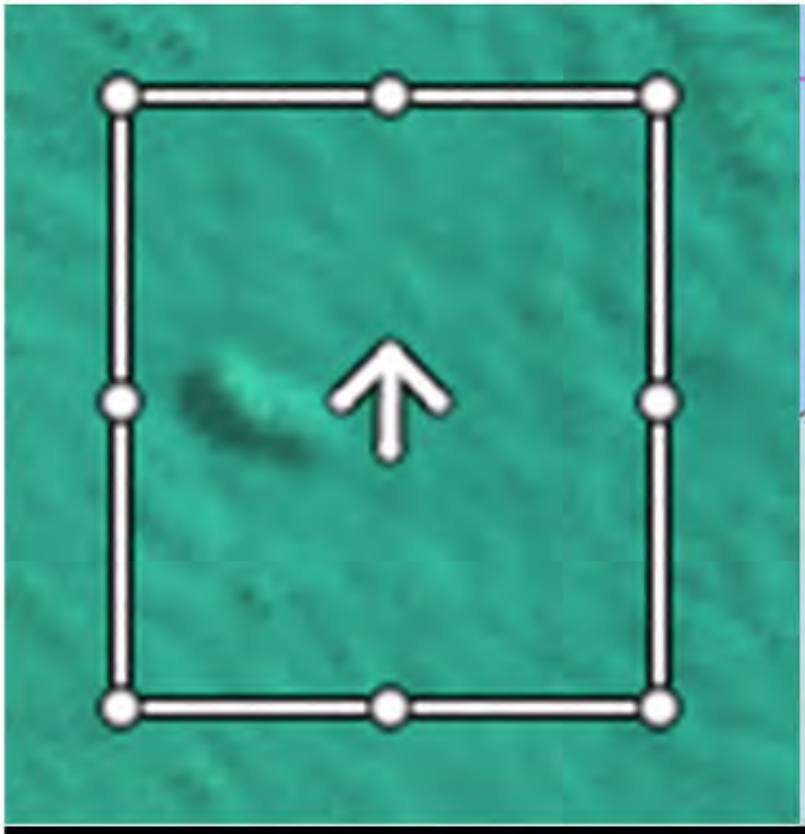
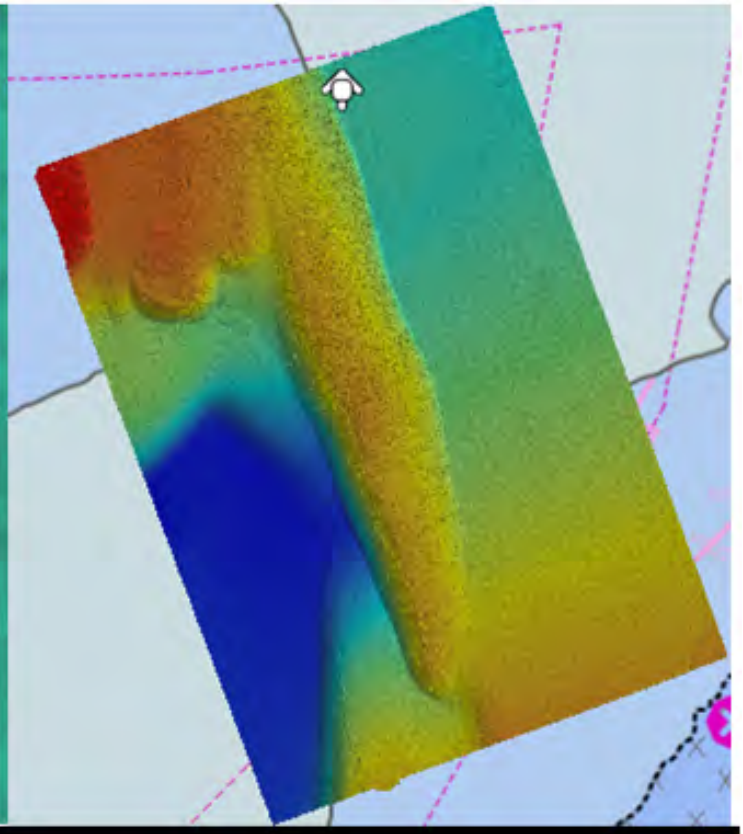
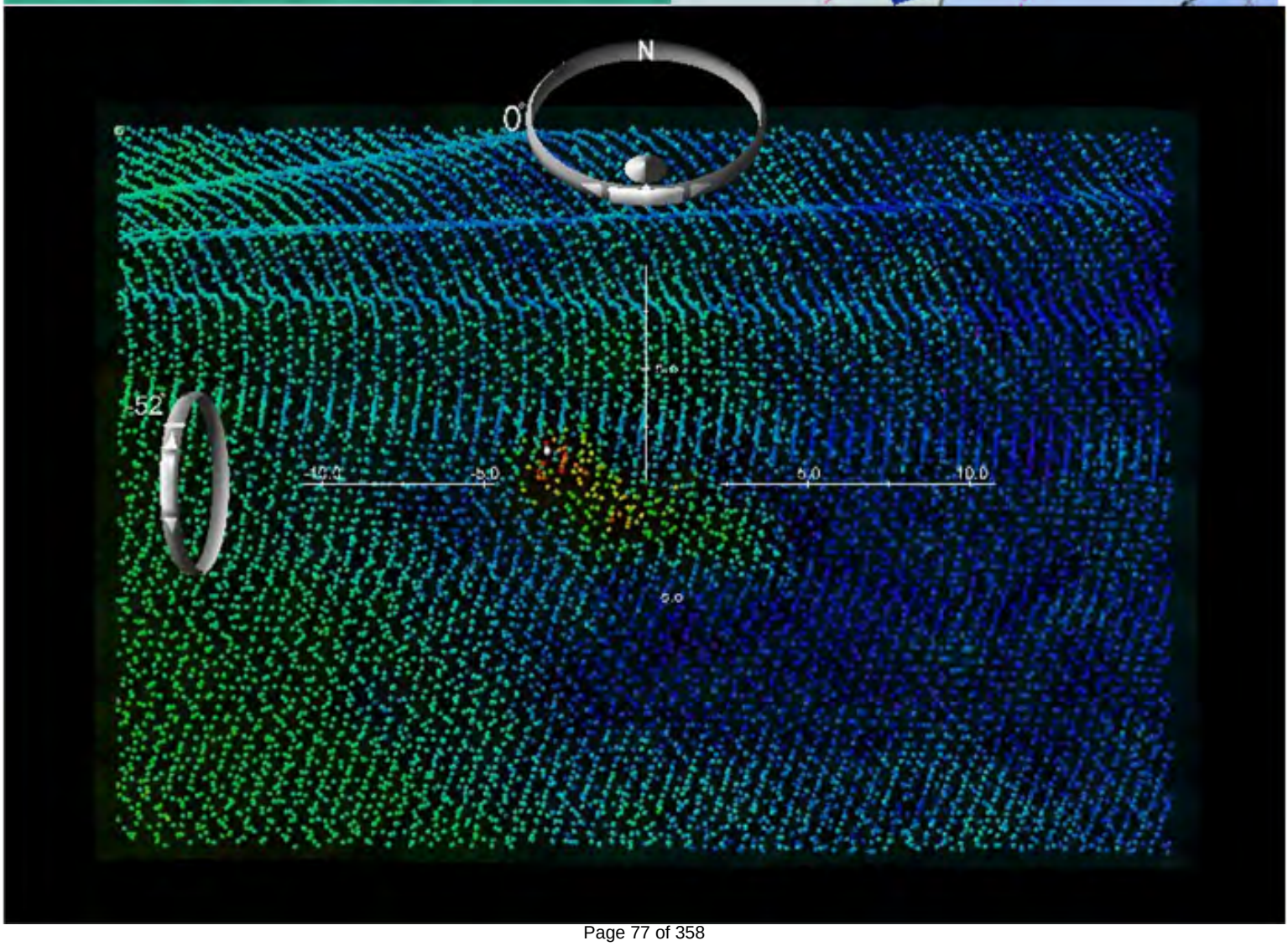
UKO_034





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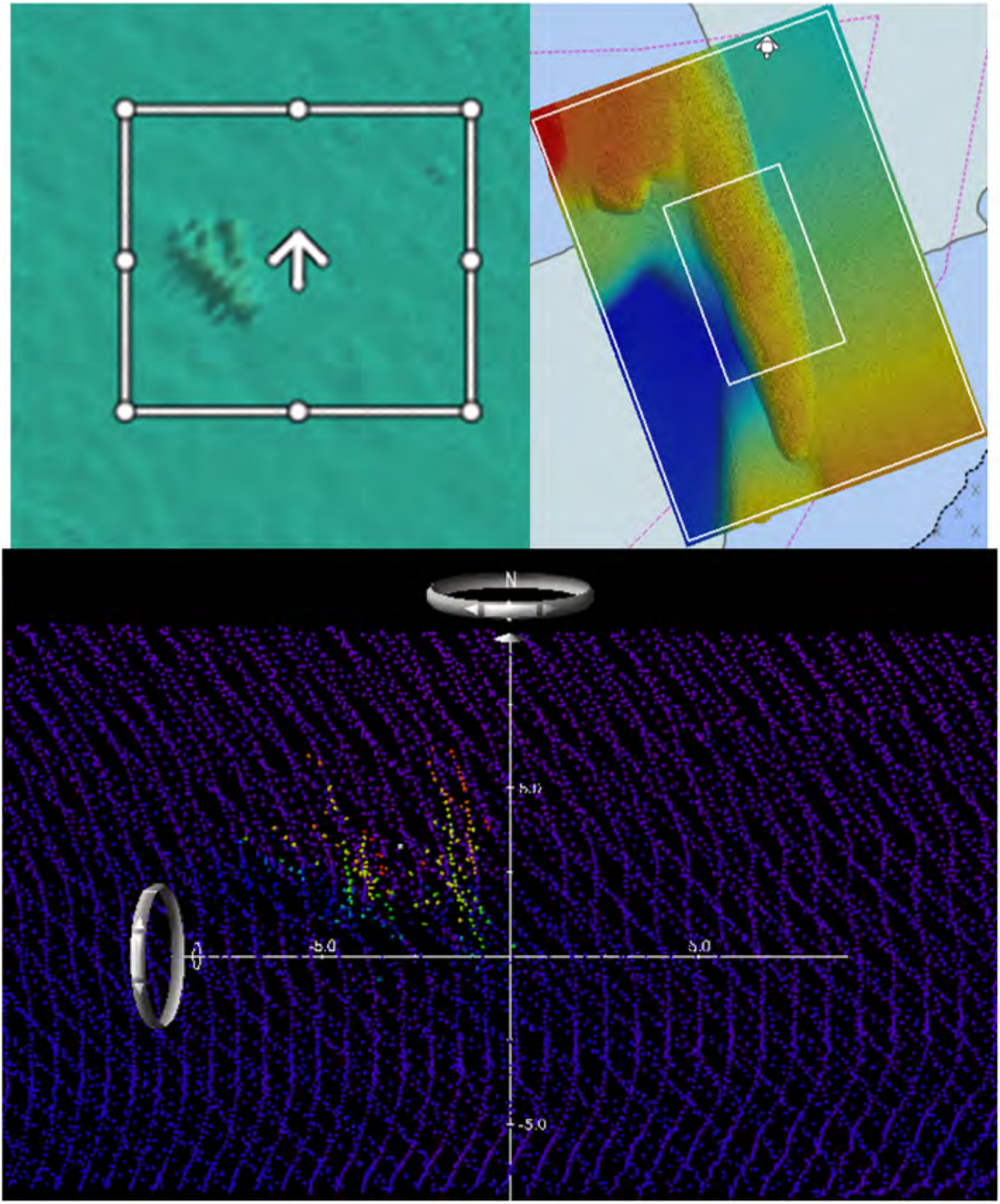
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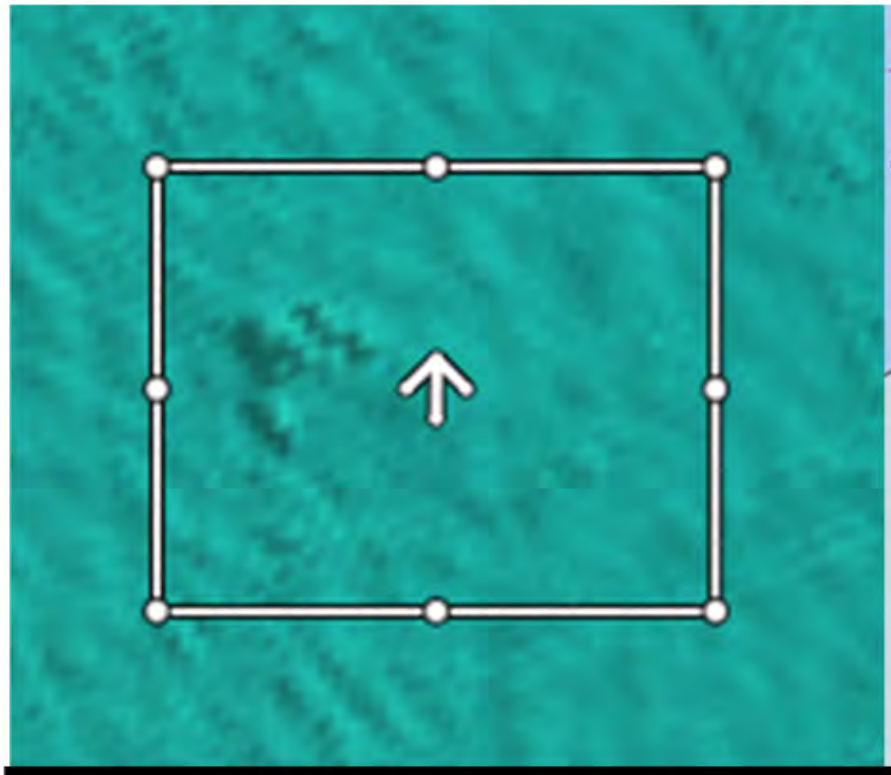

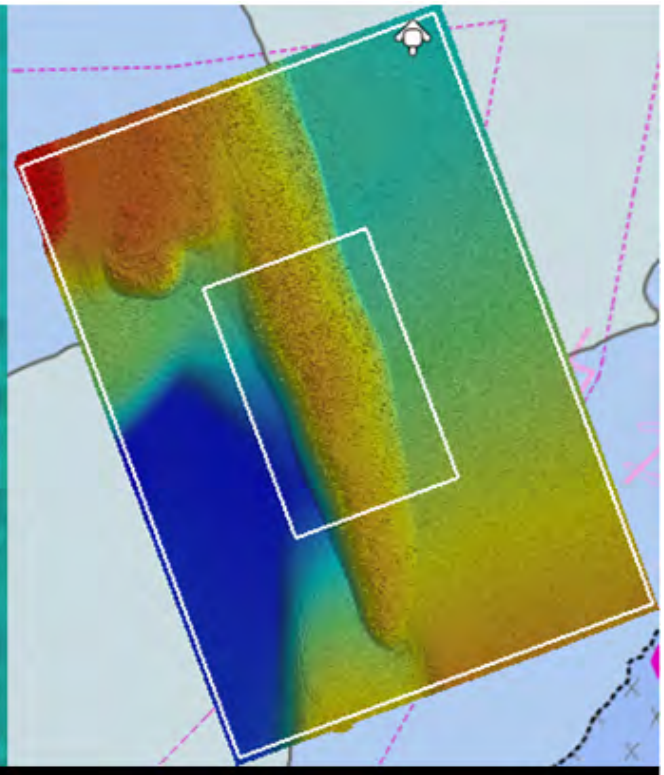

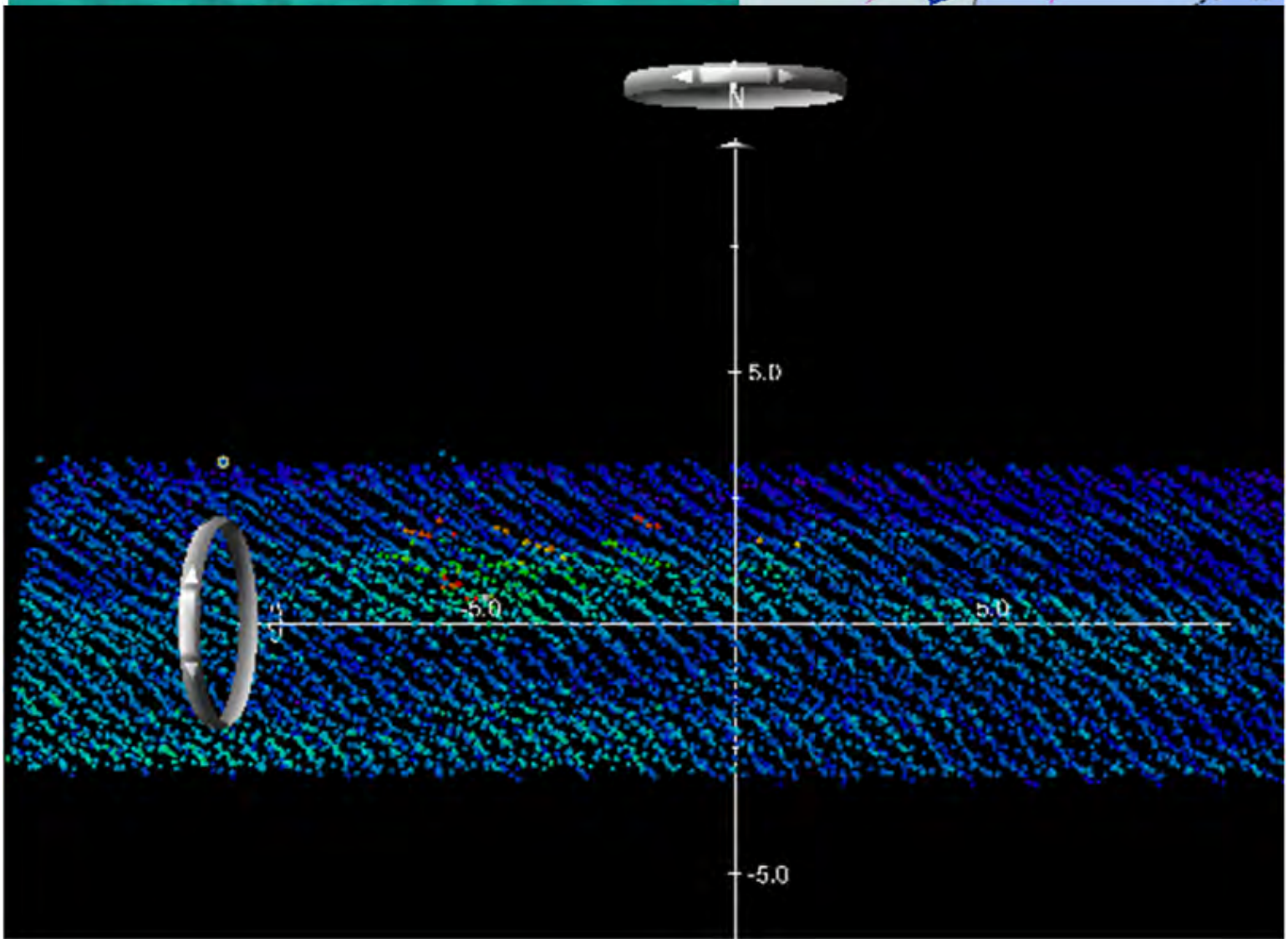
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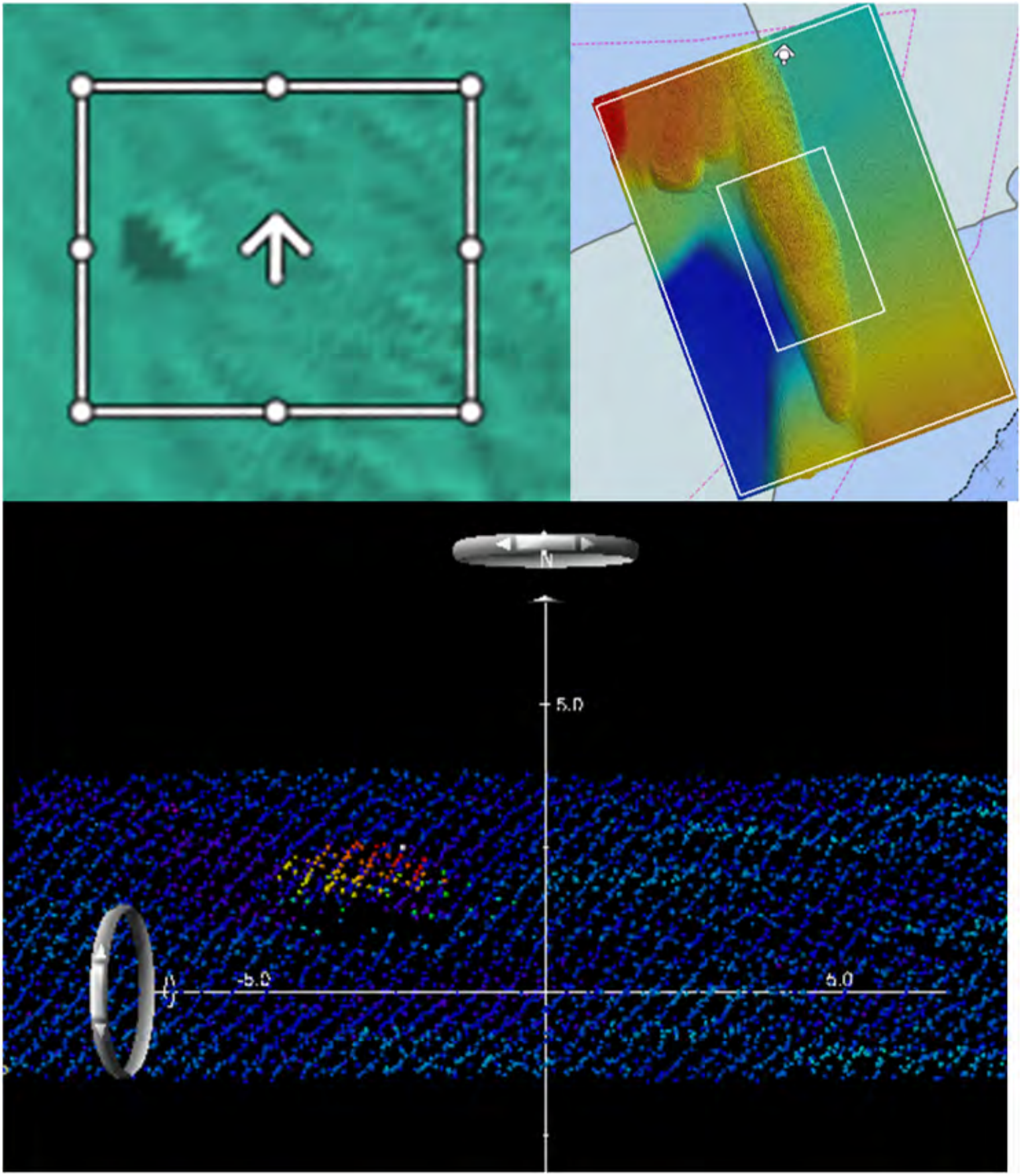

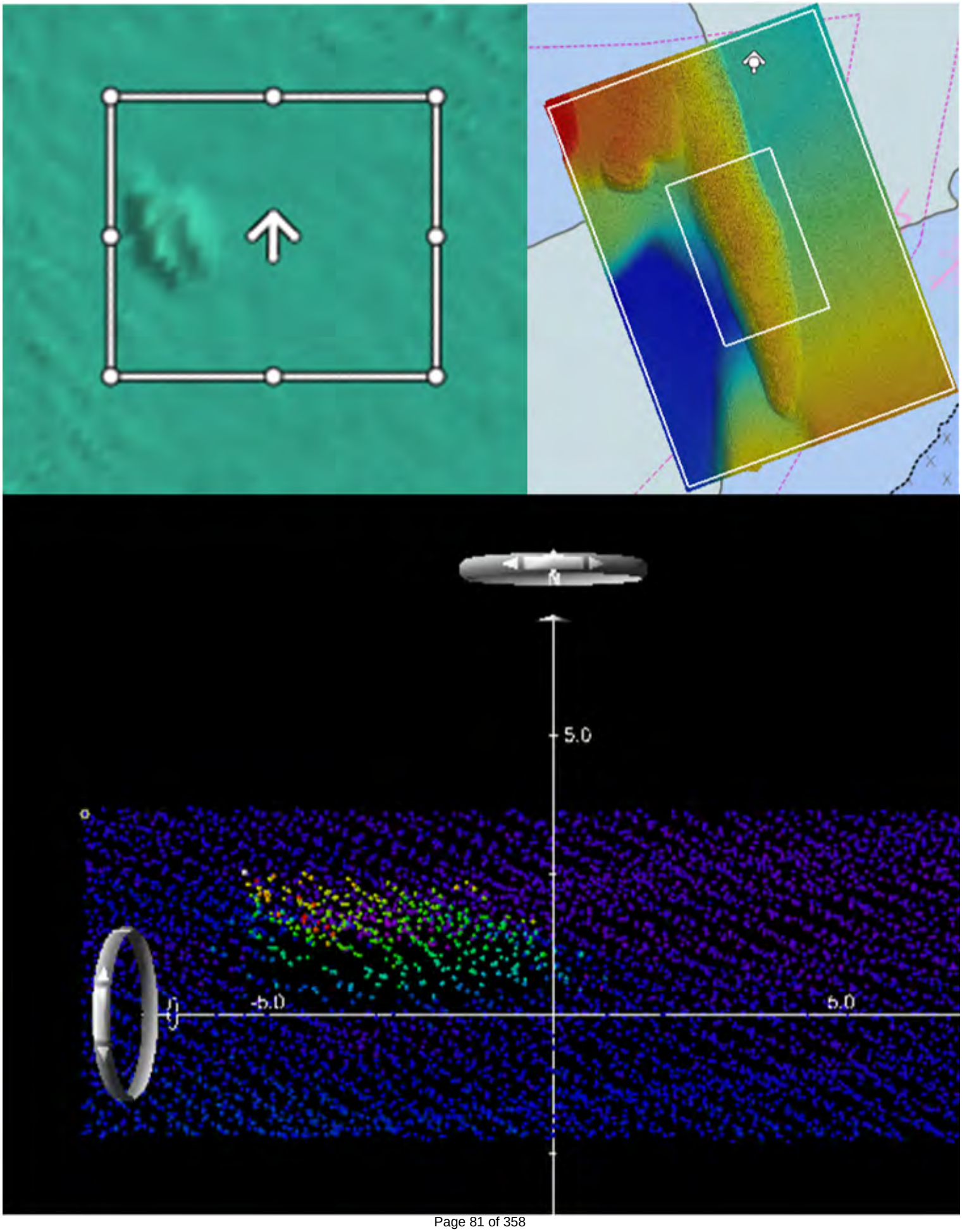
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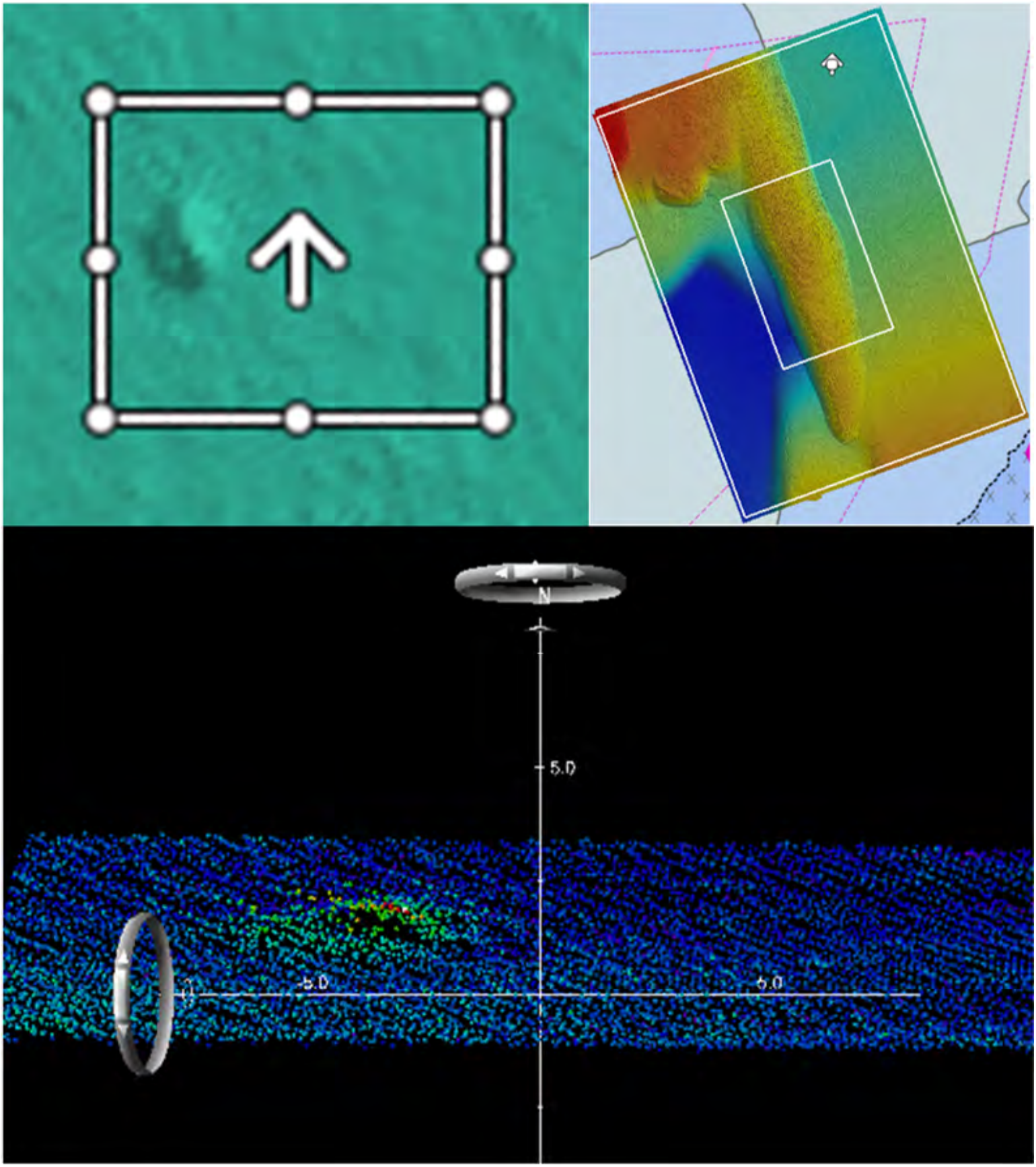

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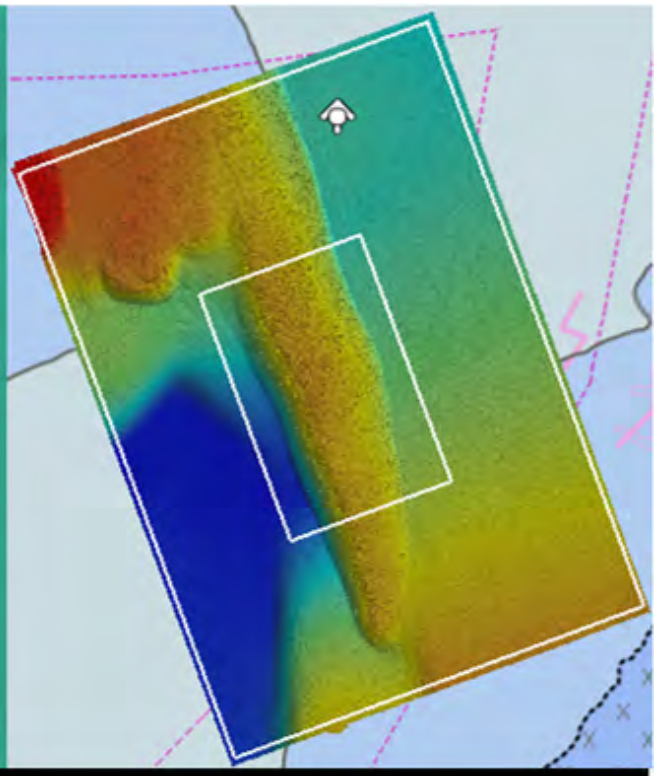

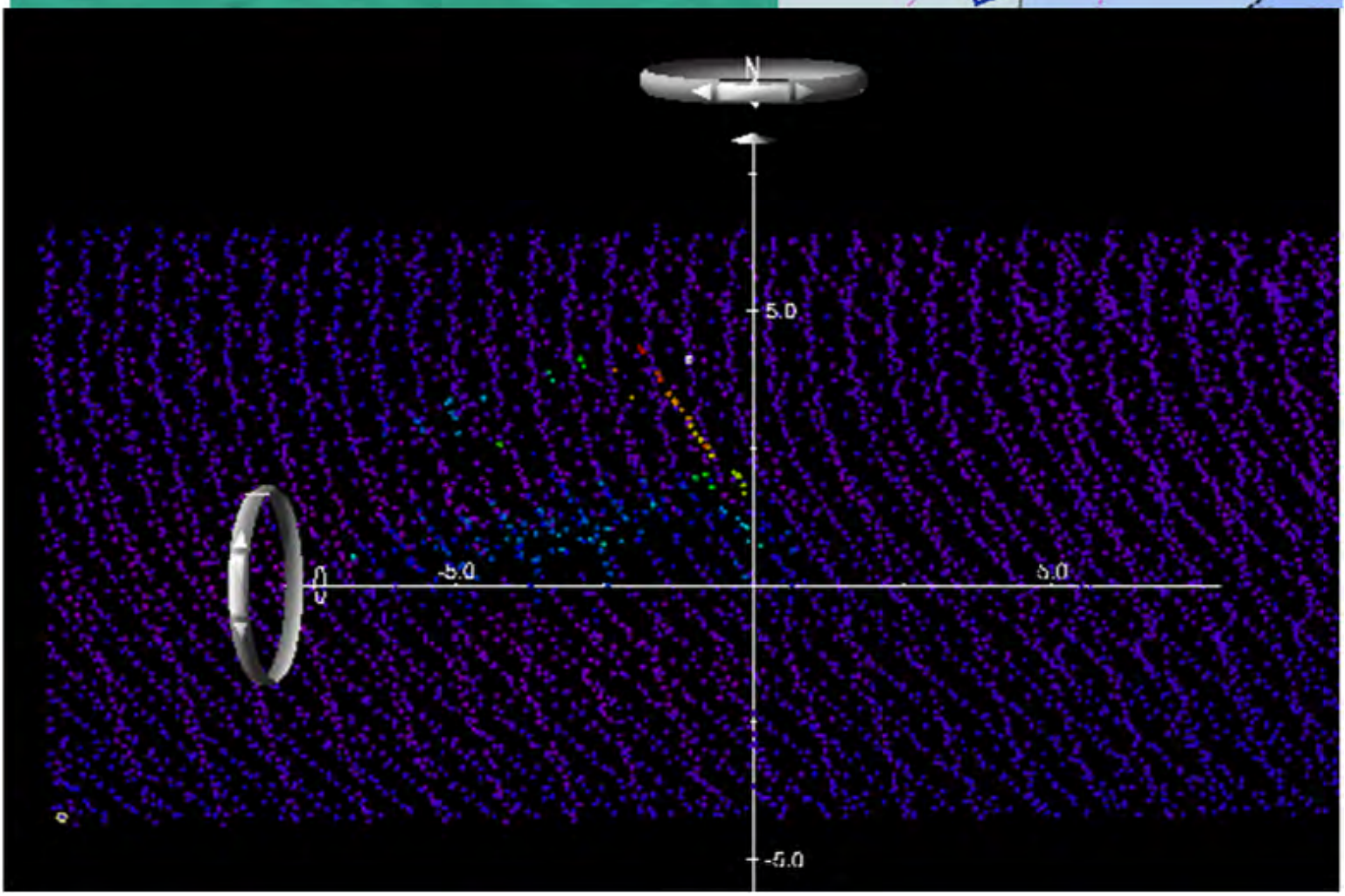

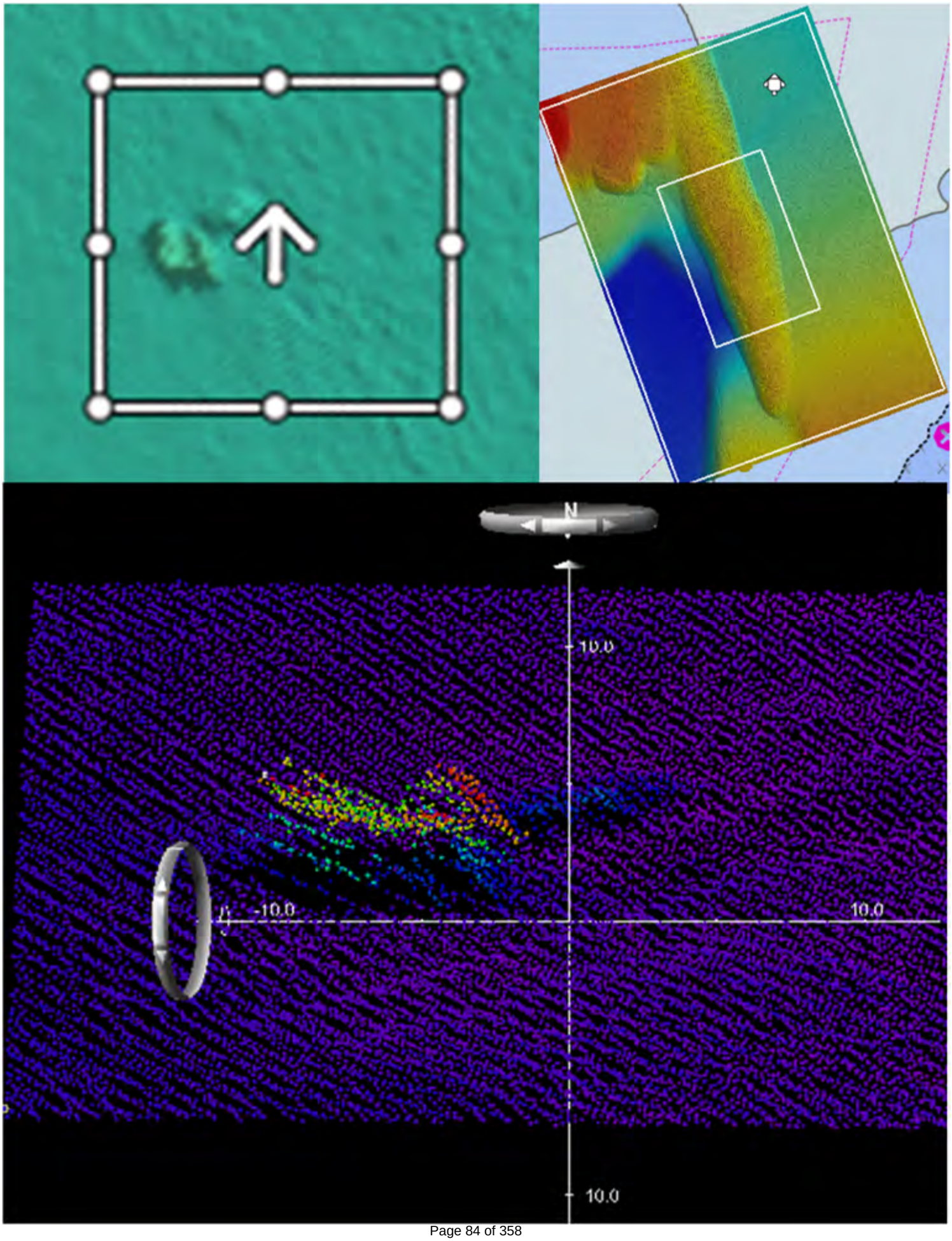
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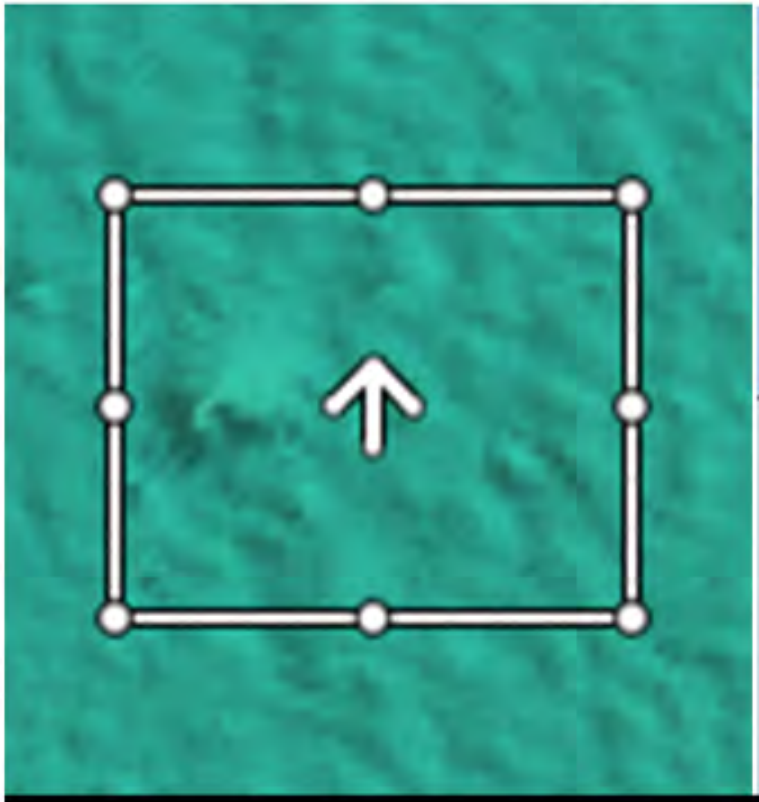

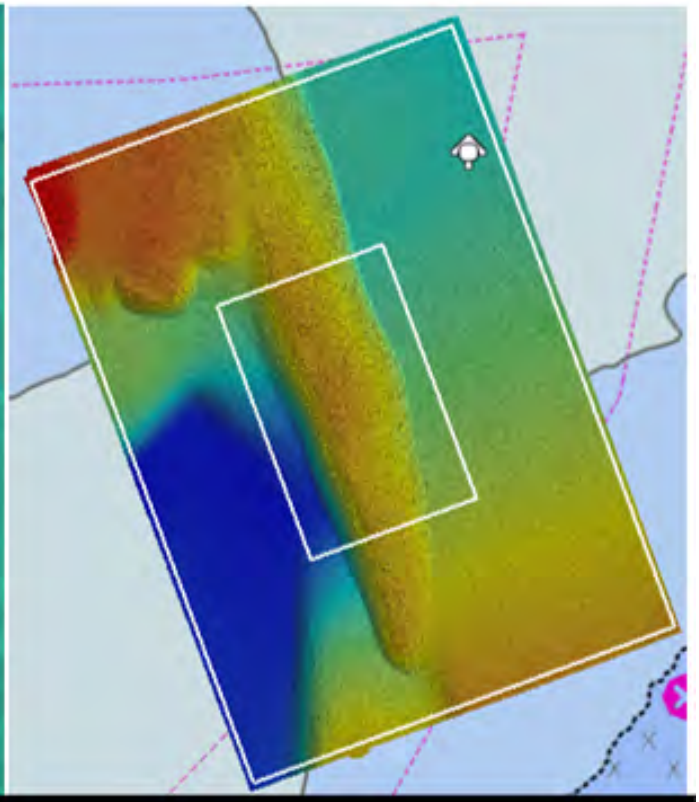

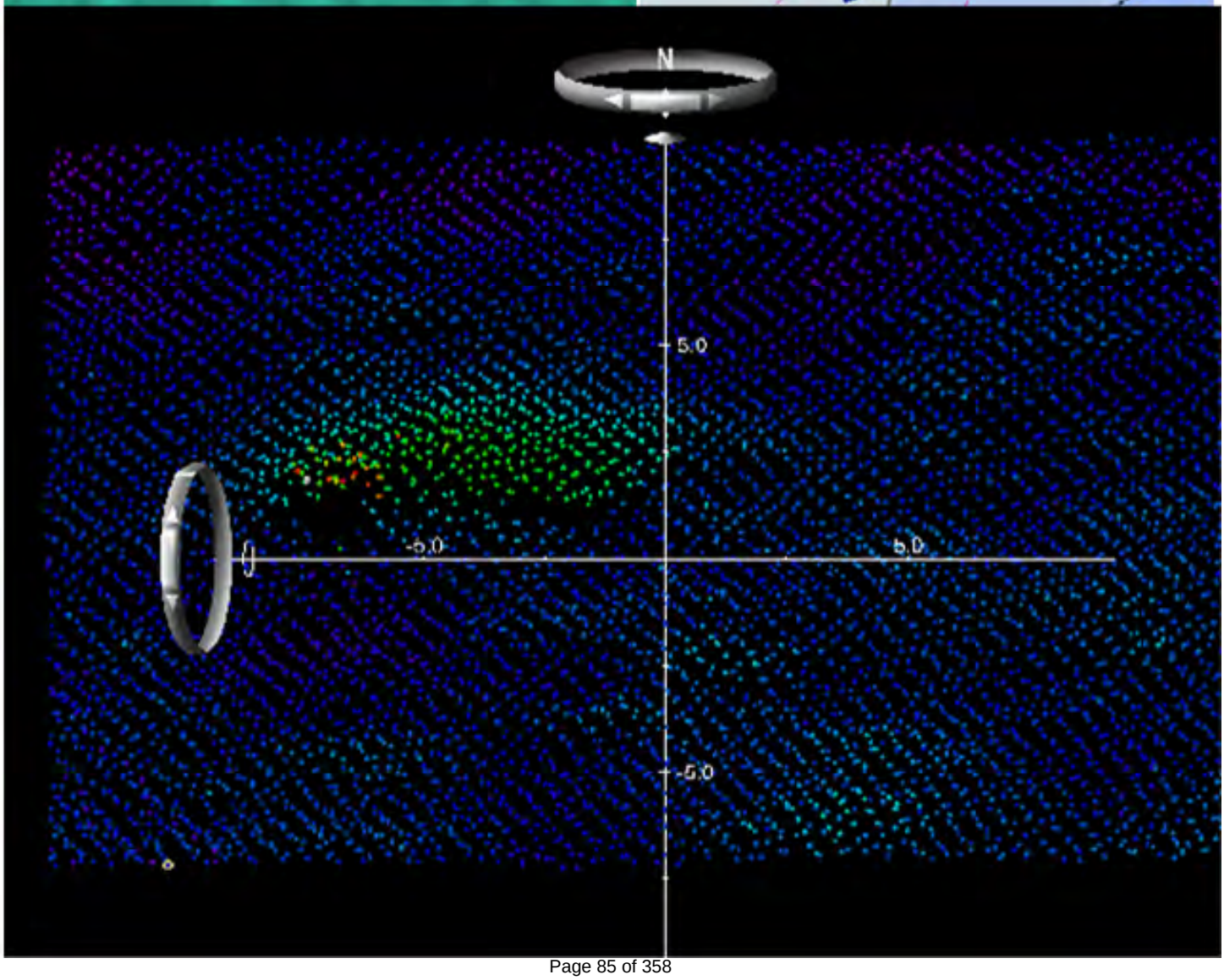
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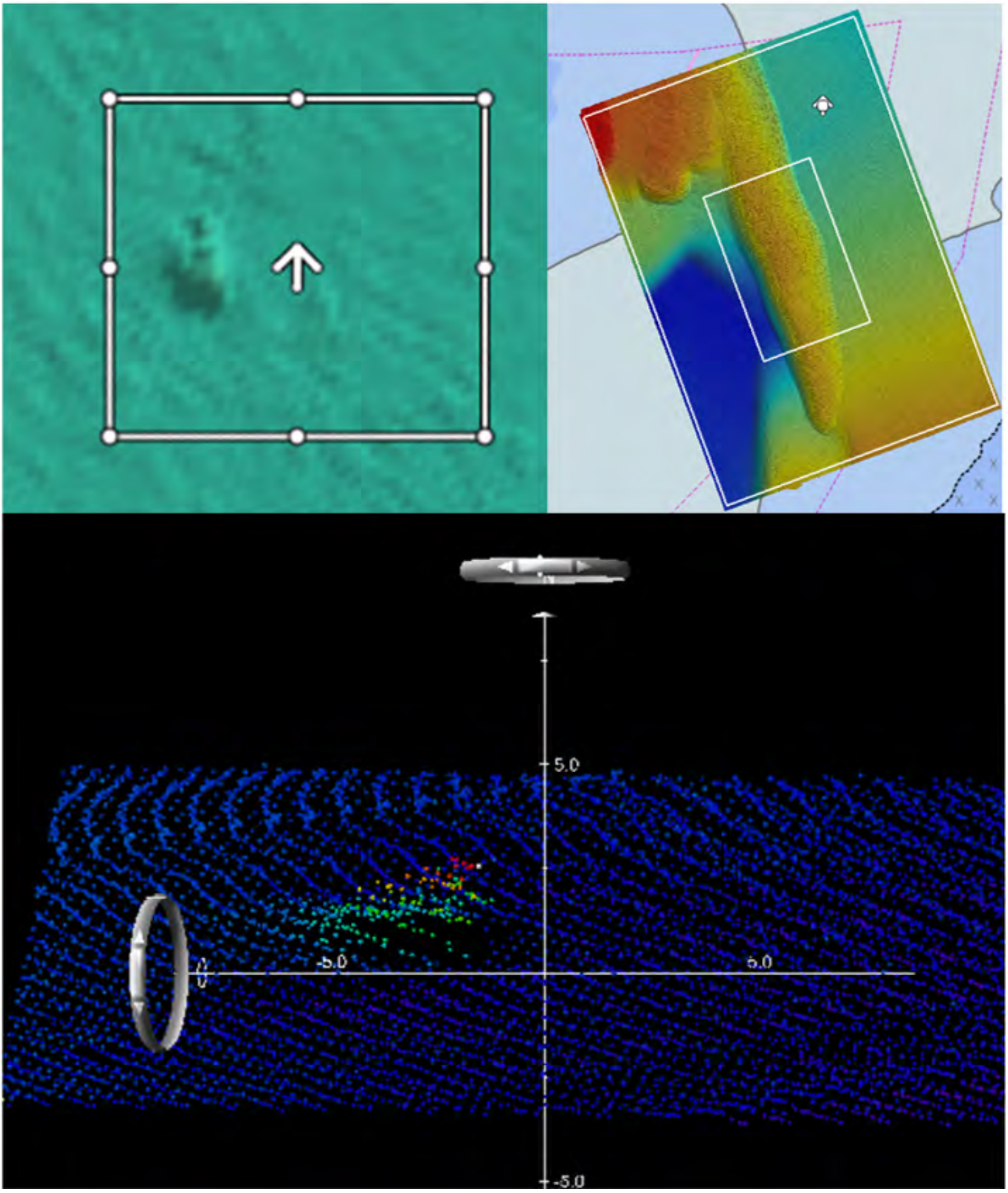
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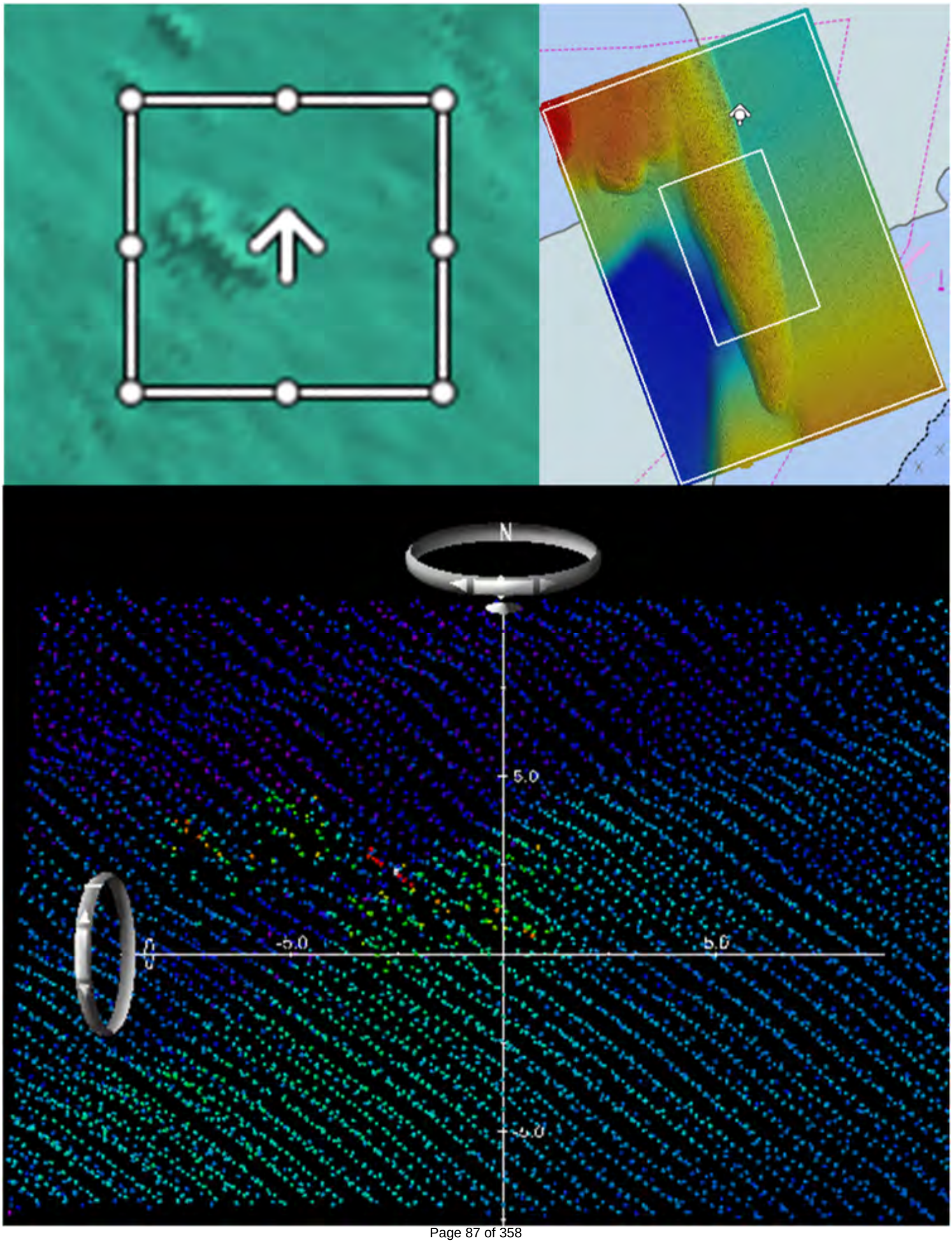
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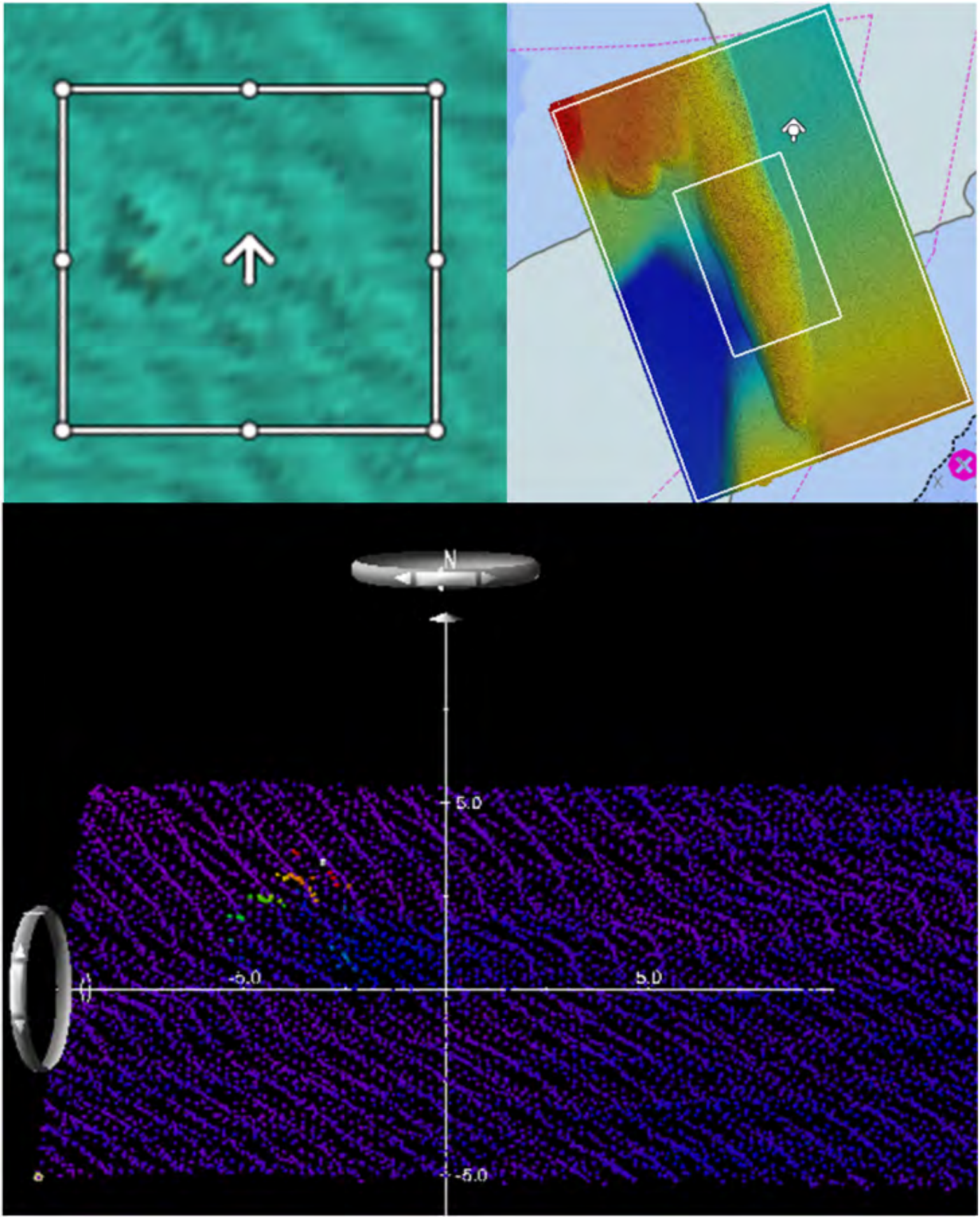
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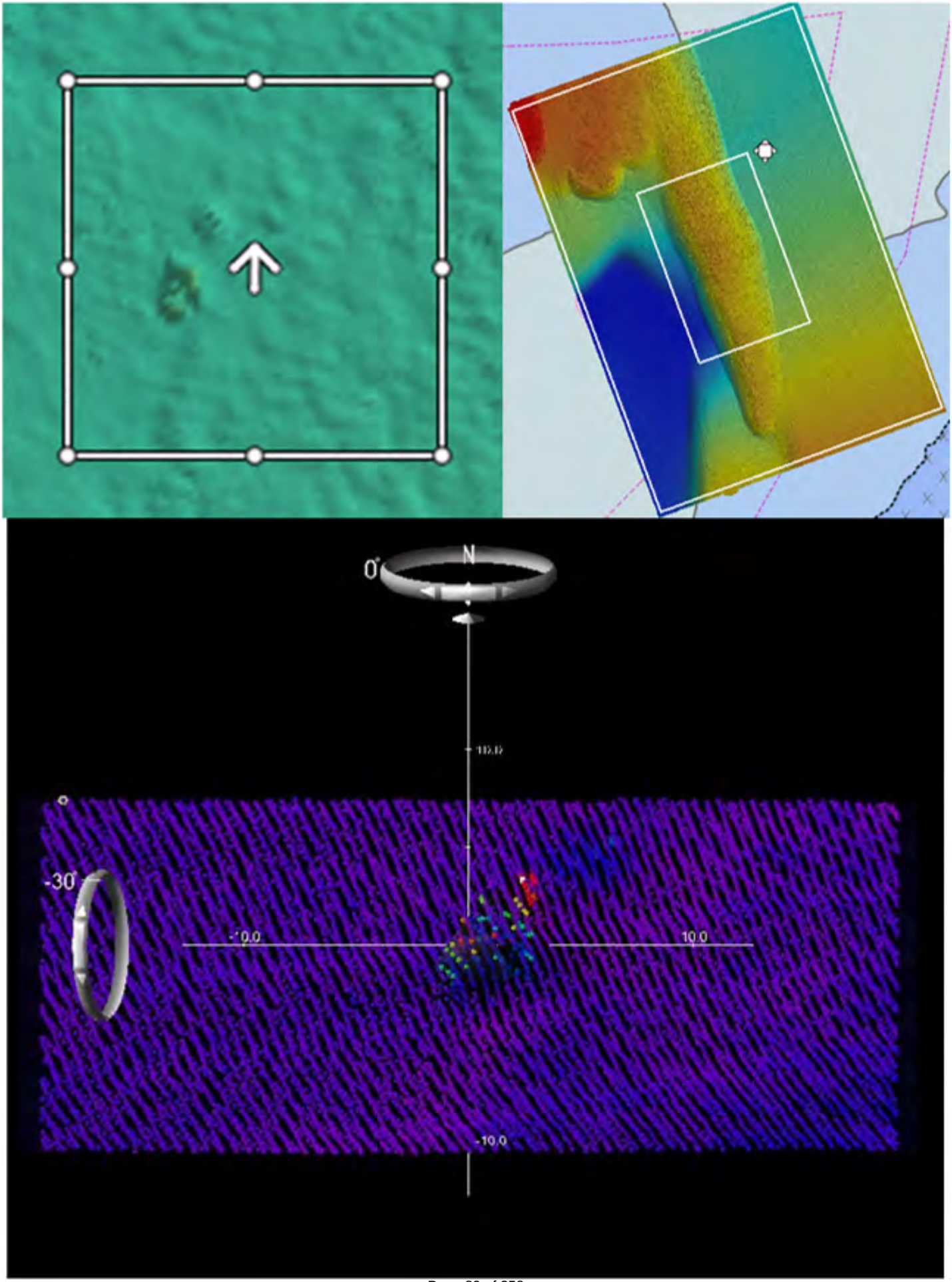
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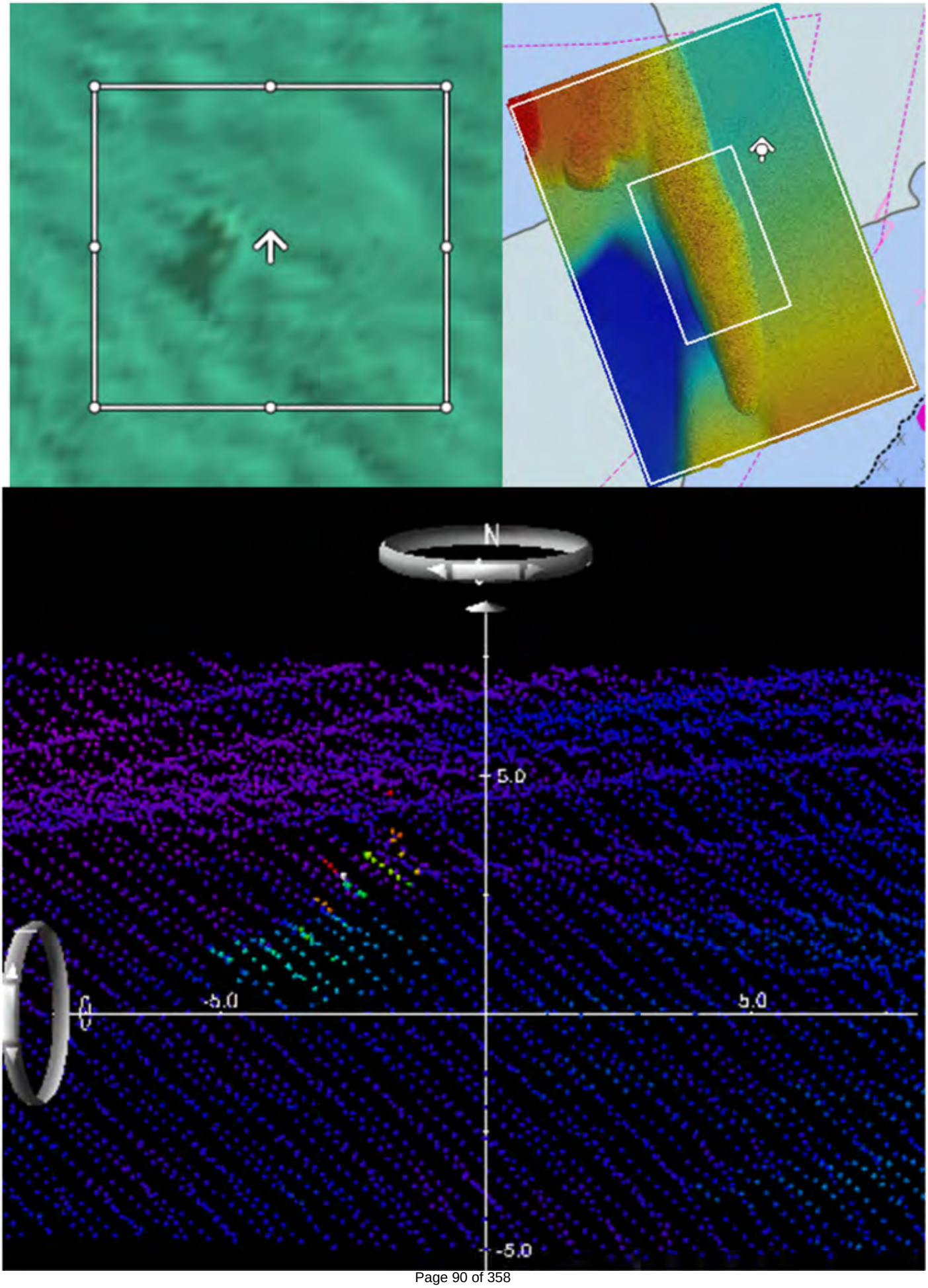
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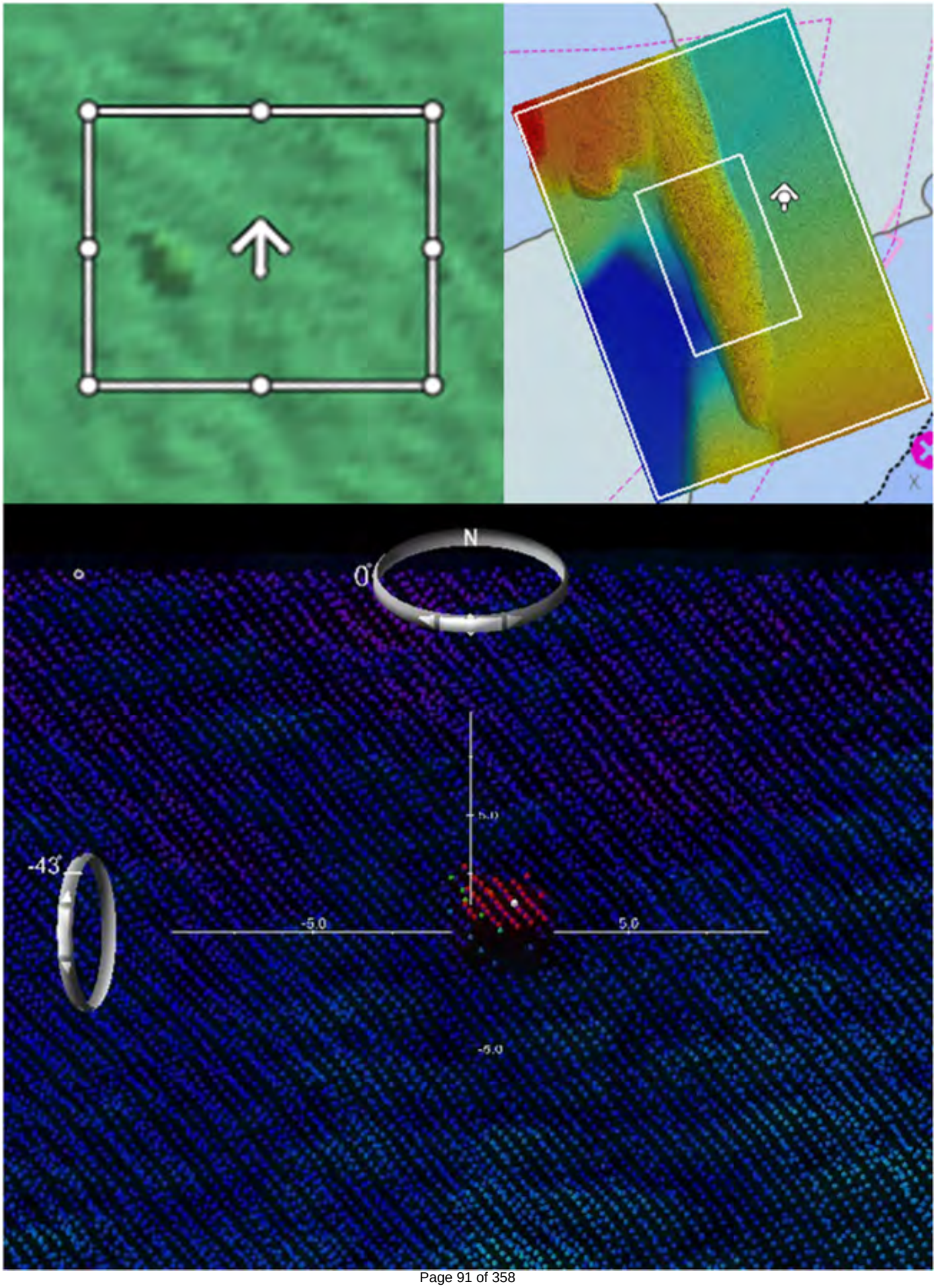
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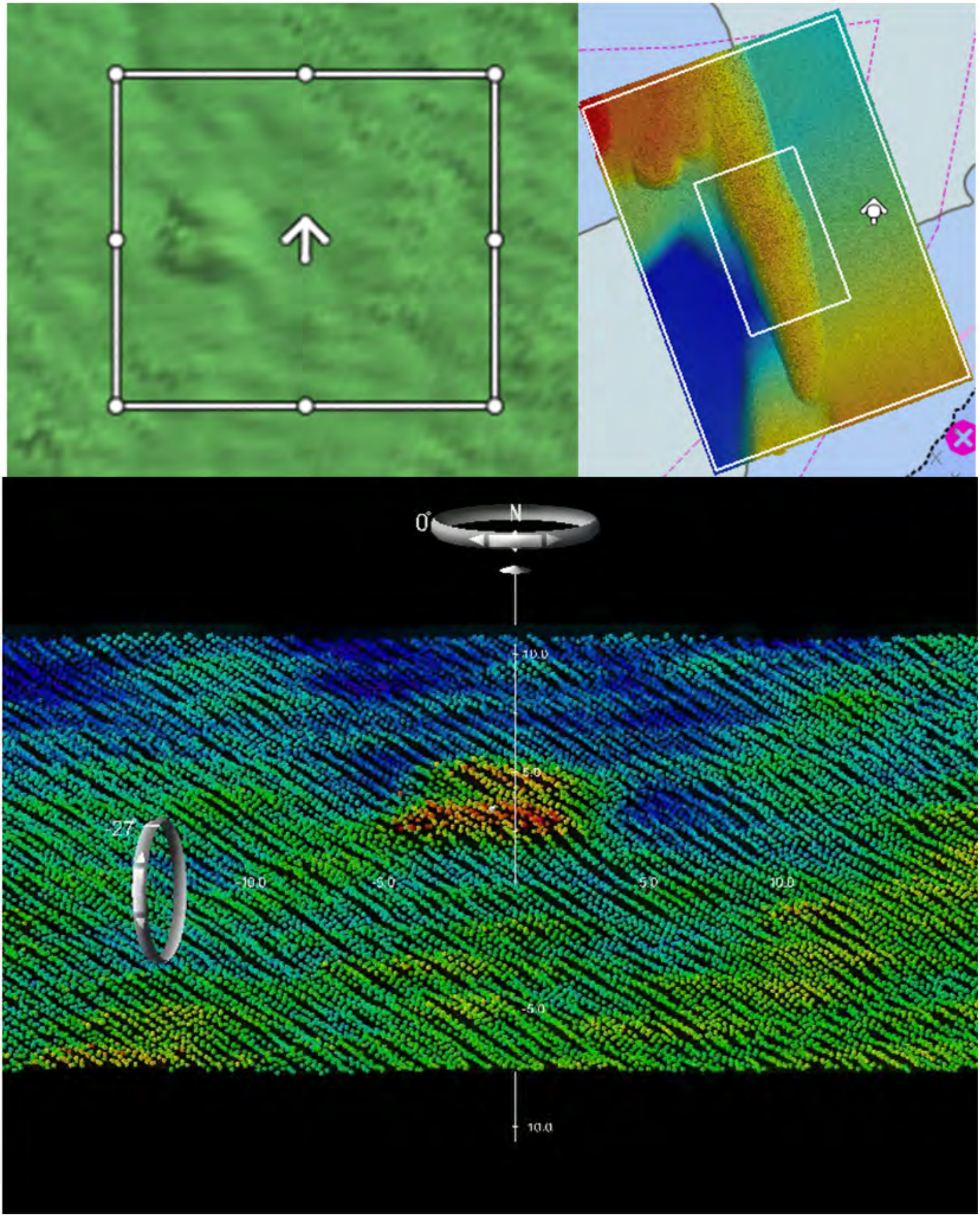
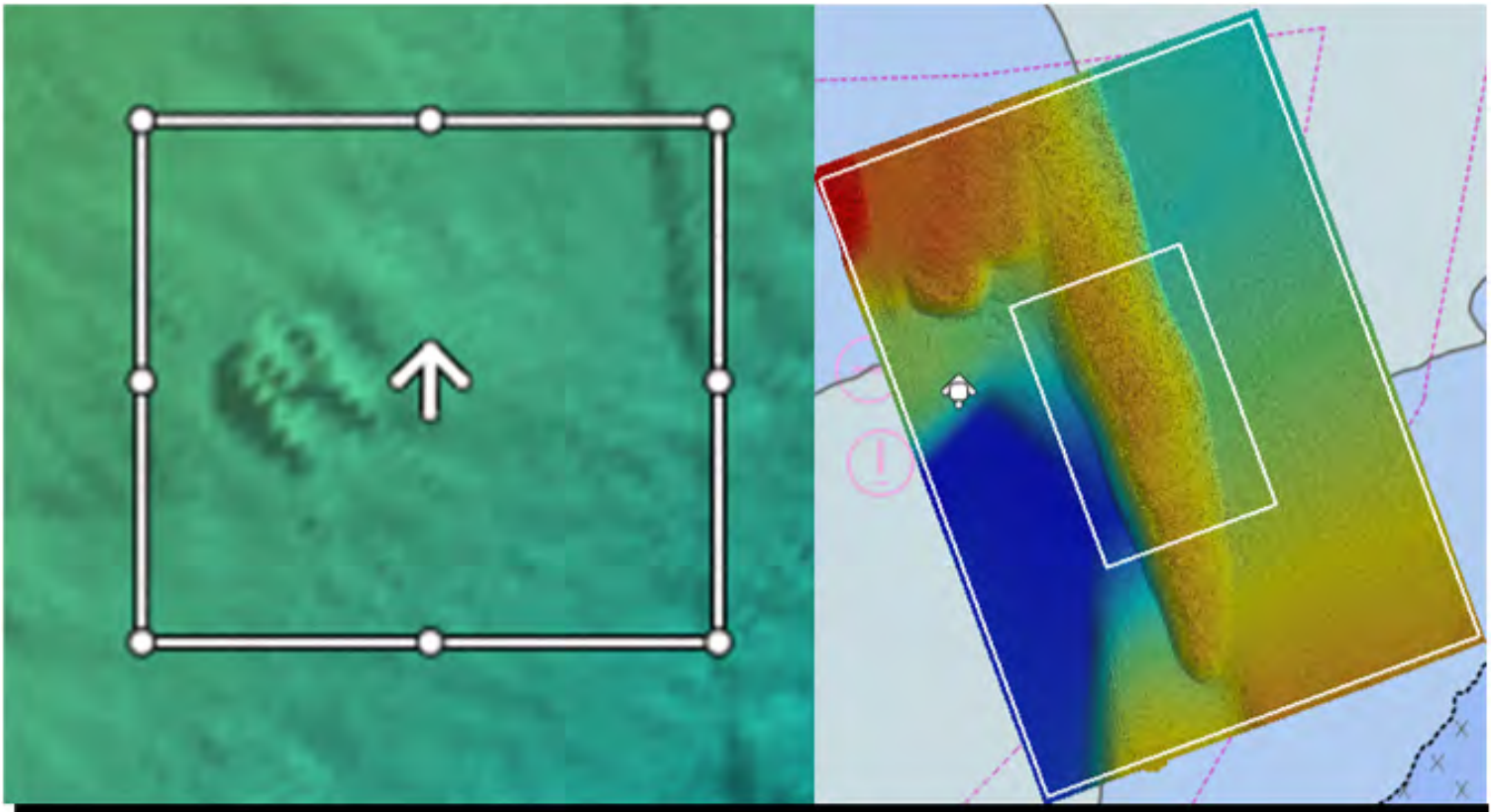
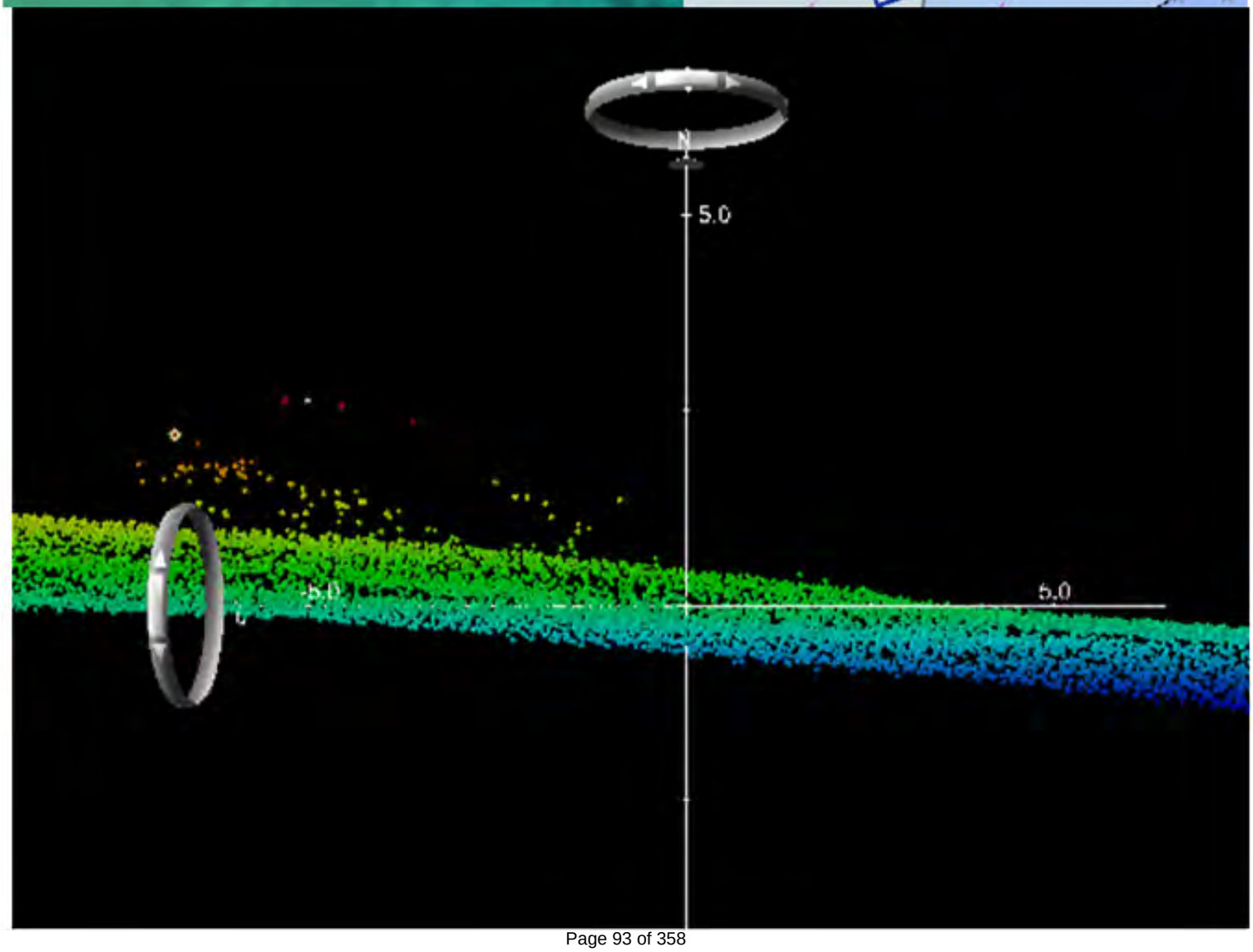
UKO_050



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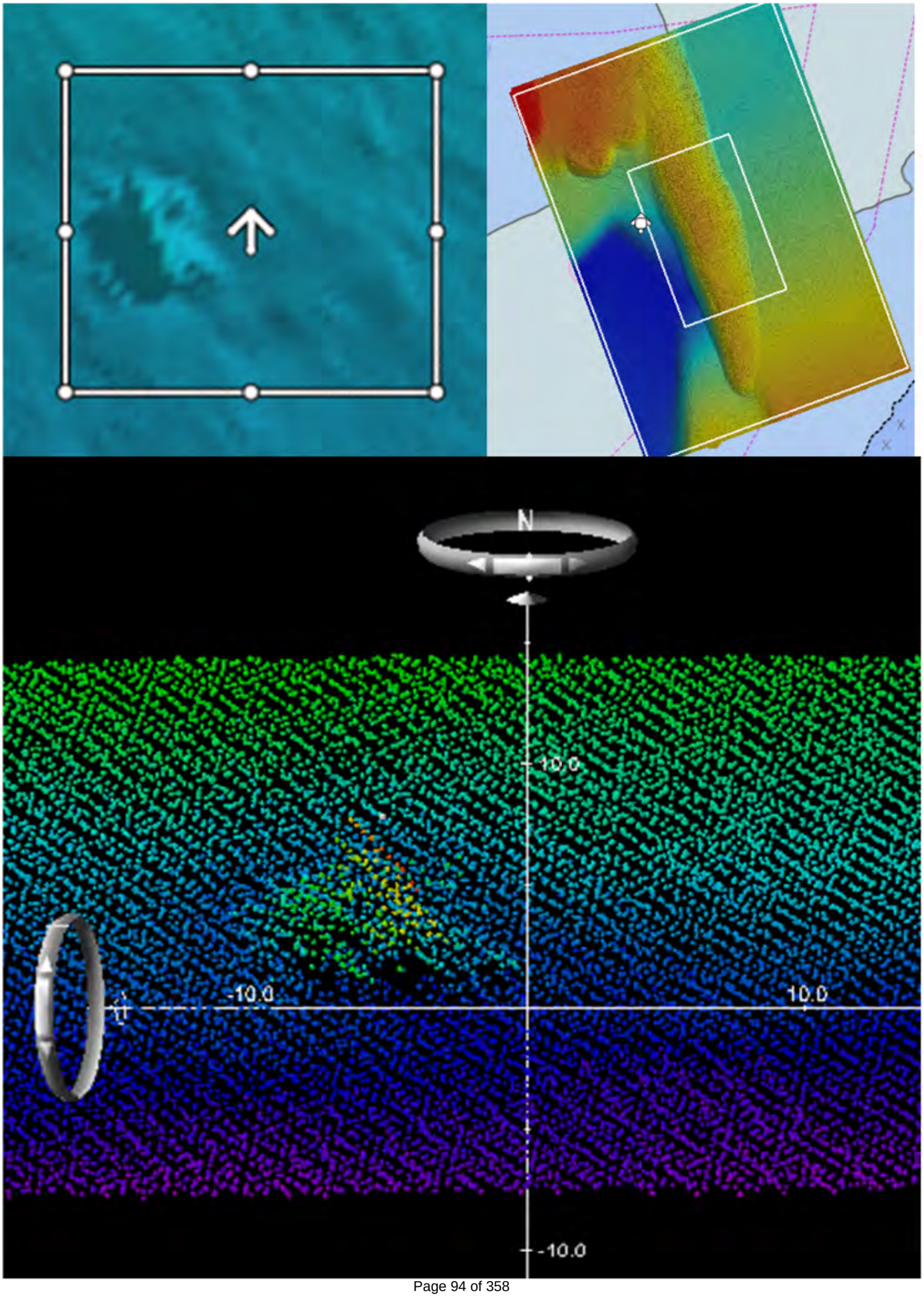
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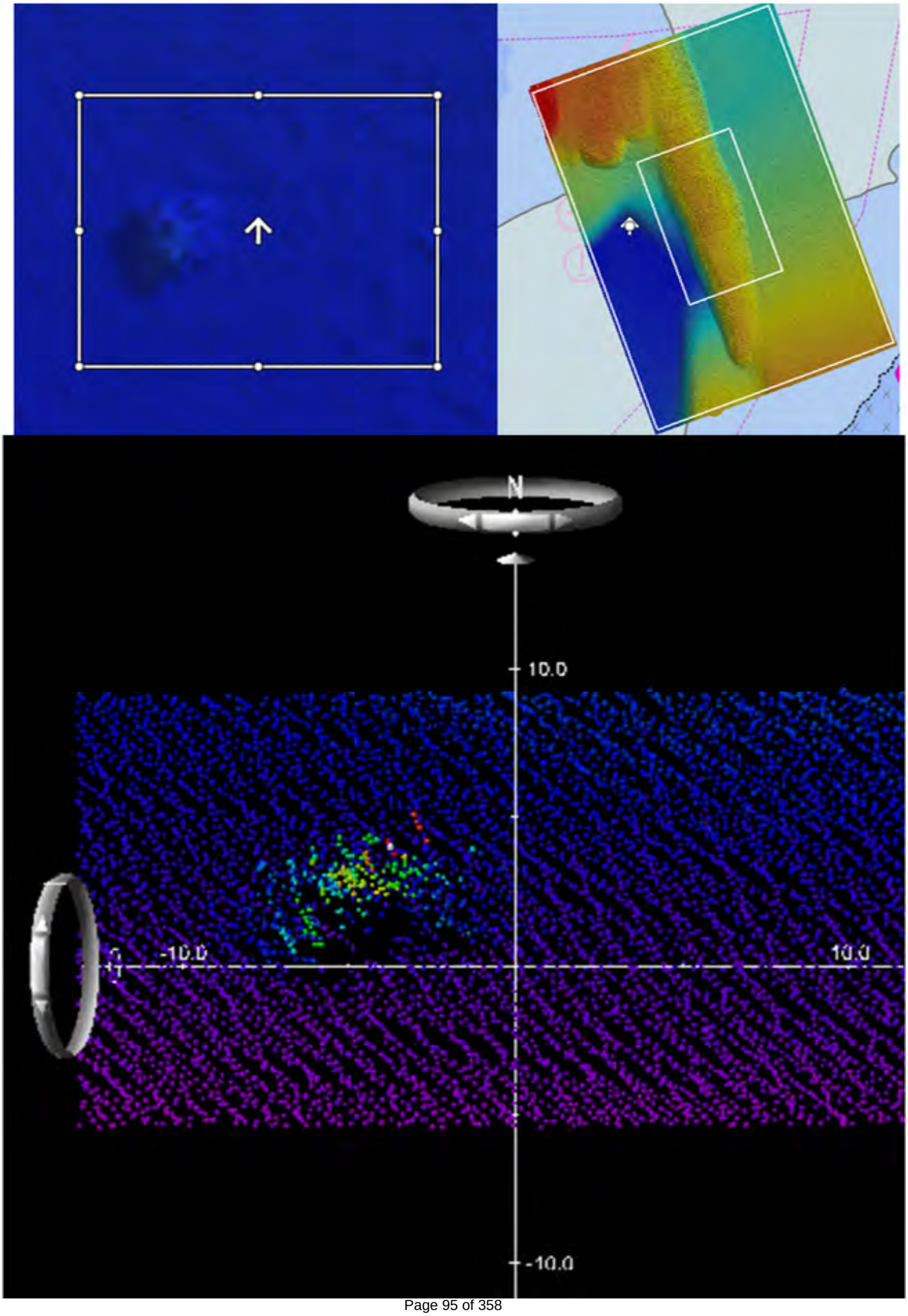
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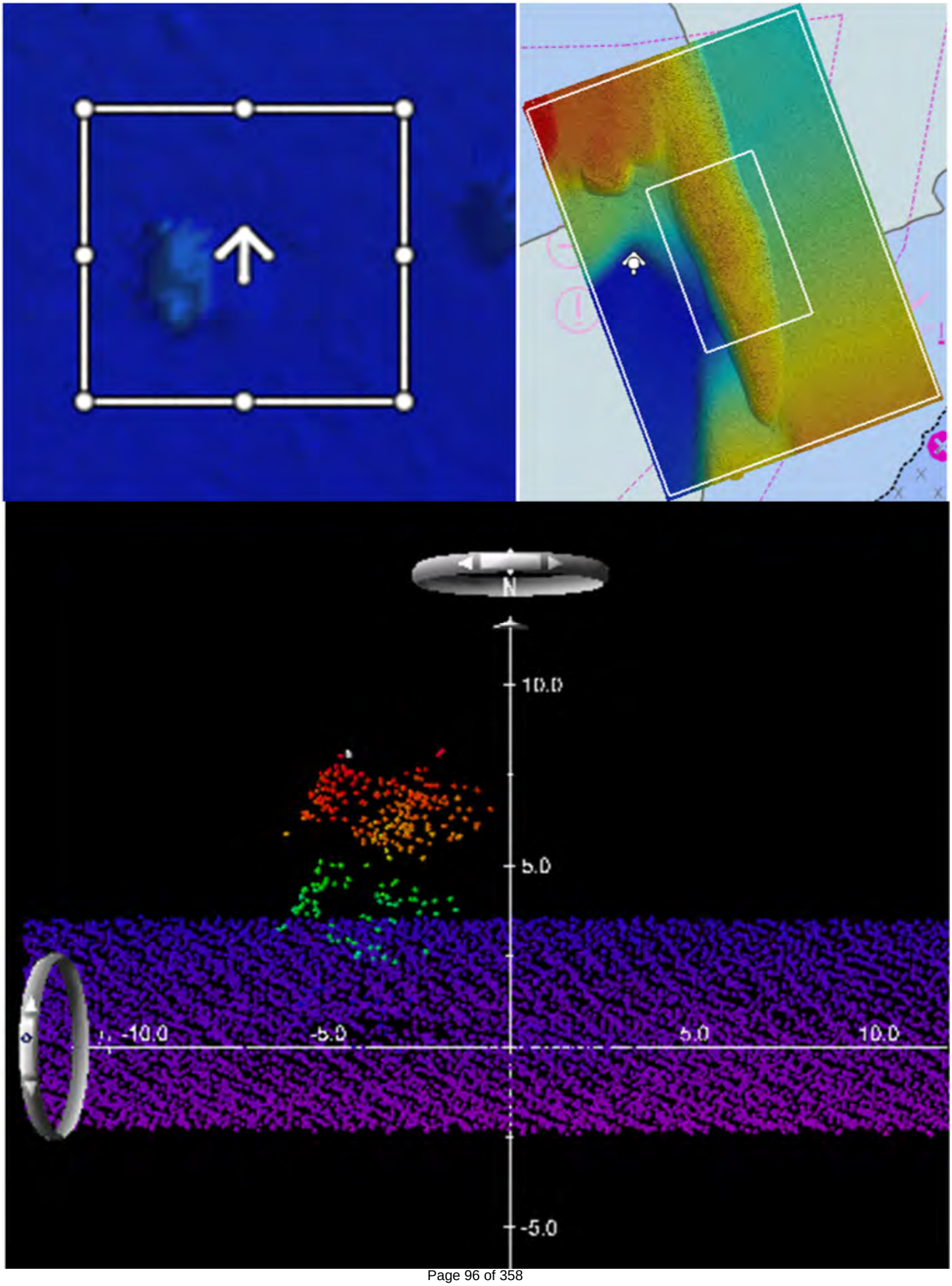
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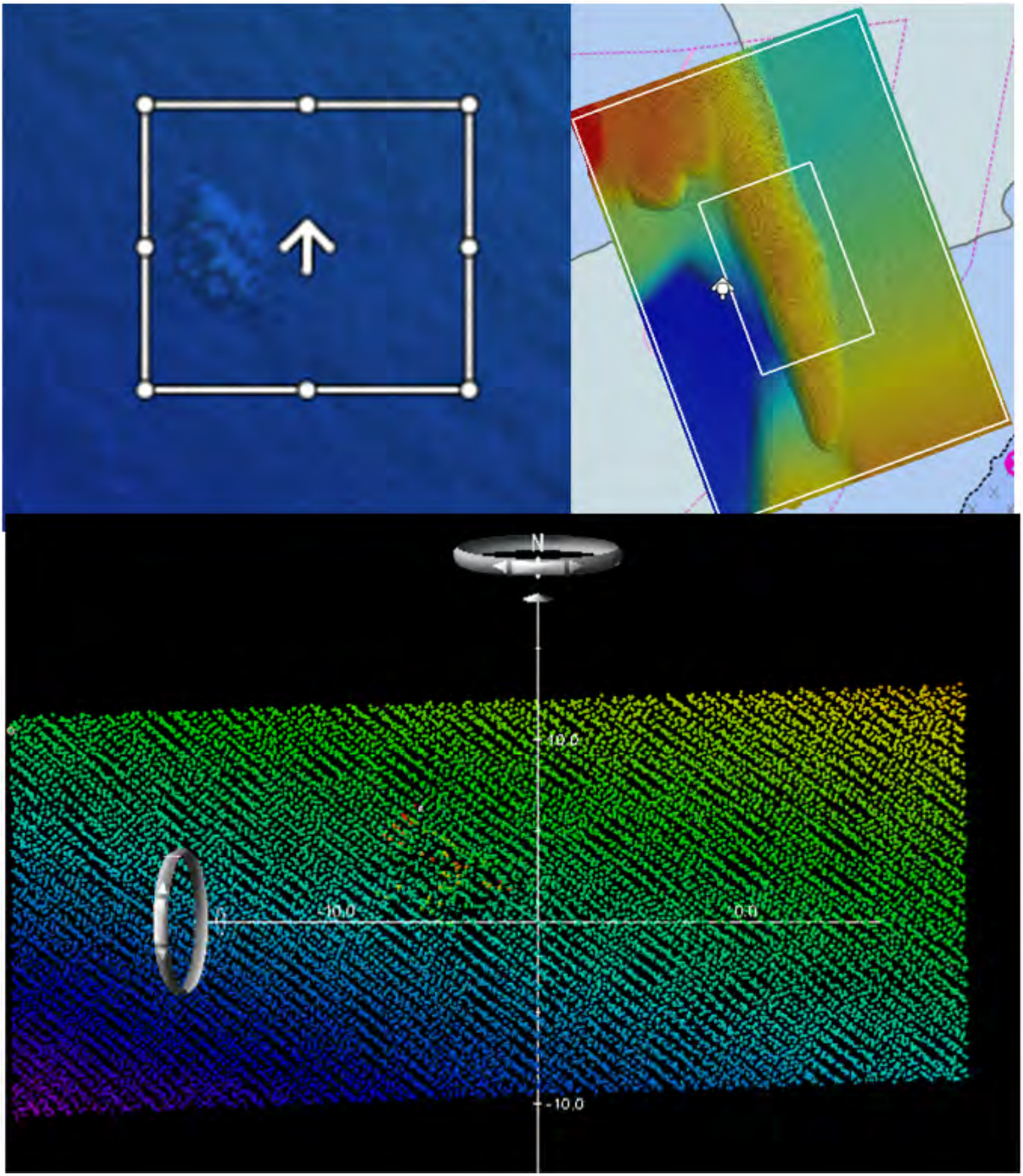

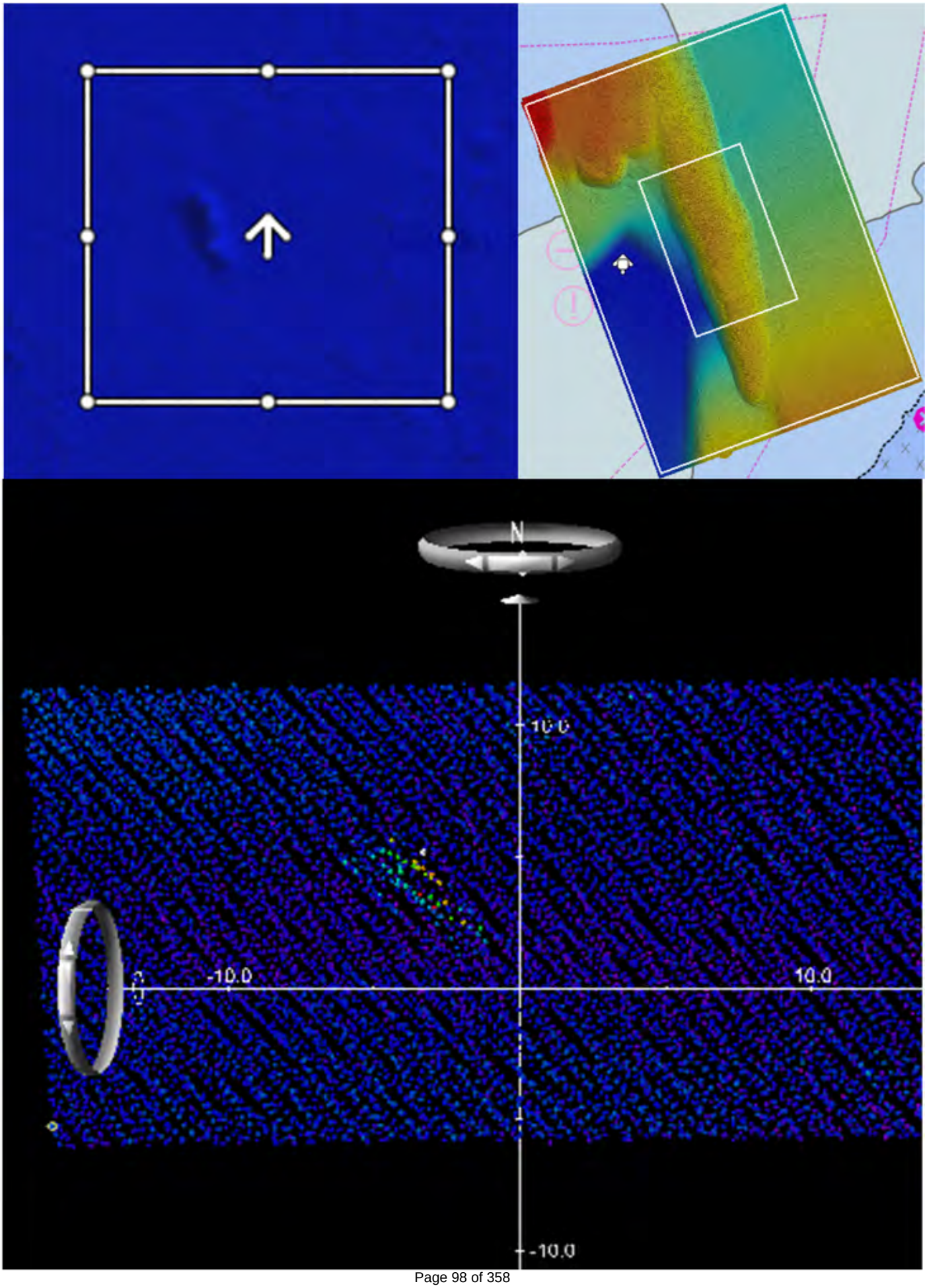
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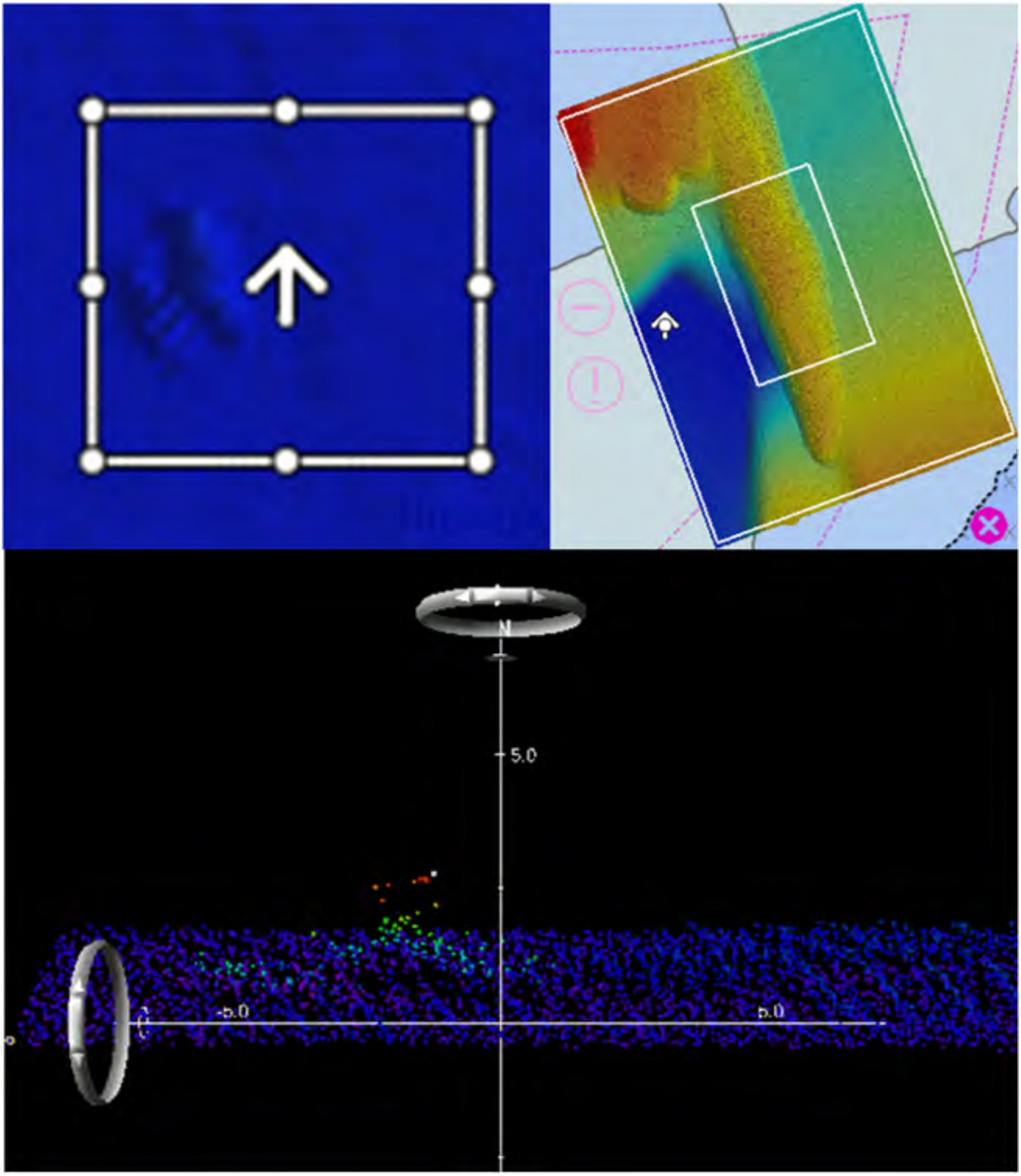

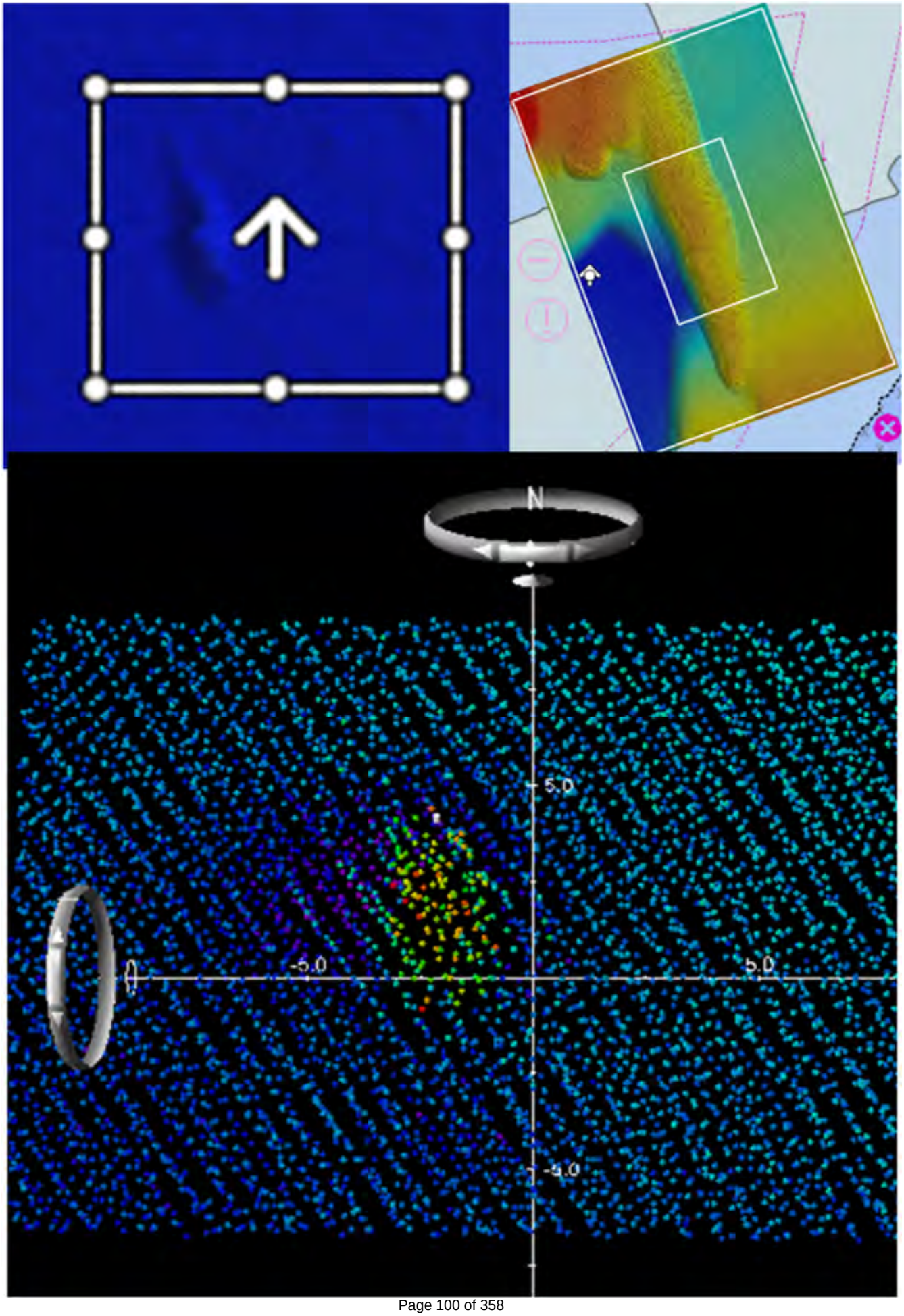
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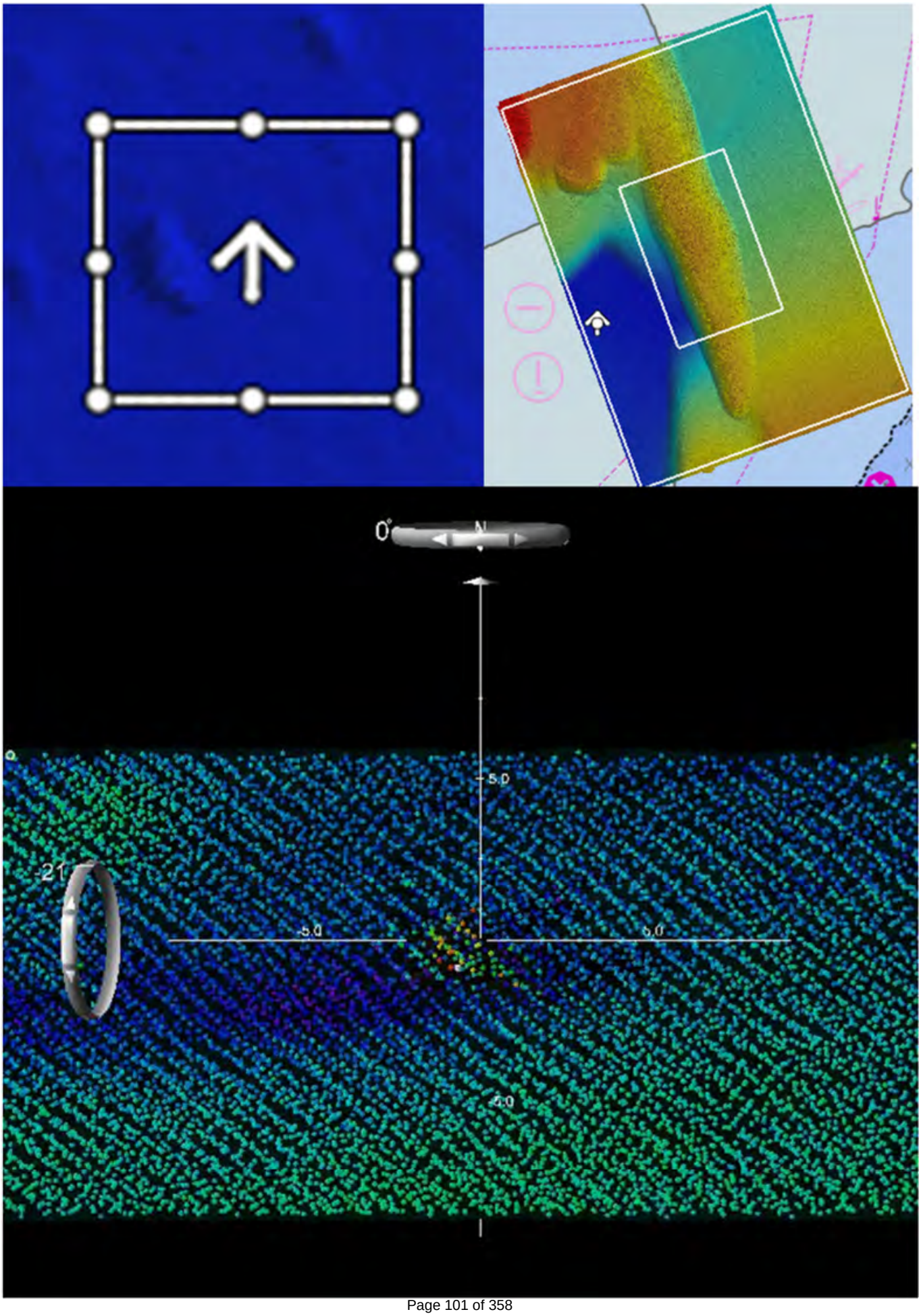
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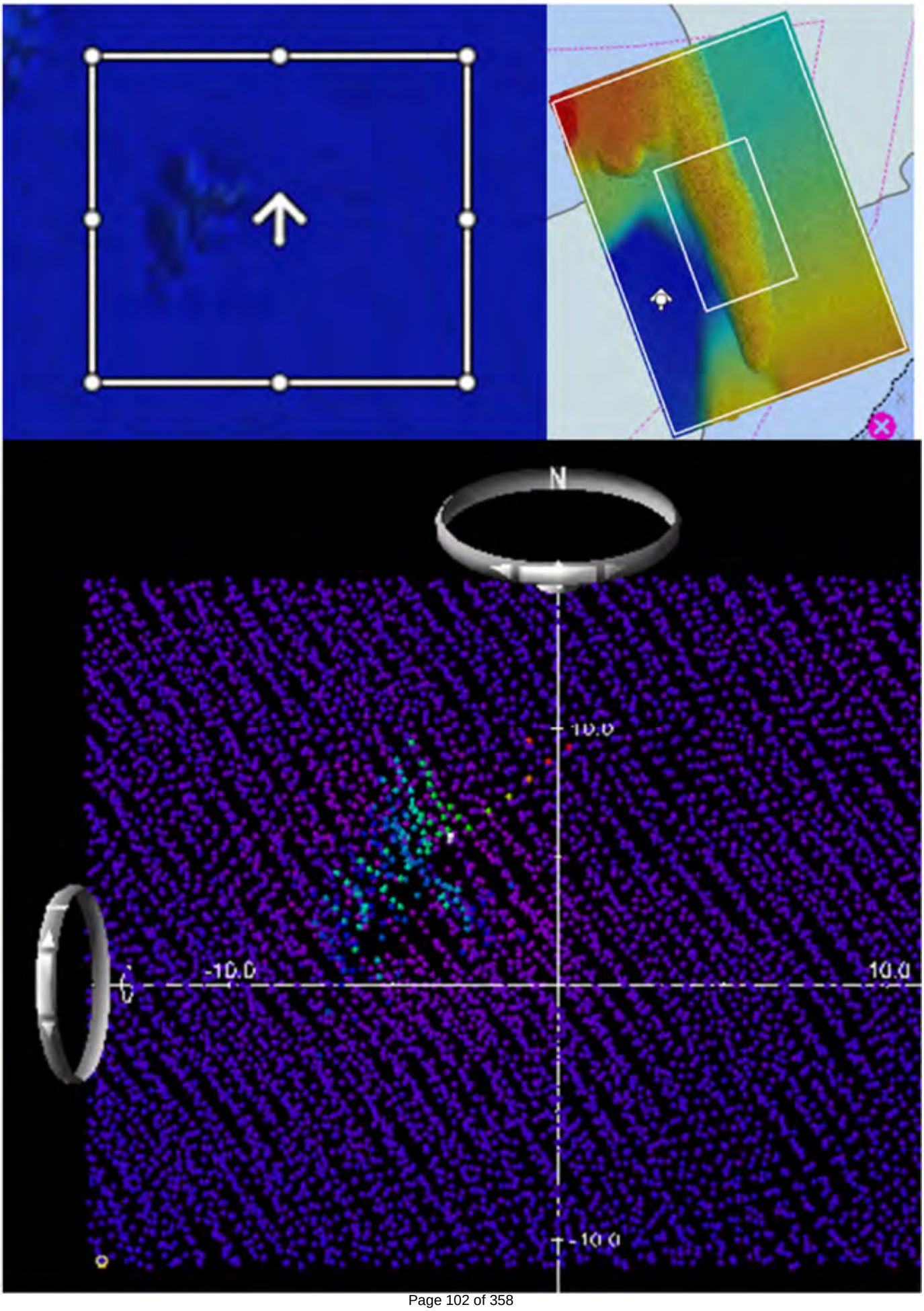
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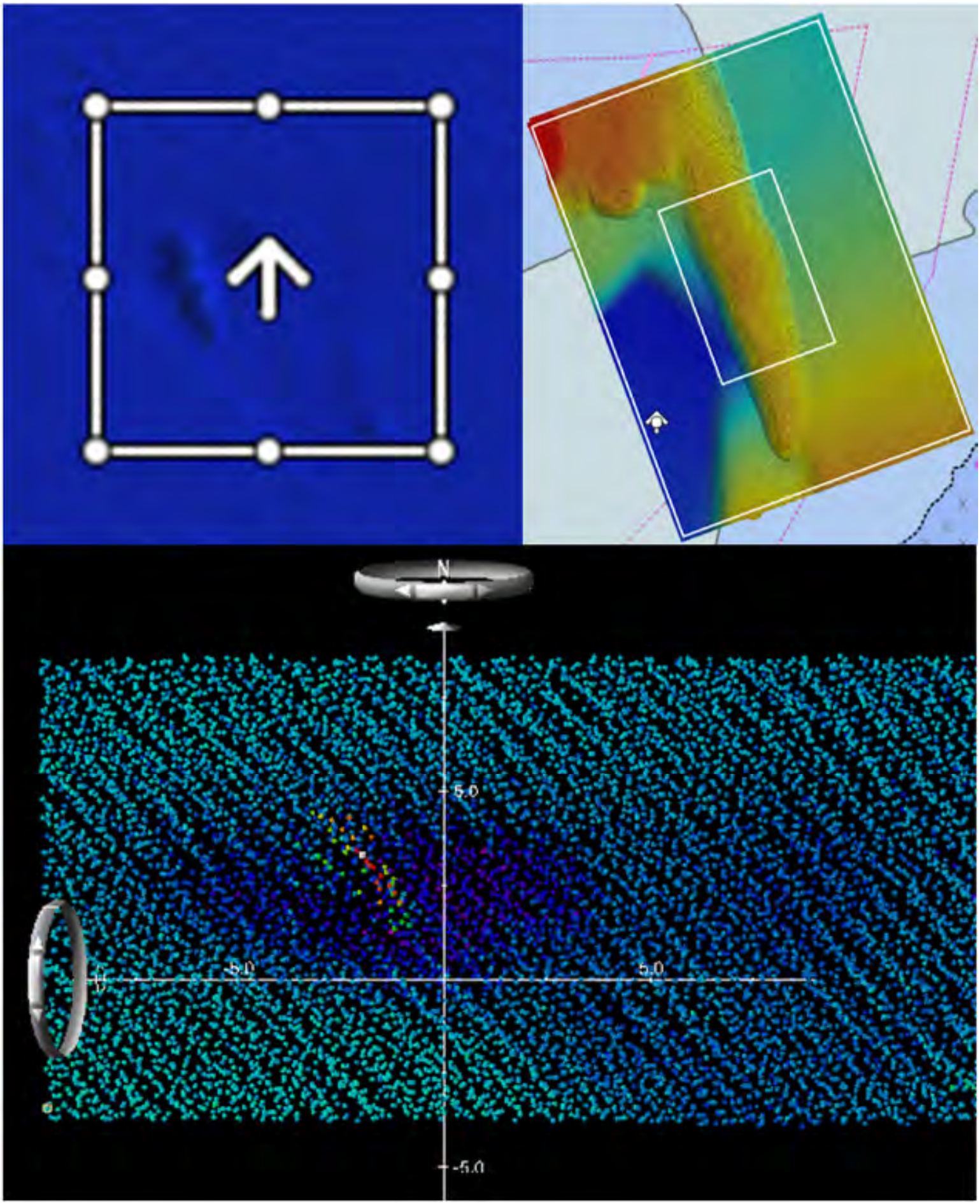
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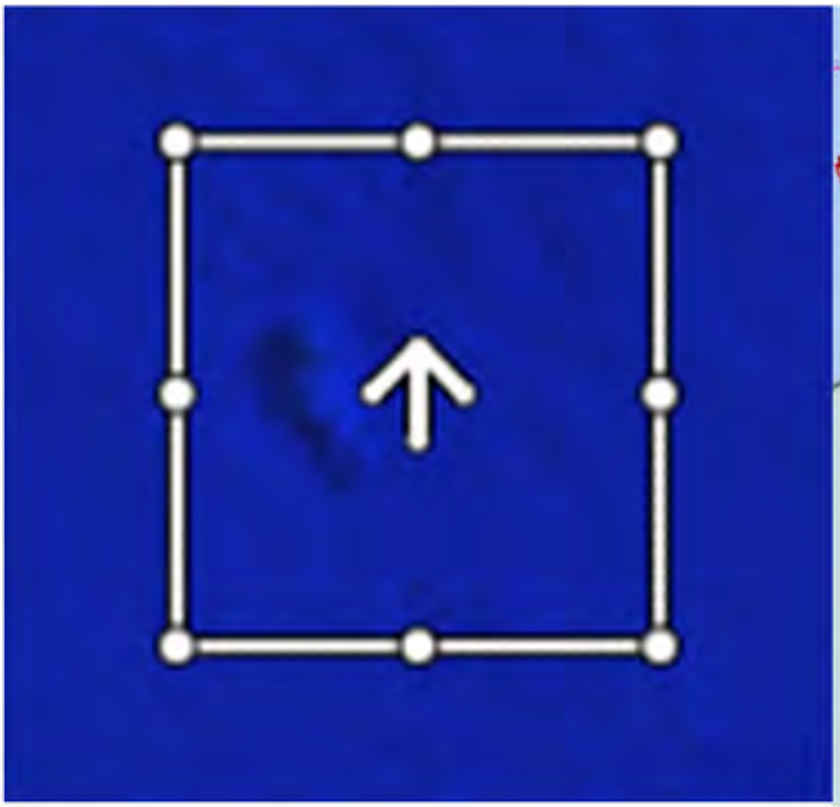

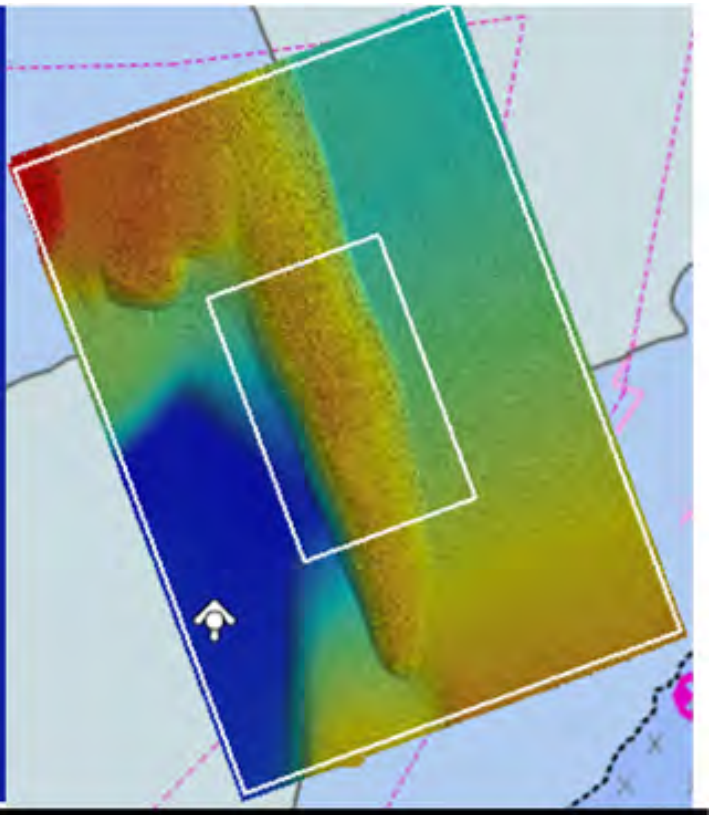

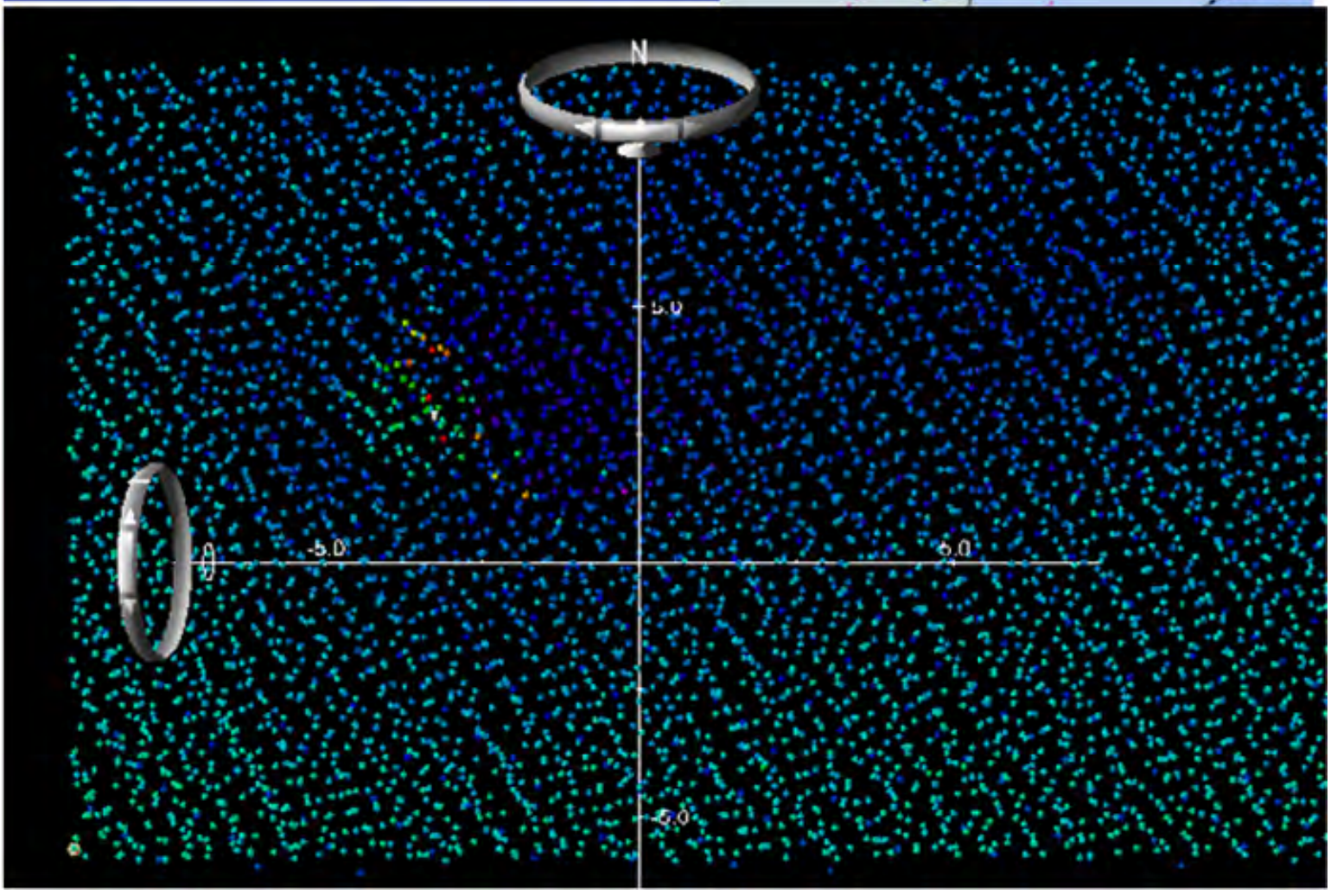
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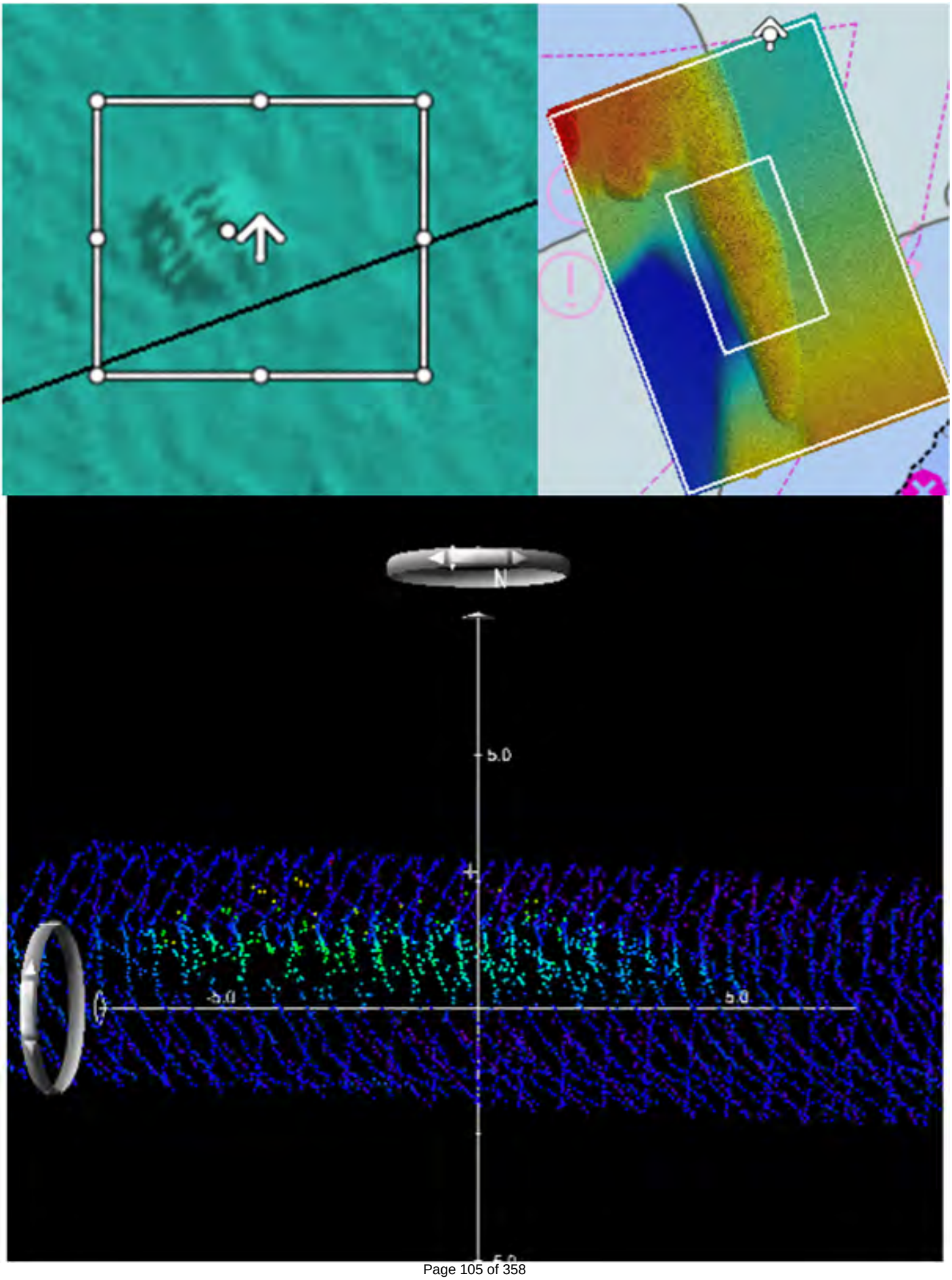
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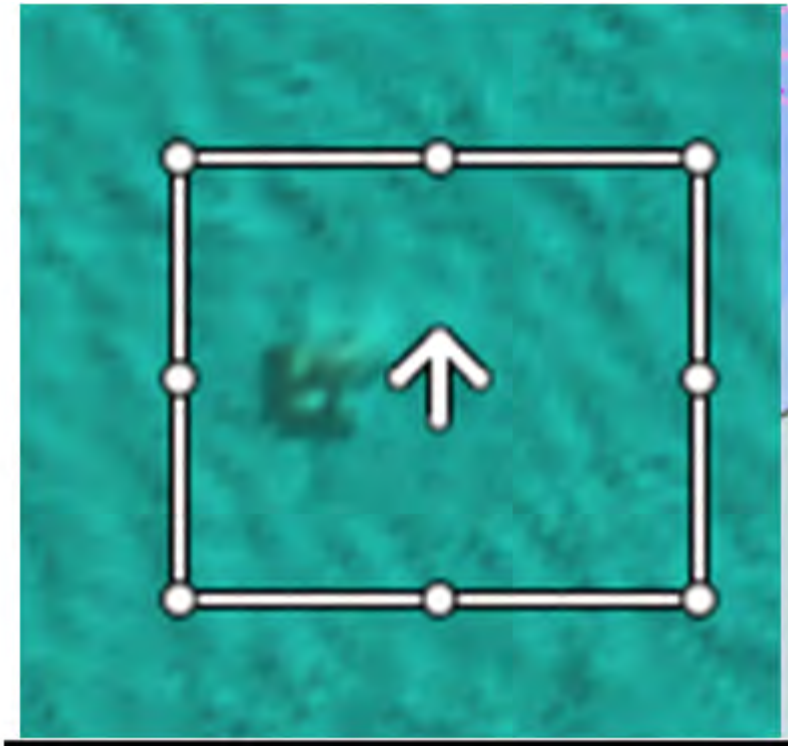

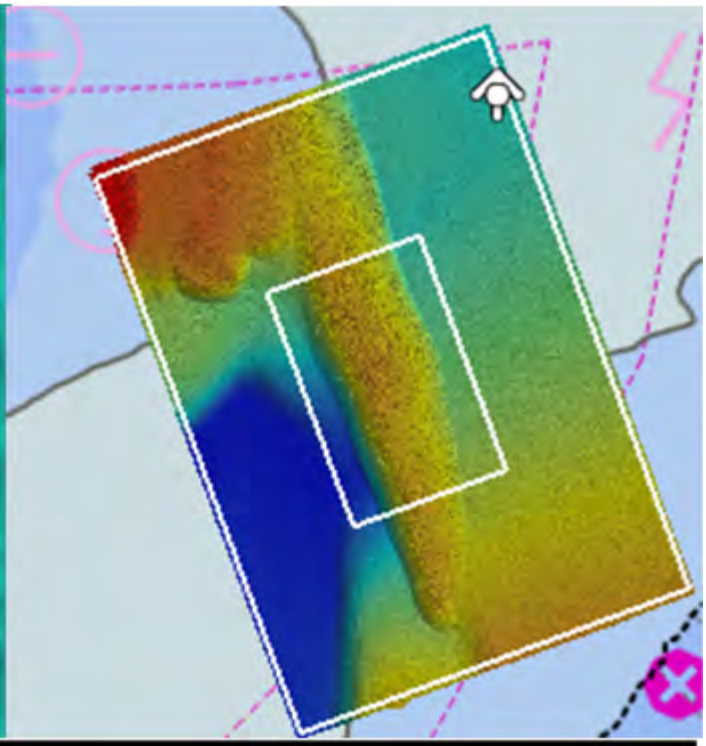

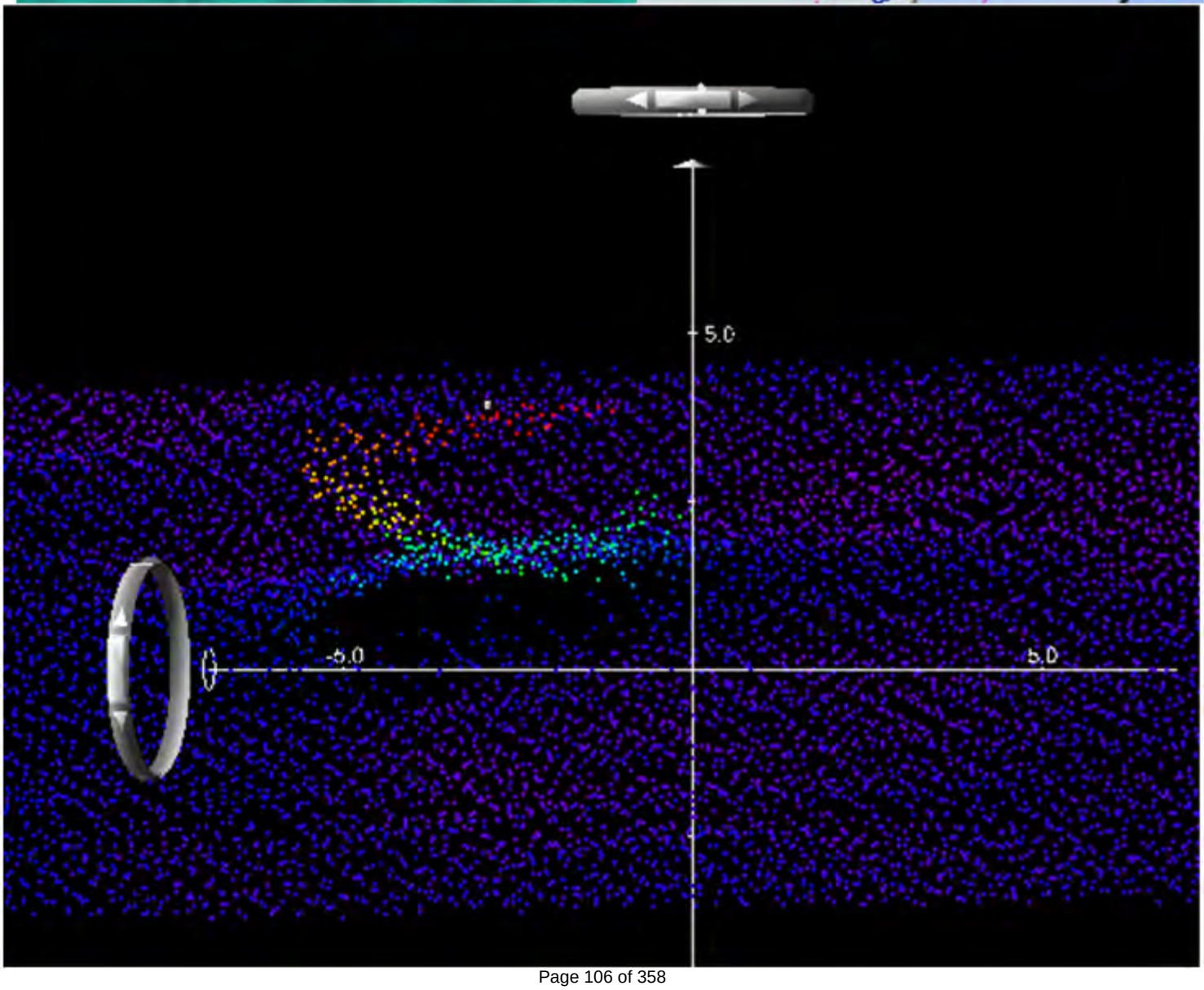
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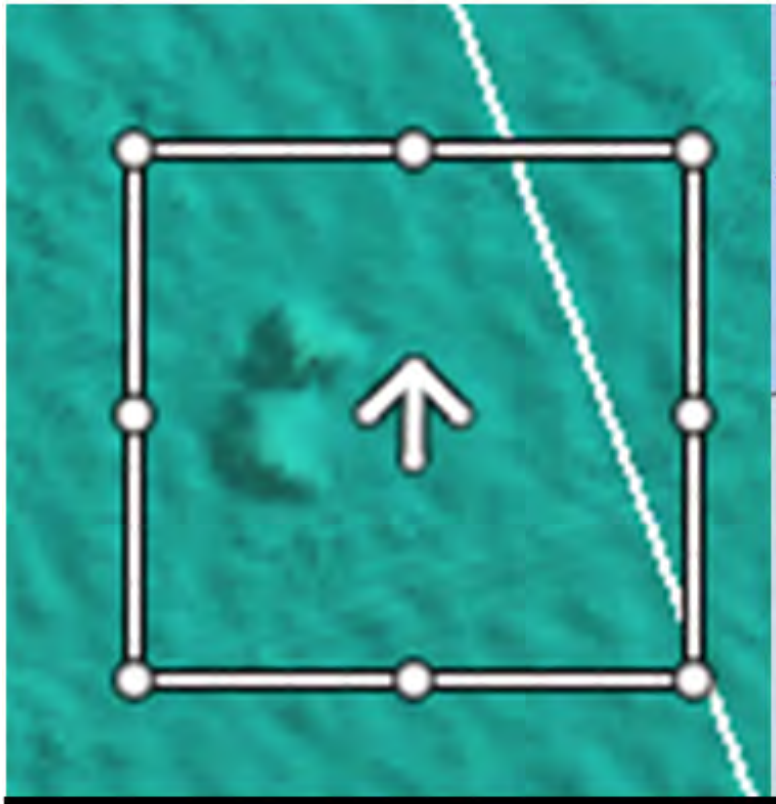

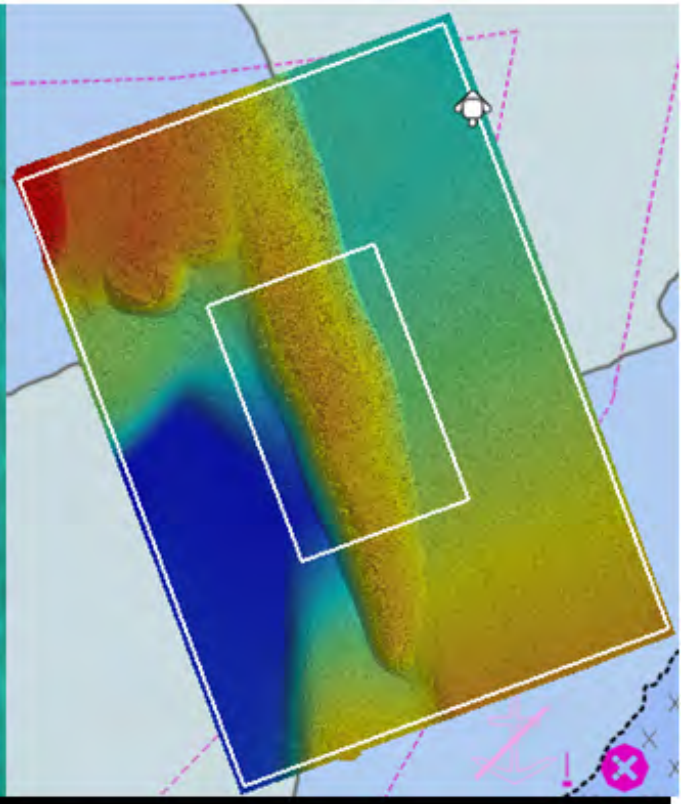

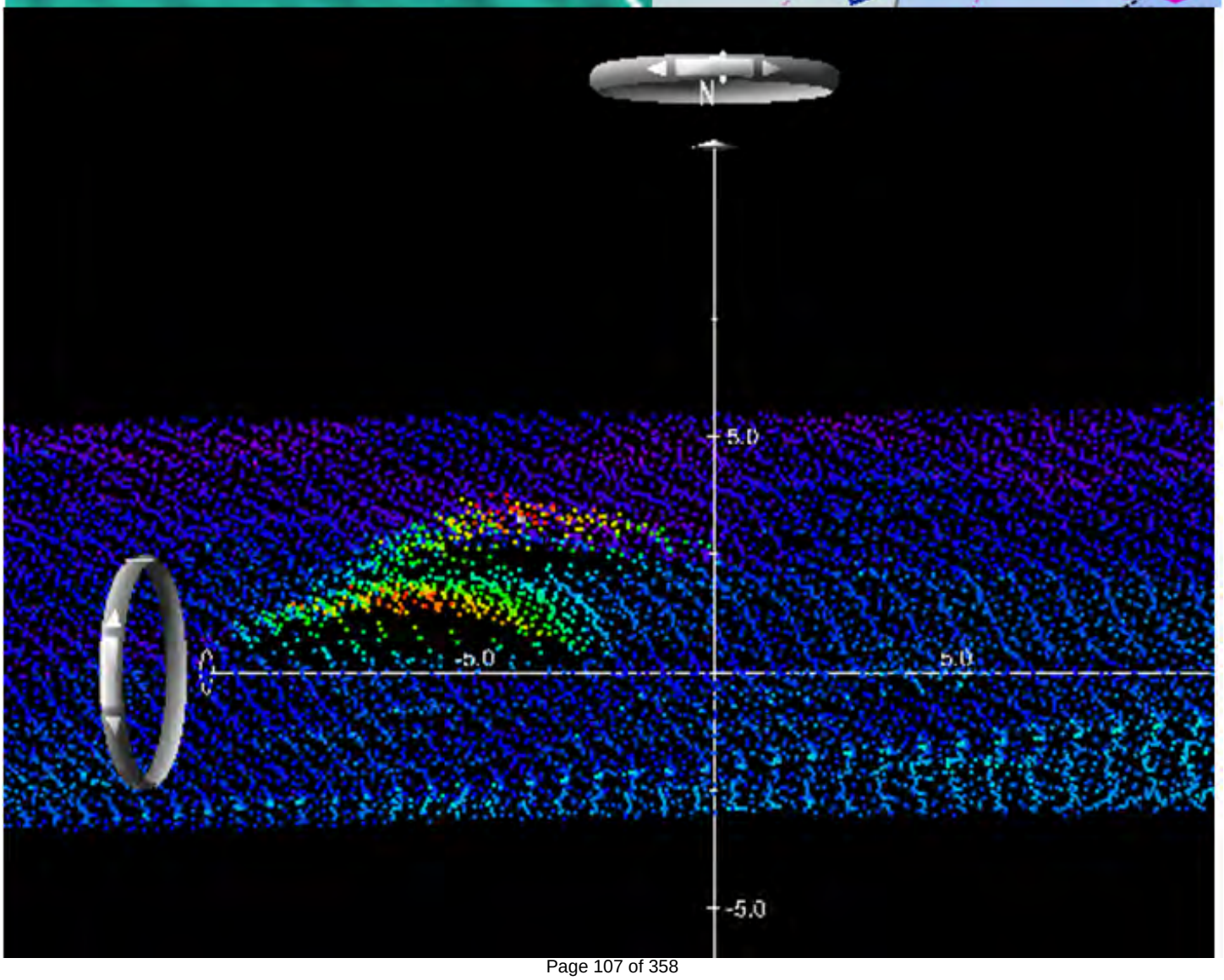
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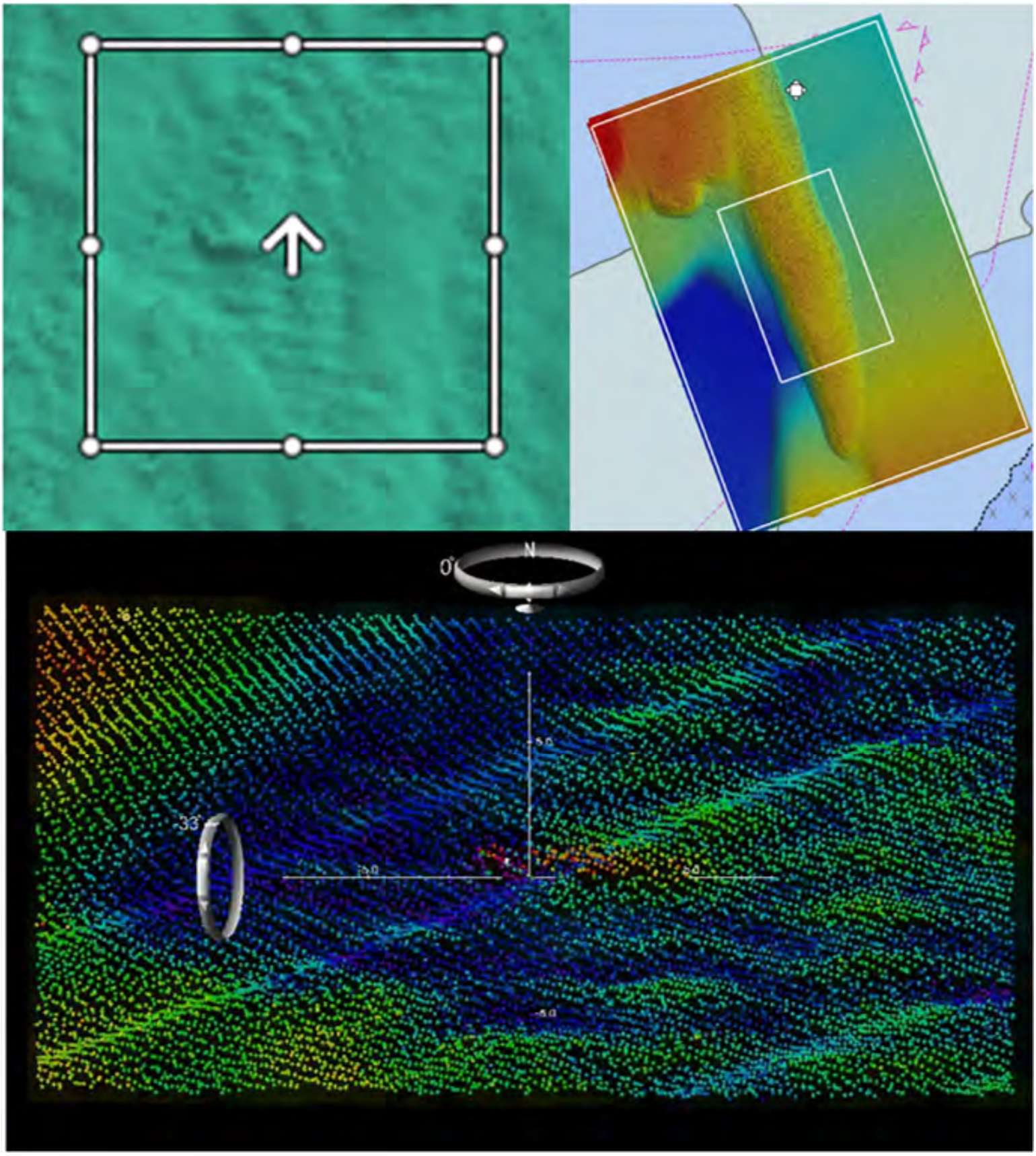

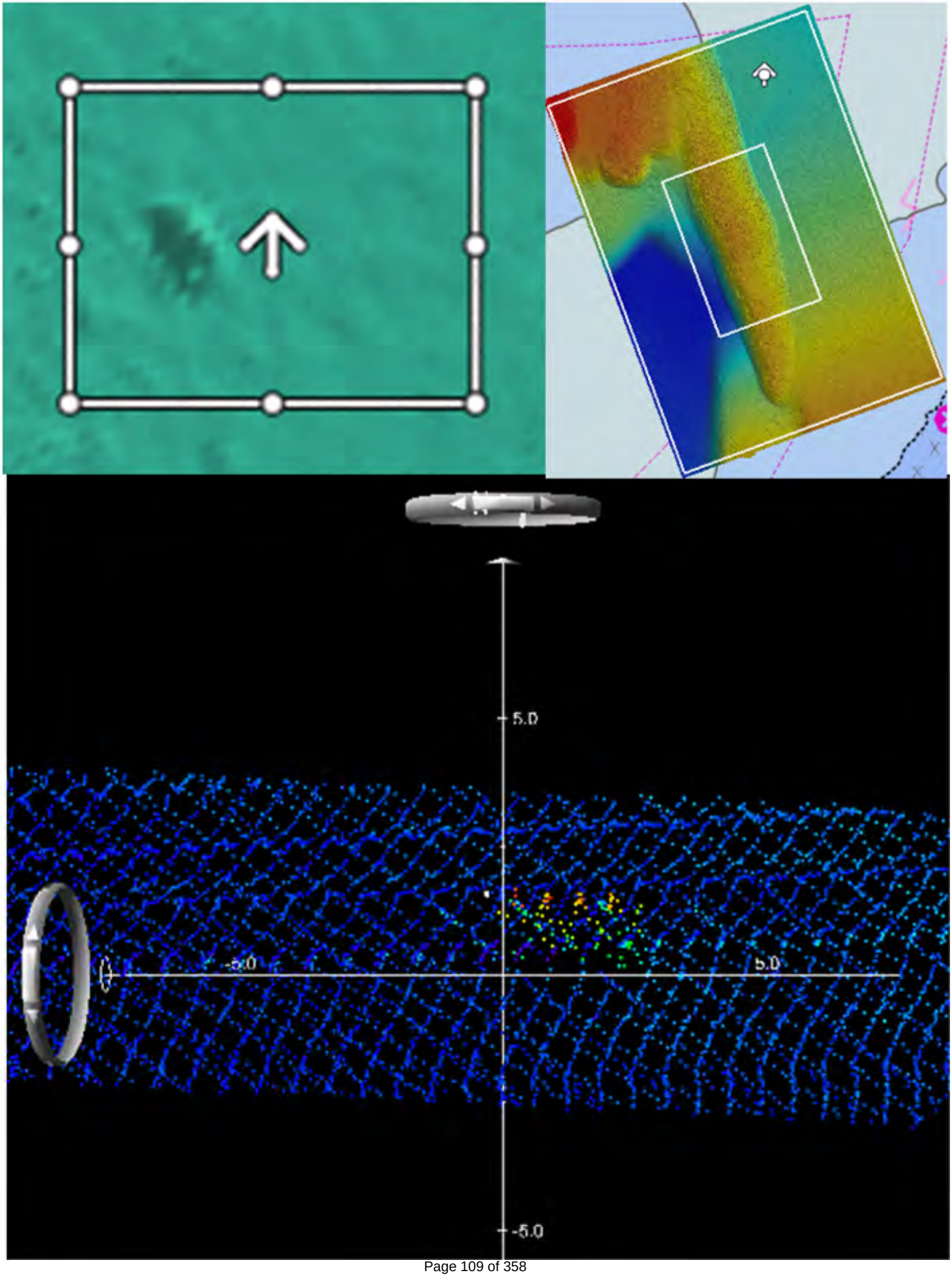
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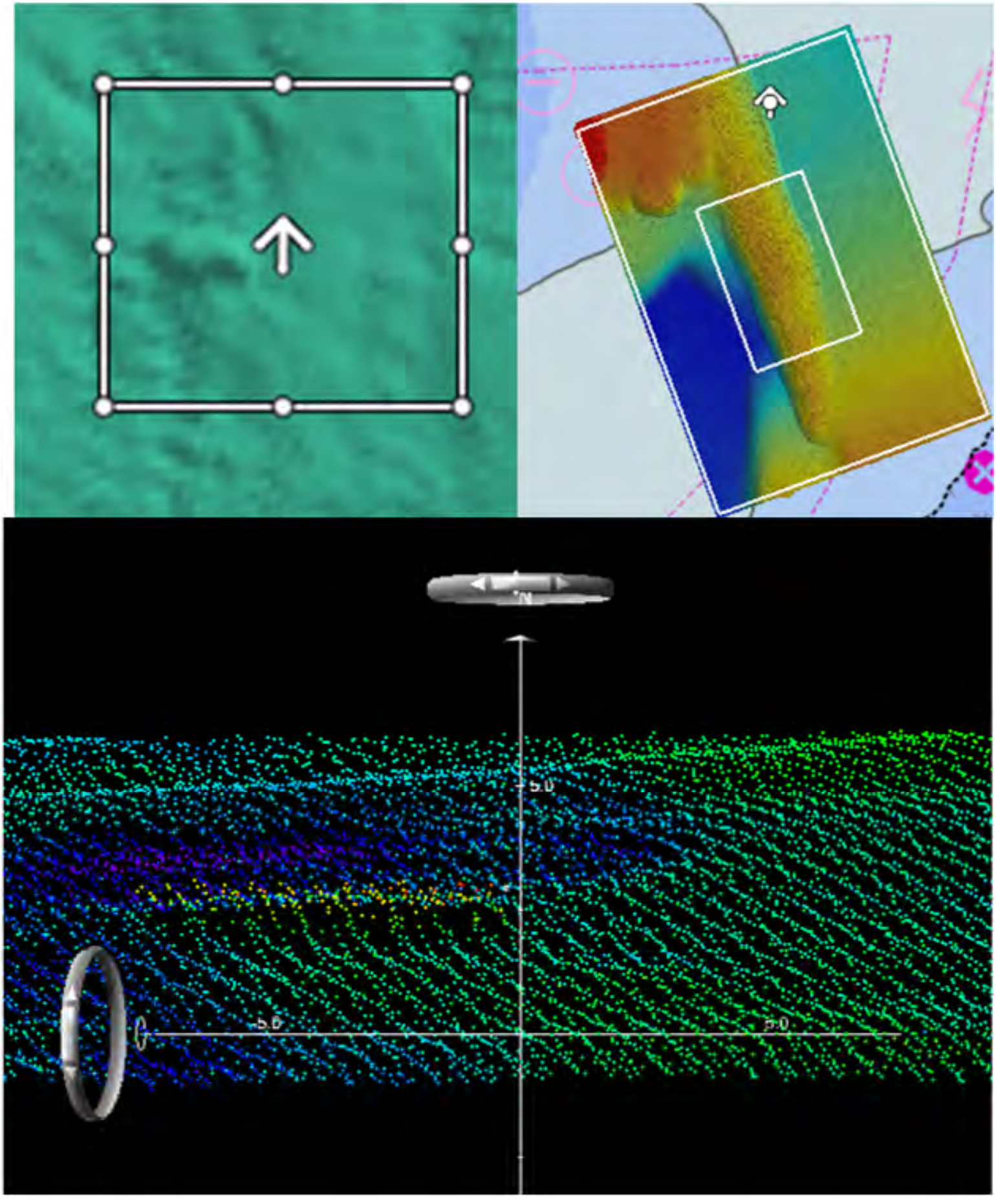

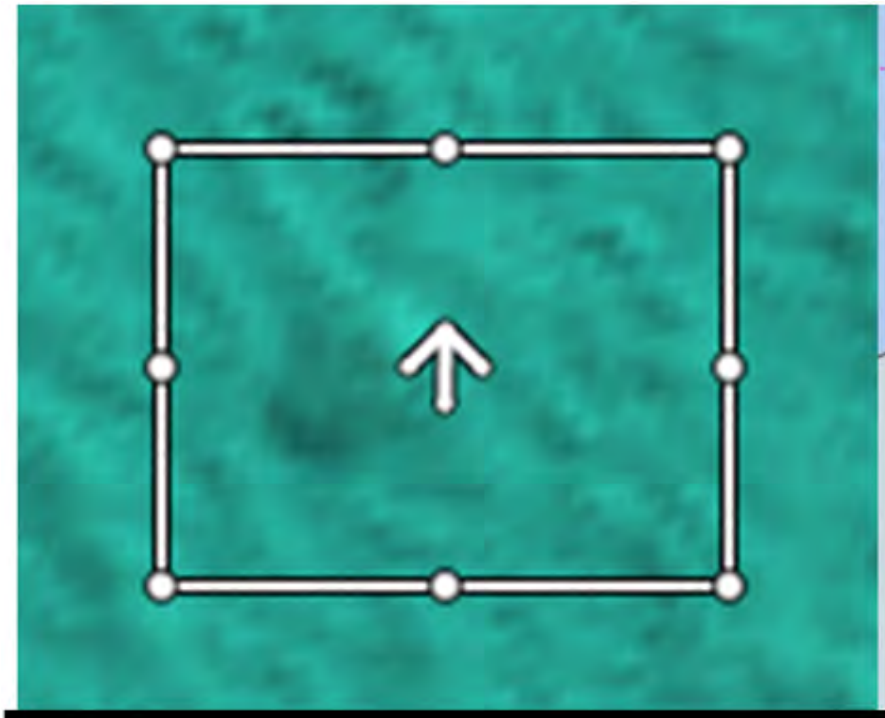

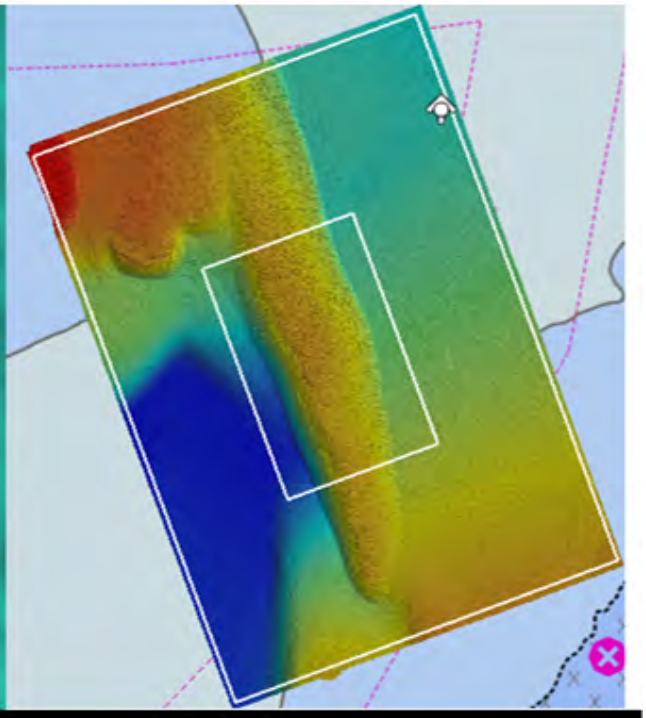

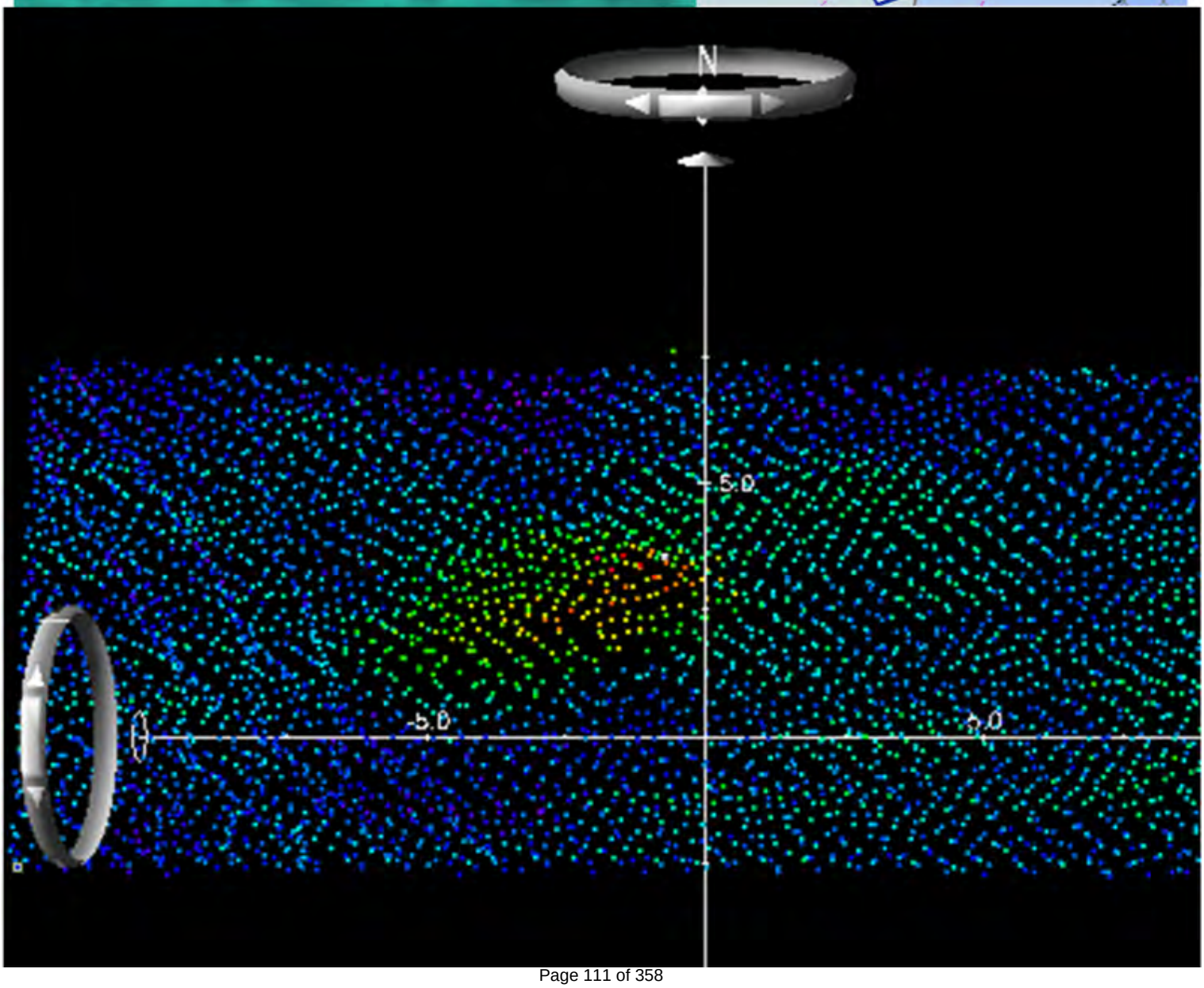
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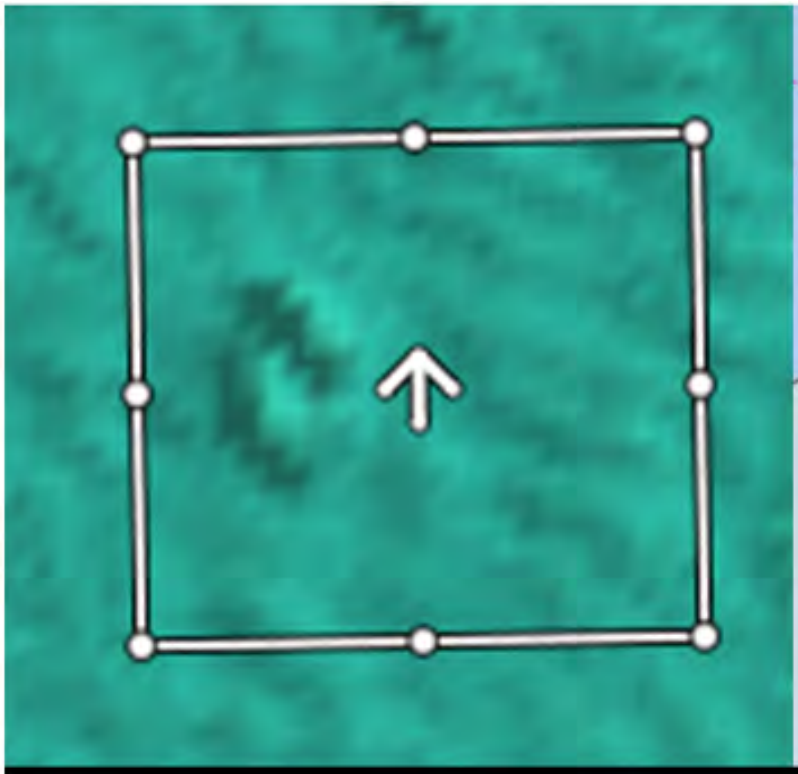

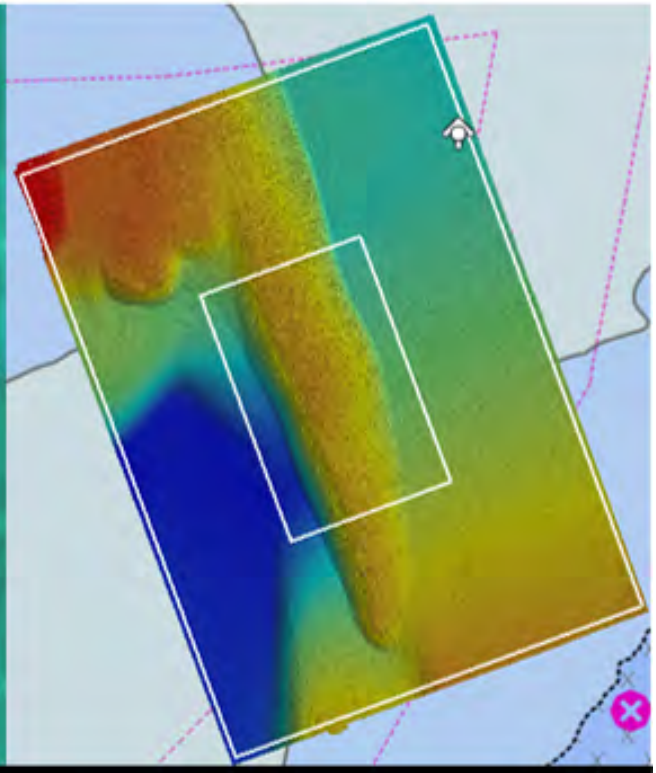

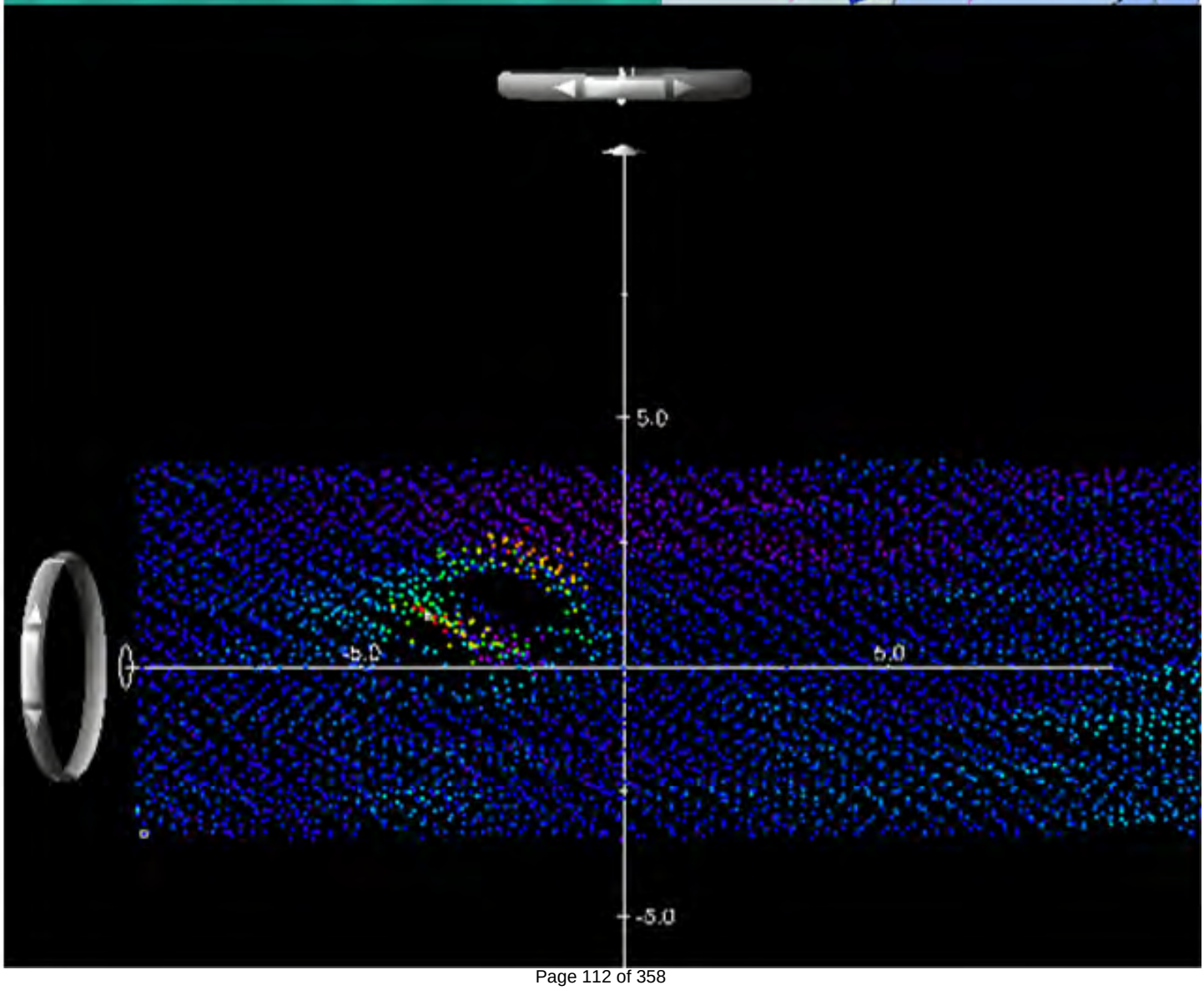
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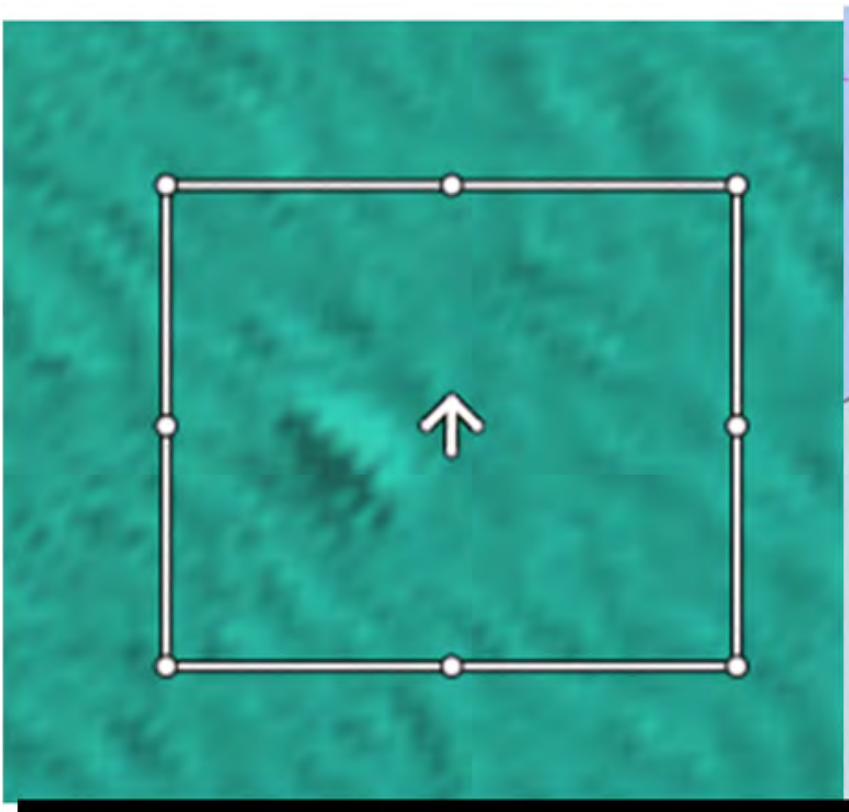

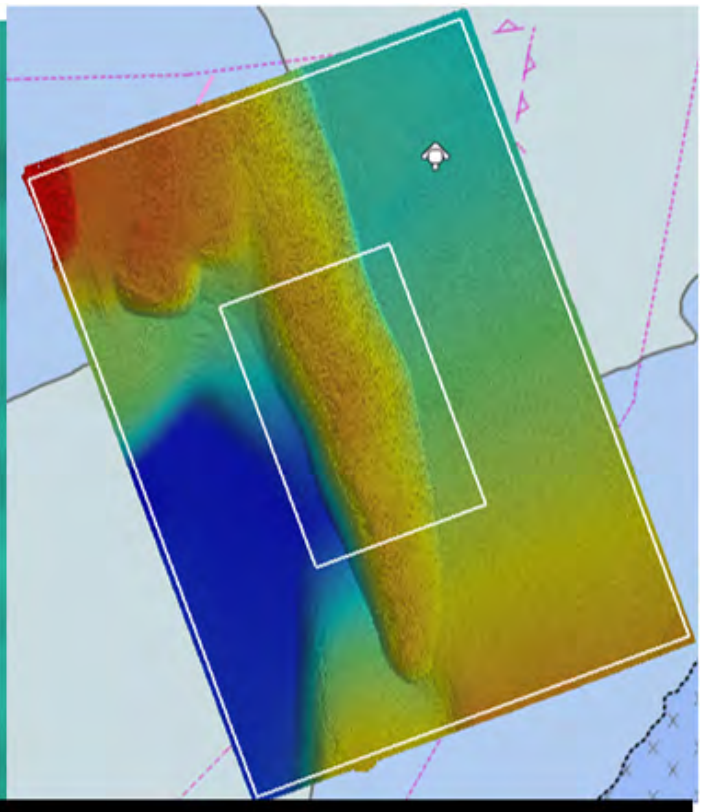

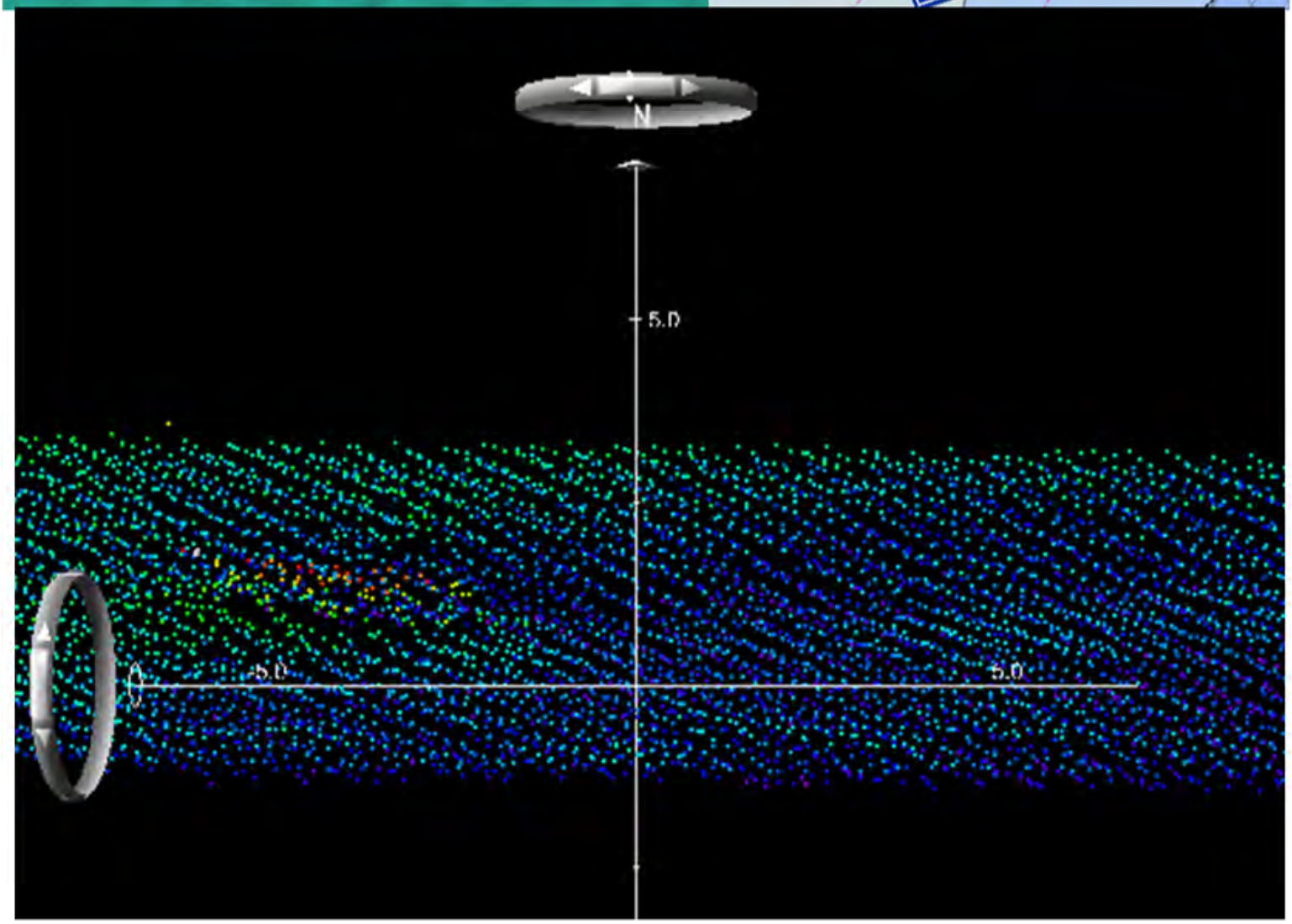

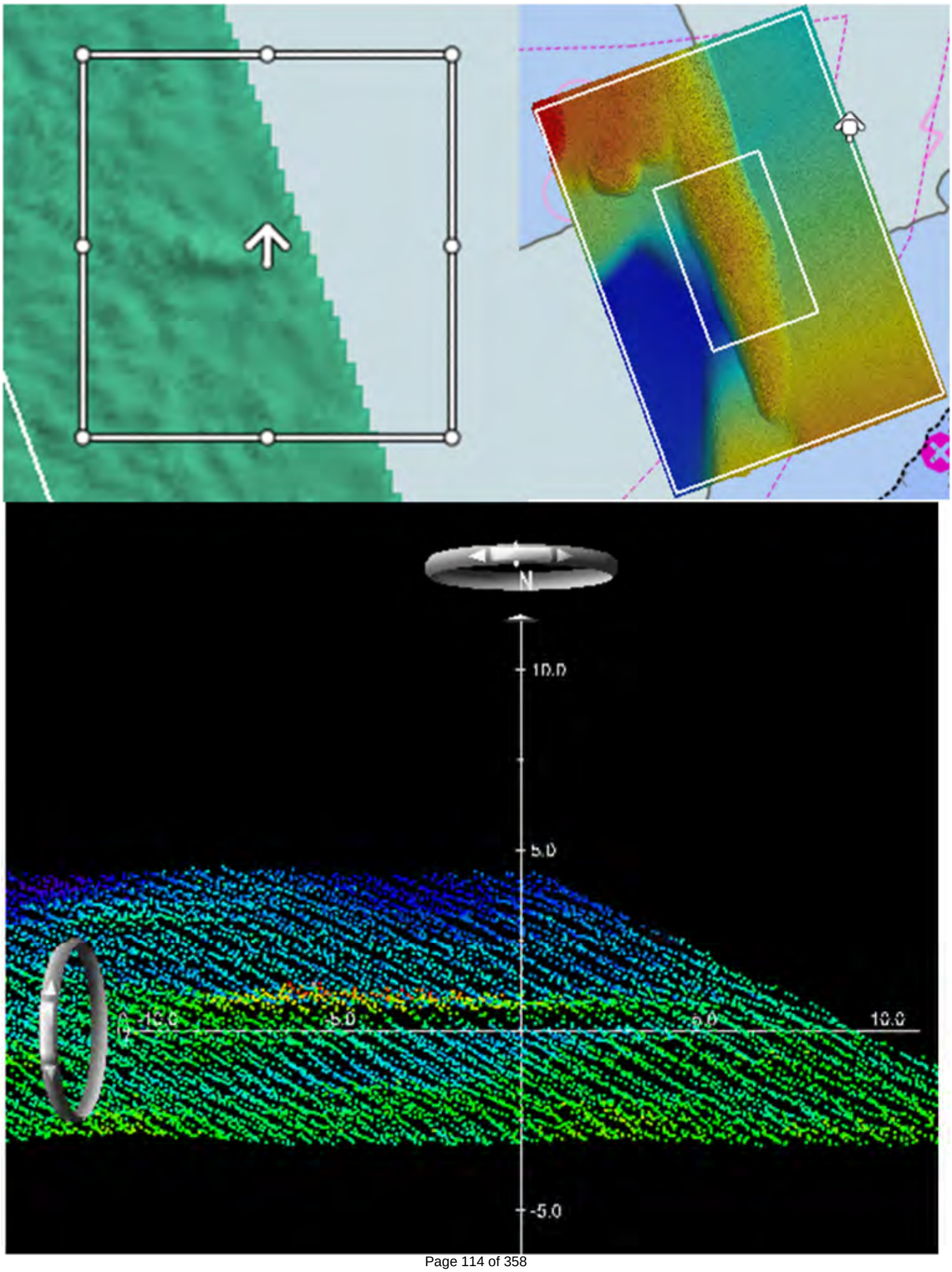
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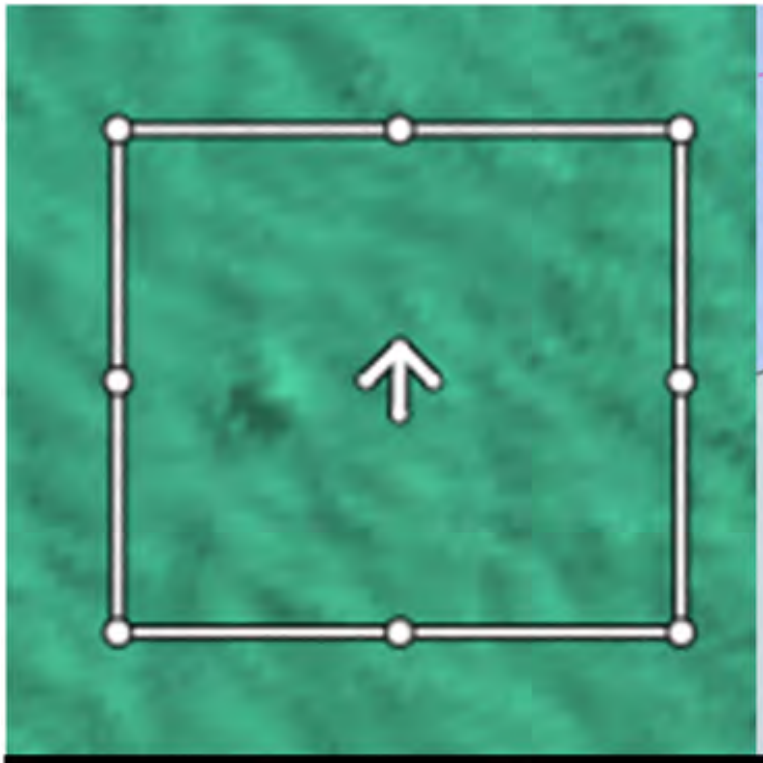

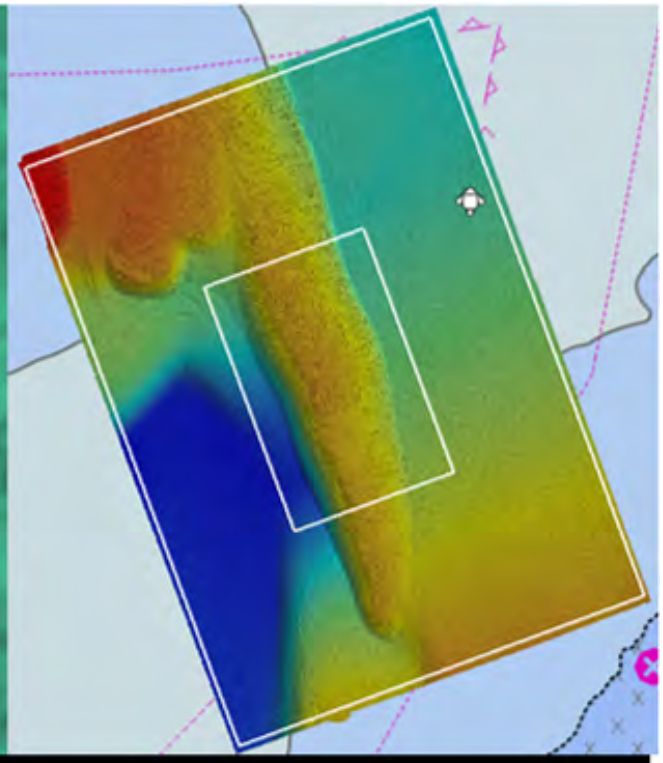

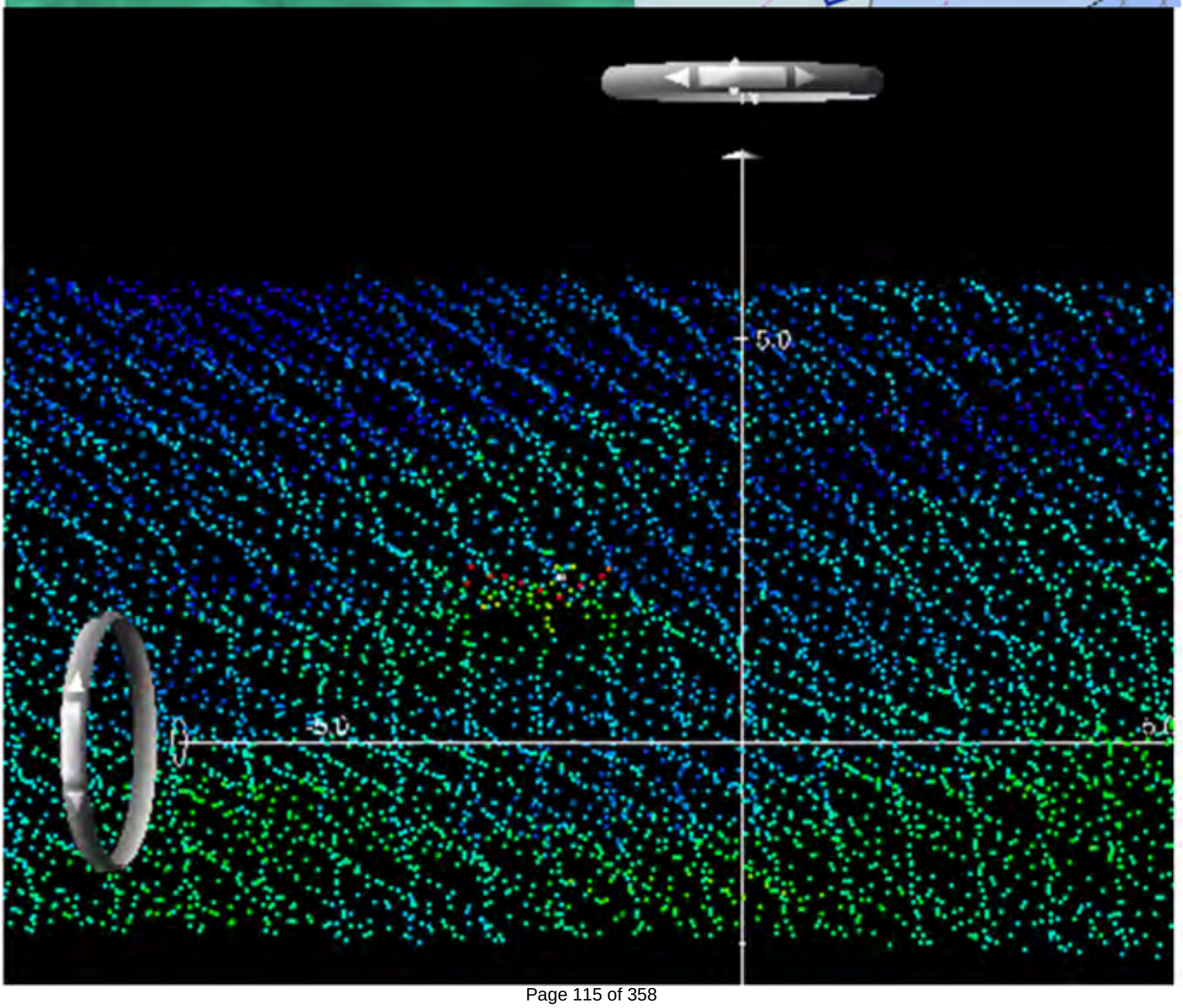
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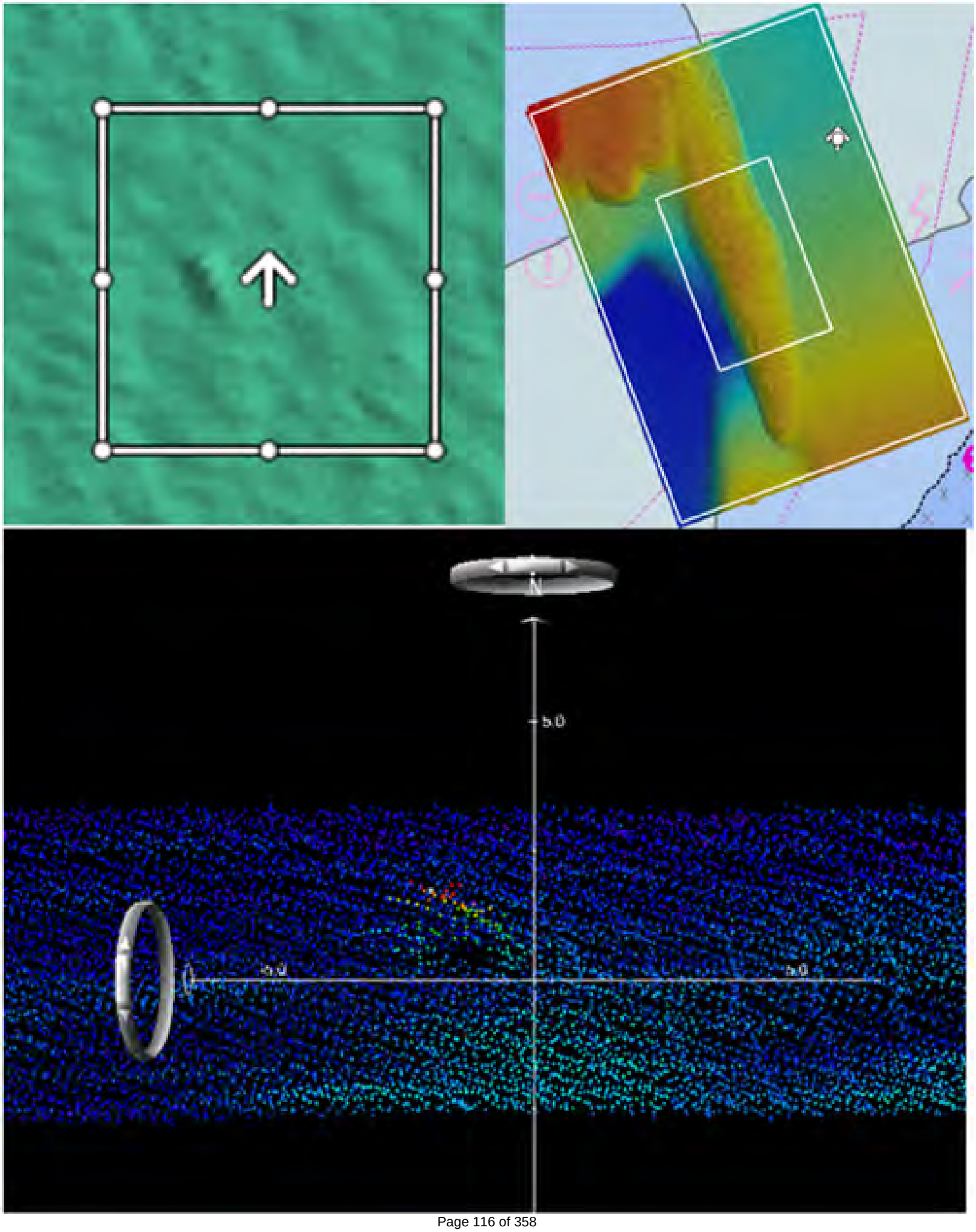
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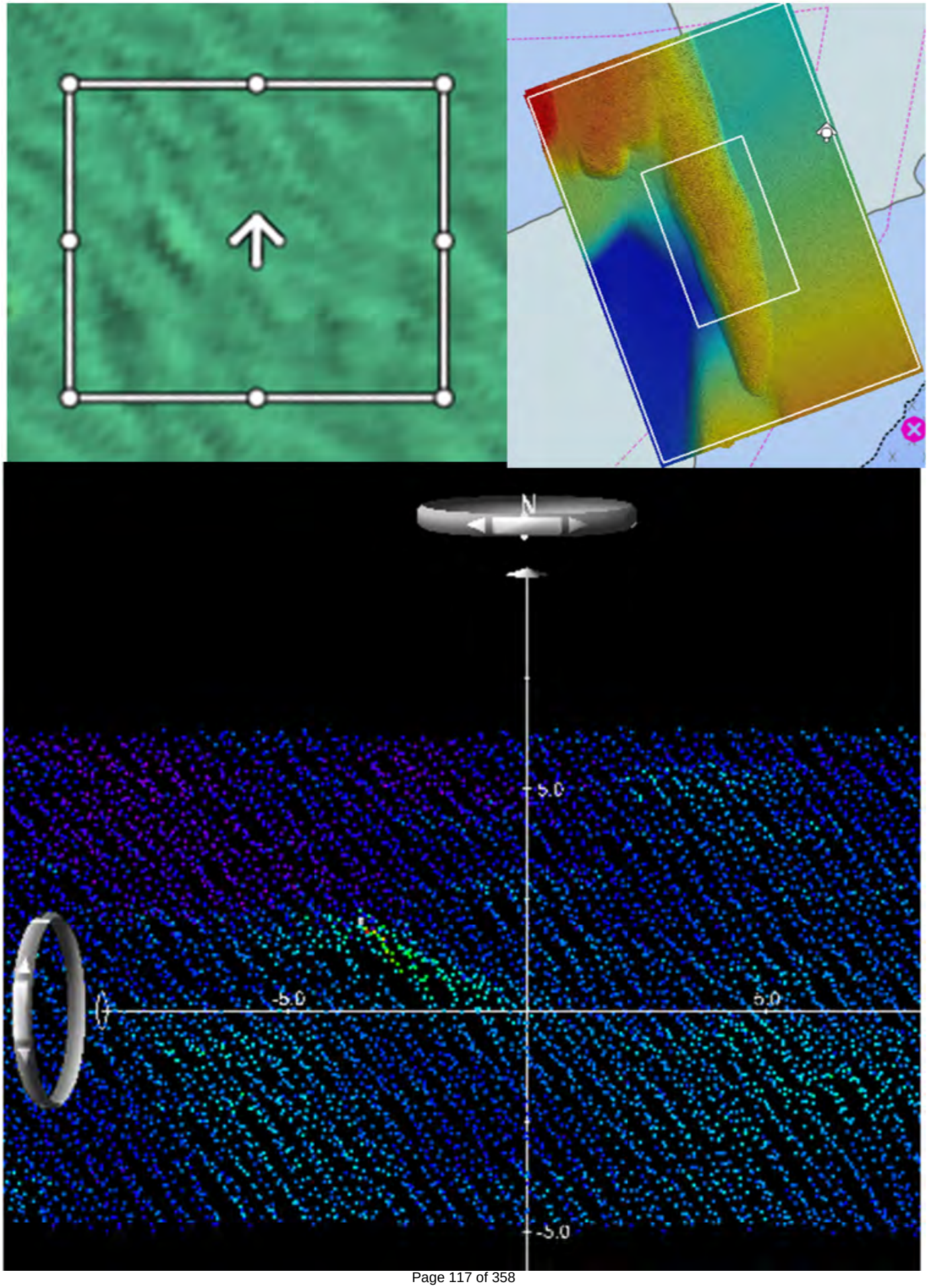
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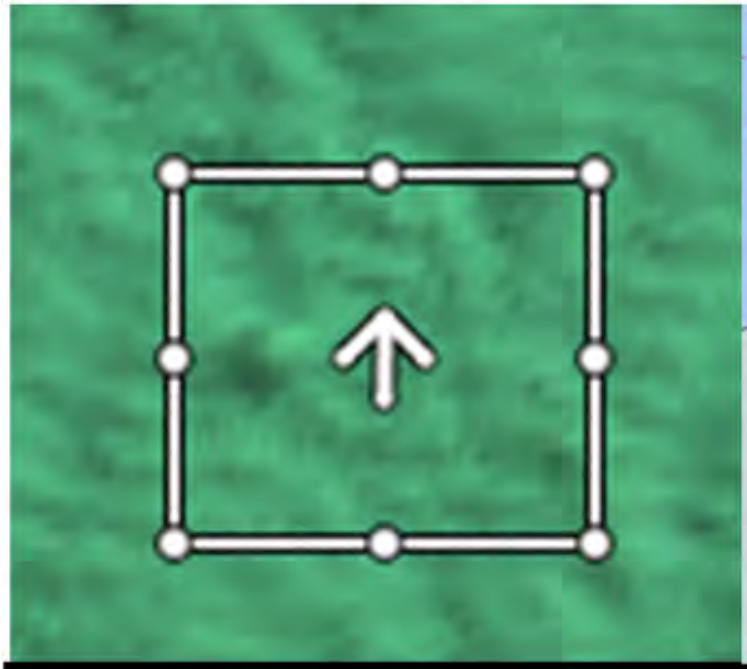

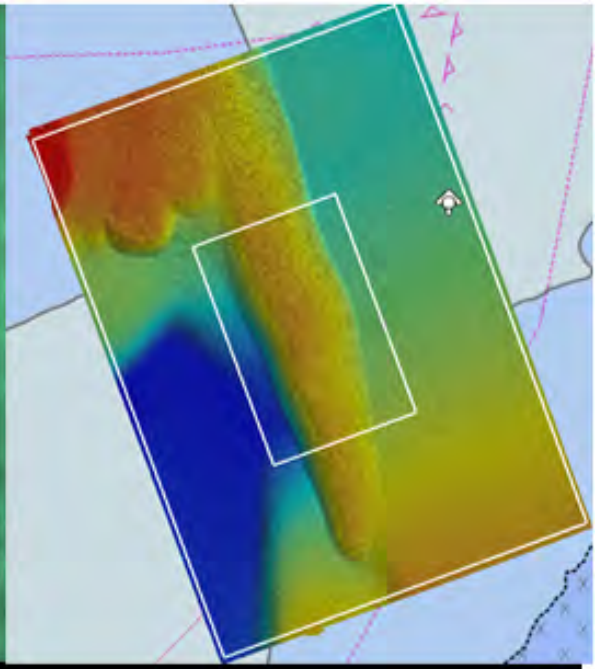

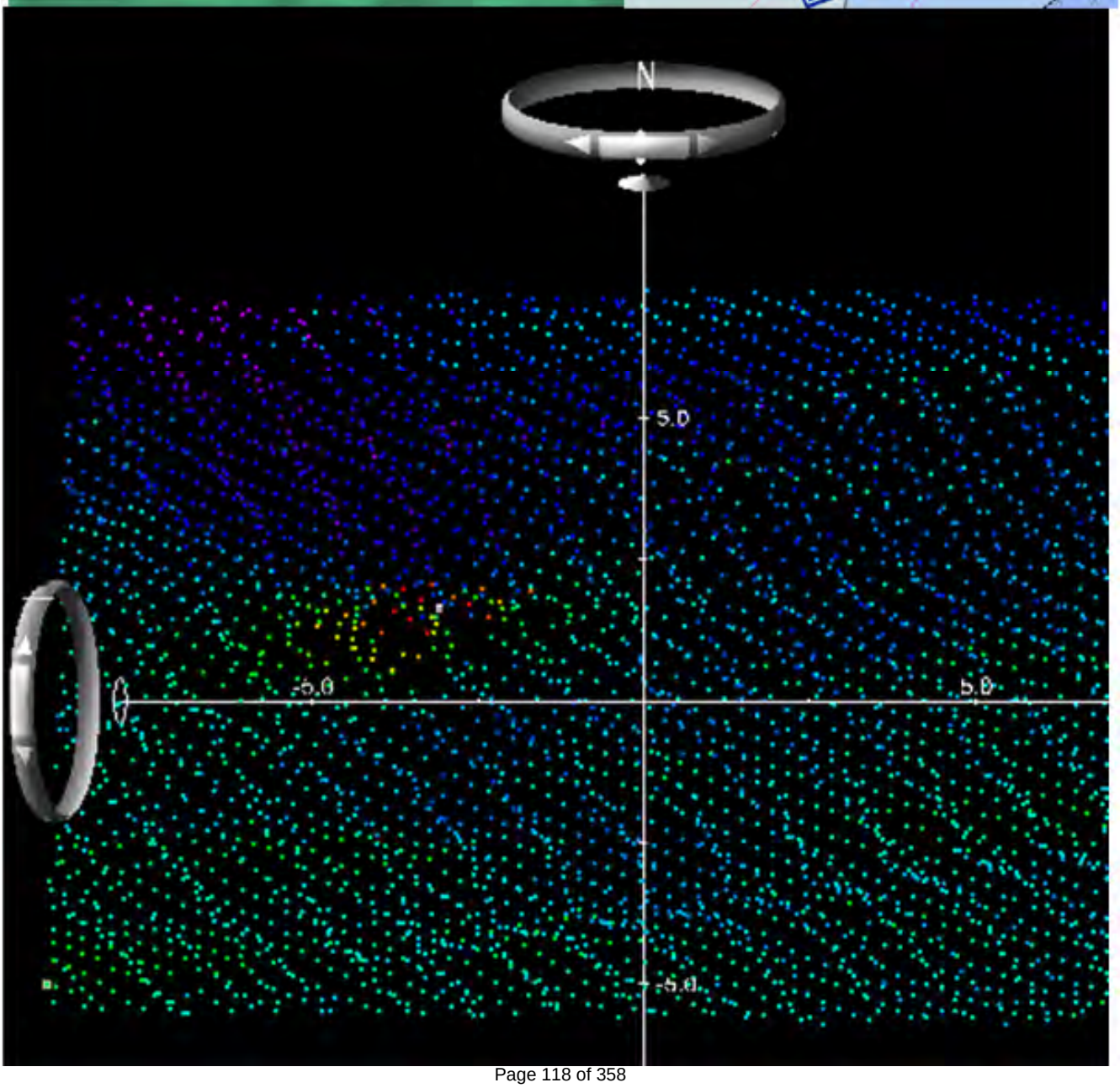
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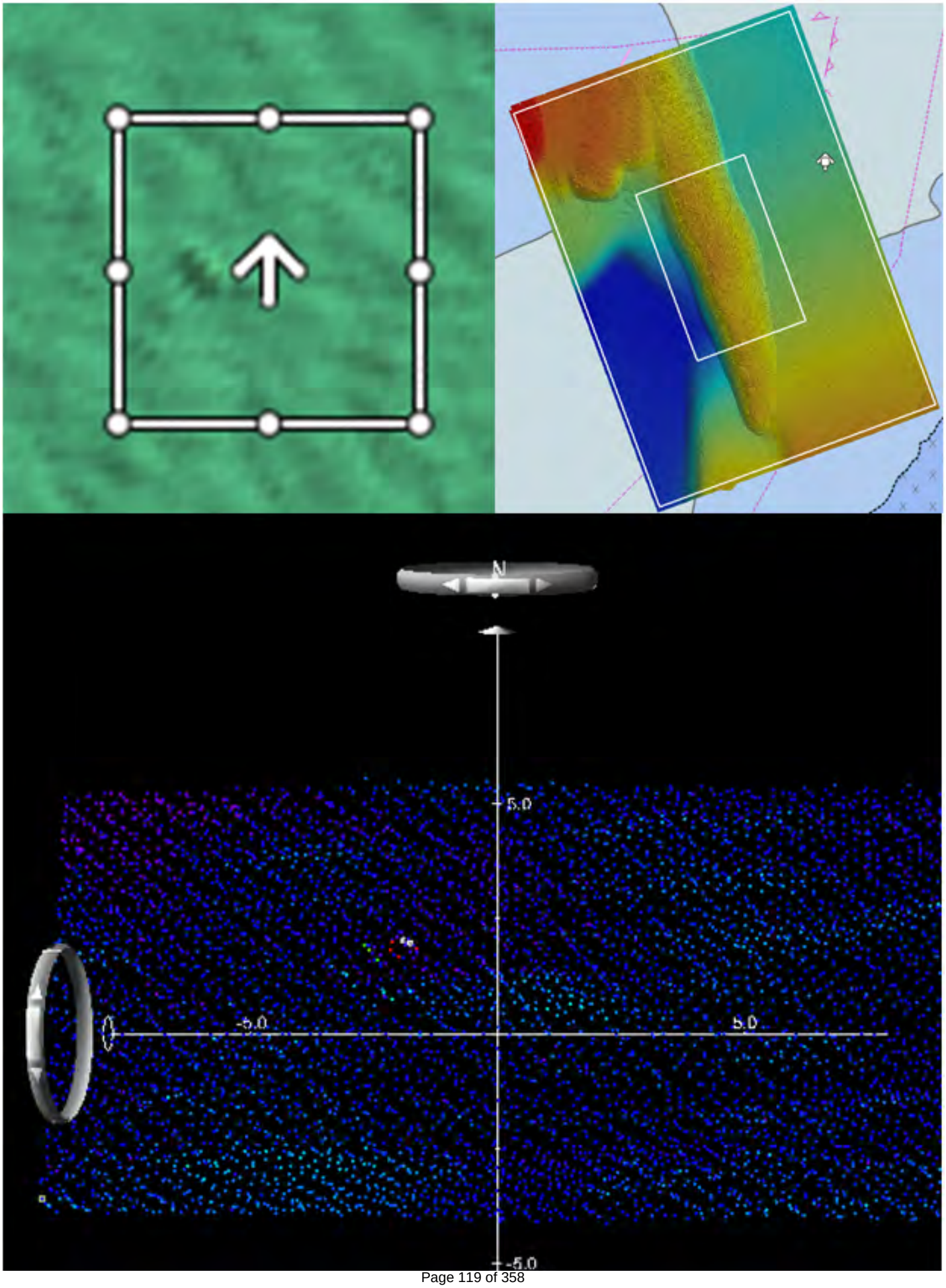
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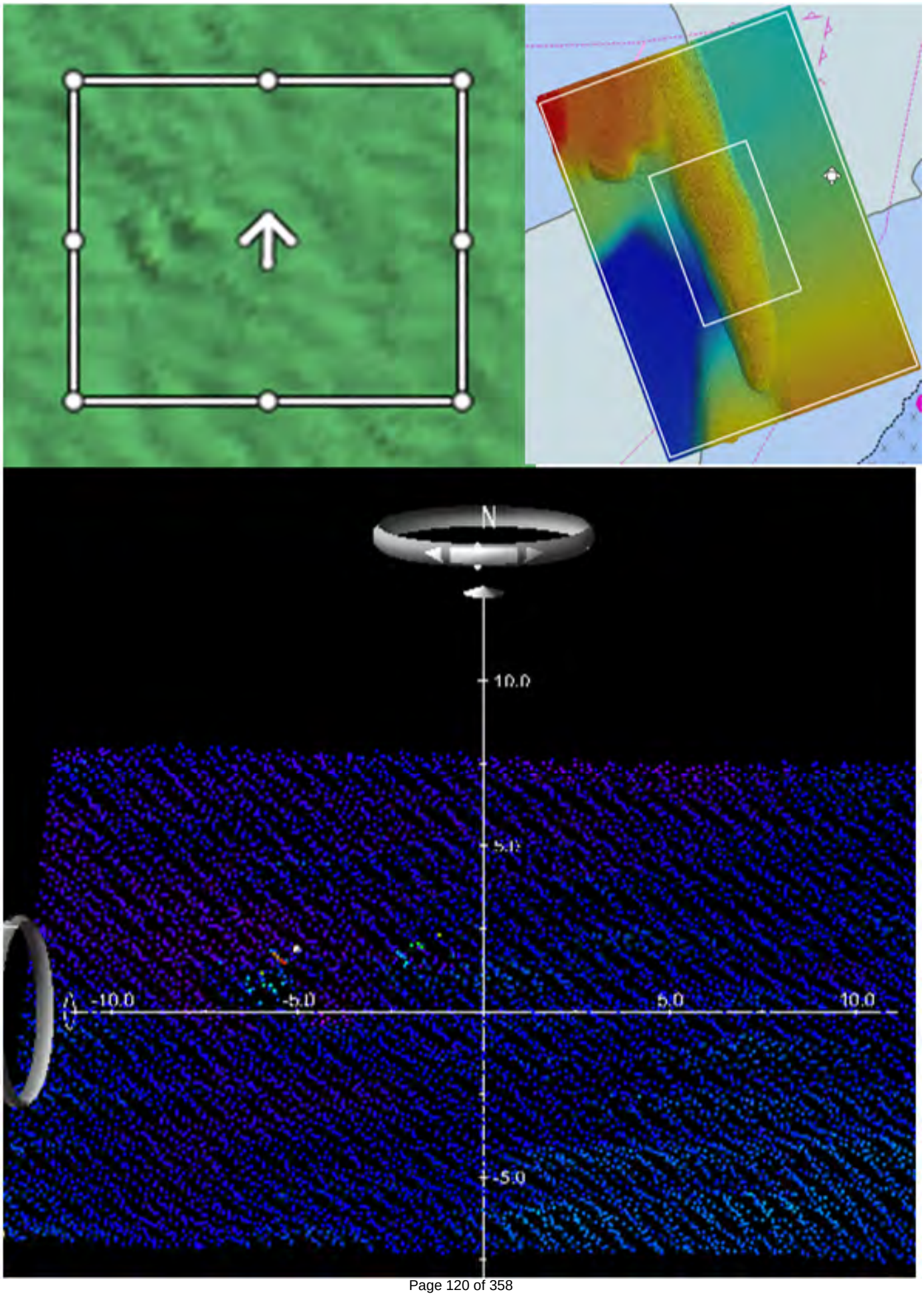
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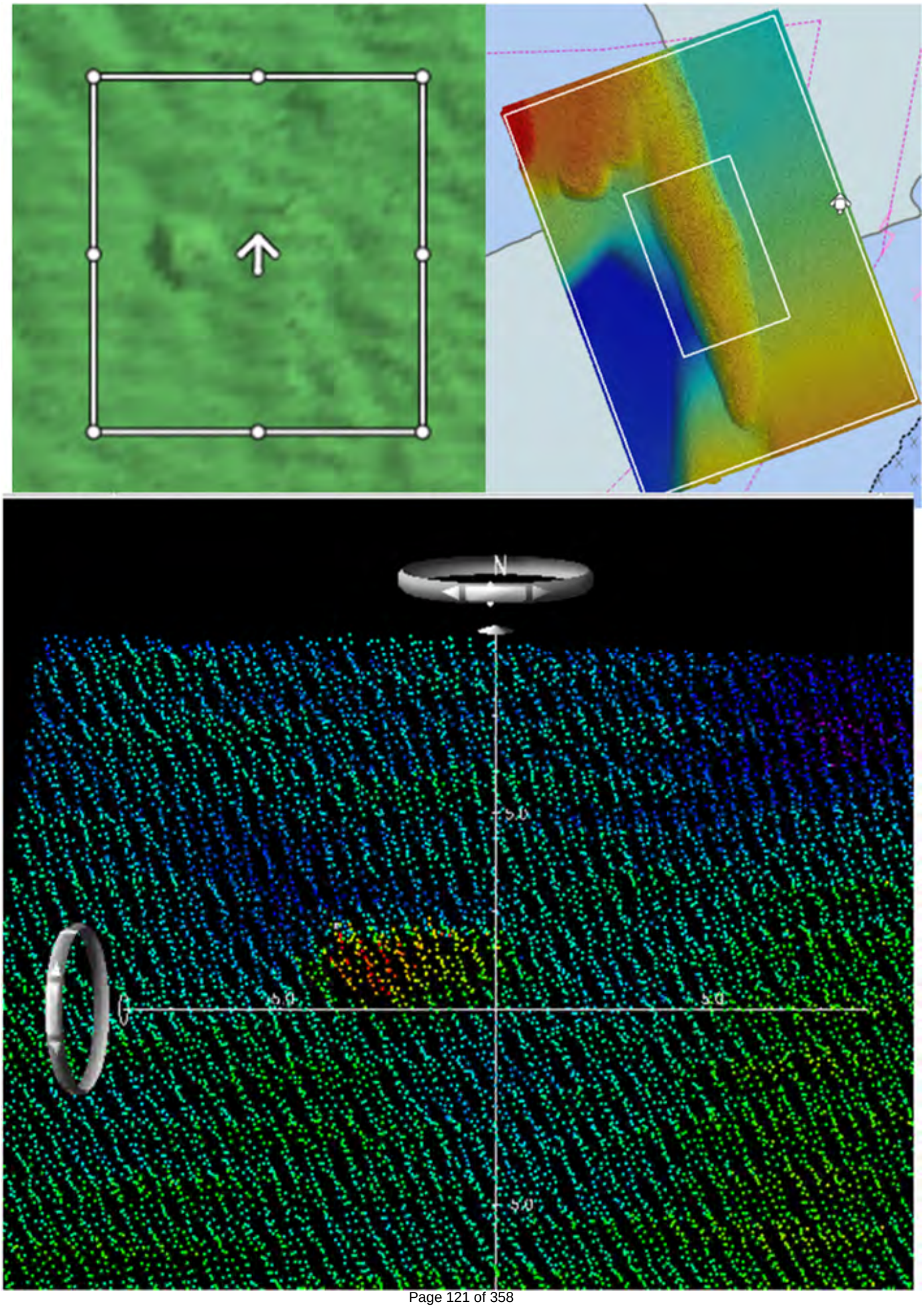
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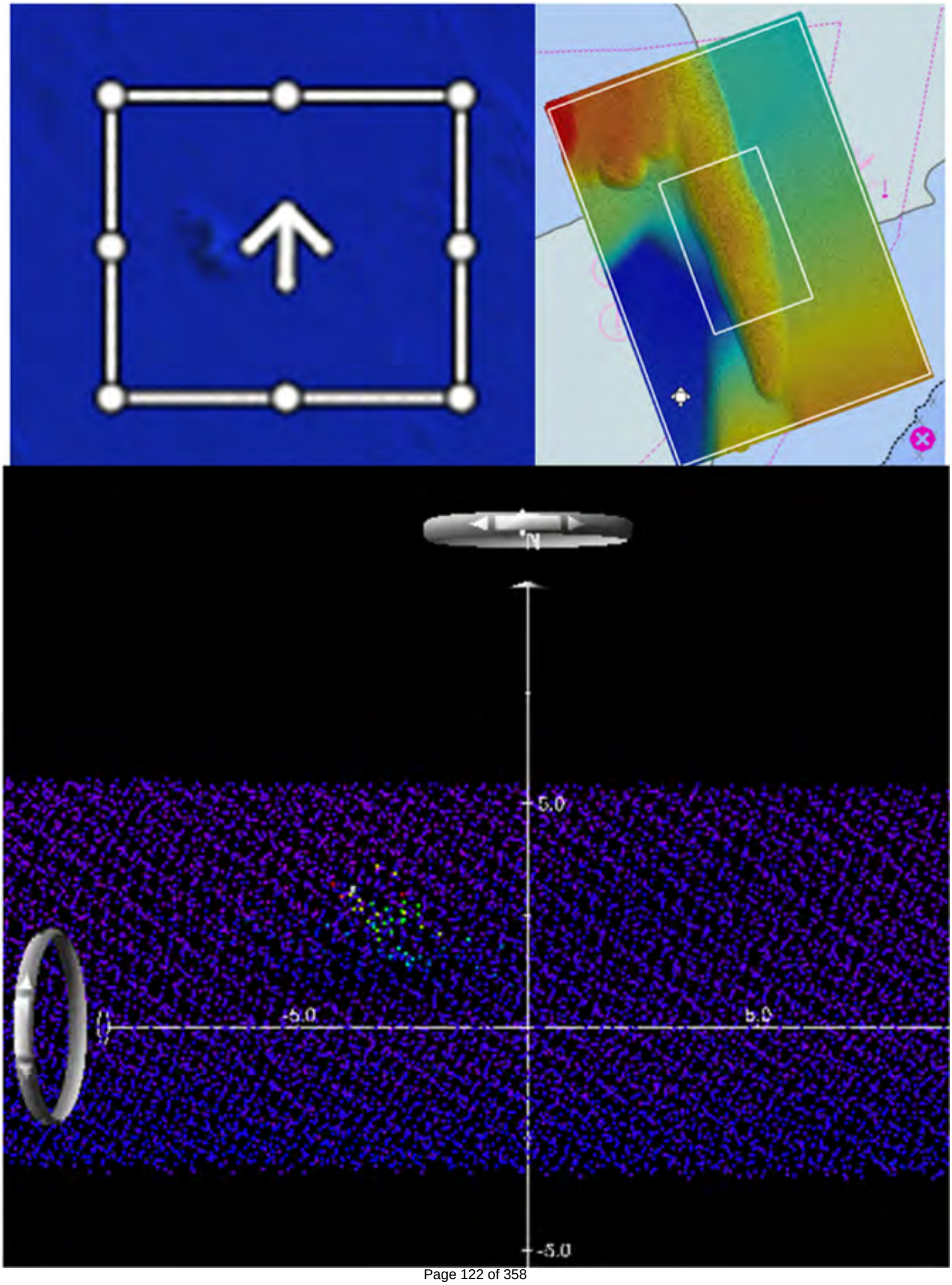
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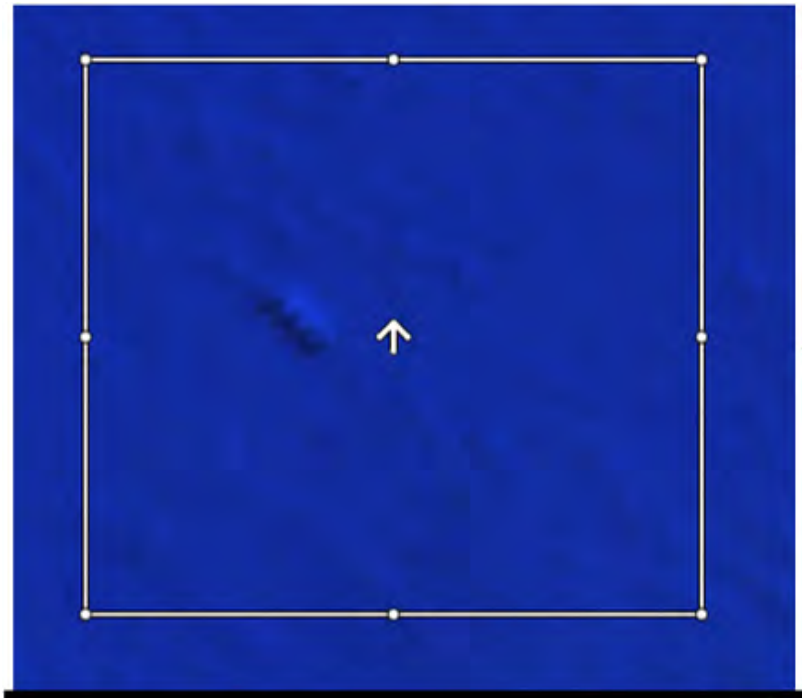

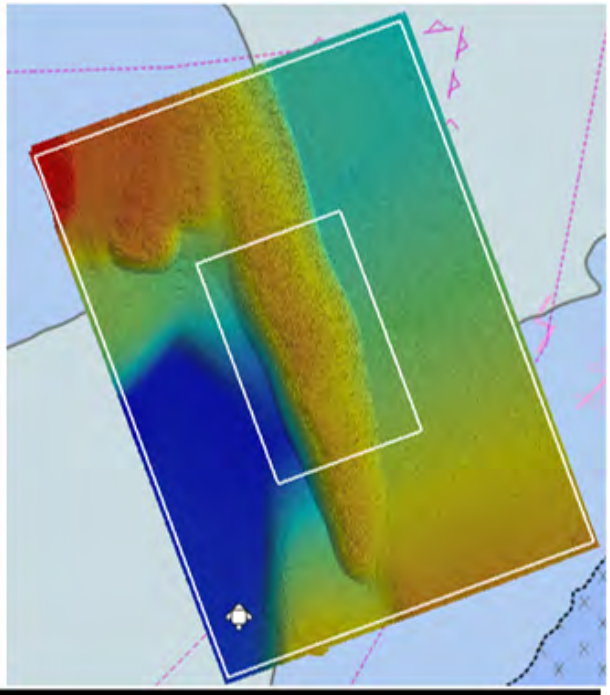

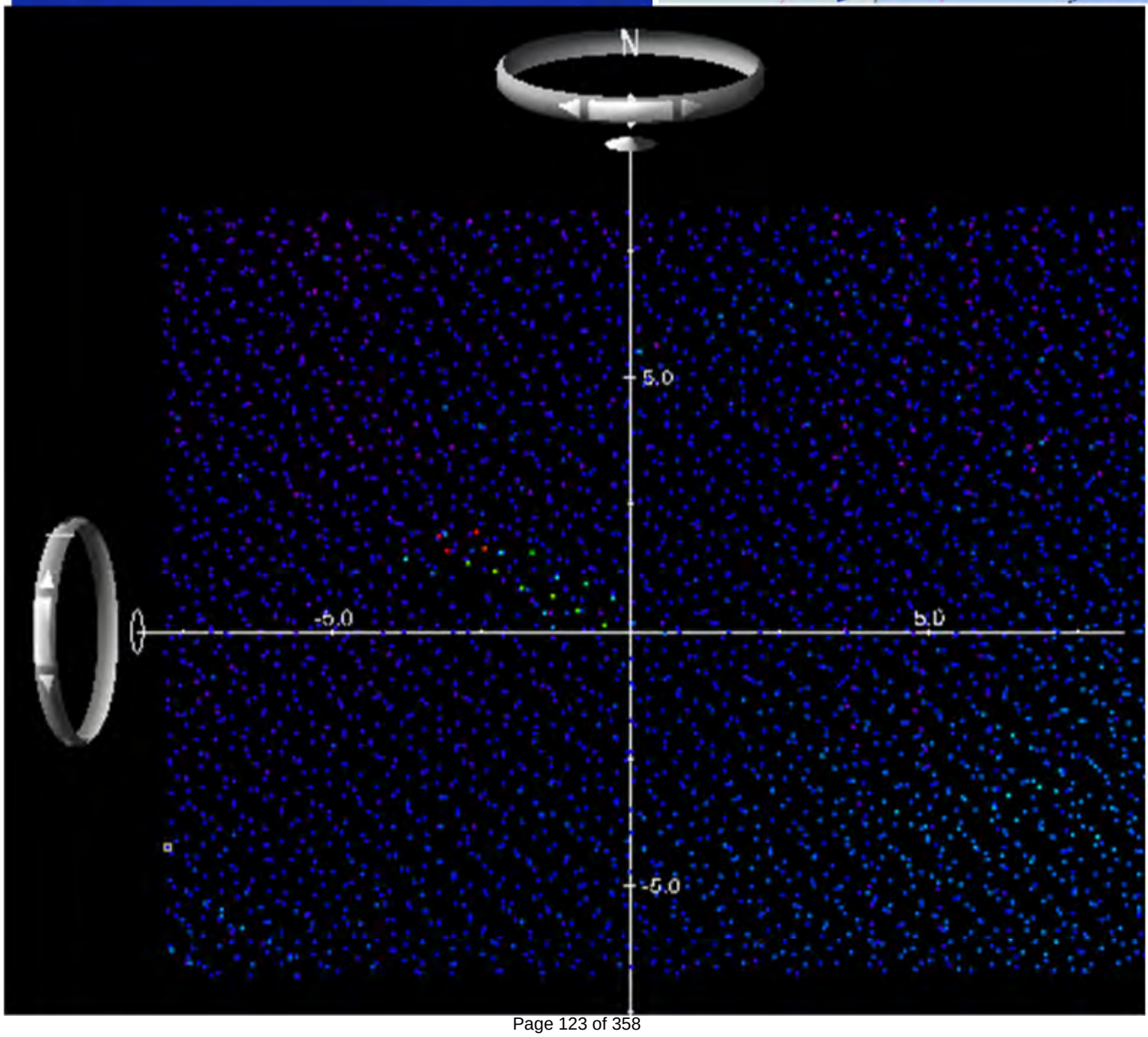
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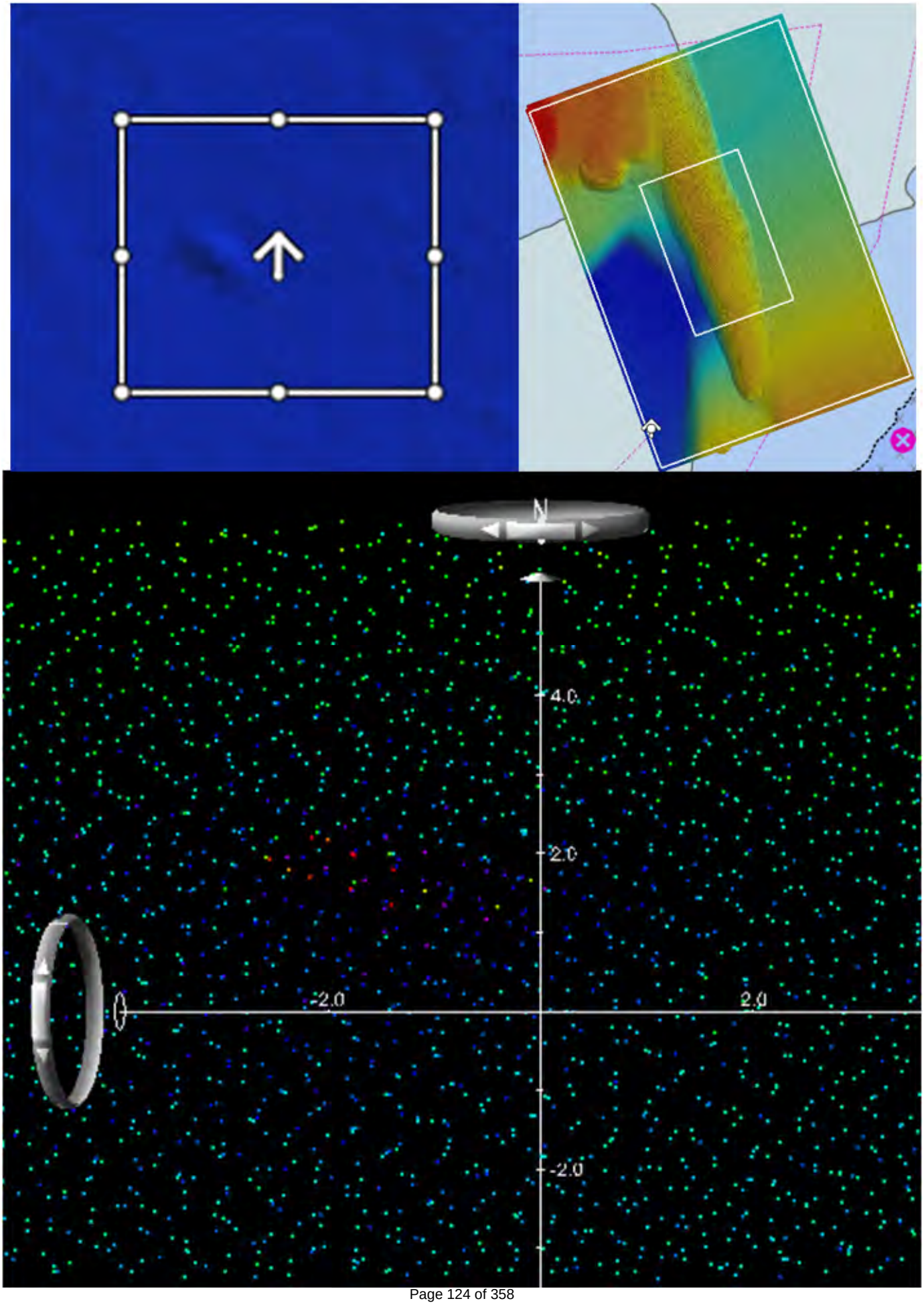
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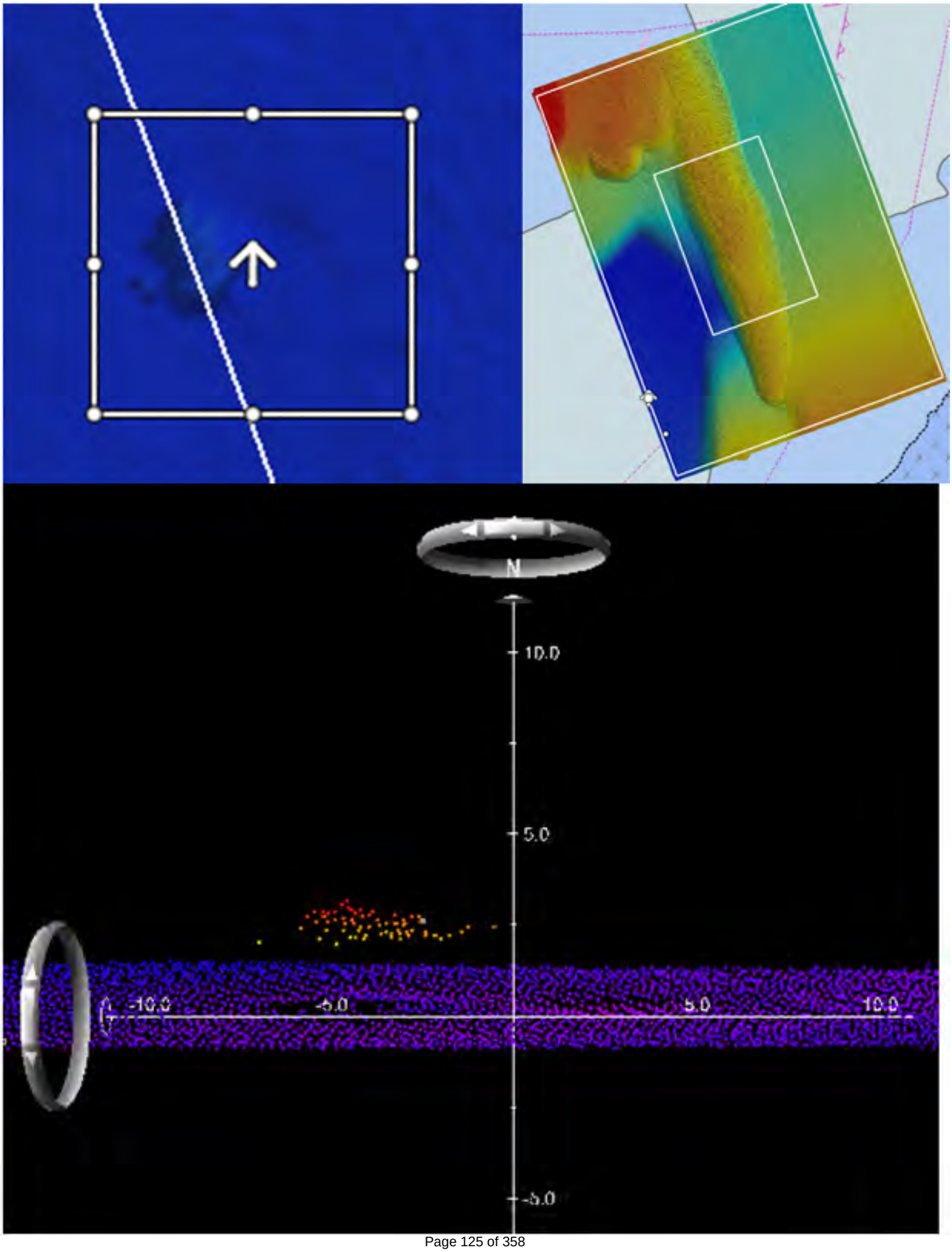
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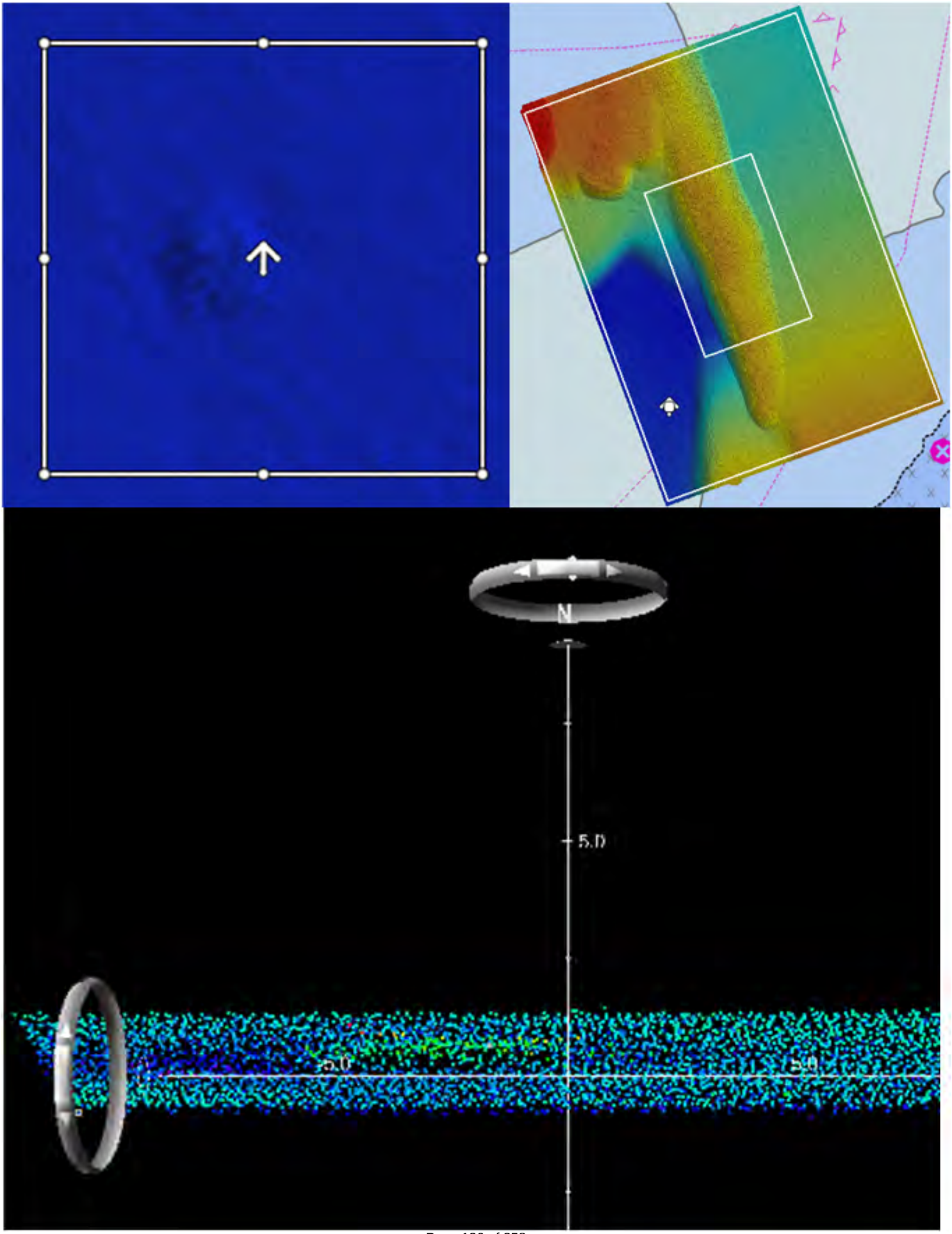
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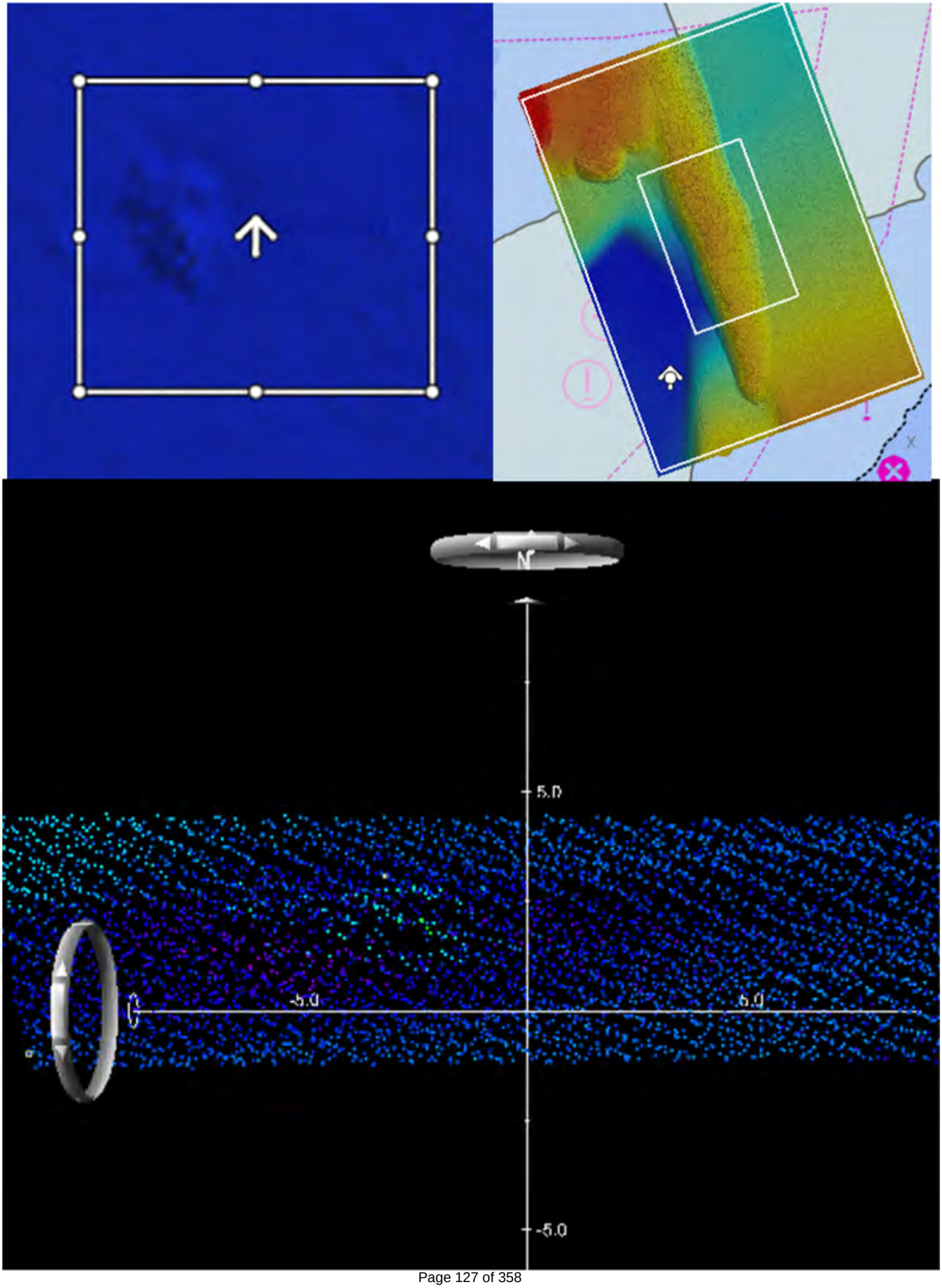
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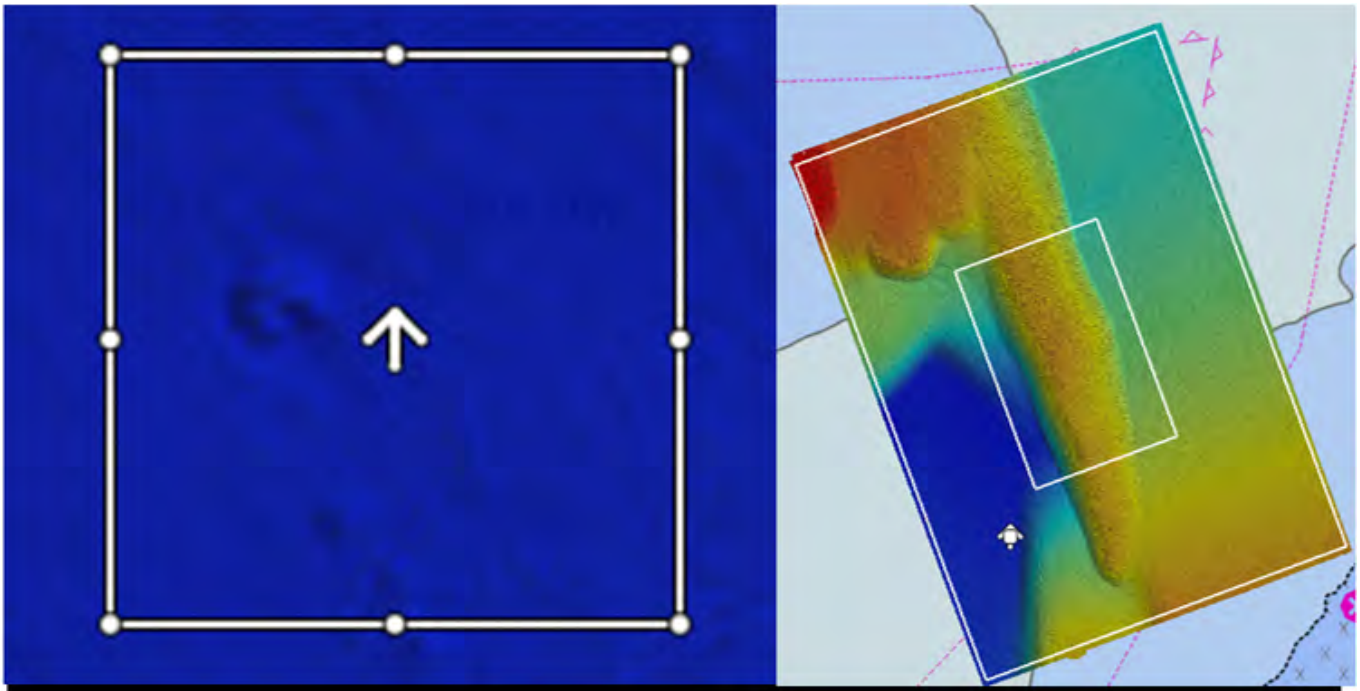

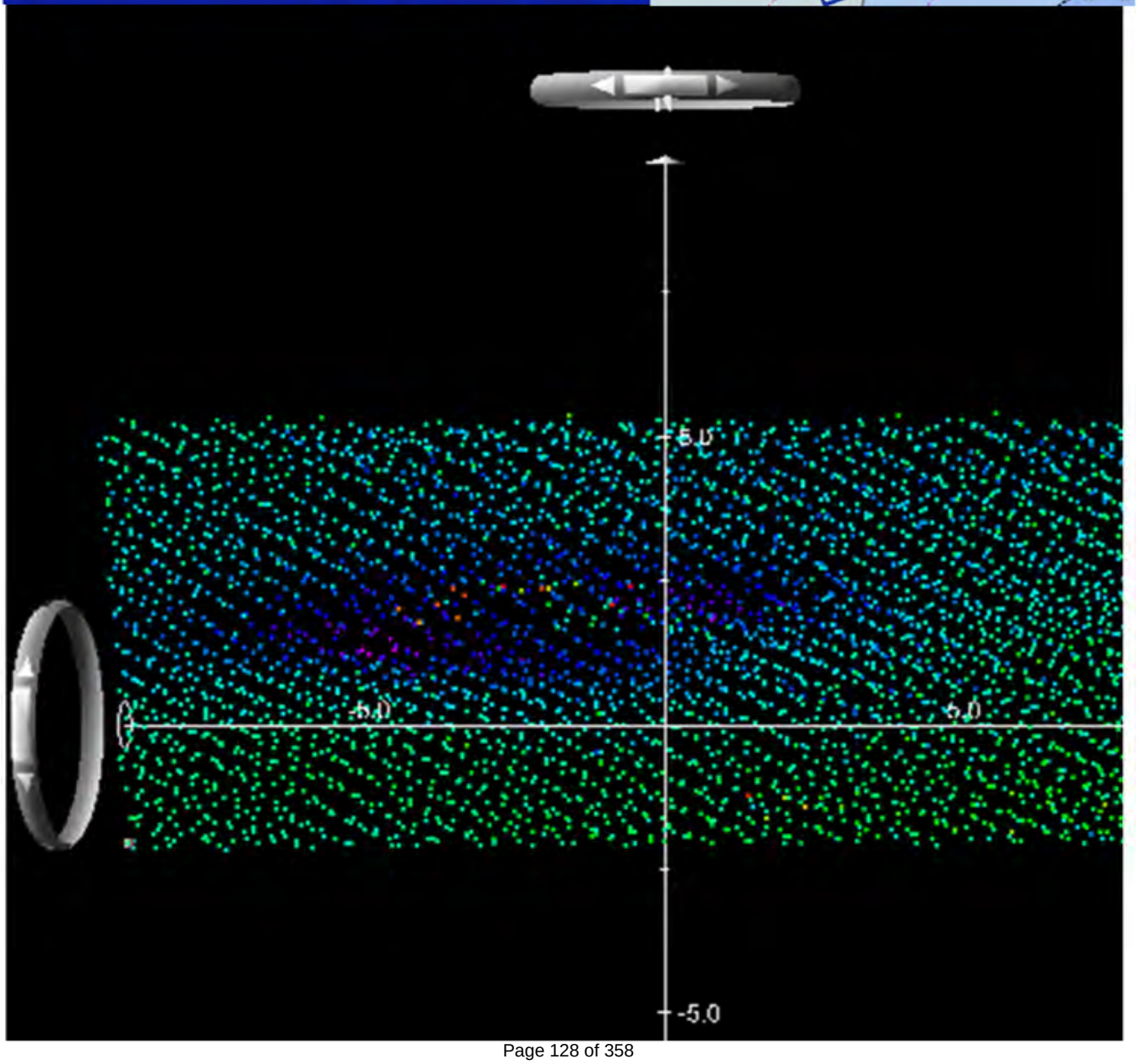
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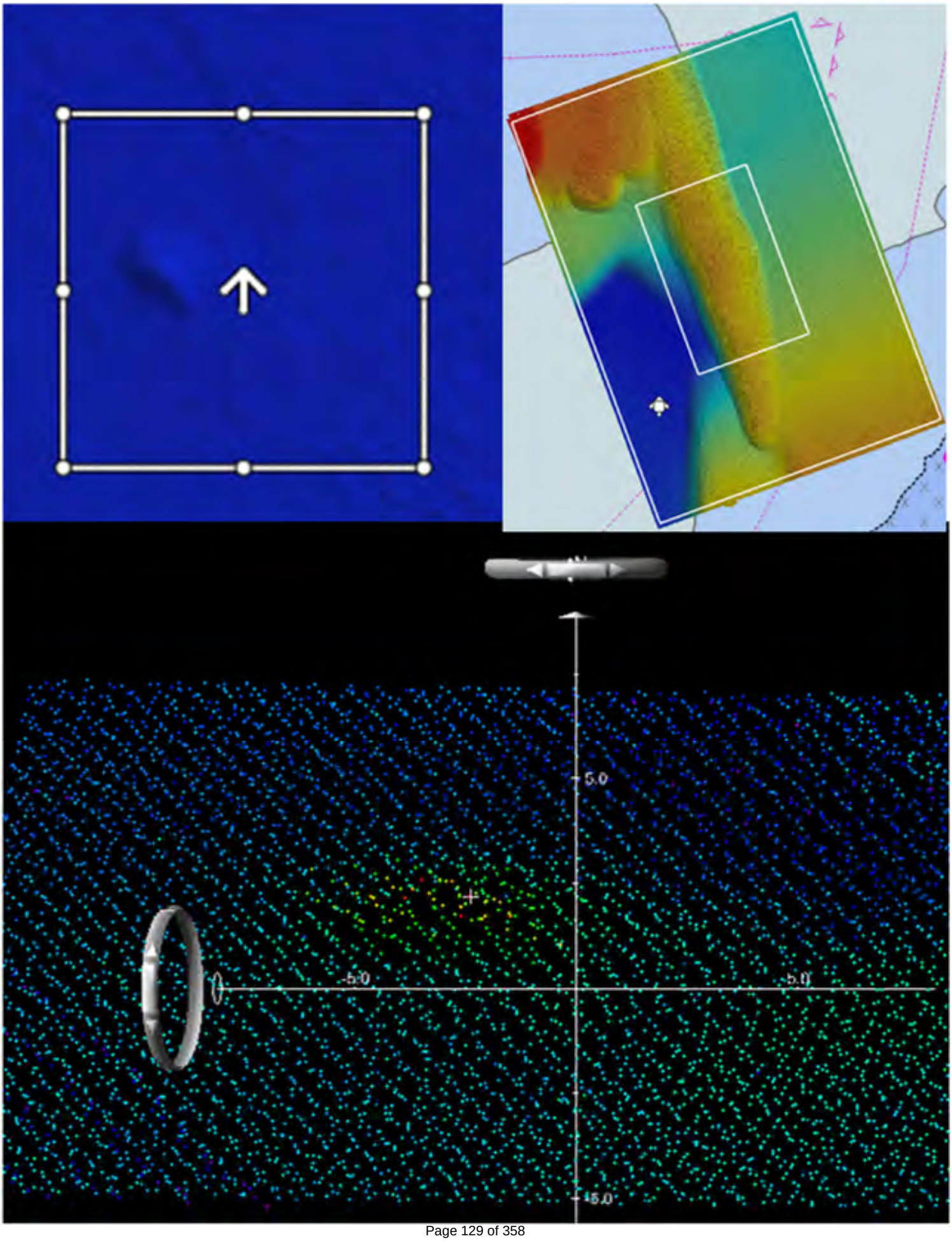
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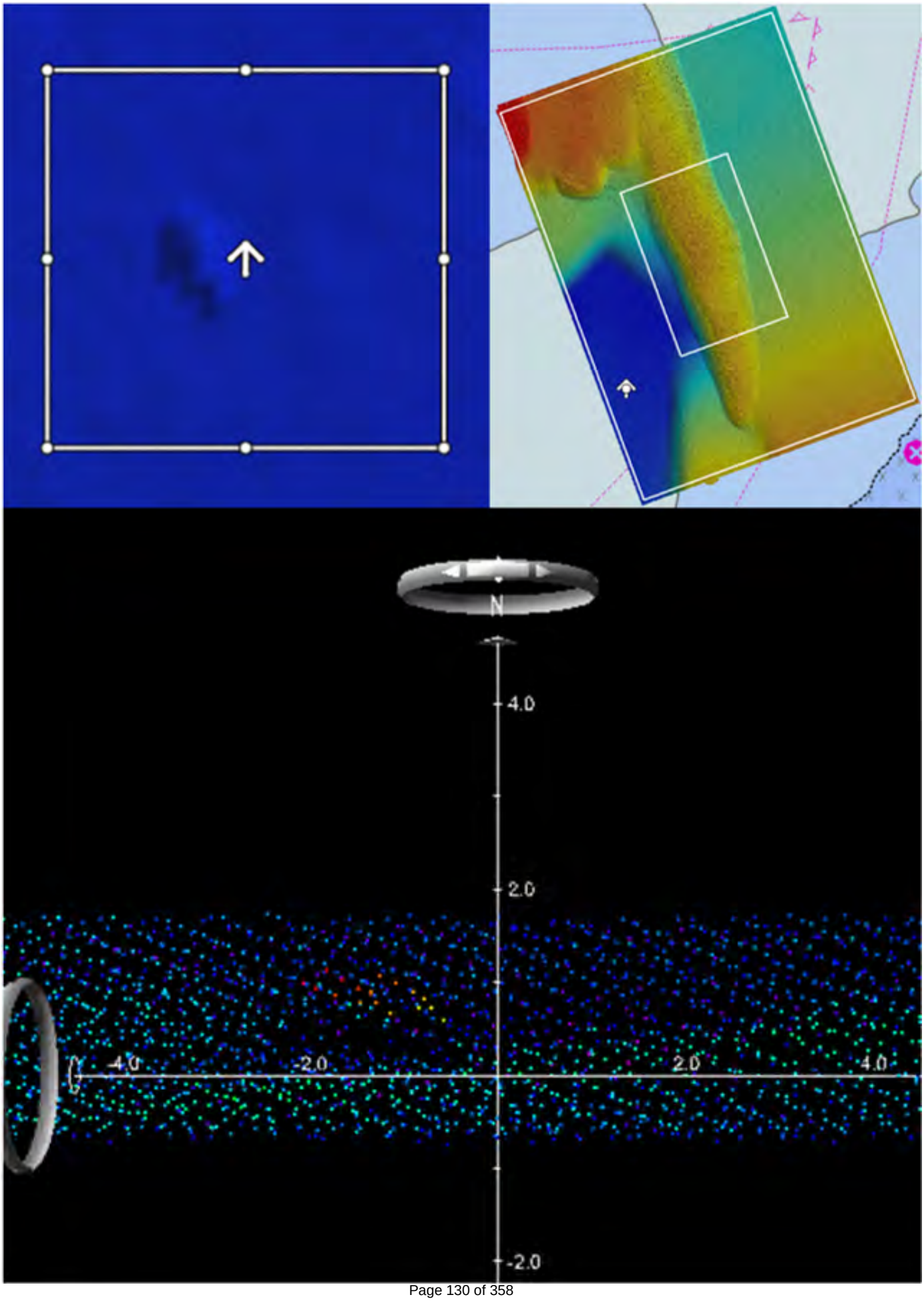
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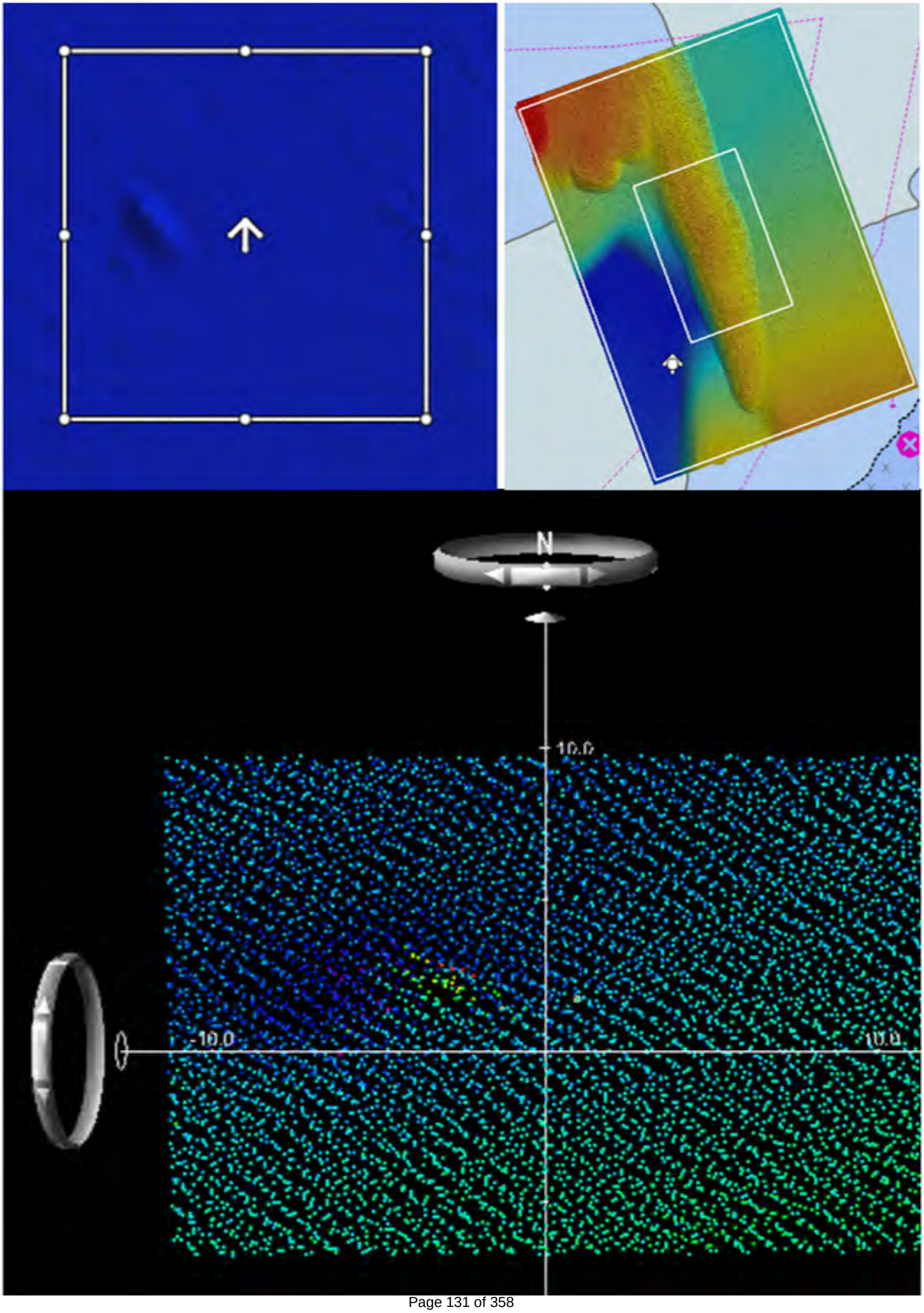
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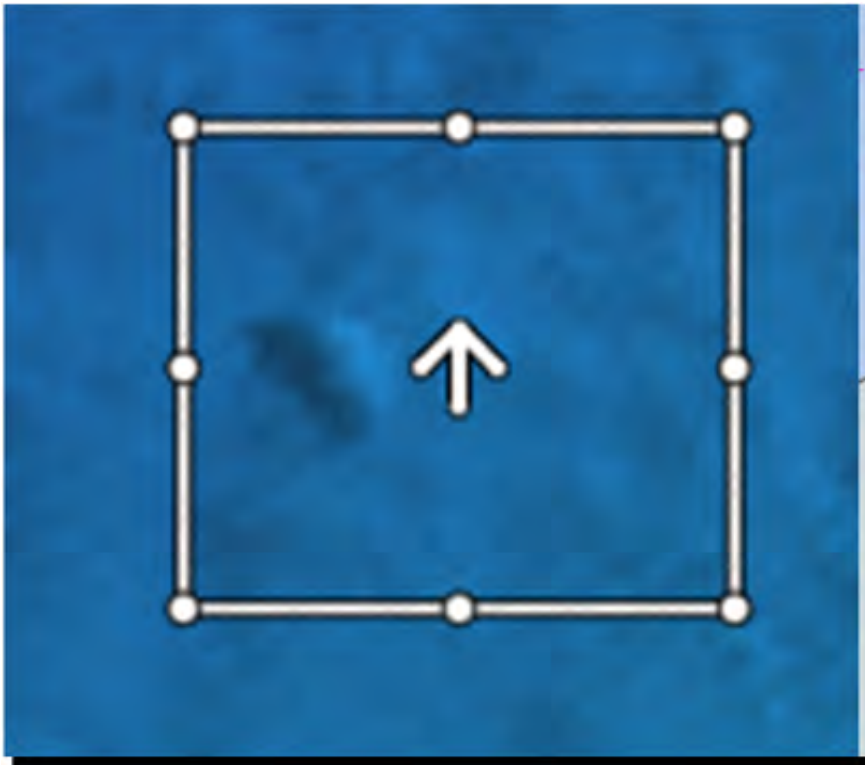

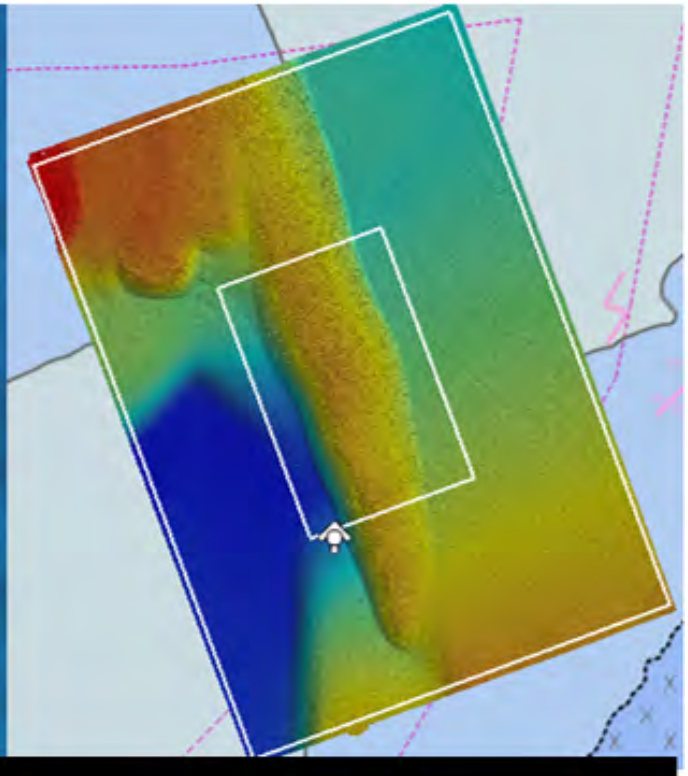

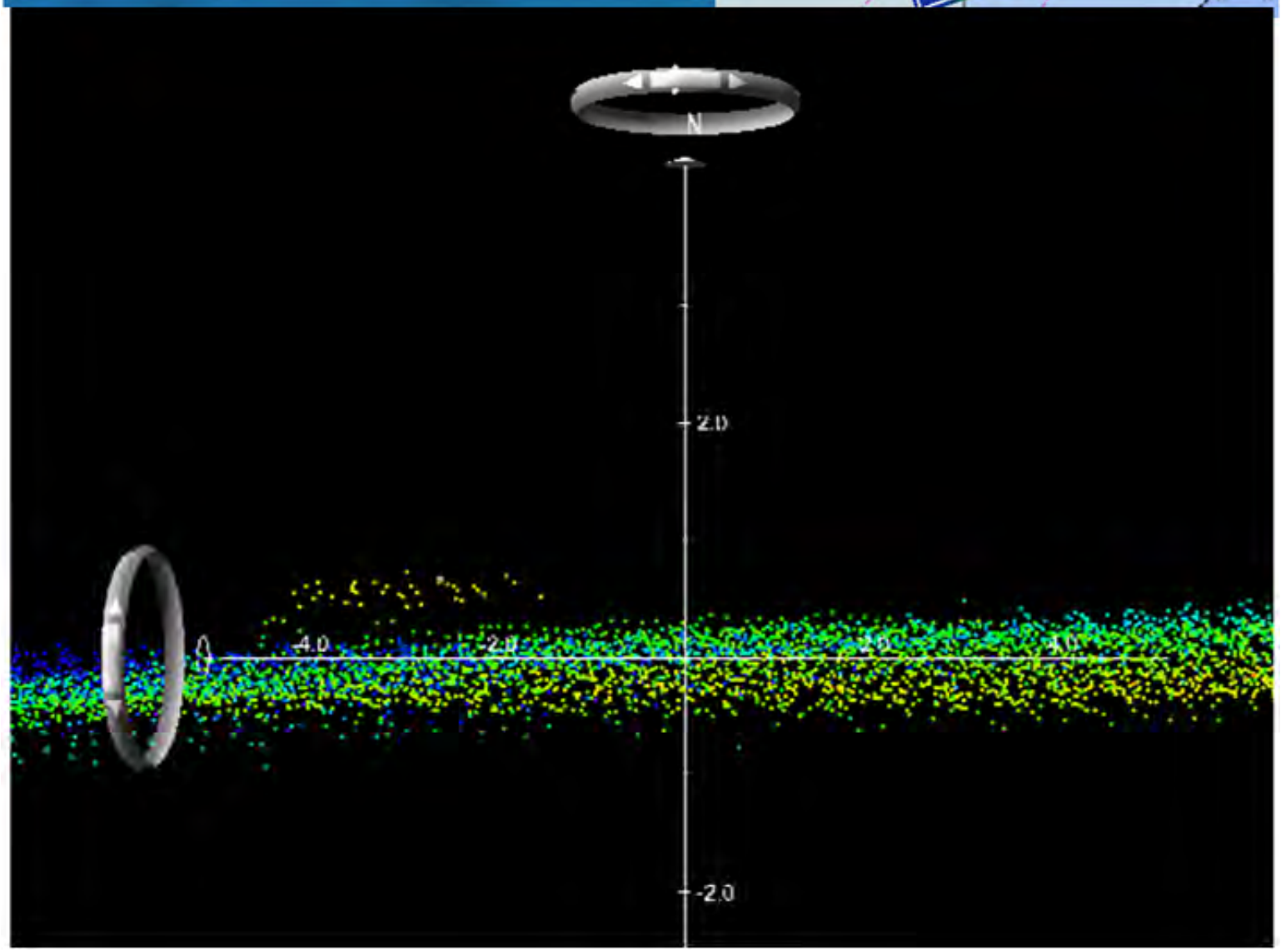
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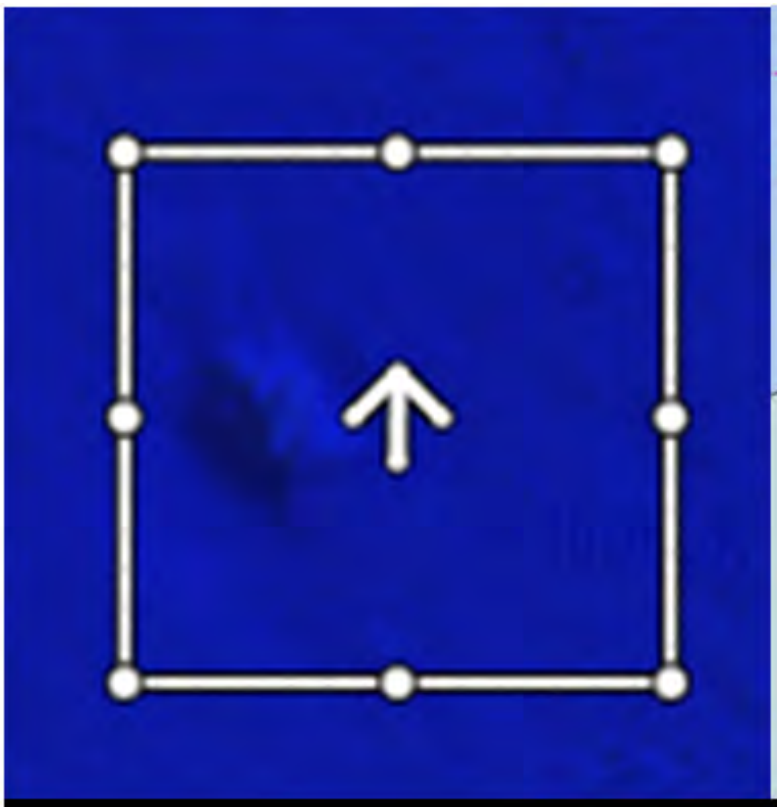

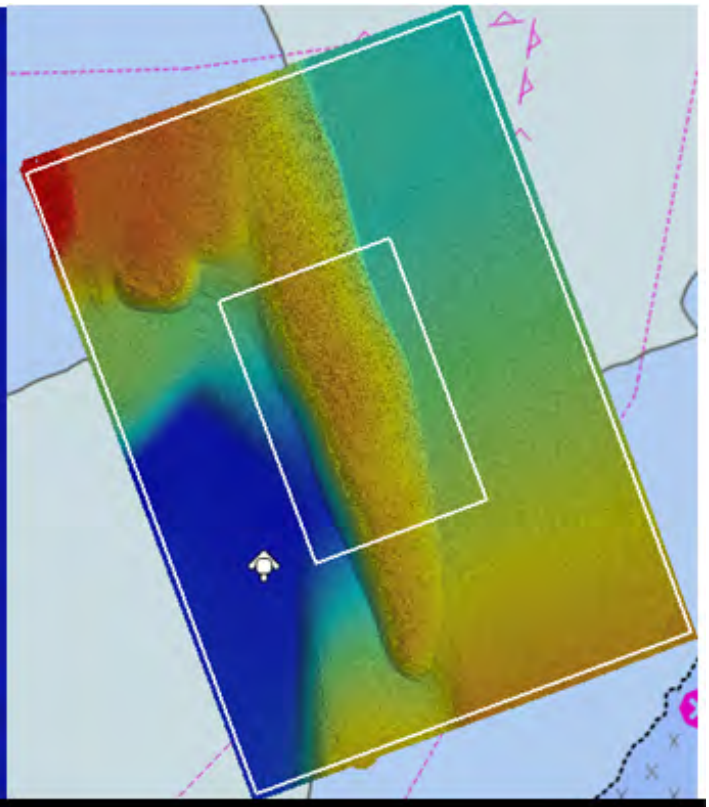

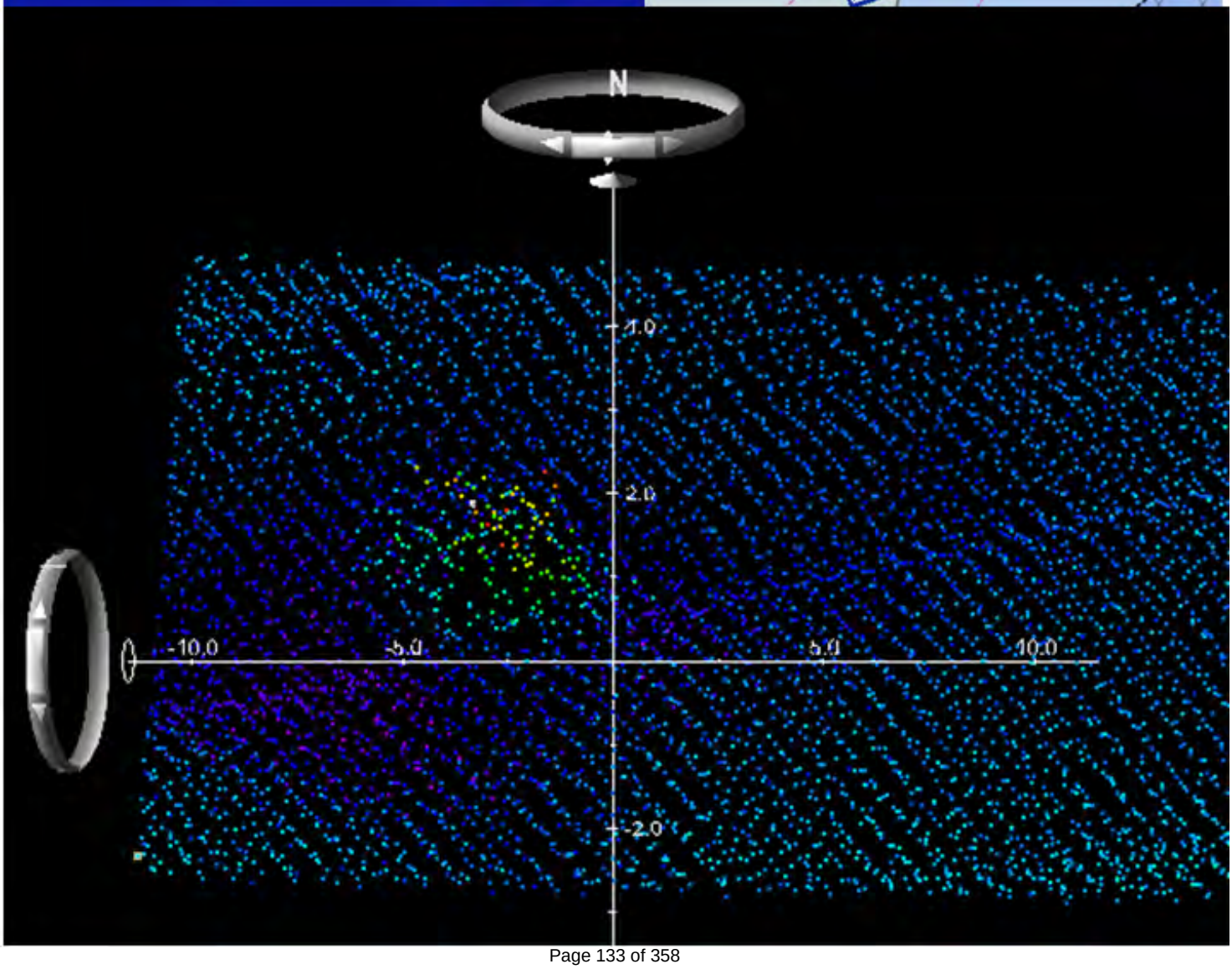
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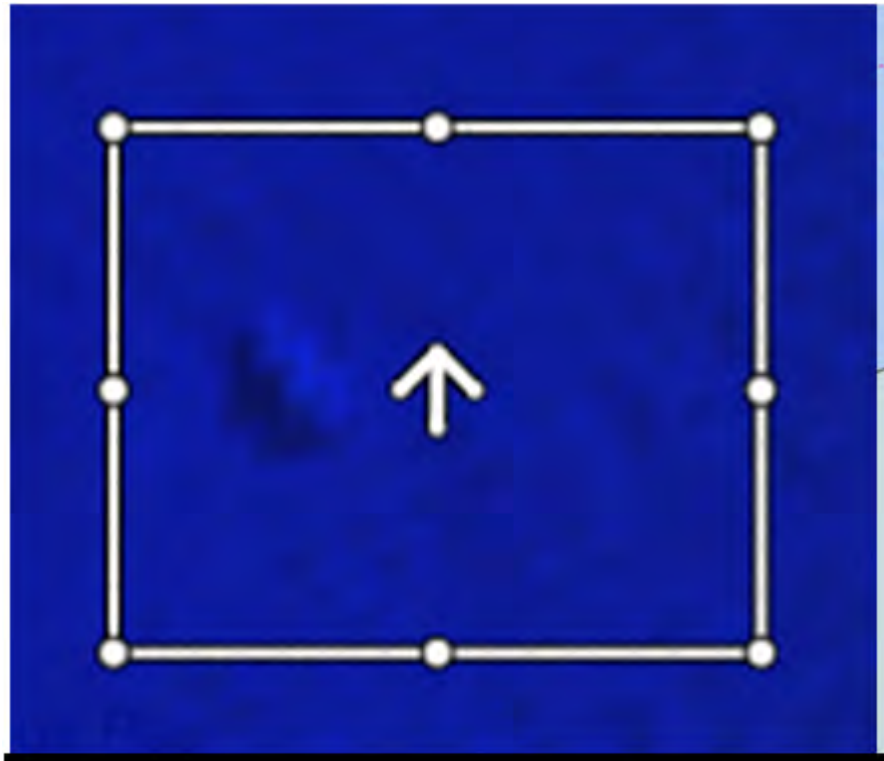
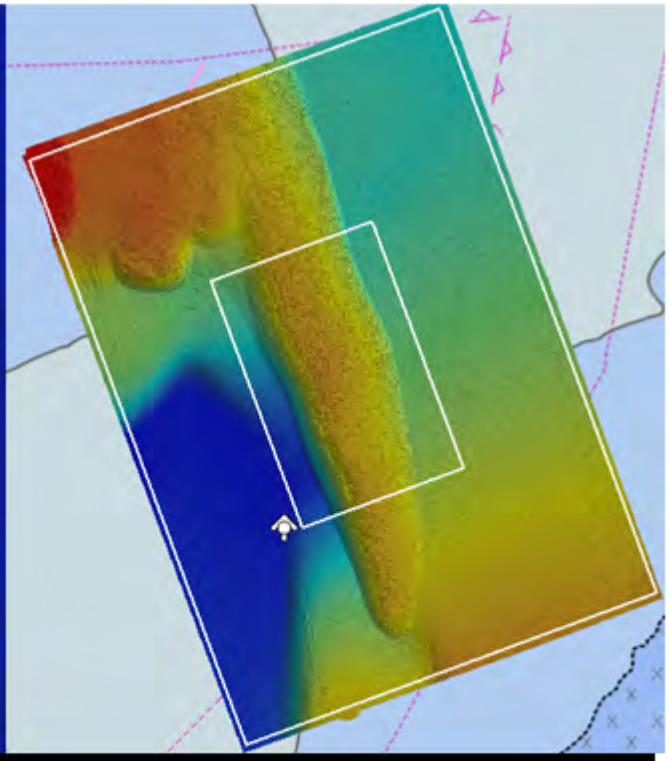
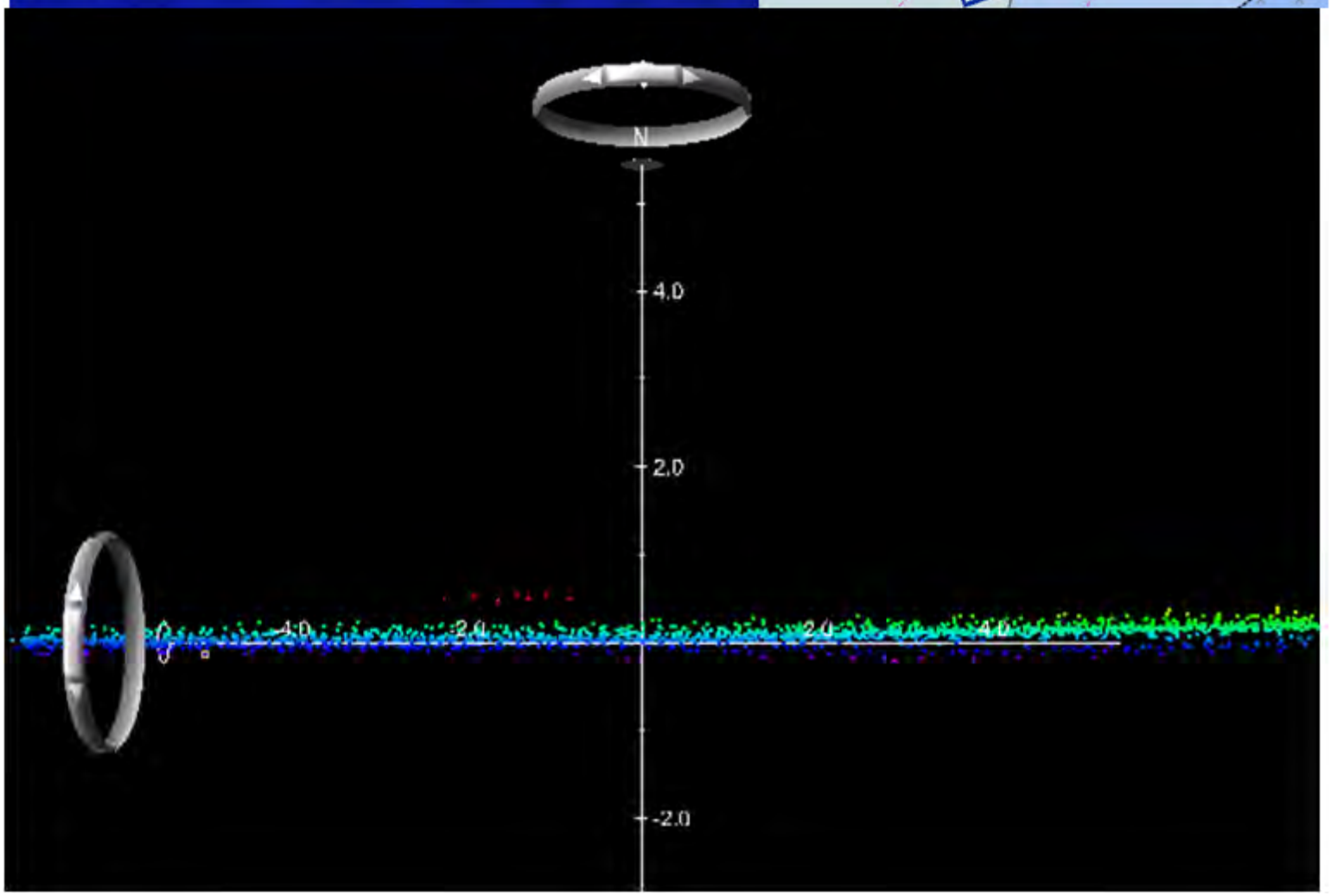
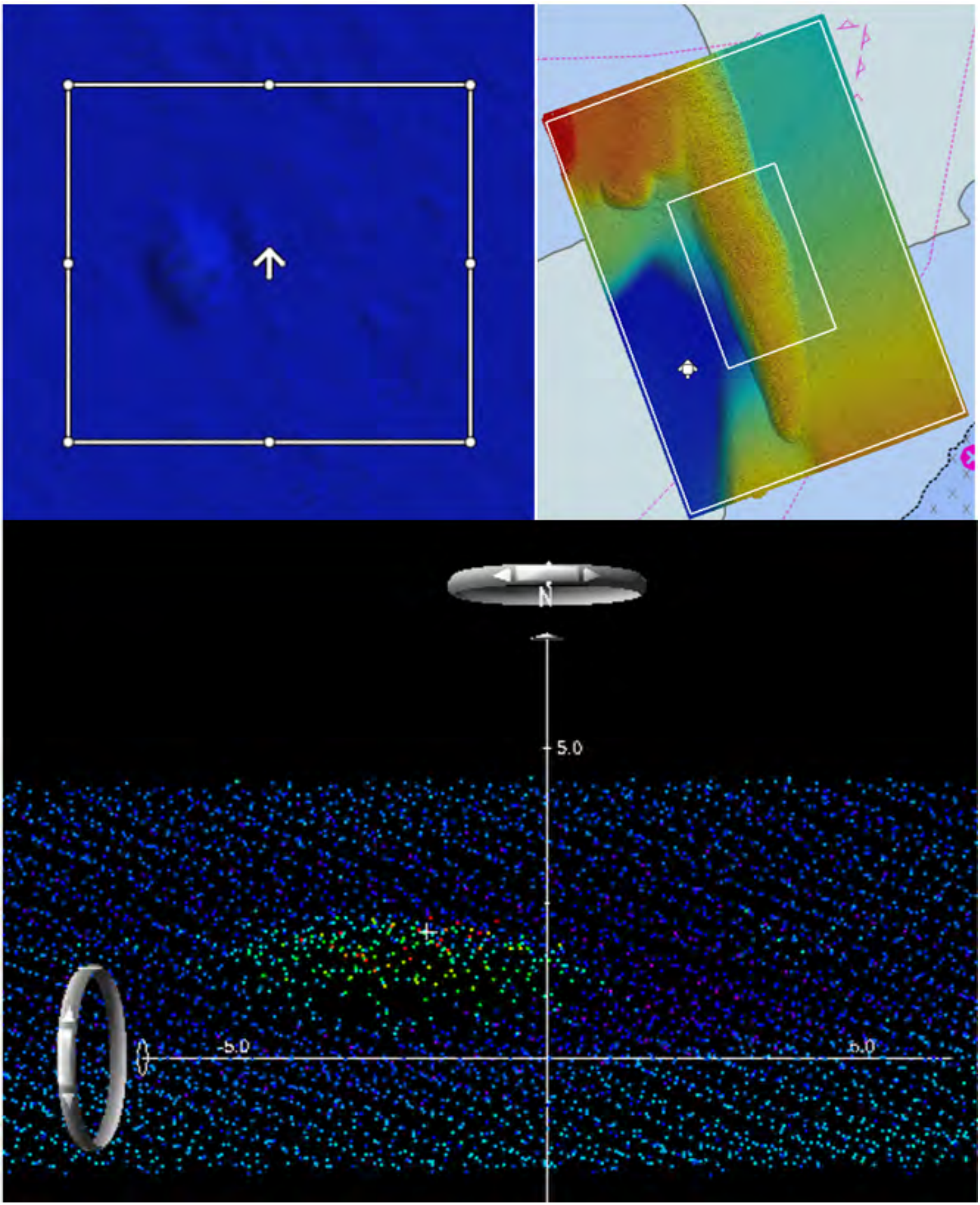
UKO_092

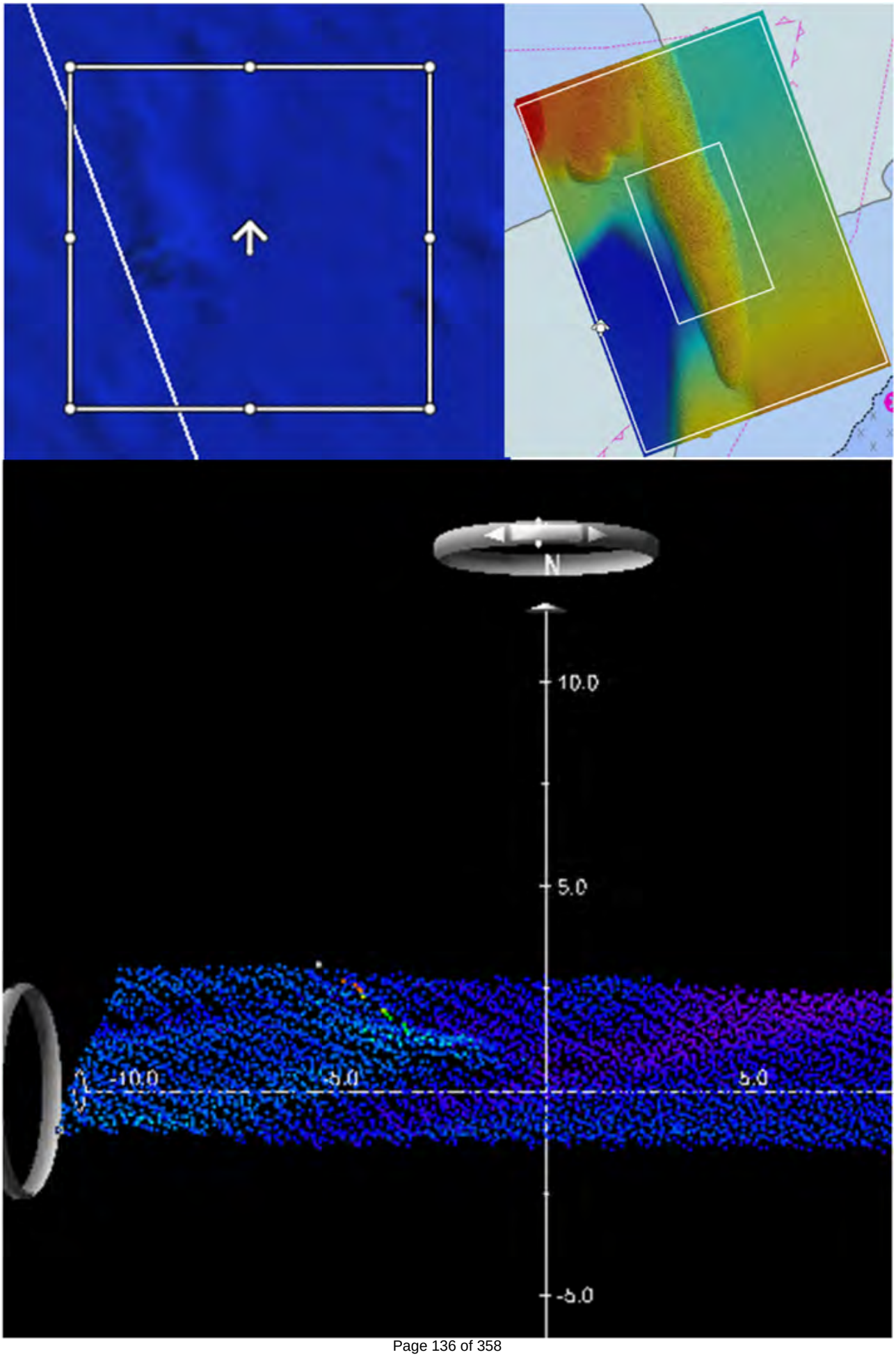






UKO_093

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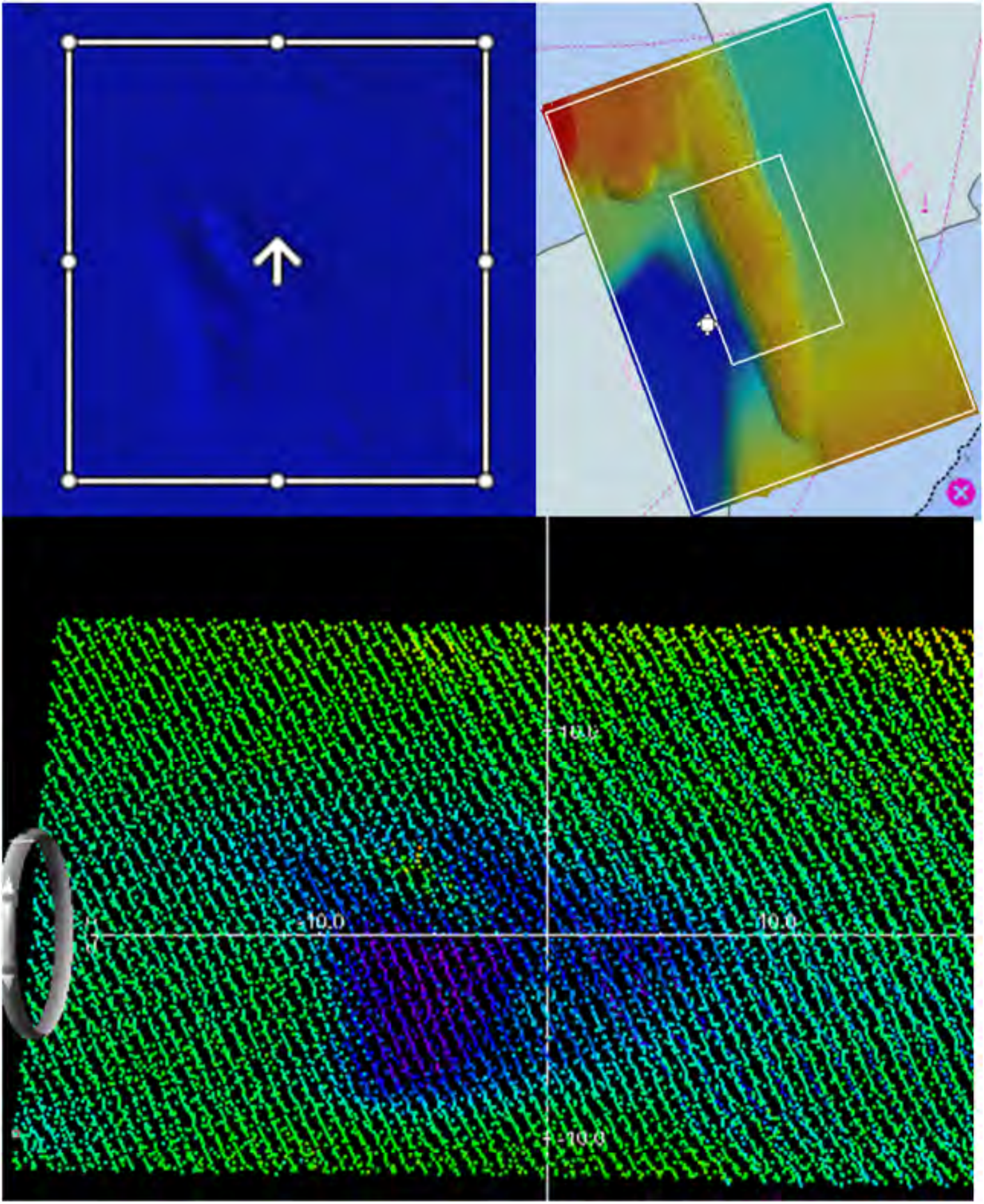
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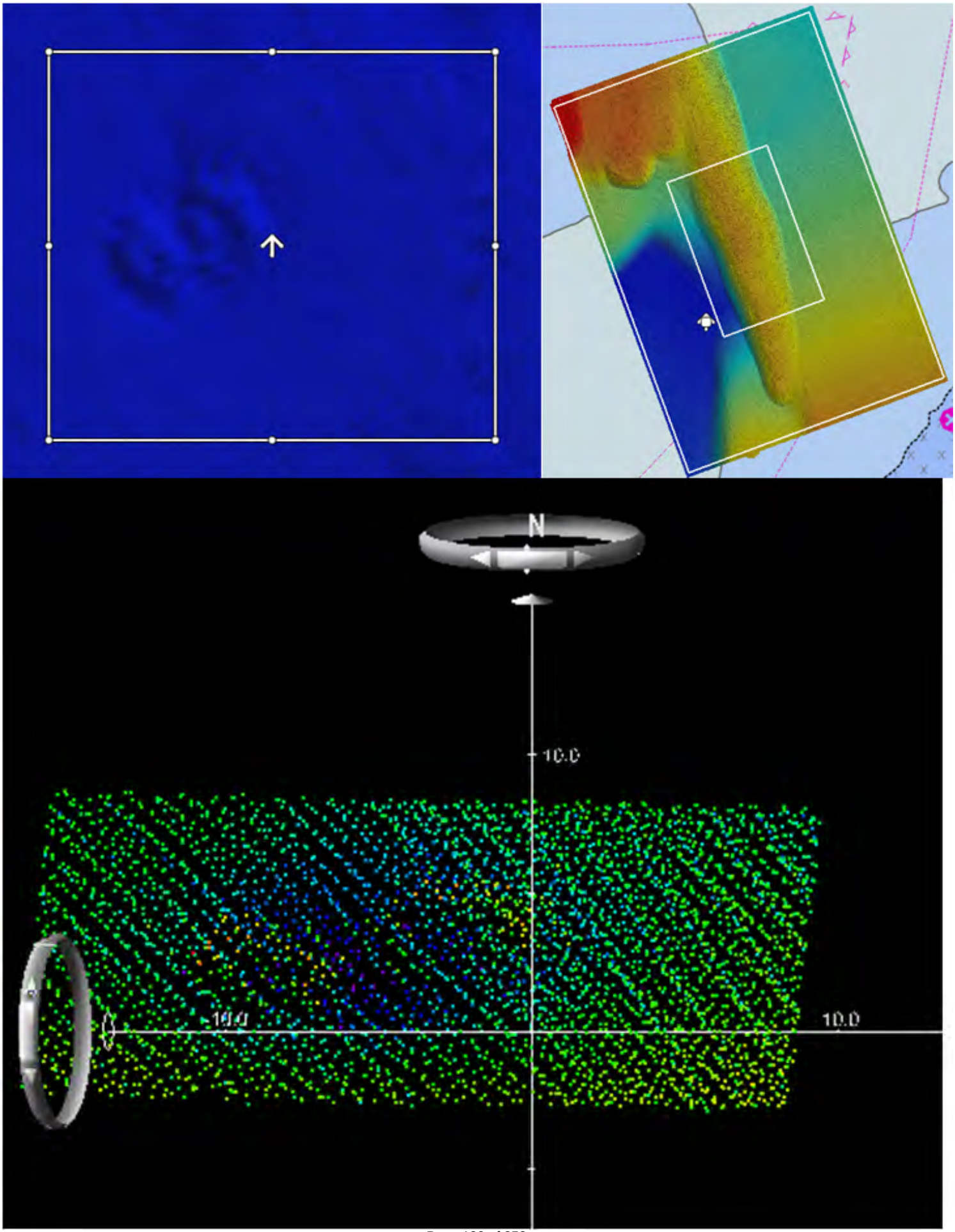
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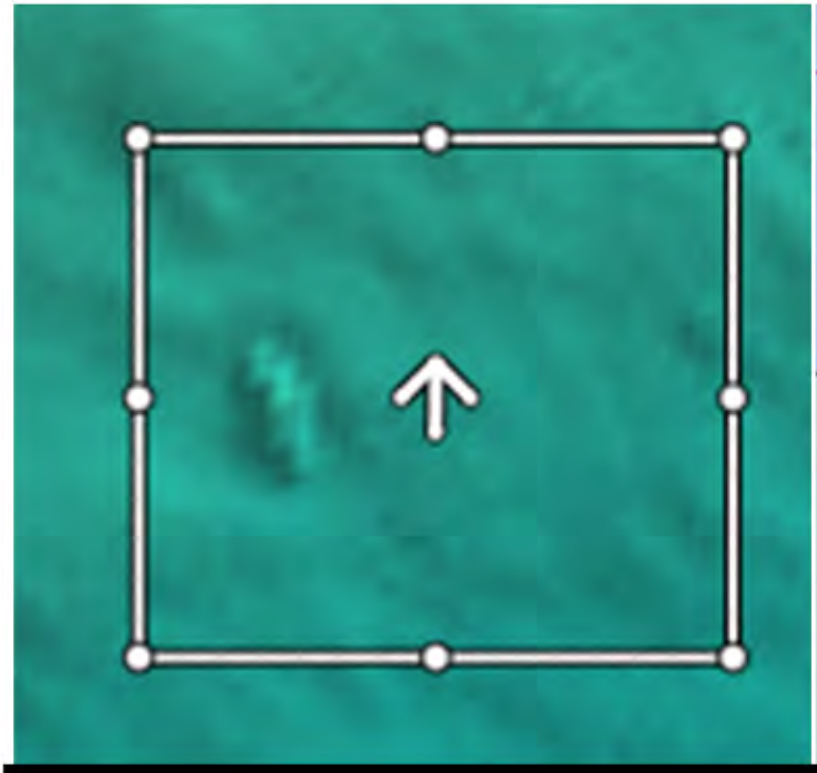

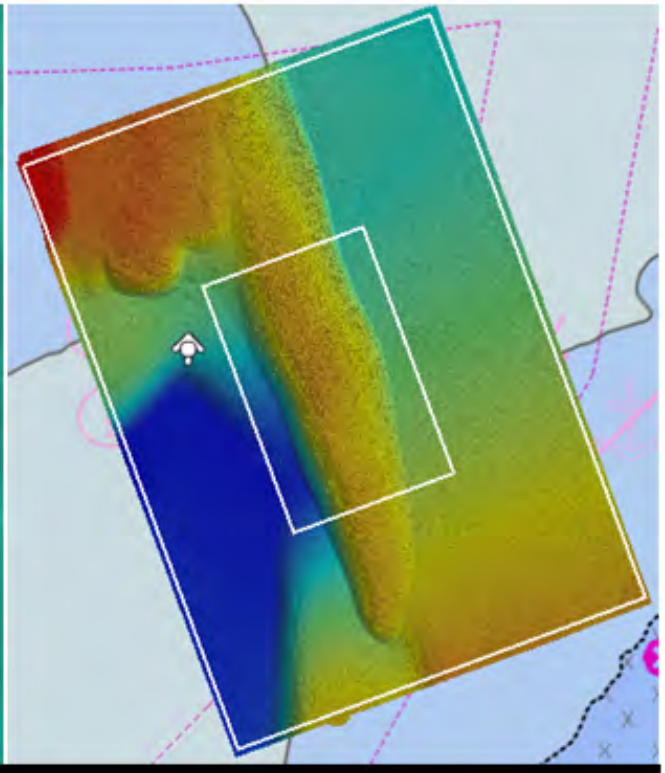

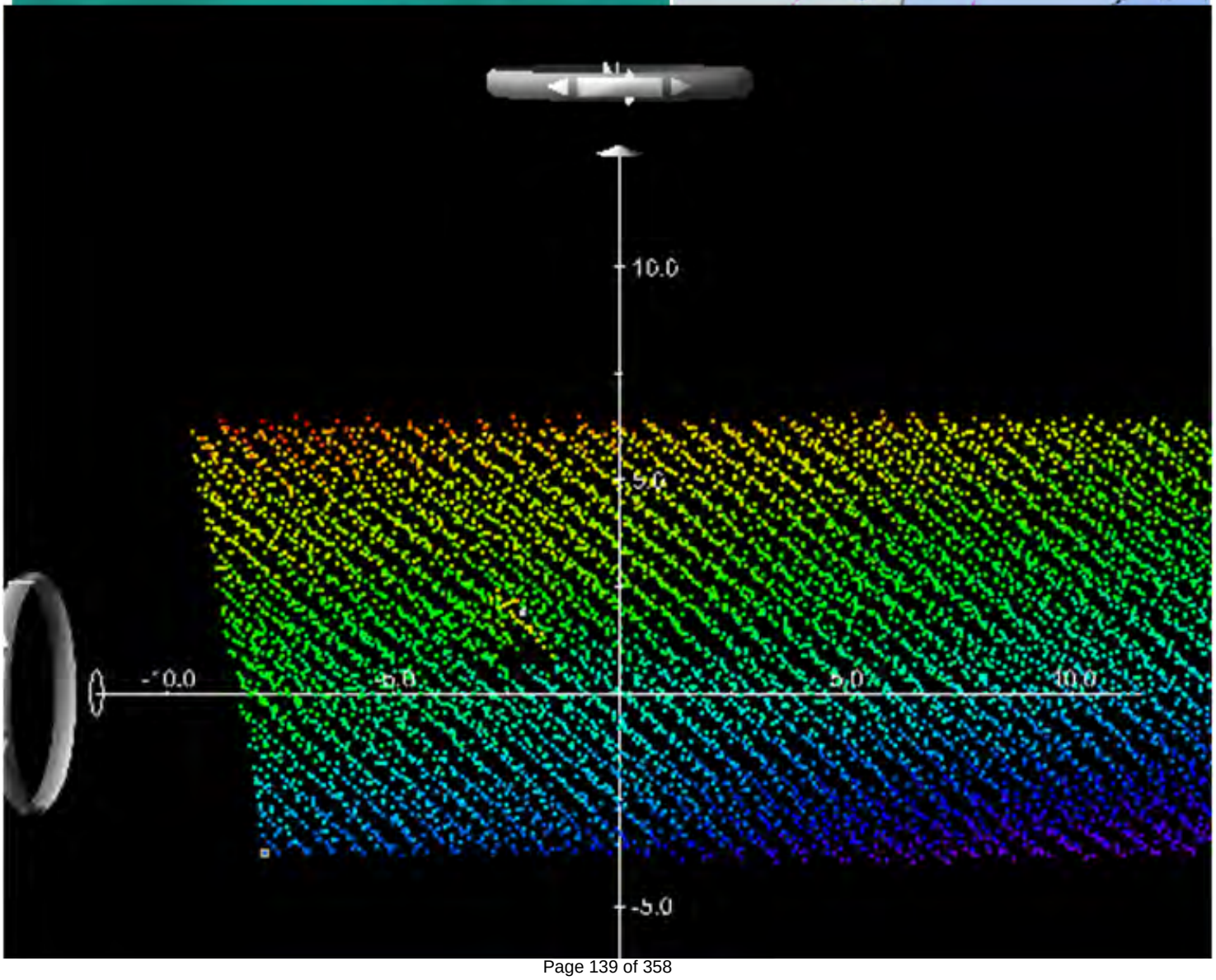
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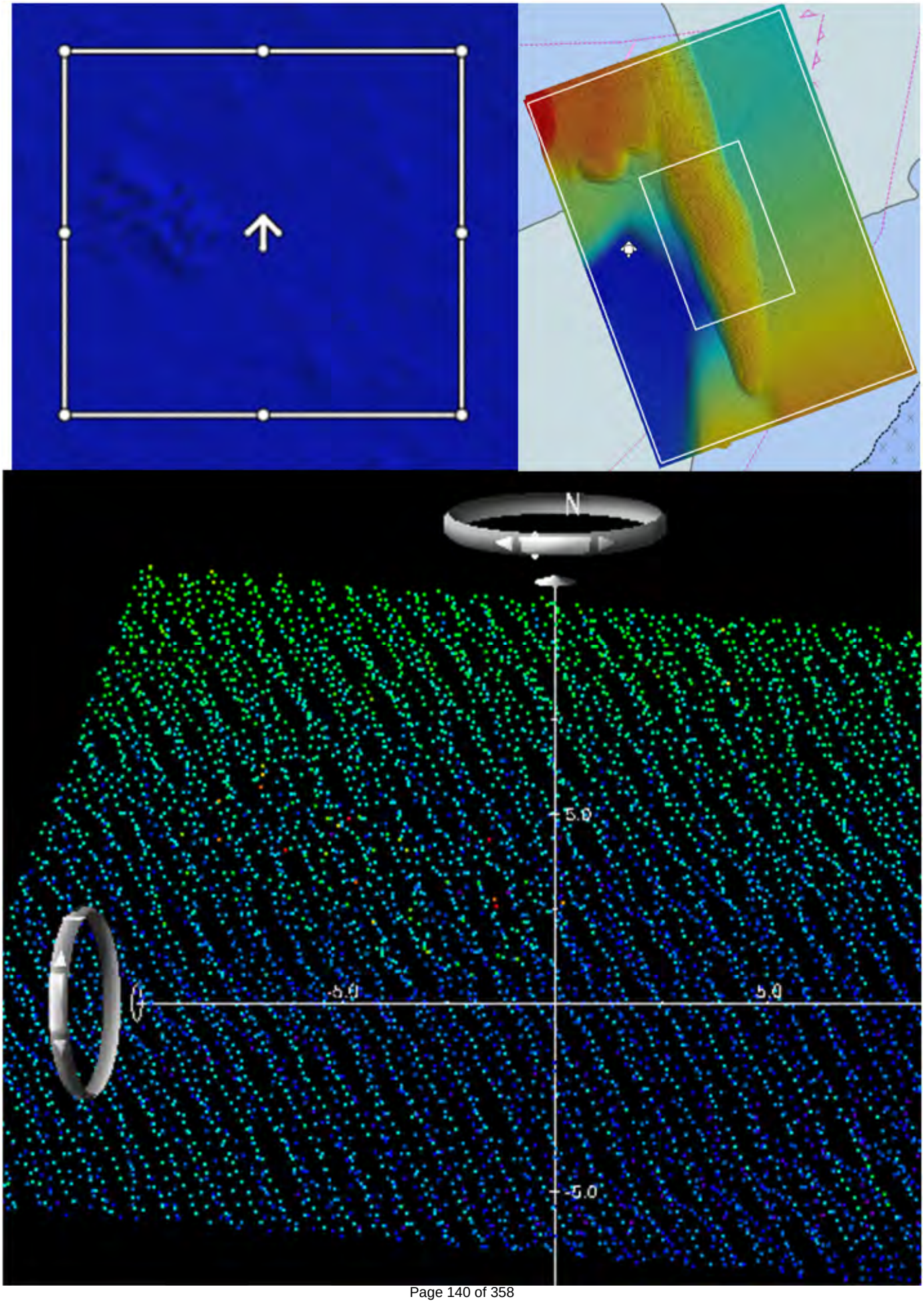
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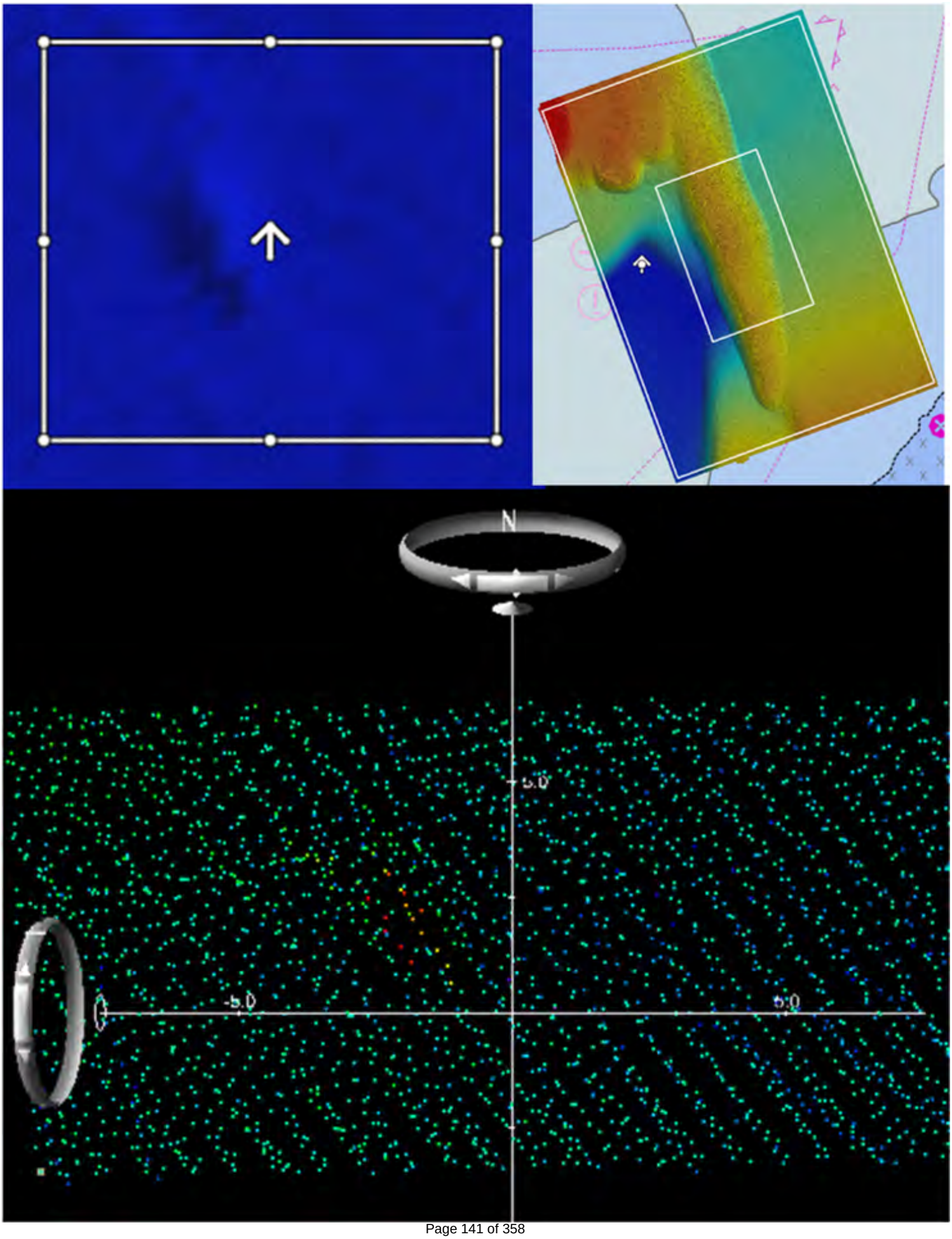
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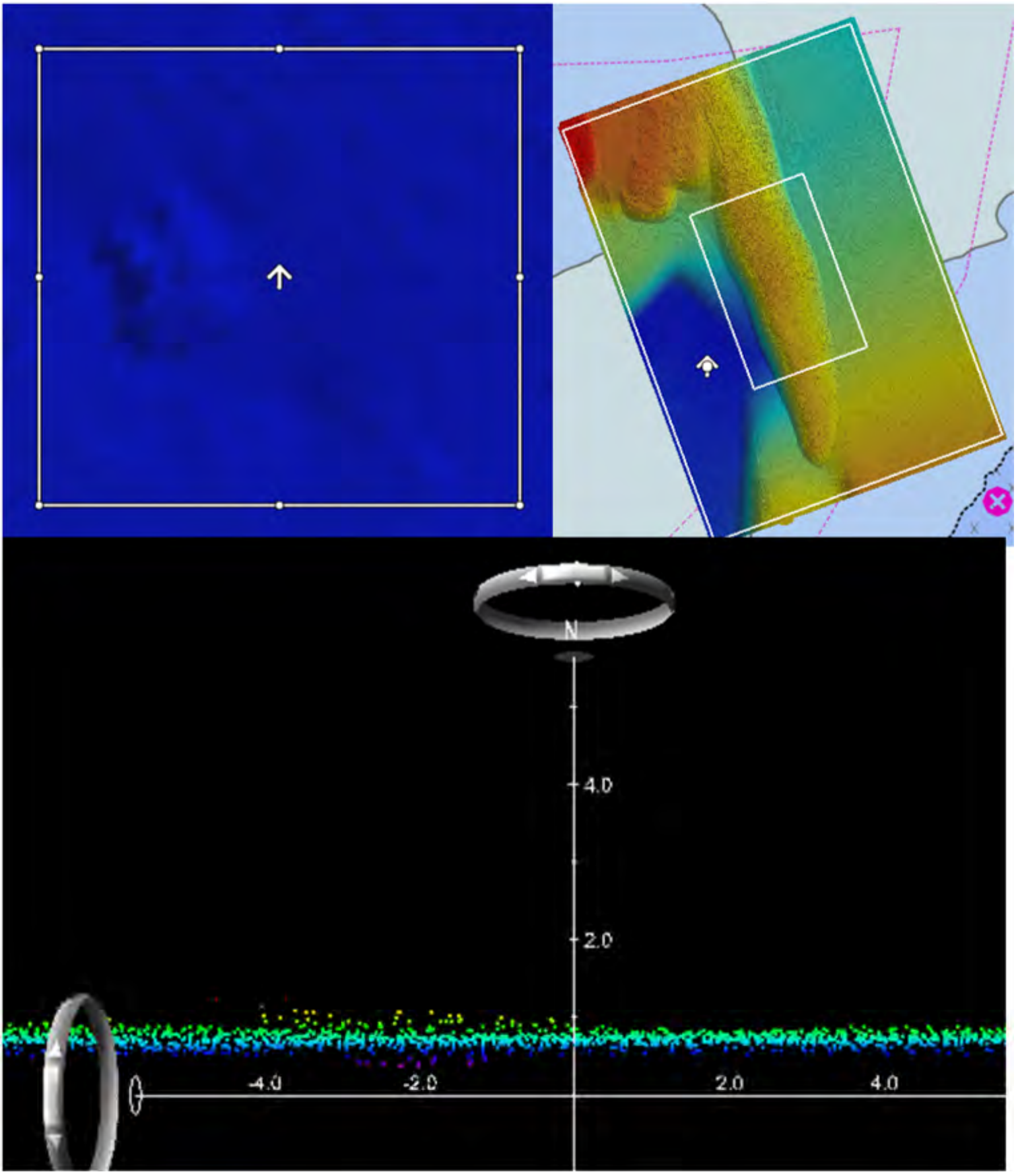
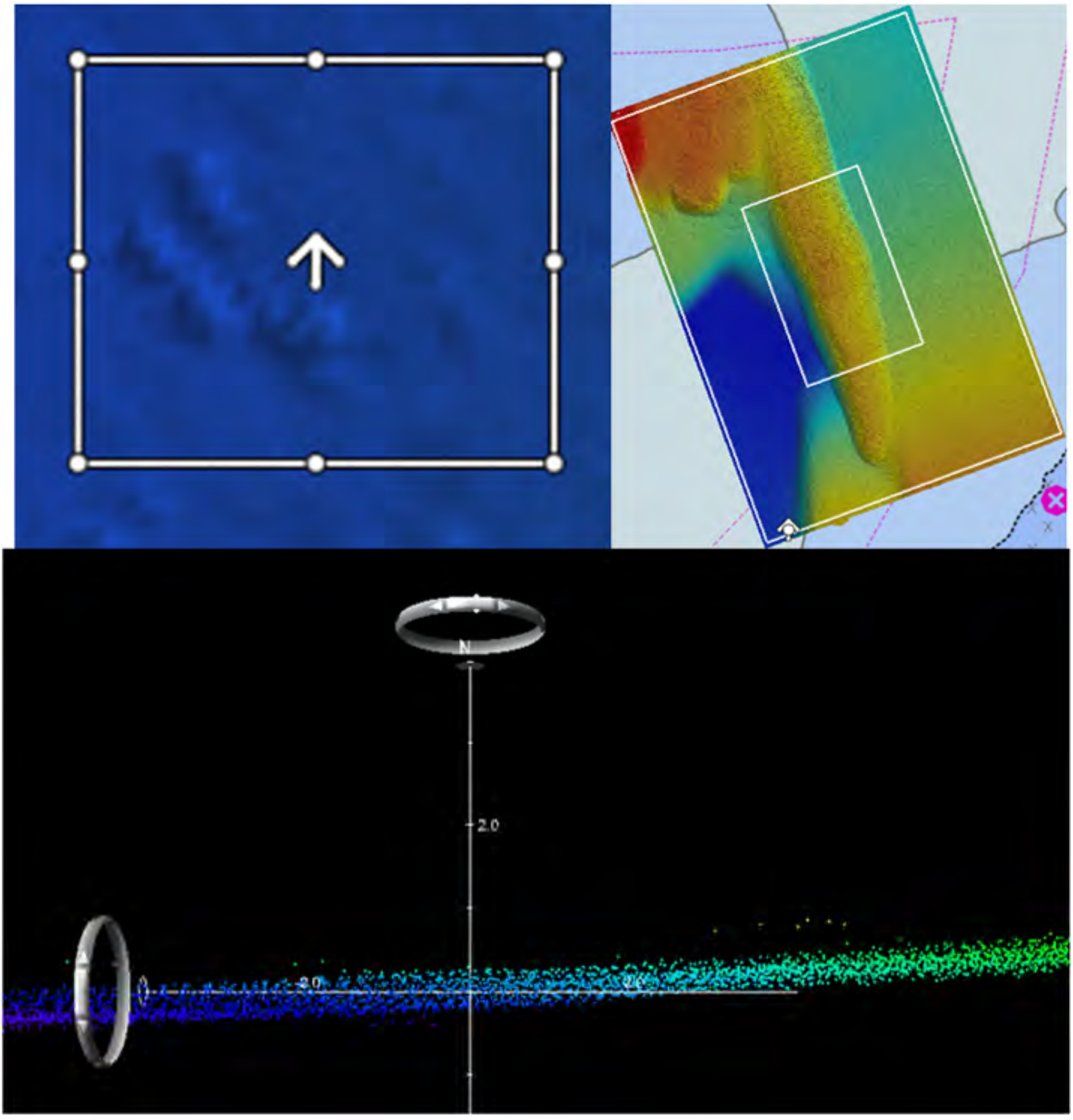
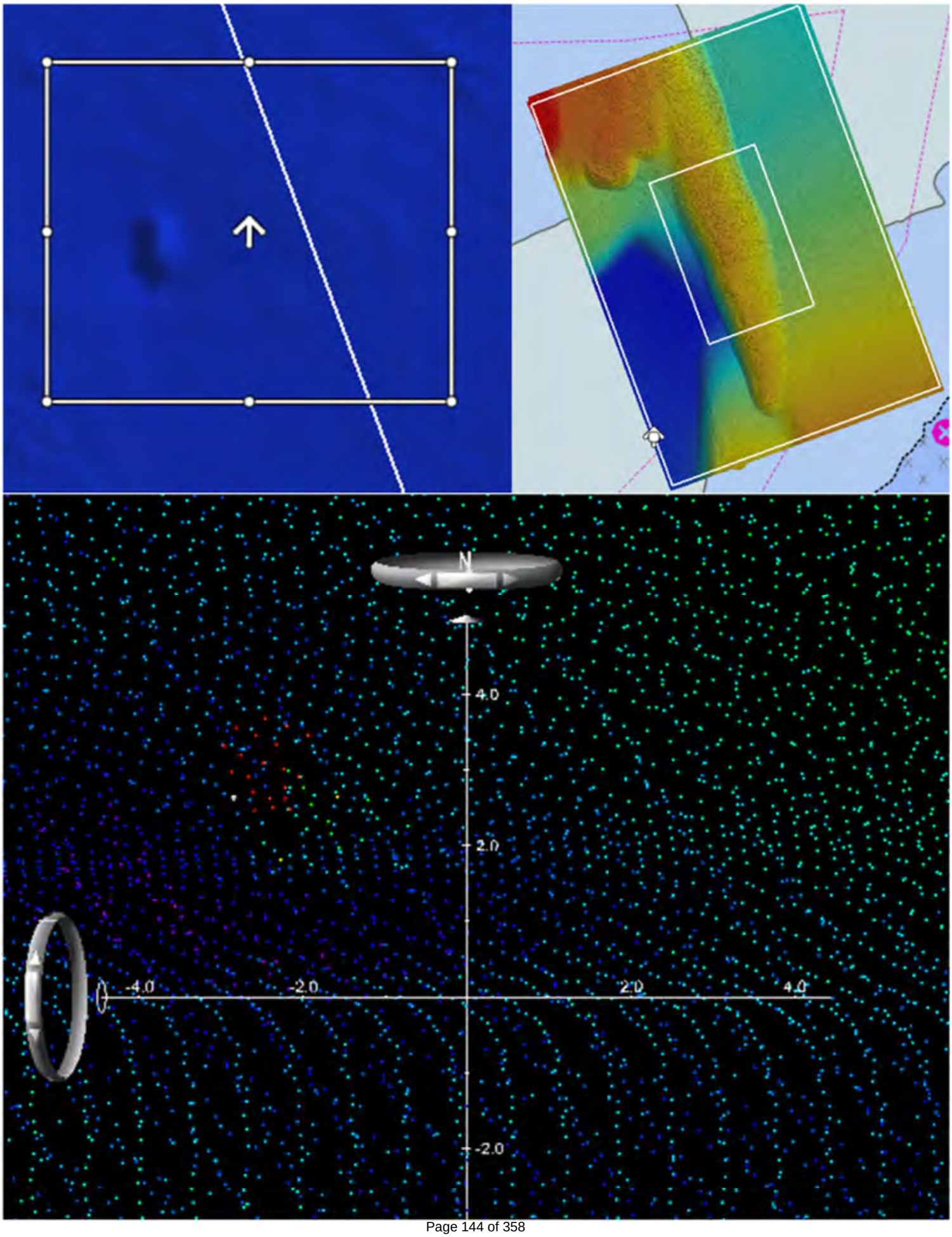
UKO_100



UKO_101

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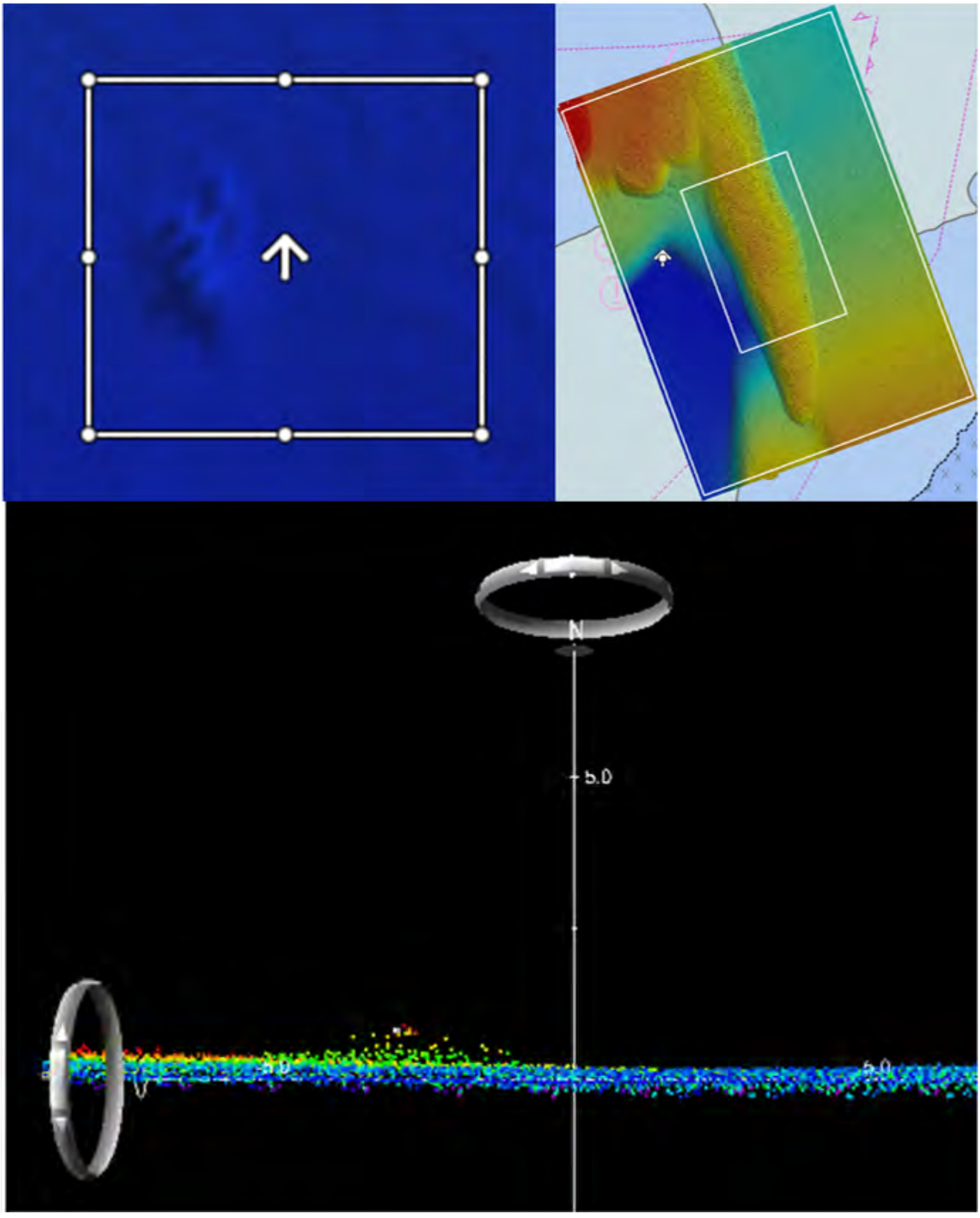
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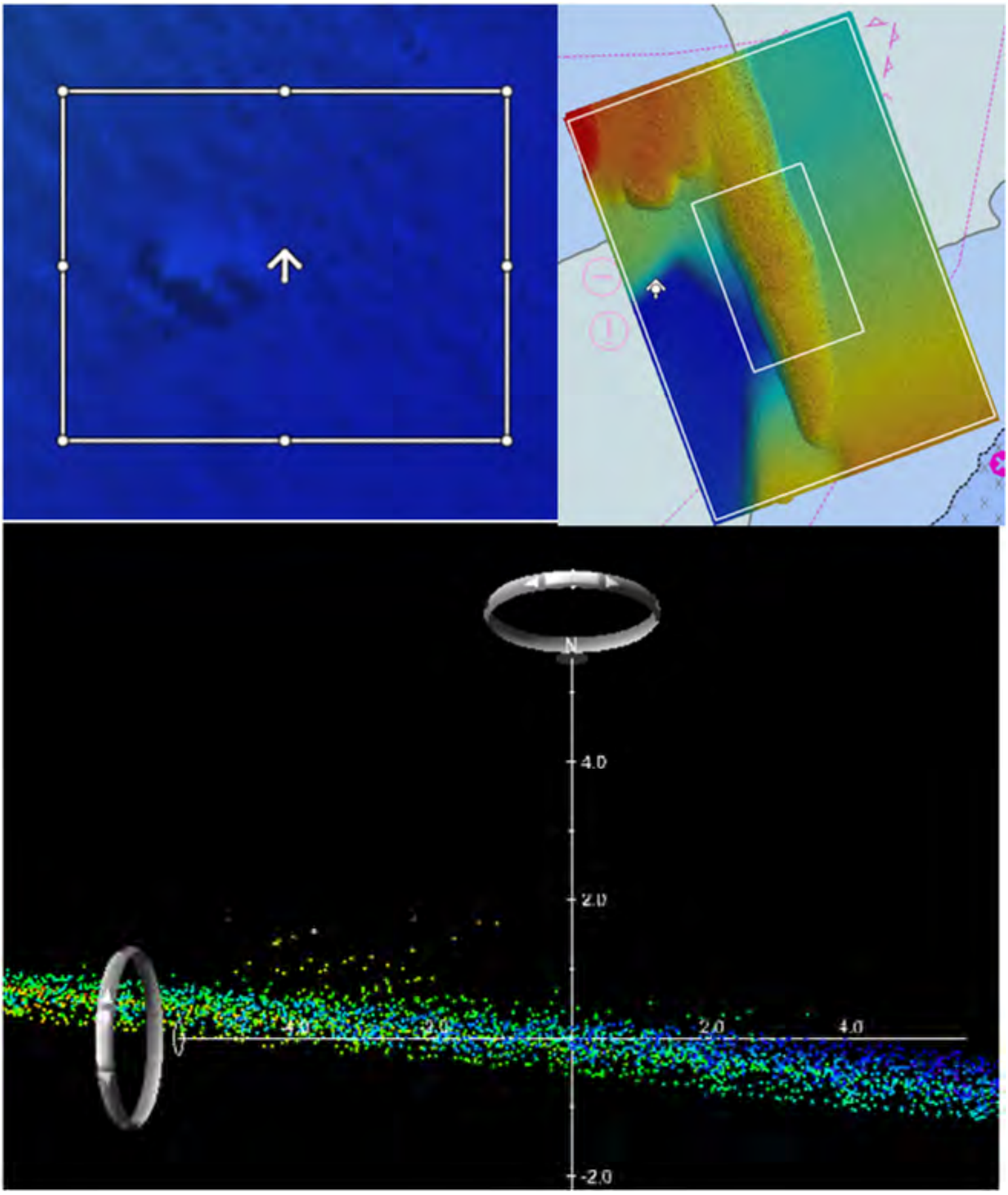
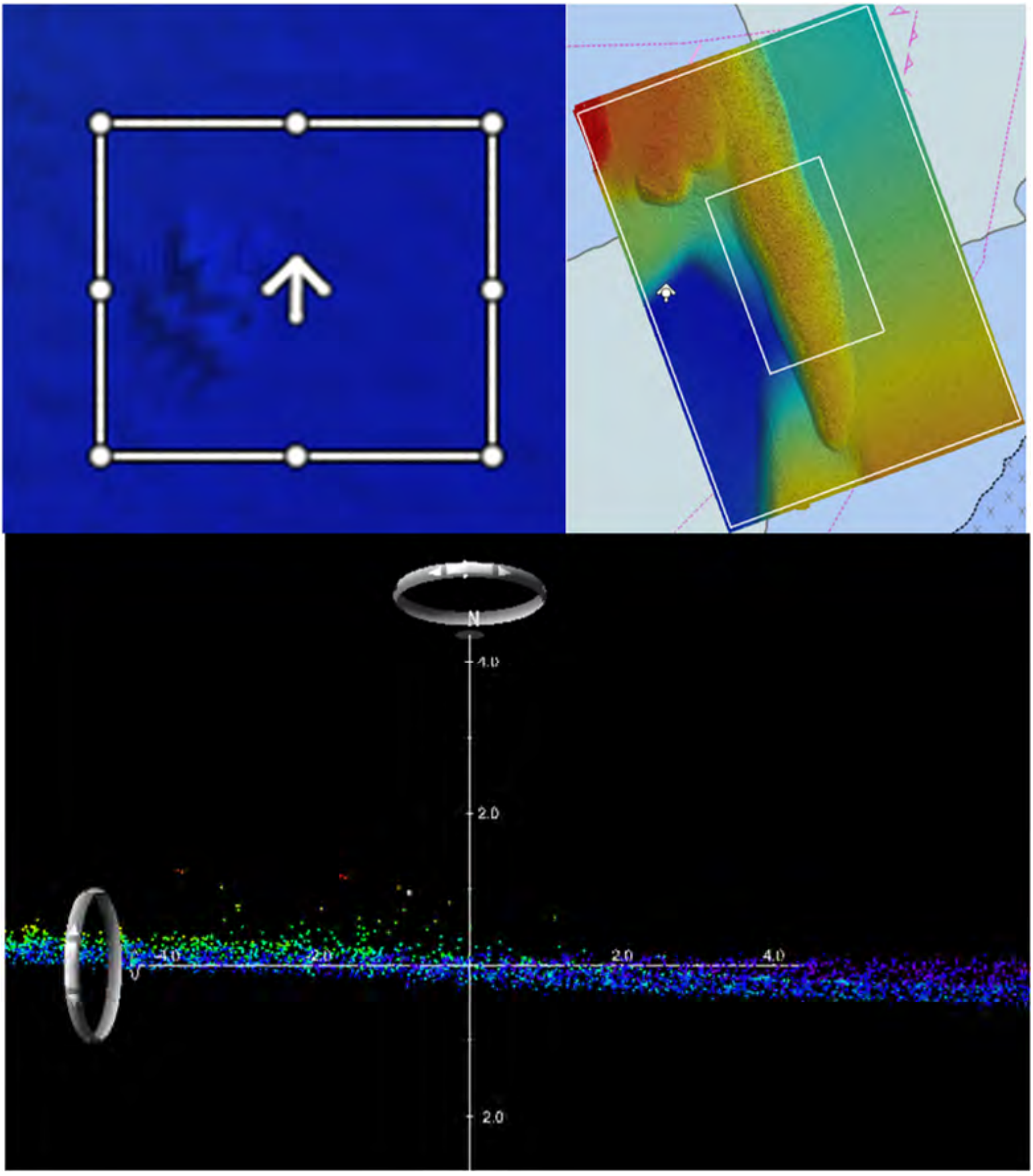
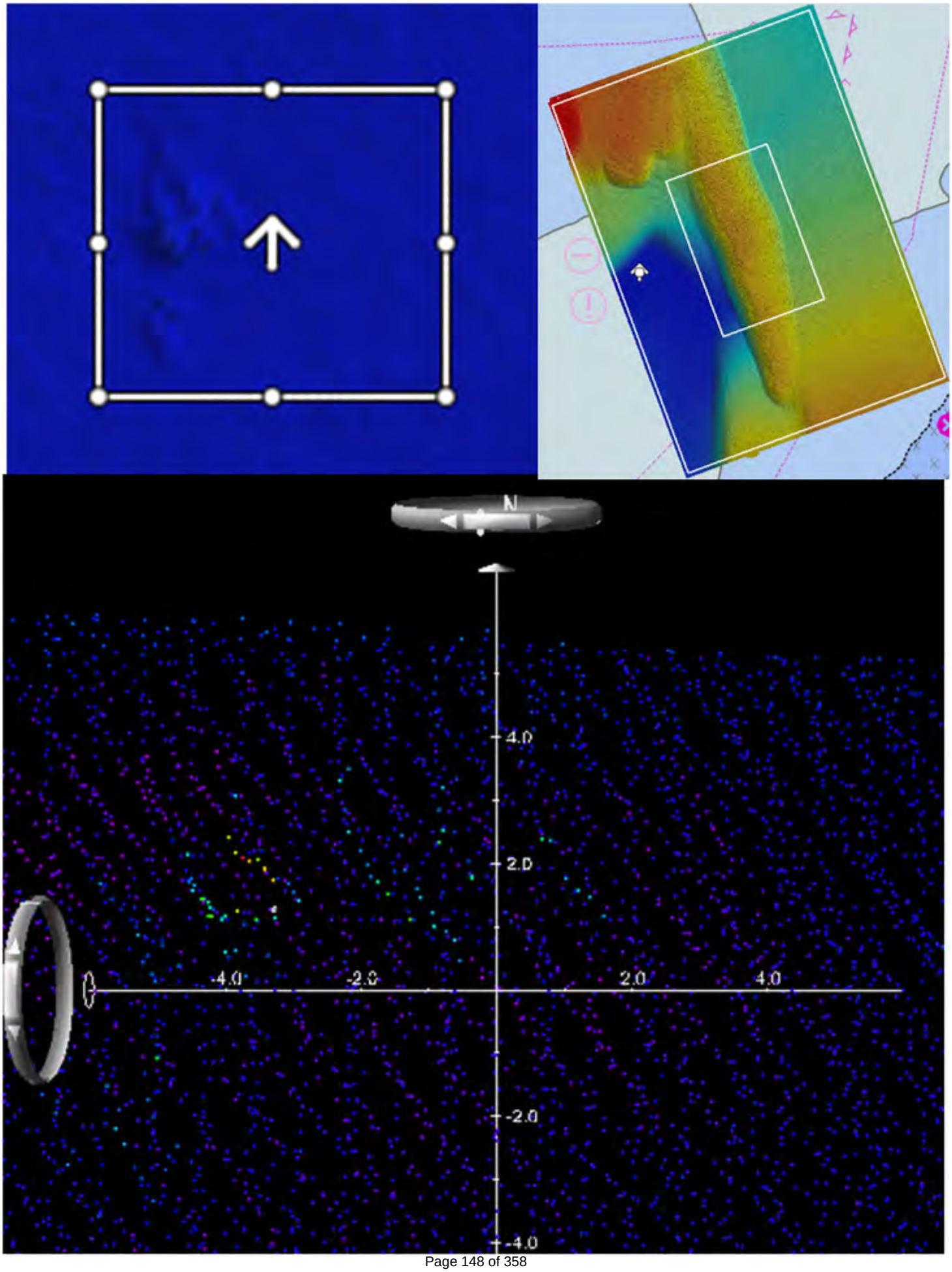
UKO_104



UKO_105

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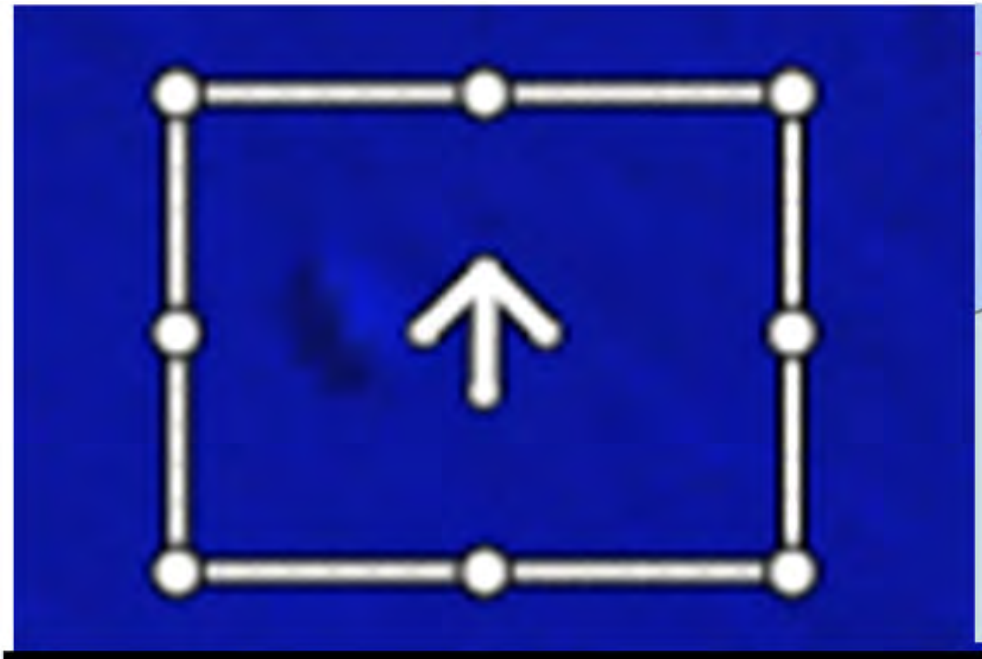

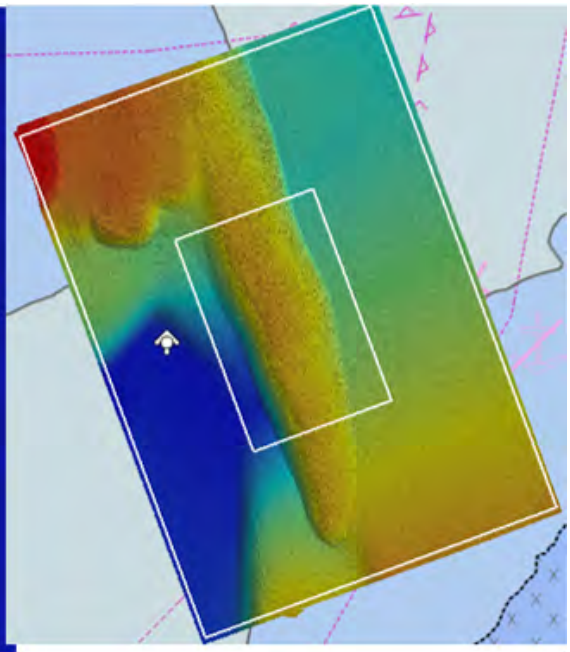

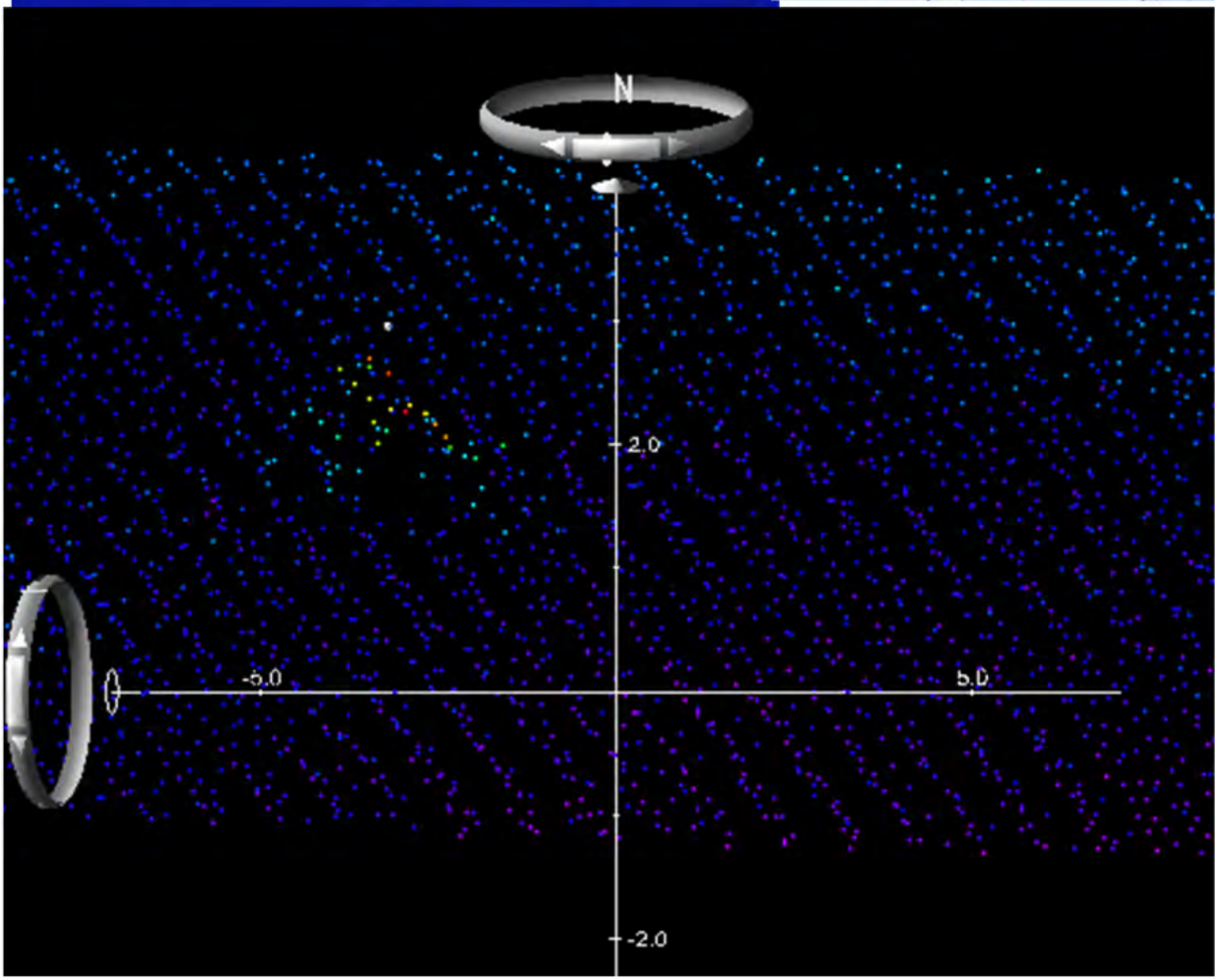
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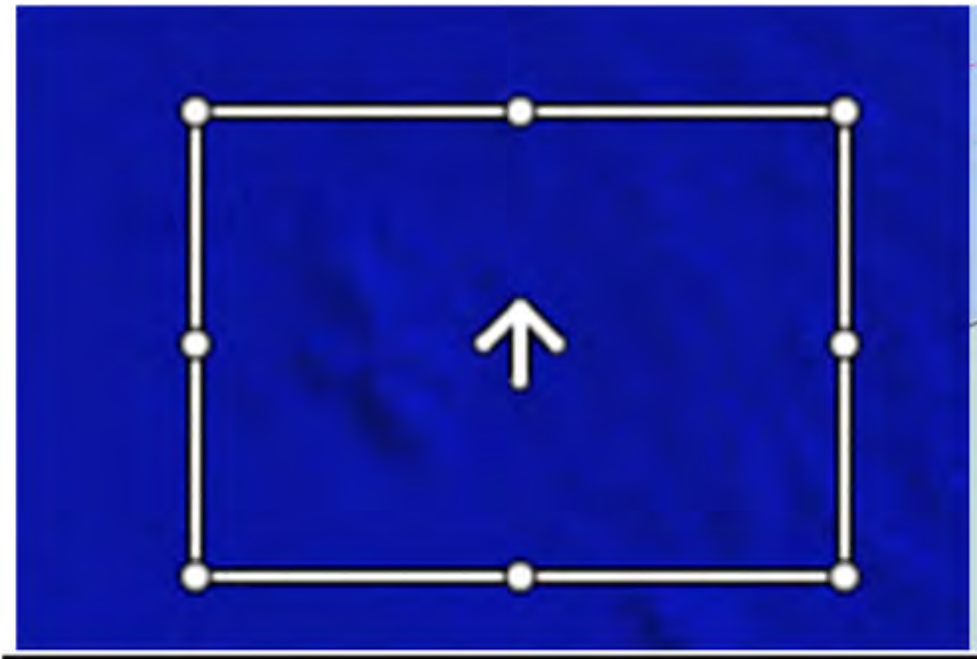

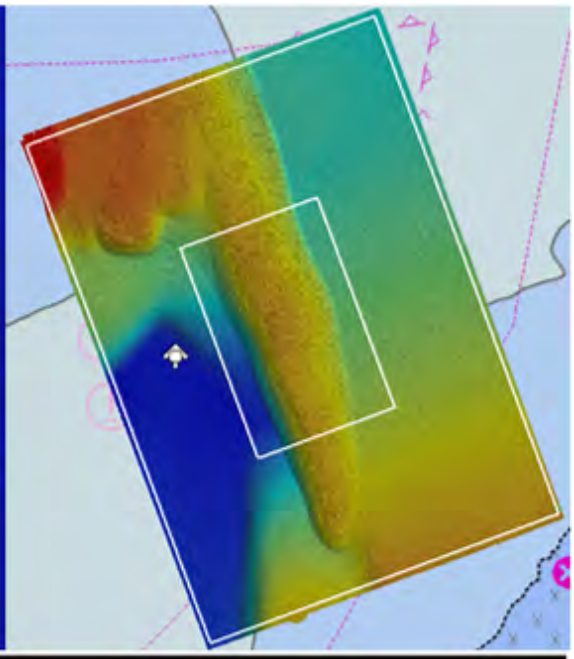

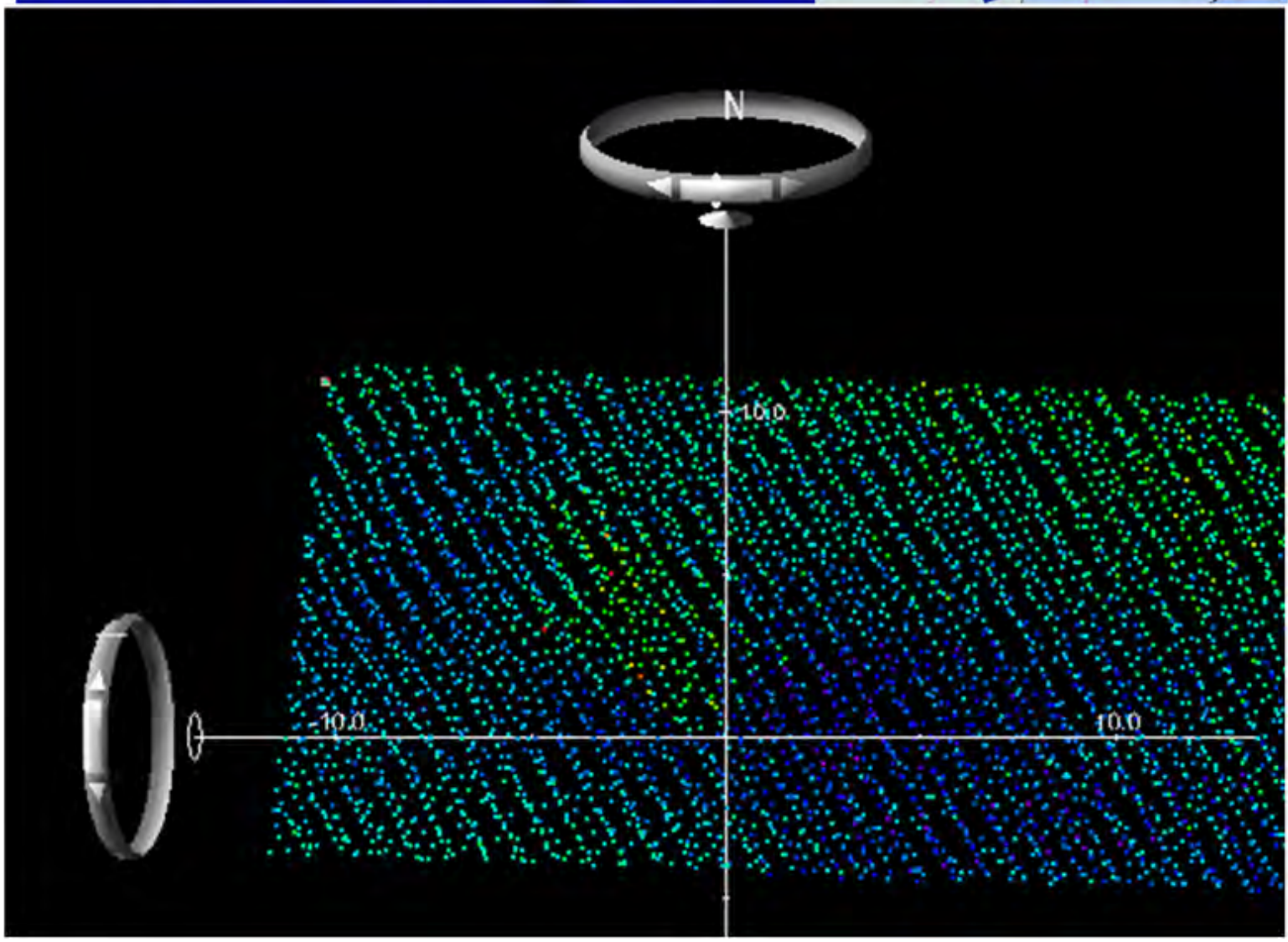

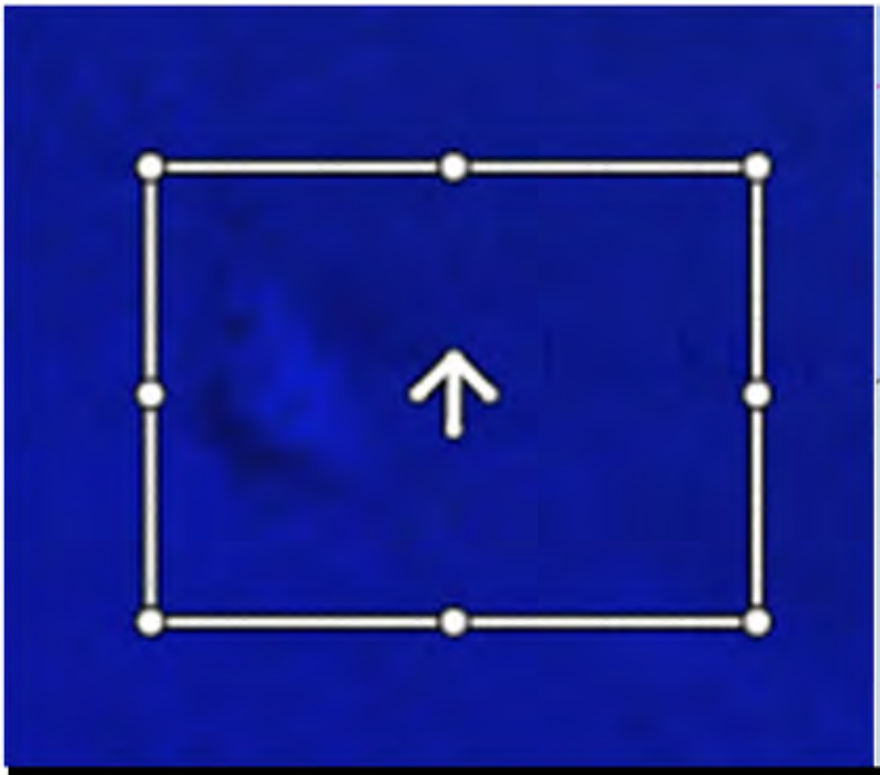

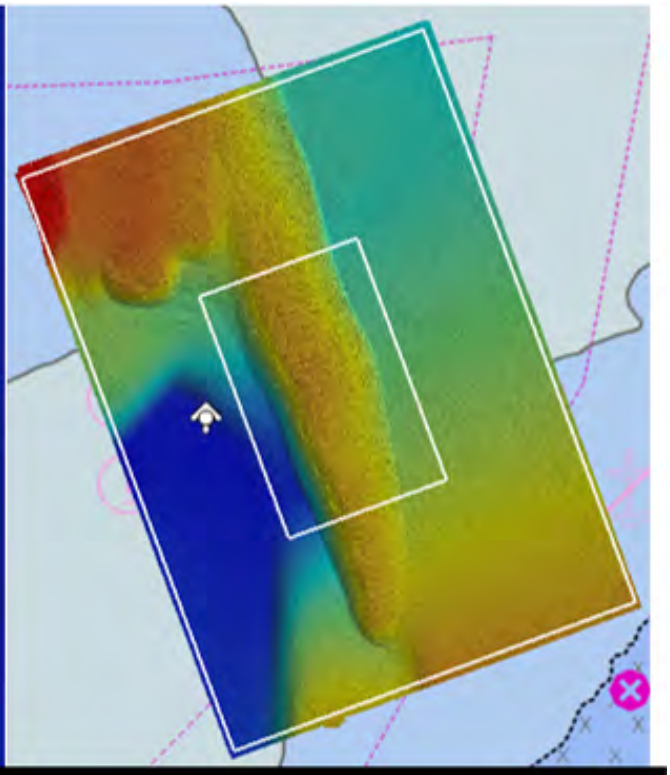

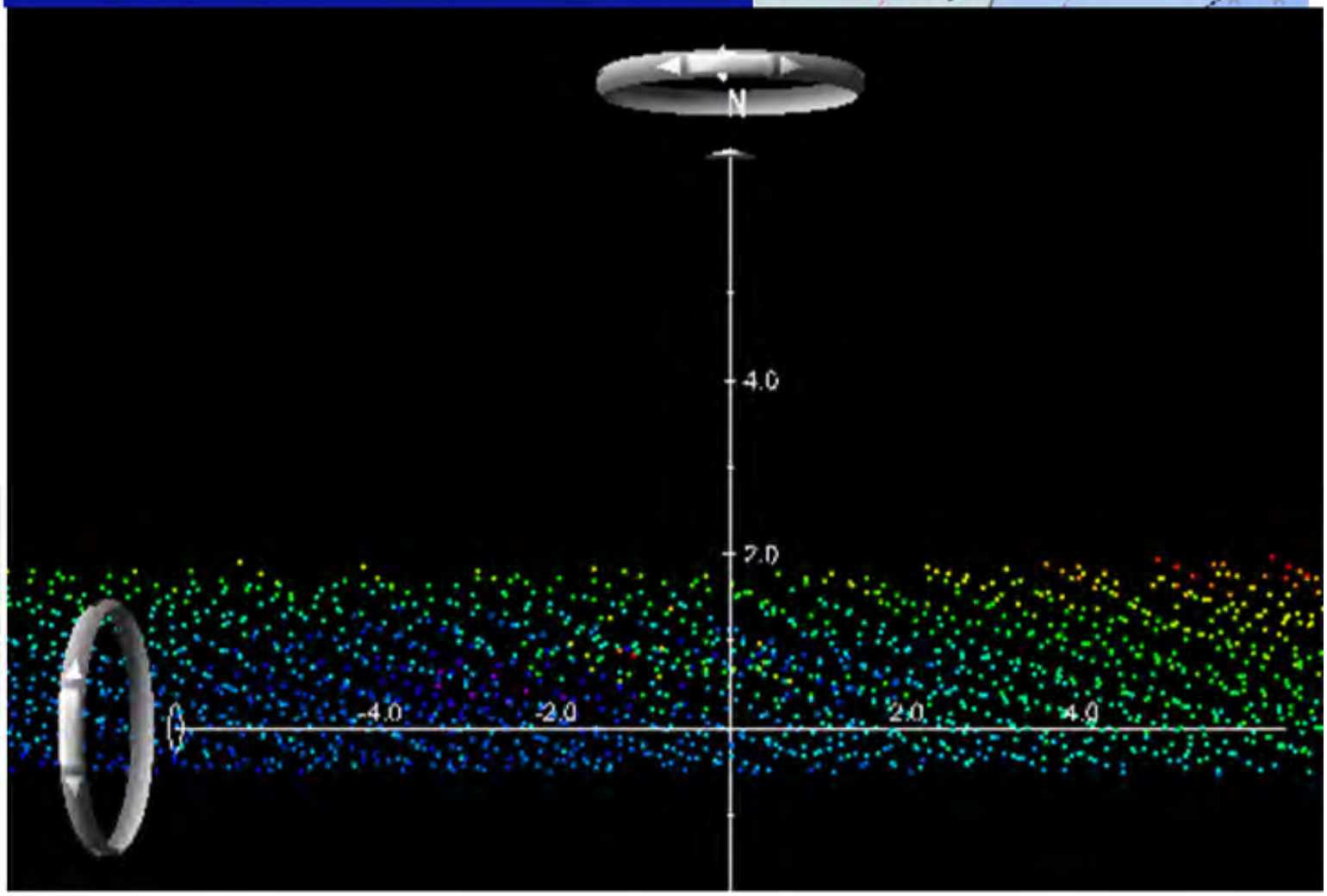
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