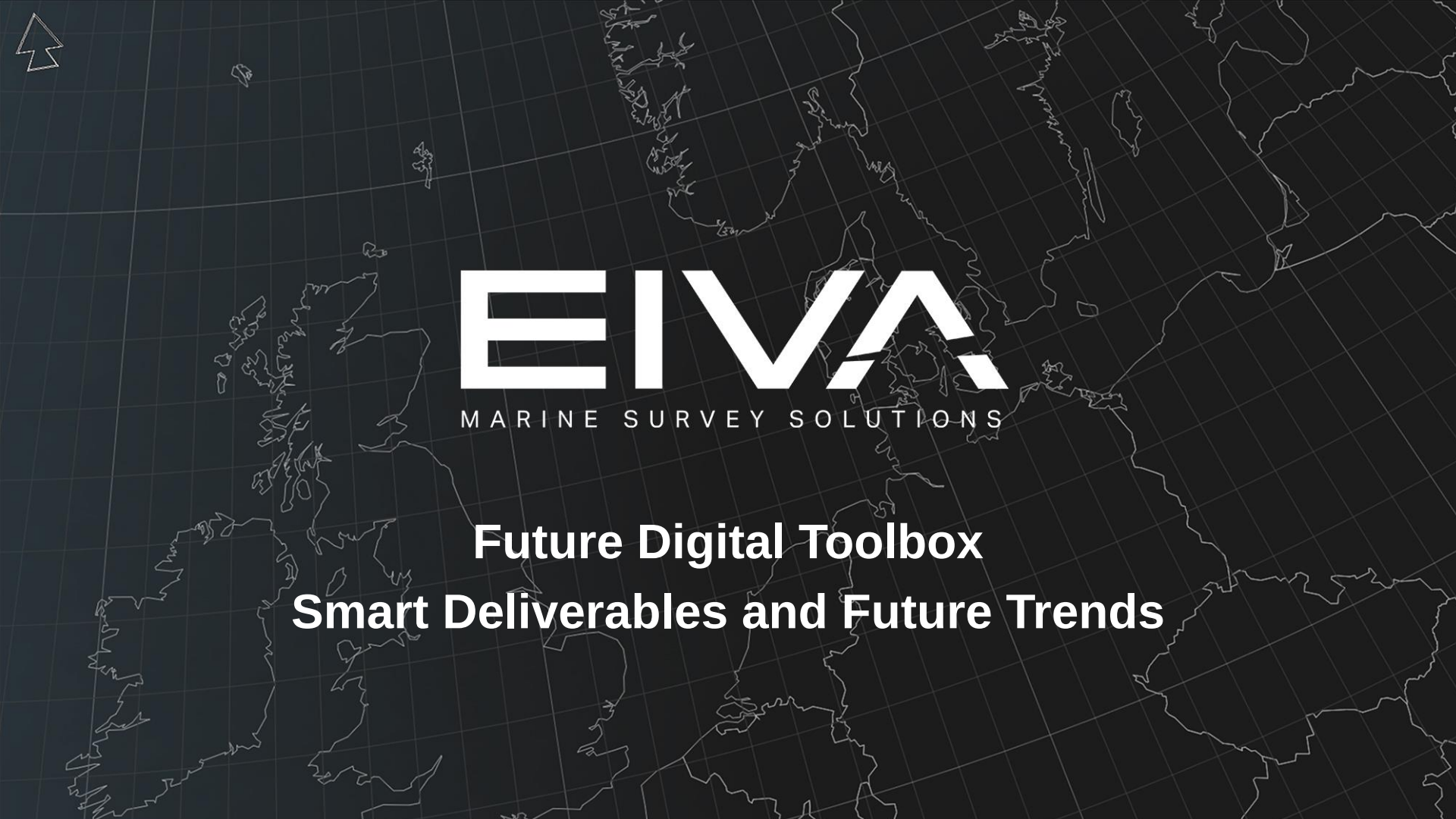
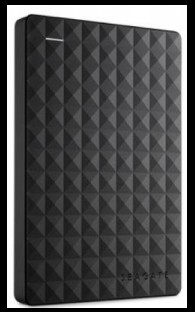
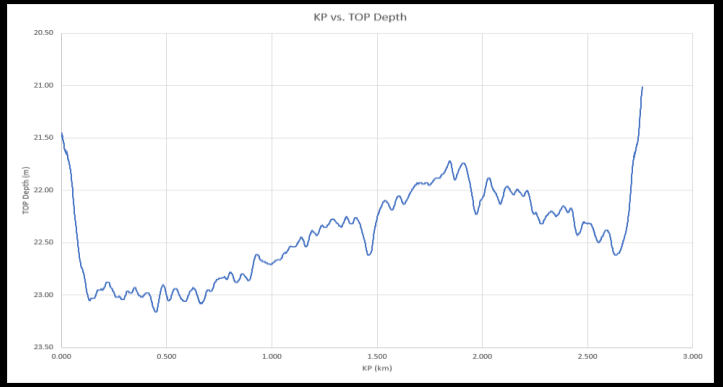


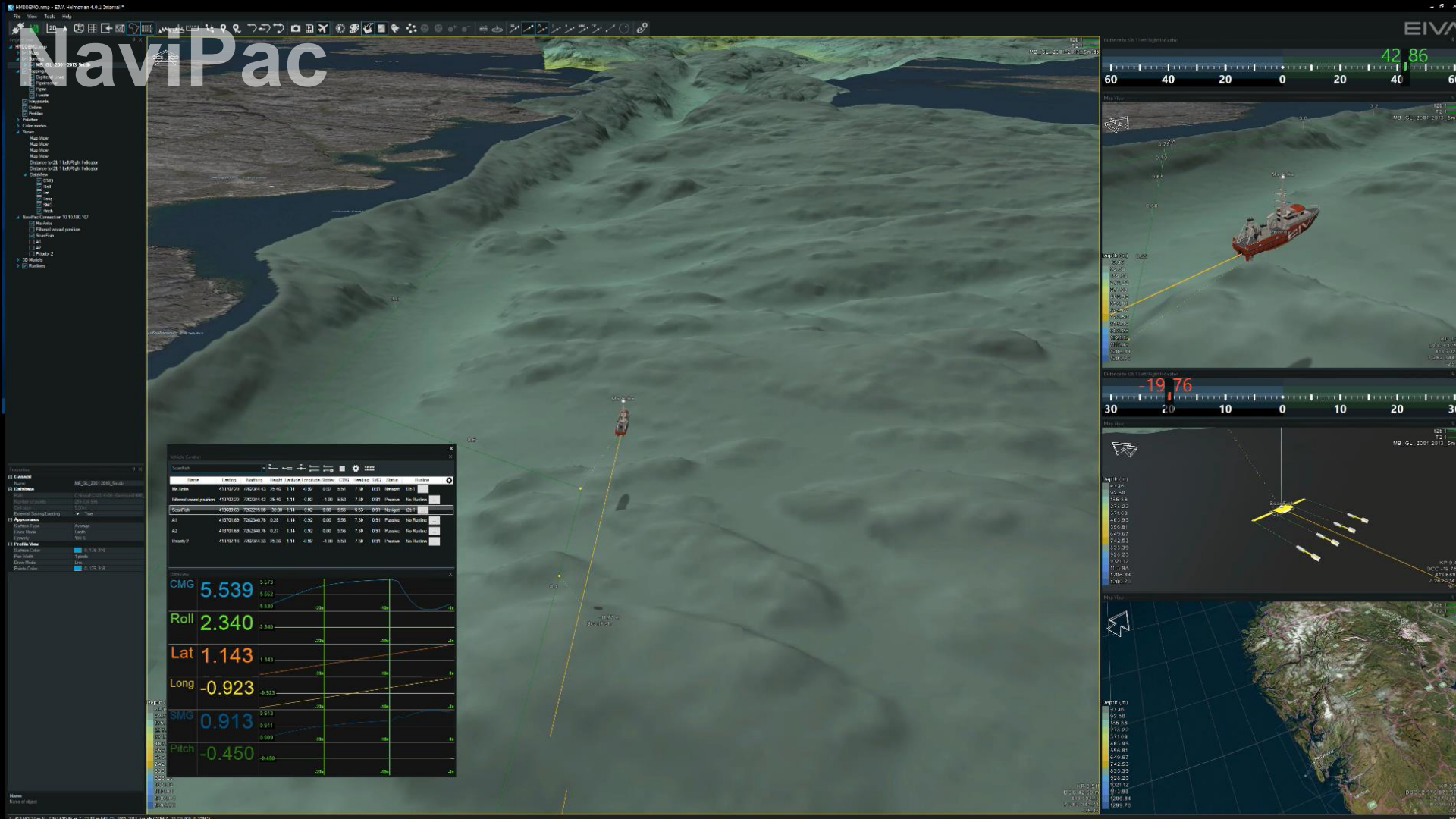
Future Digital Toolbox
Smart Deliverables and Future Trends

Introduction

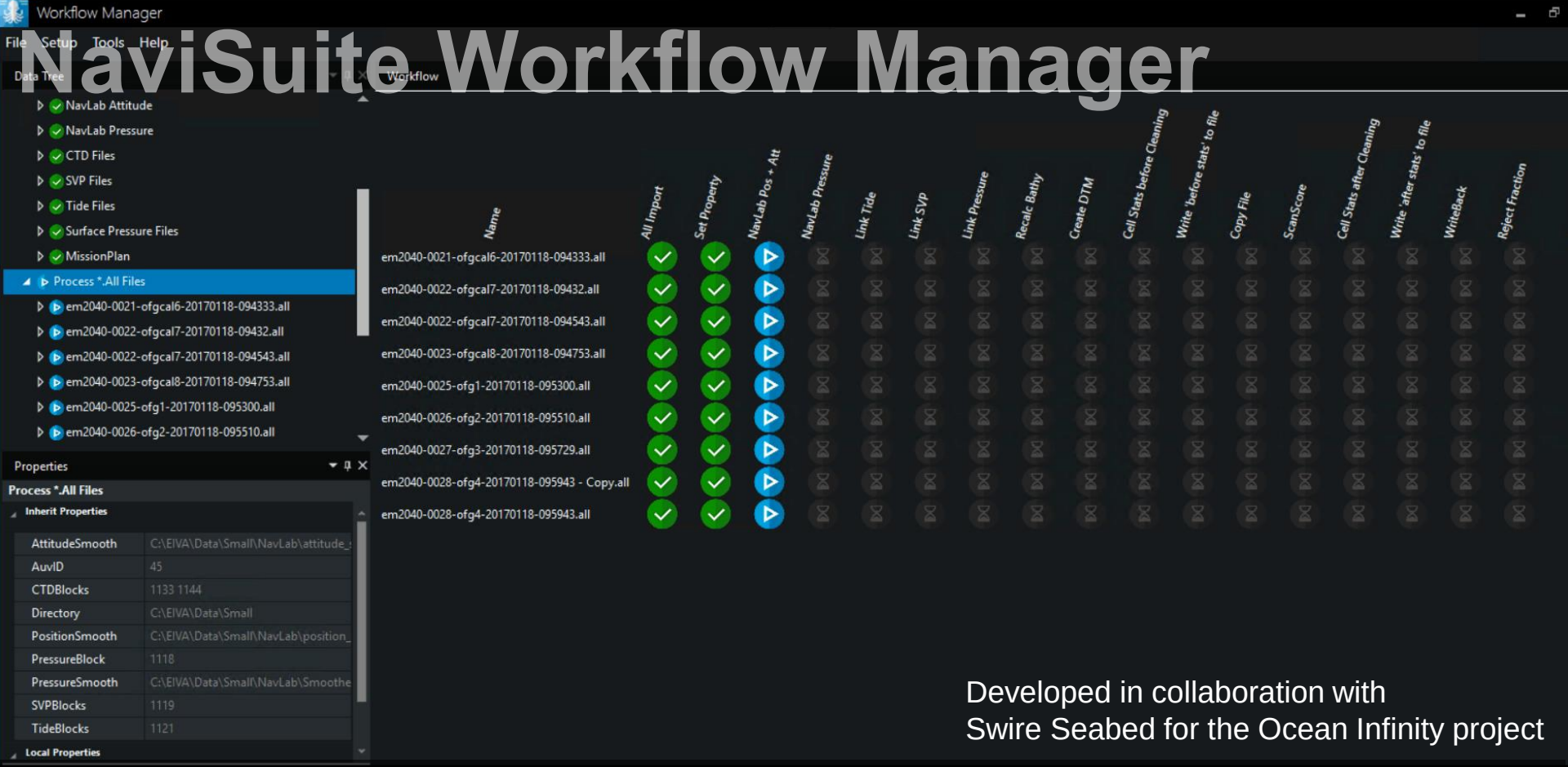


Date	Time	TOP KP	TOP DCC	TOP Easting	TOP Northing	TOP Depth
21/09/2019	00:09:21	0.000	-0.88	468016.39	2048917.15	21.49
21/09/2019	00:09:26	0.001	-0.87	468017.29	2048916.72	21.48
21/09/2019	00:09:31	0.002	-0.87	468018.20	2048916.31	21.45
21/09/2019	00:09:36	0.003	-0.87	468019.11	2048915.89	21.47
21/09/2019	00:09:41	0.004	-0.87	468020.02	2048915.47	21.48
21/09/2019	00:09:47	0.005	-0.88	468020.93	2048915.06	21.49
21/09/2019	00:09:53	0.006	-0.88	468021.84	2048914.64	21.50
21/09/2019	00:09:59	0.007	-0.89	468022.75	2048914.23	21.52
21/09/2019	00:09:05	0.008	-0.88	468023.65	2048913.80	21.52
21/09/2019	00:09:12	0.009	-0.87	468024.56	2048913.37	21.54
21/09/2019	00:09:18	0.010	-0.87	468025.47	2048912.96	21.55




NaviPac
EIVA
42.86
-19.76
CMG 5.539
Roll 2.340
Lat 1.143
Long -0.923
SMG 0.913
Pitch -0.450

NaviSuite Workflow Manager



Developed in collaboration with
Swire Seabed for the Ocean Infinity project

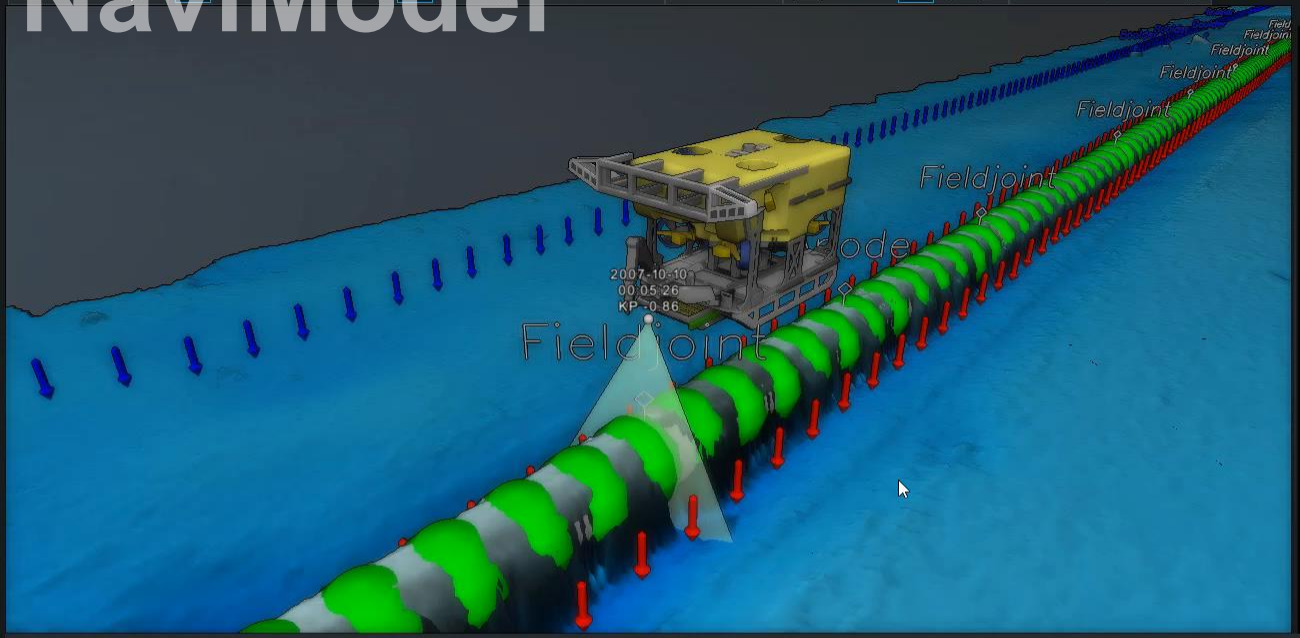
Automatic processing of massive amounts of sensor data

Example - Video.nmp - EIVA NaviModel Producer 4.2.3 ((23031) ED50 / UTM zone 31N) *

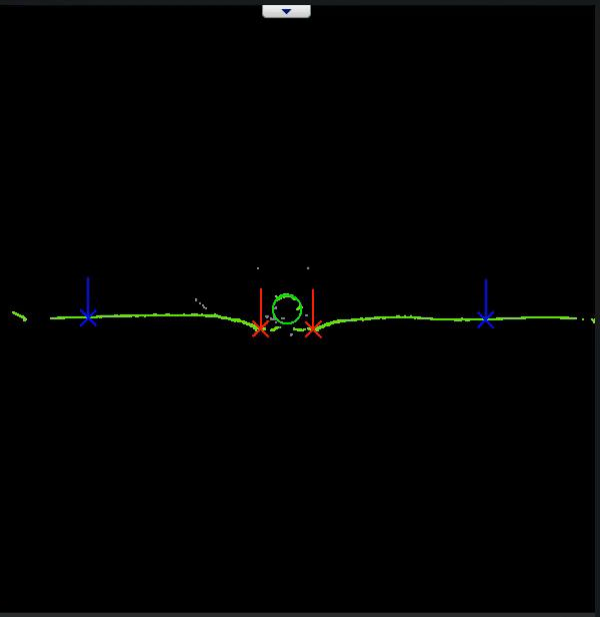
File View Tools Help

NaviModel

EIVA



Cross Profile



Video Window - Playing Speed: 100%

A-PORT

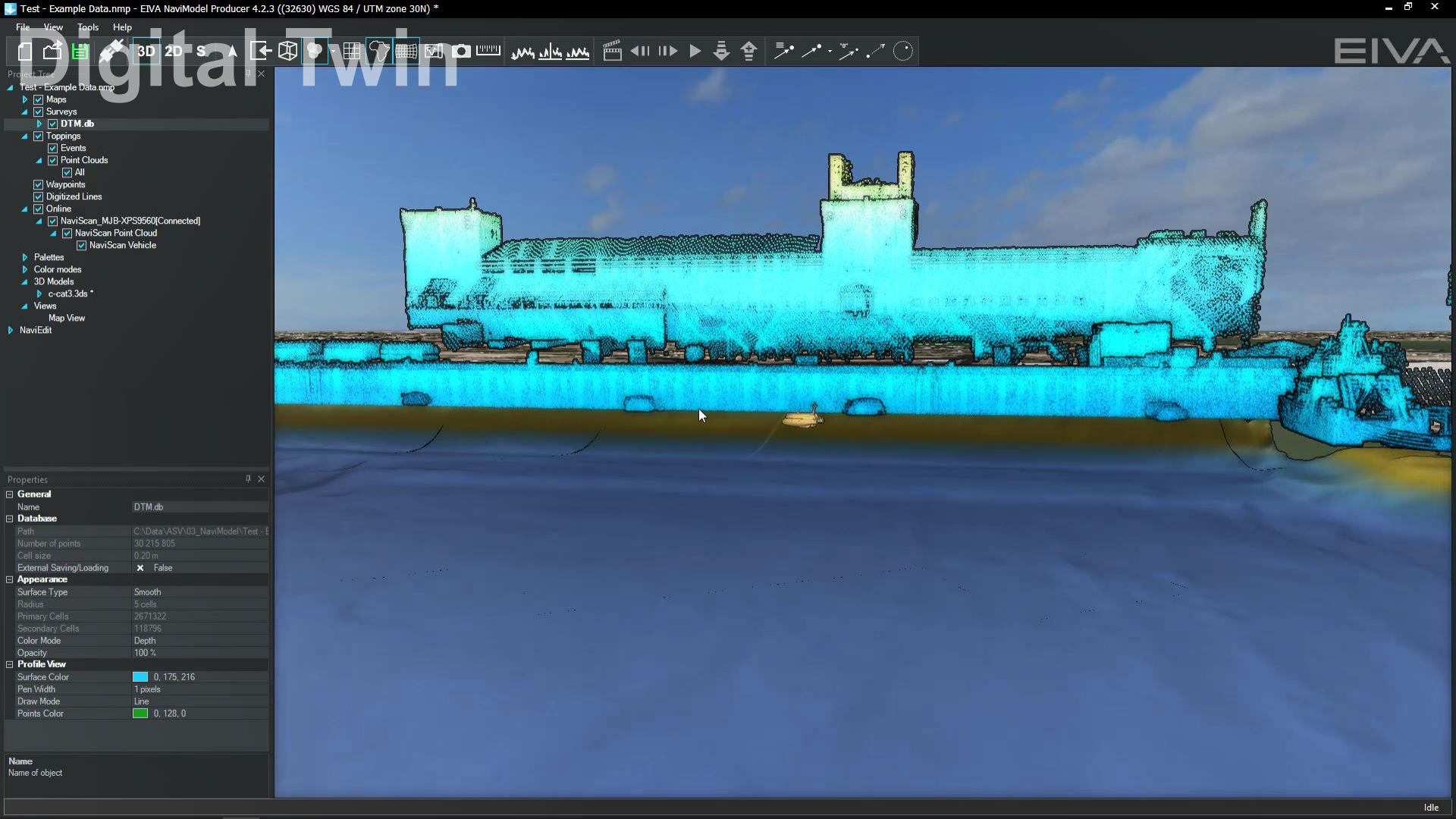
B-CENTRE

C-STBD

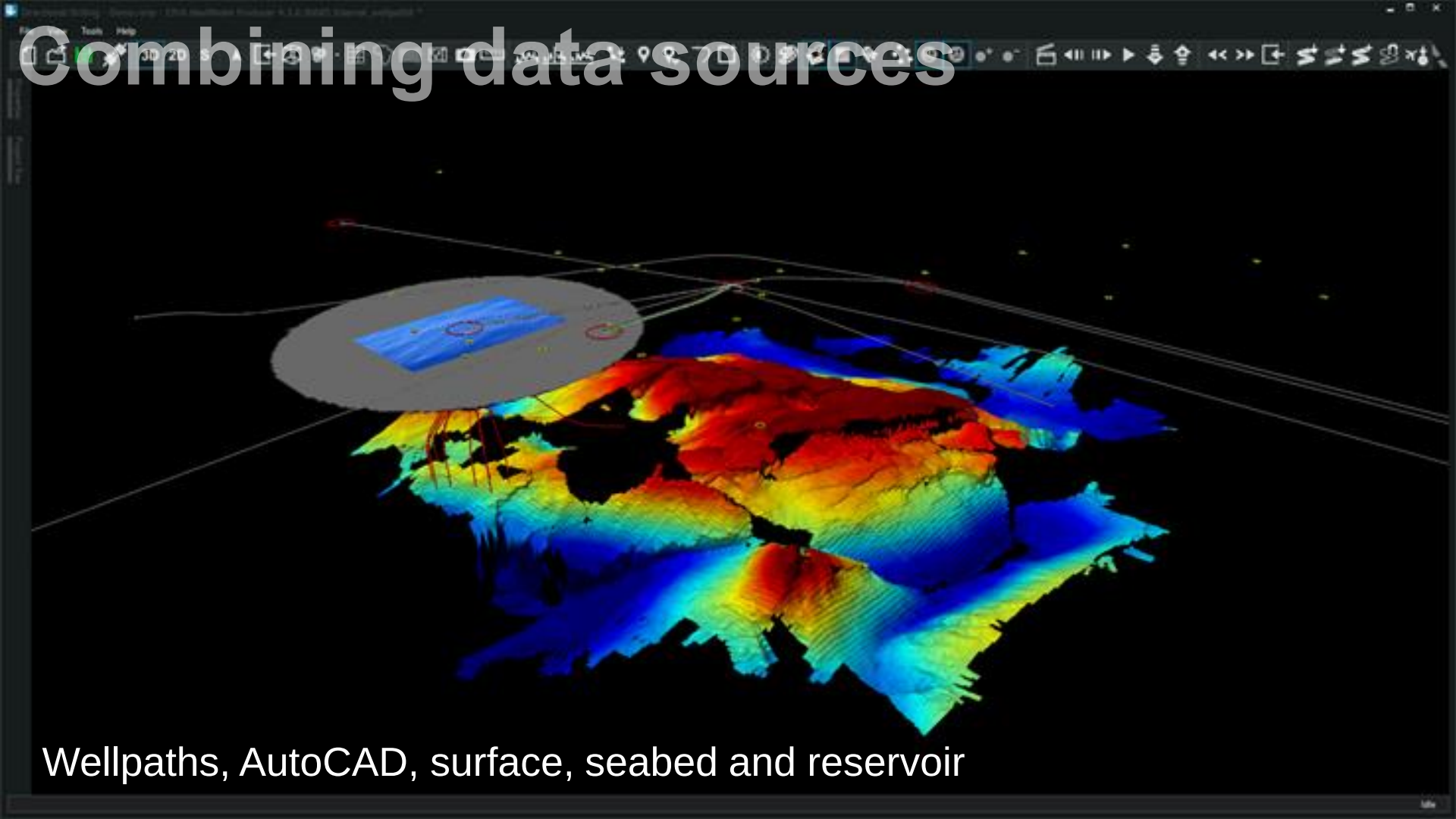
E=436 552.04 m N=6 471 087.51 m Z=82.70 m 02_Cleaned.db (CELL Z=82.69 m) (KP -0.859) (DOL -1.64 m)

Idle

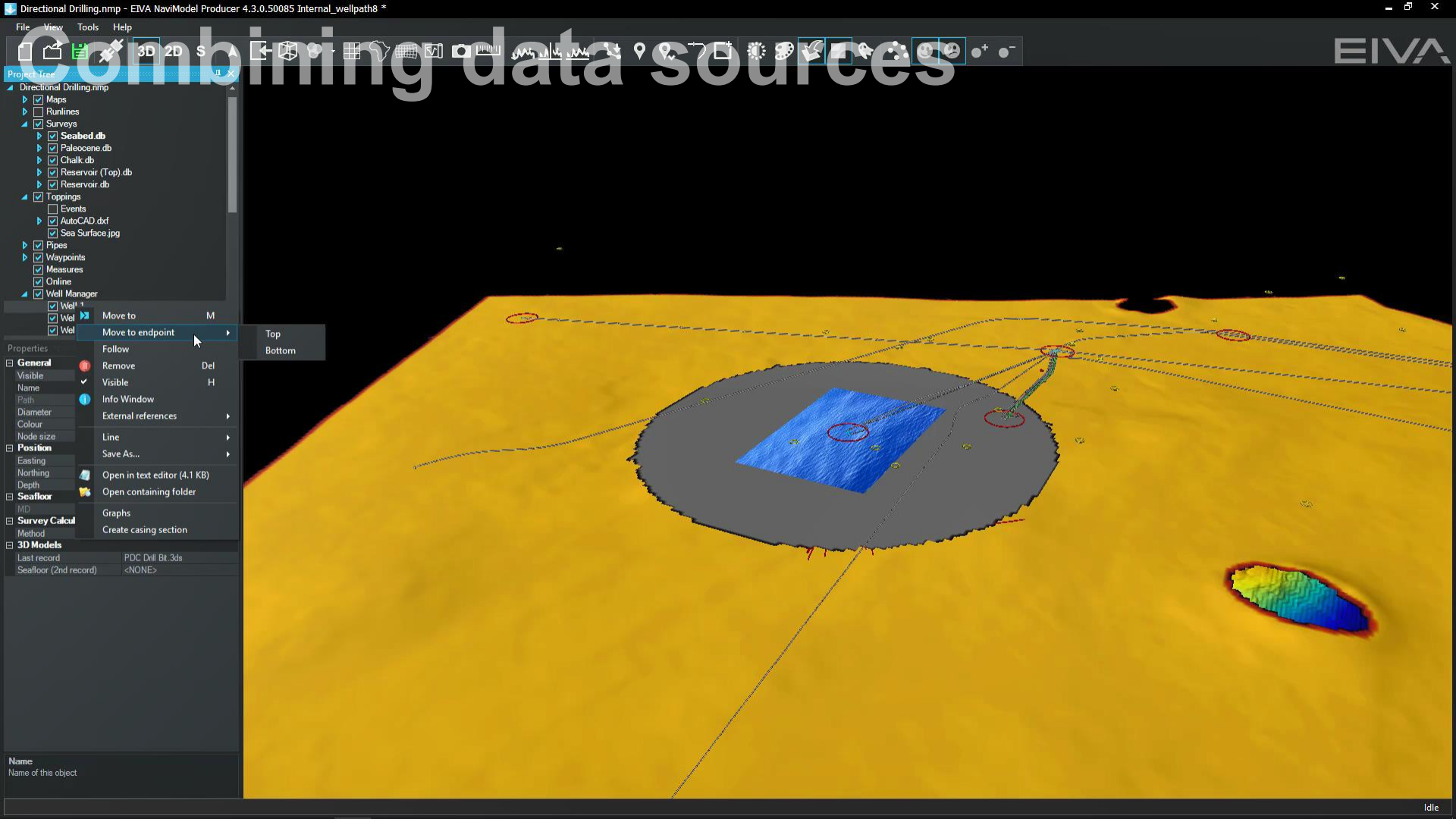
Real Life

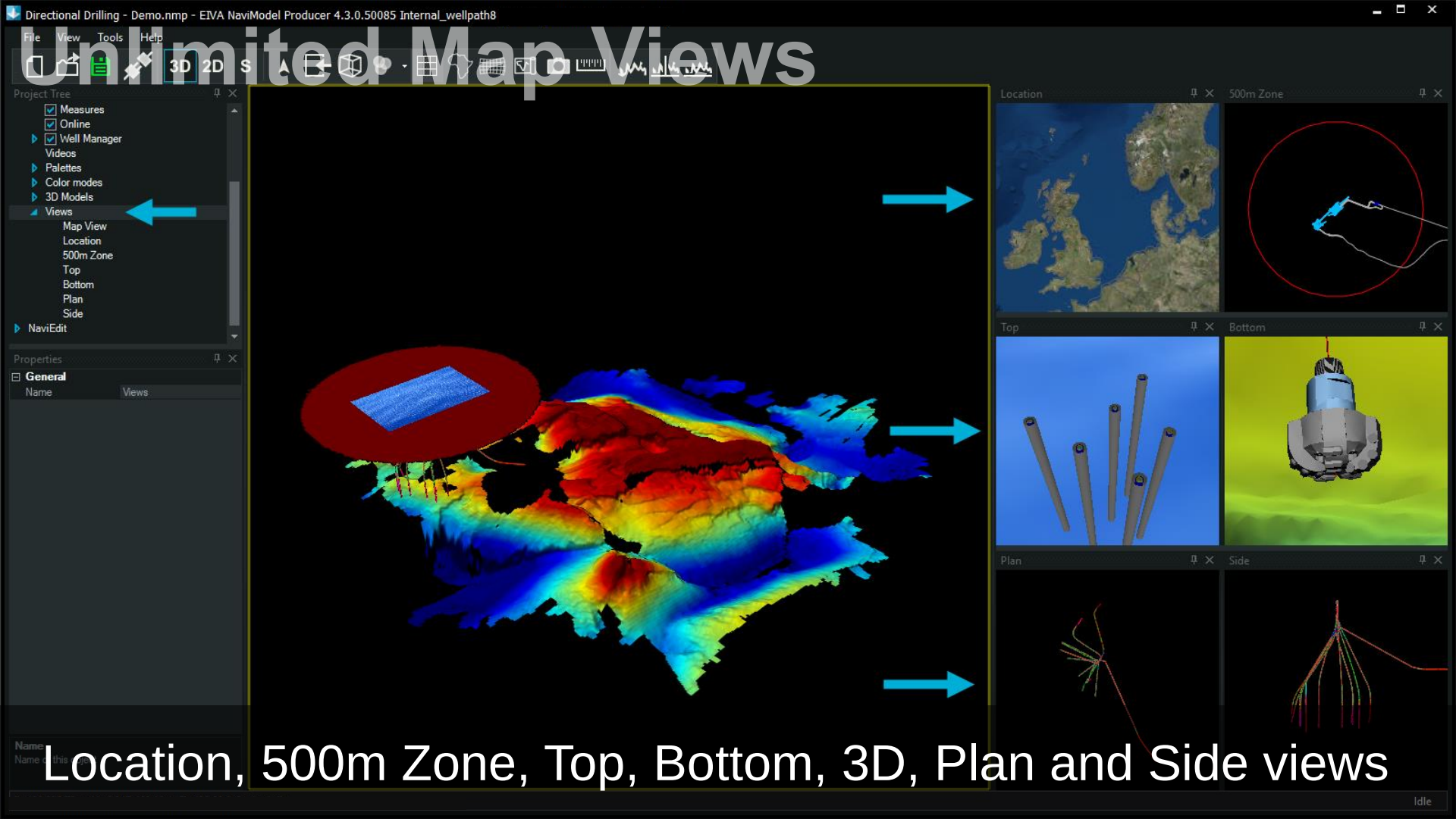

Test - Example Data.nmp - EIVA NaviModel Producer 4.2.3 ((32630) WGS 84 / UTM zone 30N) *
File View Tools Help
3D 2D S
Digital Twin
EIVA
Project Tree
Test - Example Data.nmp
Maps
Surveys
DTM.db
Toppings
Events
Point Clouds
All
Waypoints
Digitized Lines
Online
NaviScan_MJB-XPS9560[Connected]
NaviScan Point Cloud
NaviScan Vehicle
Palettes
Color modes
3D Models
c-cat3.3ds *
Views
Map View
NaviEdit
Properties
General
Name DTM.db
Database
Path C:\Data\ASV\03_NaviModel\Test - E
Number of points 30 215 805
Cell size 0.20 m
External Saving/Loading False
Appearance
Surface Type Smooth
Radius 5 cells
Primary Cells 2671322
Secondary Cells 118796
Color Mode Depth
Opacity 100 %
Profile View
Surface Color 0, 175, 216
Pen Width 1 pixels
Draw Mode Line
Points Color 0, 128, 0
Name
Name of object
Idle

Combining data sources

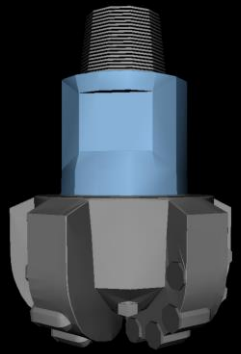


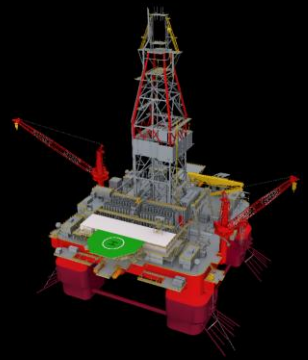
Wellpaths, AutoCAD, surface, seabed and reservoir

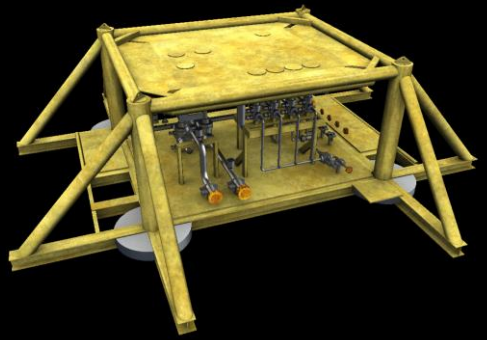

Directional Drilling.nmp - EIVA NaviModel Producer 4.3.0.50085 Internal_wellpath8 *
File View Tools Help
Combining data sources
EIVA
Project Tree
Directional Drilling.nmp
Maps
Runlines
Surveys
Seabed.db
Paleocene.db
Chalk.db
Reservoir (Top).db
Reservoir.db
Toppings
Events
AutoCAD.dxf
Sea Surface.jpg
Pipes
Waypoints
Measures
Online
Well Manager
Move to M
Move to endpoint
Top
Bottom
Follow
Remove Del
Visible H
Info Window
External references
Line
Save As...
Open in text editor (4.1 KB)
Open containing folder
Graphs
Create casing section
Properties
General
Visible
Name
Path
Diameter
Colour
Node size
Position
Easting
Northing
Depth
Seafloor
MD
Survey Calcul
Method
3D Models
Last record
PDC Drill Bit.3ds
Seafloor (2nd record)
<NONE>
Name
Name of this object
Idle


Directional Drilling - Demo.nmp - EIVA NaviModel Producer 4.3.0.50085 Internal_wellpath8
File View Tools Help
3D 2D S
Unlimited Map Views
Project Tree
Measures
Online
Well Manager
Videos
Palettes
Color modes
3D Models
Views
Map View
Location
500m Zone
Top
Bottom
Plan
Side
NaviEdit
Properties
General
Name
Views
Location
500m Zone
Top
Bottom
Plan
Side
Idle
Location, 500m Zone, Top, Bottom, 3D, Plan and Side views

3D Engineering Models

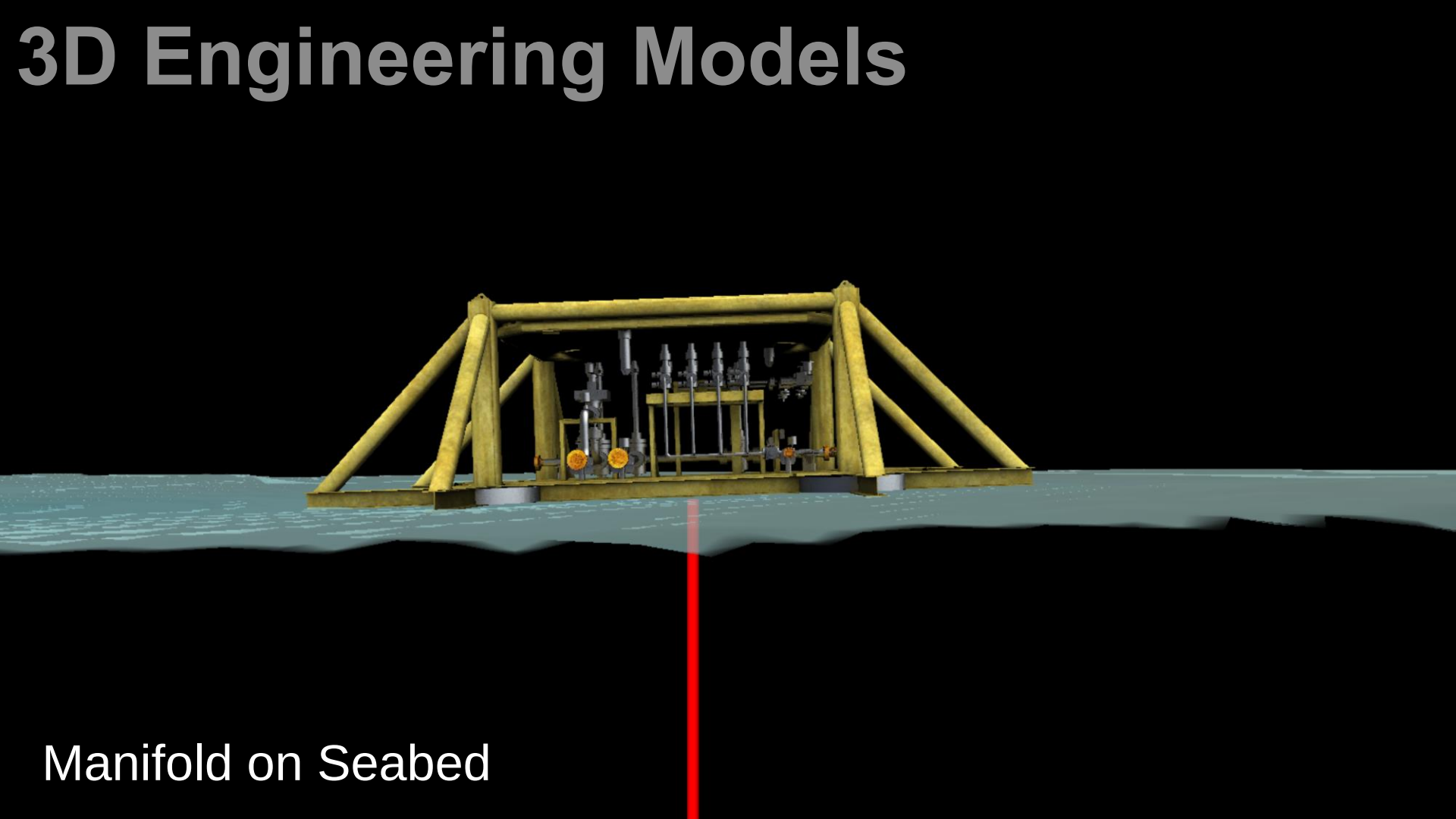




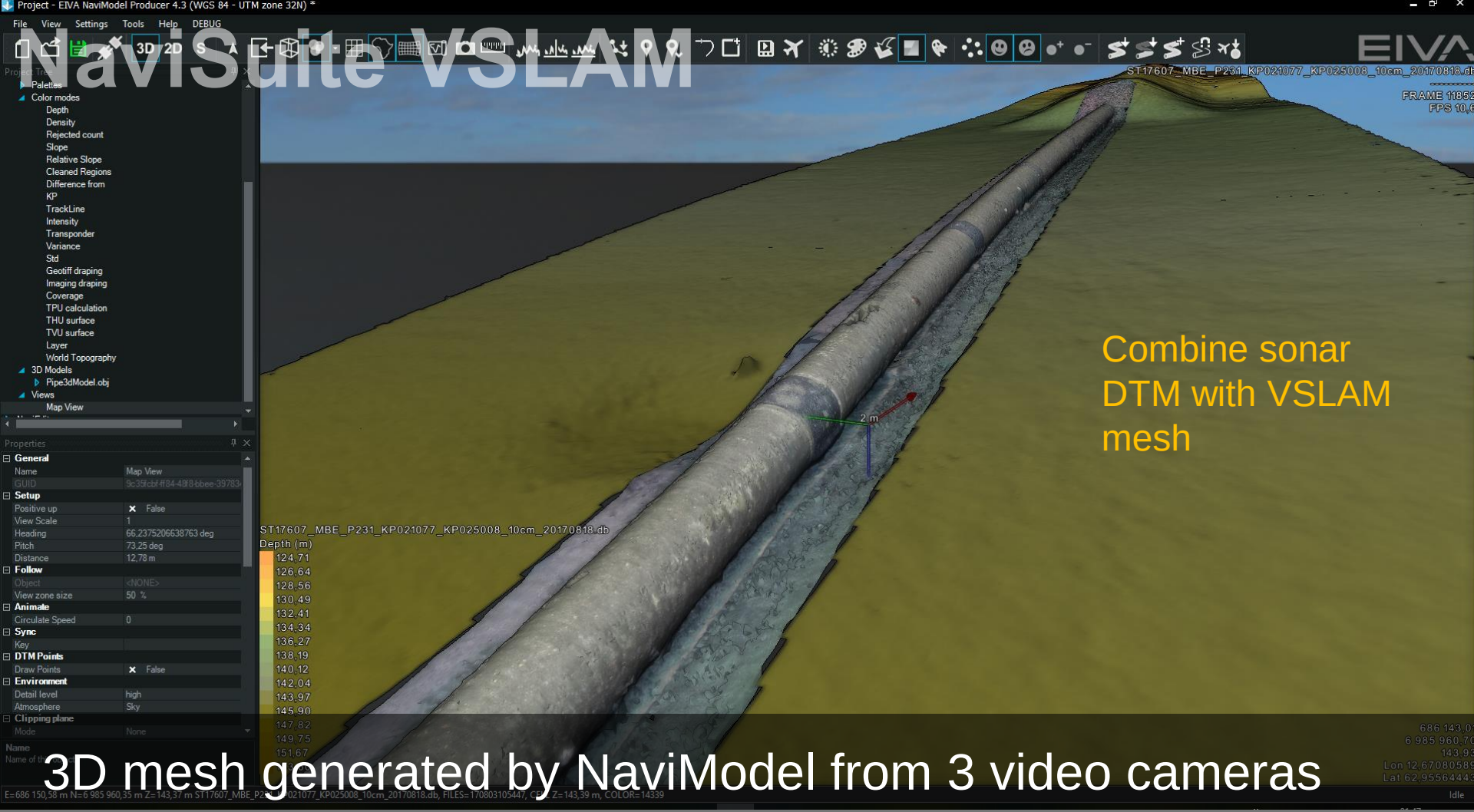


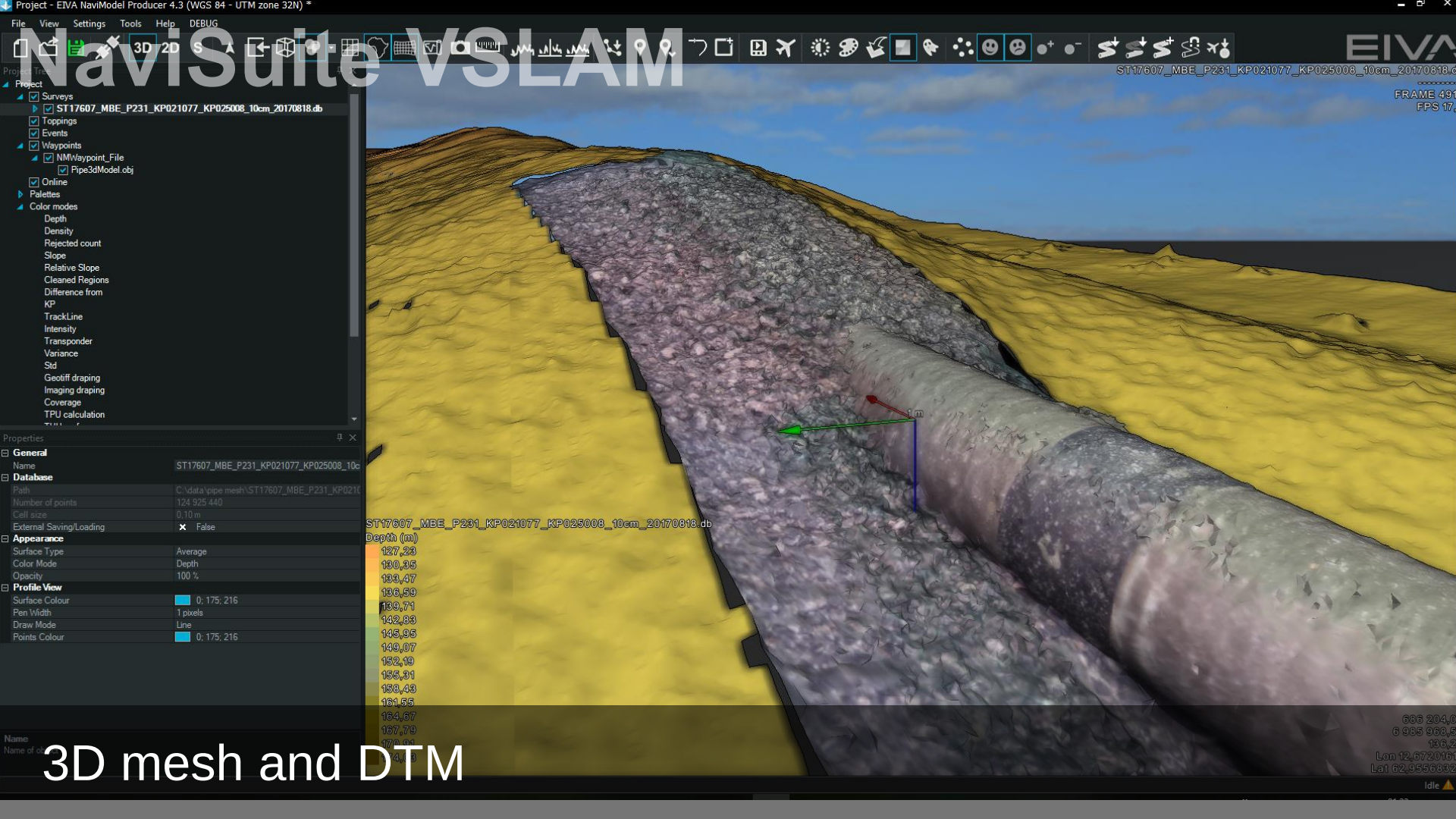
*.3ds *.obj *.fbx

3D Engineering Models



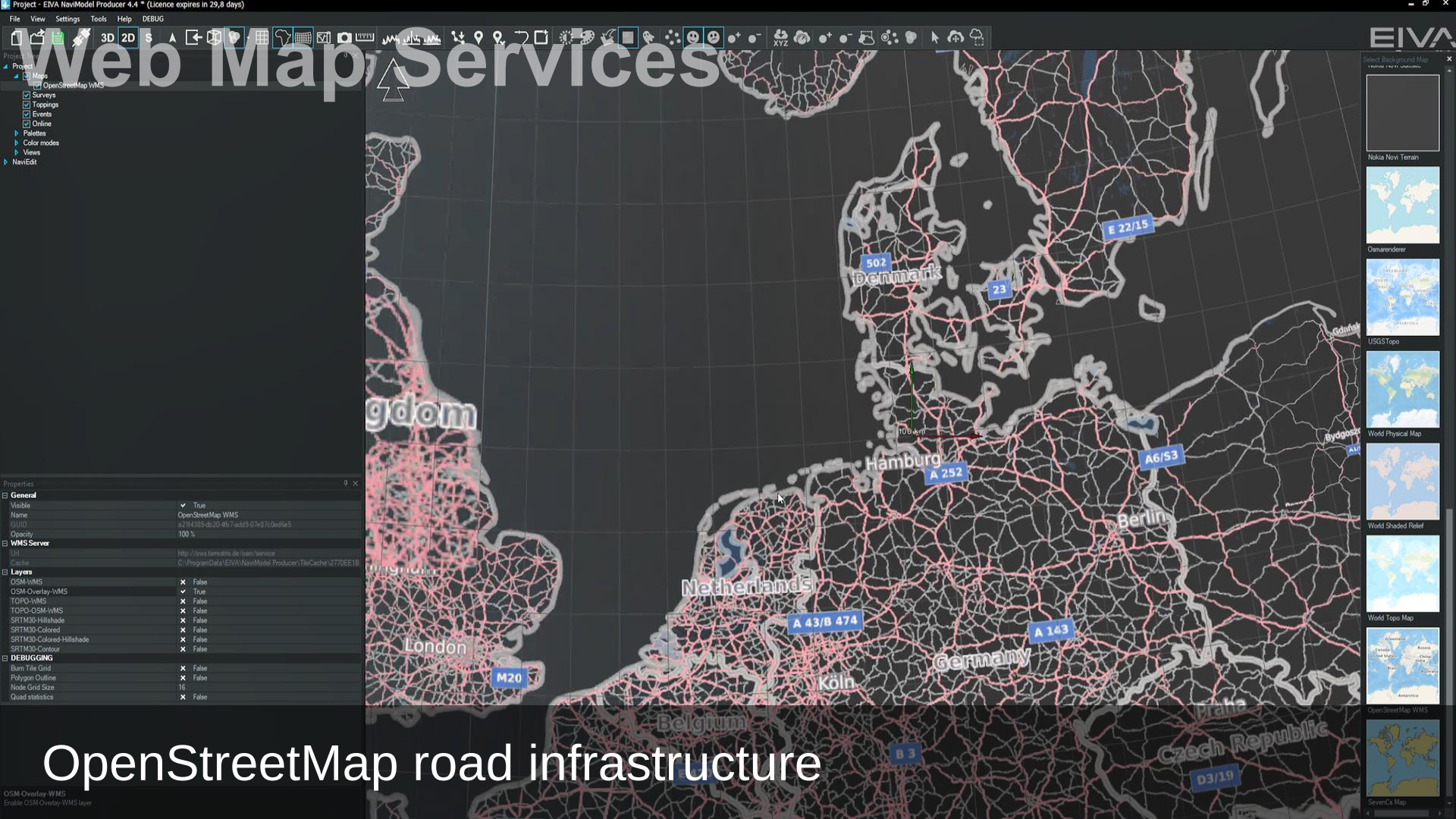
Manifold on Seabed


Project - EIVA NaviModel Producer 4.3 (WGS 84 - UTM zone 32N) *
File View Settings Tools Help DEBUG
NaviSuite VSLAM
EIVA
Palettes
Color modes
Depth
Density
Rejected count
Slope
Relative Slope
Cleaned Regions
Difference from
KP
TrackLine
Intensity
Transponder
Variance
Std
Geotiff draping
Imaging draping
Coverage
TPU calculation
THU surface
TVU surface
Layer
World Topography
3D Models
Pipe3dModel.obj
Views
Map View
Properties
General
Name Map View
Setup
Positive up False
View Scale 1
Heading 66,2375206638763 deg
Pitch 73,25 deg
Distance 12,78 m
Follow
Object <NONE>
View zone size 50 %
Animate
Circulate Speed 0
Sync
Key
DTM Points
Draw Points False
Environment
Detail level high
Atmosphere Sky
Clipping plane
Mode None
ST17607_MBE_P231_KP021077_KP025008_10cm_20170818.db
FRAME 11852
2 m
ST17607_MBE_P231_KP021077_KP025008_10cm_20170818.db
Depth (m)
124,71
126,64
128,56
130,49
132,41
134,34
136,27
138,19
140,12
142,04
143,97
145,90
147,82
149,75
151,67
Combine sonar DTM with VSLAM mesh
3D mesh generated by NaviModel from 3 video cameras
Idle

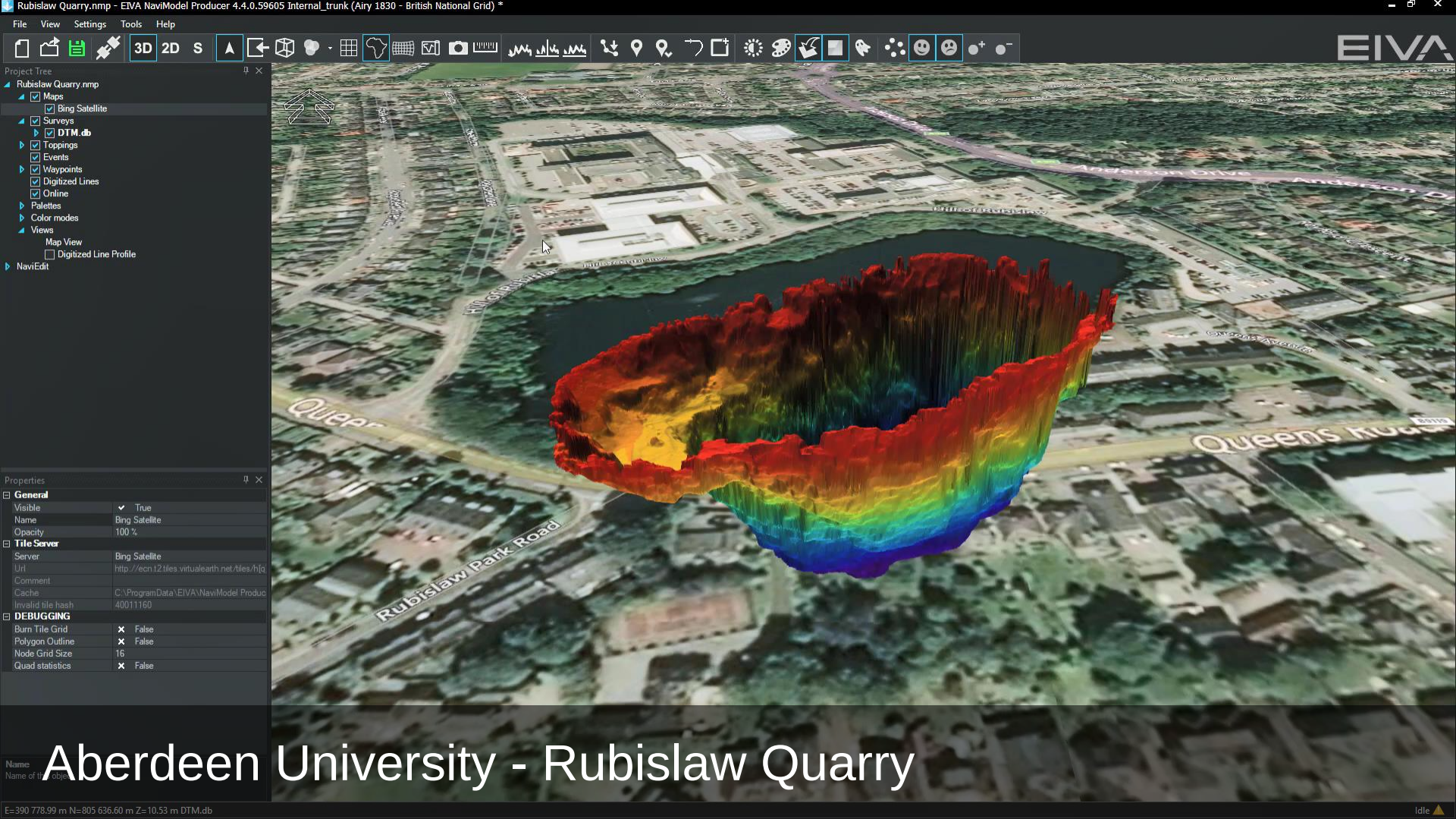

Project - EIVA NaviModel Producer 4.3 (WGS 84 - UTM zone 32N) *
File View Settings Tools Help DEBUG
NaviSuite VSLAM
EIVA
Project
Surveys
ST17607_MBE_P231_KP021077_KP025008_10cm_20170818.db
Toppings
Events
Waypoints
NMWaypoint_File
Pipe3dModel.obj
Online
Palettes
Color modes
Depth
Density
Rejected count
Slope
Relative Slope
Cleaned Regions
Difference from
KP
TrackLine
Intensity
Transponder
Variance
Std
Geotiff draping
Imaging draping
Coverage
TPU calculation
Properties
General
Name
Database
Path
Number of points
Cell size
External Saving/Loading
Appearance
Surface Type
Color Mode
Opacity
Profile View
Surface Colour
Pen Width
Draw Mode
Points Colour
ST17607_MBE_P231_KP021077_KP025008_10cm_20170818.db
Depth (m)
127,23
130,35
133,47
136,59
139,71
142,83
145,95
149,07
152,19
155,31
158,43
161,55
164,67
167,79
FRAME 491
FPS 17
1 m
Idle
3D mesh and DTM


Background Maps
Level Of Detail (LOD) matching zoom level

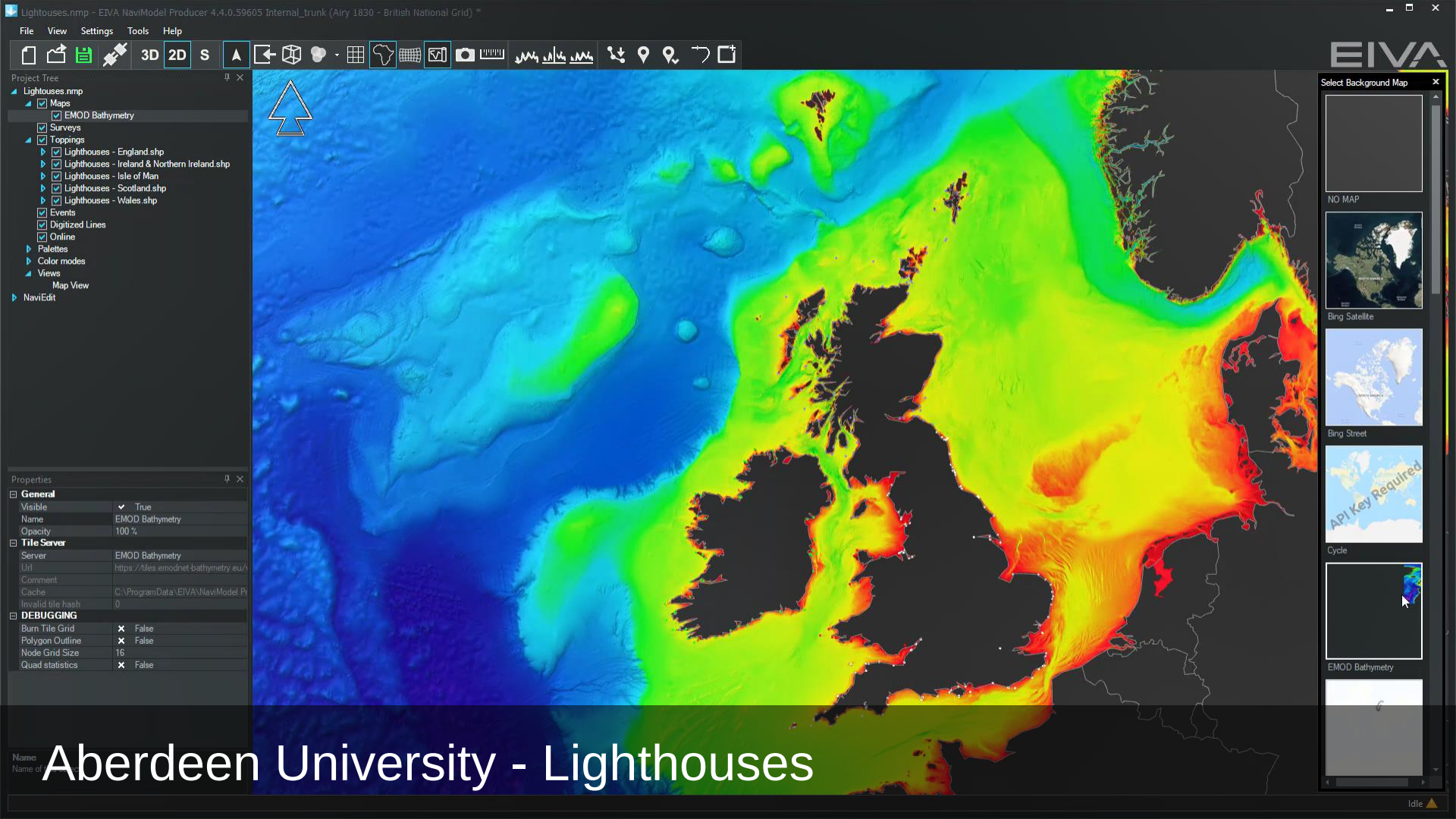
Web Map Services



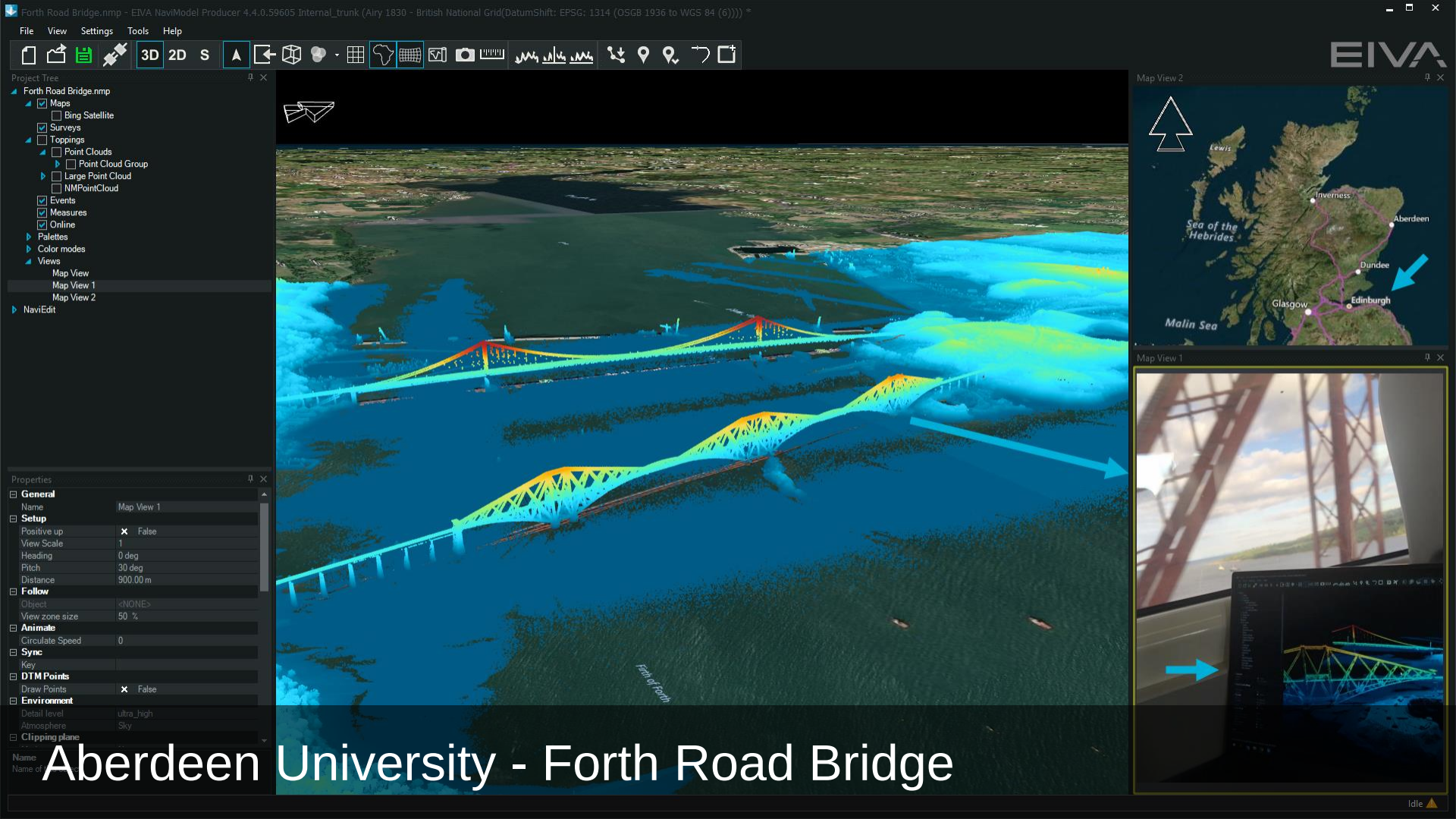
OpenStreetMap road infrastructure

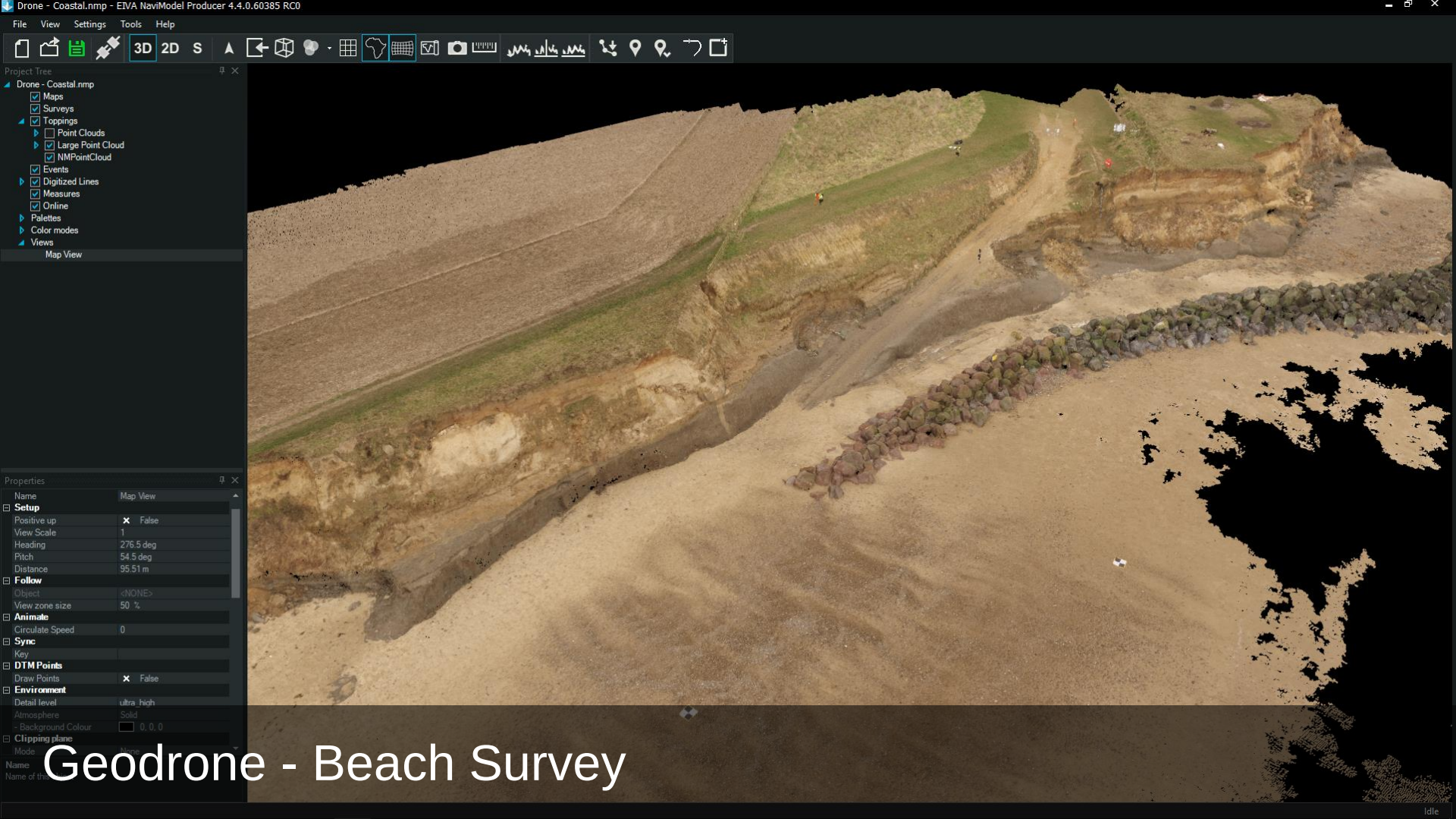


Aberdeen University - Rubislaw Quarry



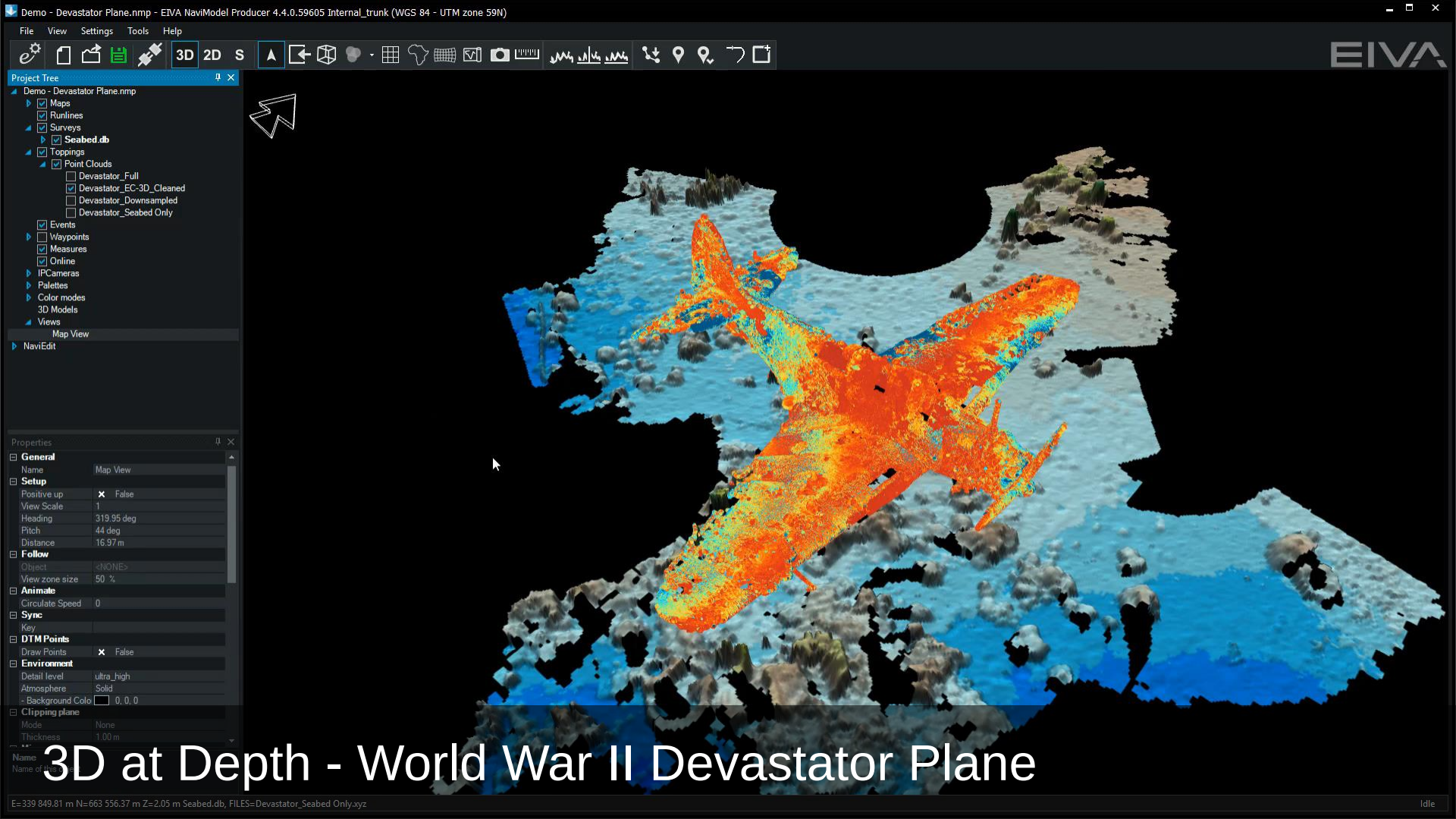
Aberdeen University - Lighthouses


Forth Road Bridge.nmp - EIVA NaviModel Producer 4.4.0.59605 Internal_trunk (Airy 1830 - British National Grid(DatumShift: EPSG: 1314 (OSGB 1936 to WGS 84 (6)))) *
File View Settings Tools Help
3D 2D S
EIVA
Project Tree
Forth Road Bridge.nmp
Maps
Bing Satellite
Surveys
Toppings
Point Clouds
Point Cloud Group
Large Point Cloud
NMPointCloud
Events
Measures
Online
Palettes
Color modes
Views
Map View
Map View 1
Map View 2
NaviEdit
Properties
General
Name Map View 1
Setup
Positive up False
View Scale 1
Heading 0 deg
Pitch 30 deg
Distance 900.00 m
Follow
Object <NONE>
View zone size 50 %
Animate
Circulate Speed 0
Sync
Key
DTM Points
Draw Points False
Environment
Detail level ultra_high
Atmosphere Sky
Clipping plane
Map View 2
Lewis
Inverness
Aberdeen
Sea of the Hebrides
Dundee
Edinburgh
Glasgow
Malin Sea
Map View 1
Forth of Forth
Idle
Aberdeen University - Forth Road Bridge


Drone - Coastal.nmp - EIVA NaviModel Producer 4.4.0.60385 RC0
File View Settings Tools Help
3D 2D S
Project Tree
Drone - Coastal.nmp
Maps
Surveys
Toppings
Point Clouds
Large Point Cloud
NMPointCloud
Events
Digitized Lines
Measures
Online
Palettes
Color modes
Views
Map View
Properties
Name Map View
Setup
Positive up False
View Scale 1
Heading 276.5 deg
Pitch 54.5 deg
Distance 95.51 m
Follow
Object <NONE>
View zone size 50 %
Animate
Circulate Speed 0
Sync
Key
DTM Points
Draw Points False
Environment
Detail level ultra_high
Atmosphere Solid
- Background Colour 0, 0, 0
Clipping plane
Mode None
Name
Idle
Geodrone - Beach Survey


Drone - Residential.nmp - EIVA NaviModel Producer 4.4.0.60385 RC0
File View Settings Tools Help
3D 2D S
Project Tree
Drone - Residential.nmp
Surveys
Toppings
NMPointCloud
Events
Online
Palettes
Color modes
Views
Map View
NaviEdit
Properties
Misc
Profile Grid False
Surface Grid False
Water Surface False
Show Geodesy False
Overlay
Shore Lines True
World Grid True
North Arrow False
Target False
Target Info False
Pipe Node Info False
Digitize Range Bearing False
Pipetracker Info True
DTM cell info False
Well path info False
Legend True
Bounding Box False
Palette False
Contours Line Step 0 m
Graphics
Target
Idle
Geodrone - Residential Survey


Project - EIVA NaviModel Producer 4.4.0.59684 Internal_trunk (Airy 1830 - British National Grid) *
File View Settings Tools Help
3D 2D S
EIVA
Project Tree
Project
Maps
Bing Satellite
Surveys
Toppings
Events
Waypoints
File 1
Dunnottar Castle
Digitized Lines
Online
Measures
Palettes
Color modes
3D Models
Views
Map View
NaviEdit
Properties
General
Visible True
Name Bing Satellite
Opacity 100 %
Tile Server
Server Bing Satellite
Url http://ecn.t2.tiles.virtualearth.net/ti
Comment
Cache C:\ProgramData\EIVA\NaviModel
Invalid tile hash 40011160
DEBUGGING
Burn Tile Grid False
Polygon Outline False
Node Grid Size 16
Quad statistics False
Name
Name of the object
INNOVAIR - Dunnottar Castle Survey
E=387 964.66 m N=783 888.24 m Z=0.00 m Bing Satellite
Idle



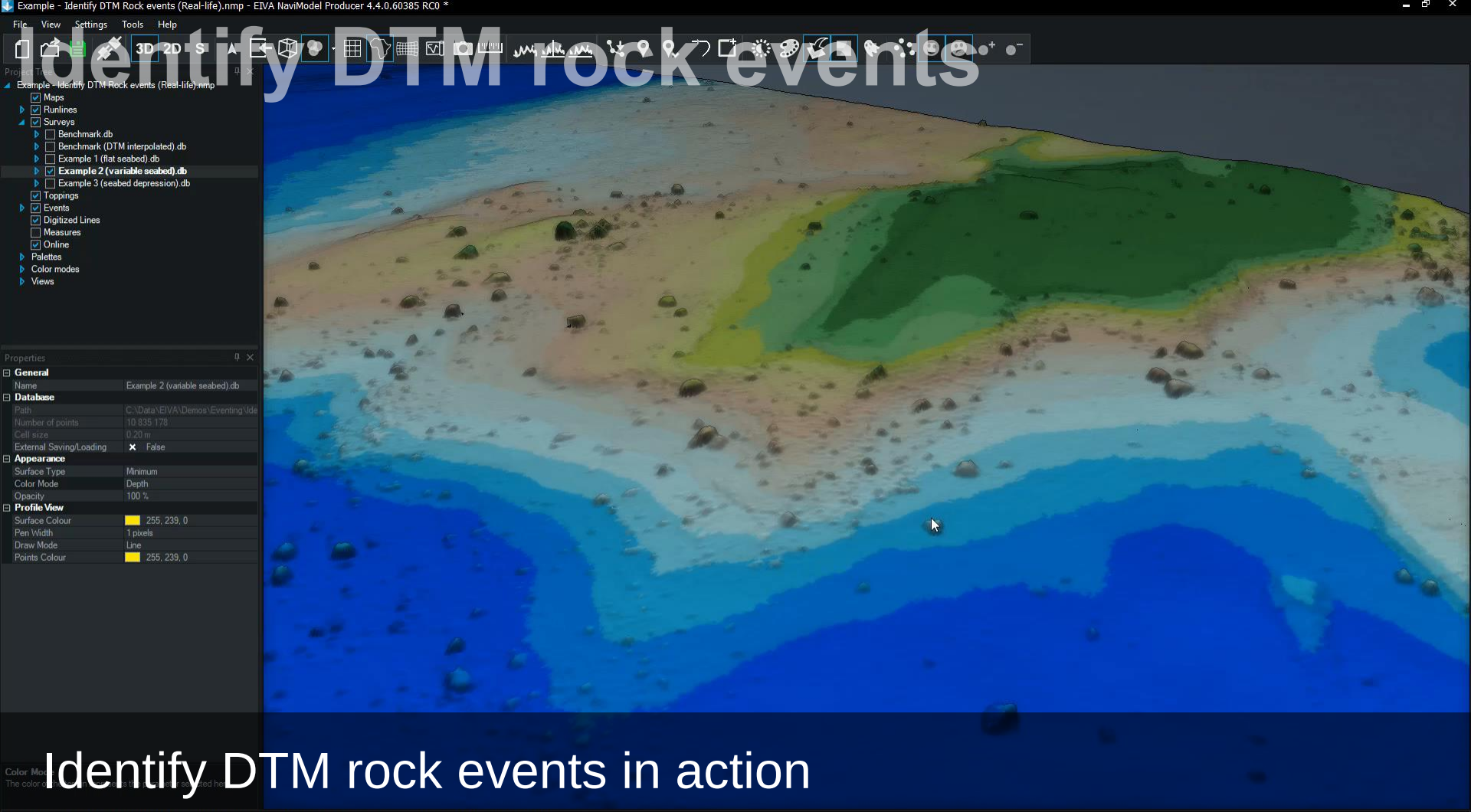
3D at Depth - World War II Devastator Plane

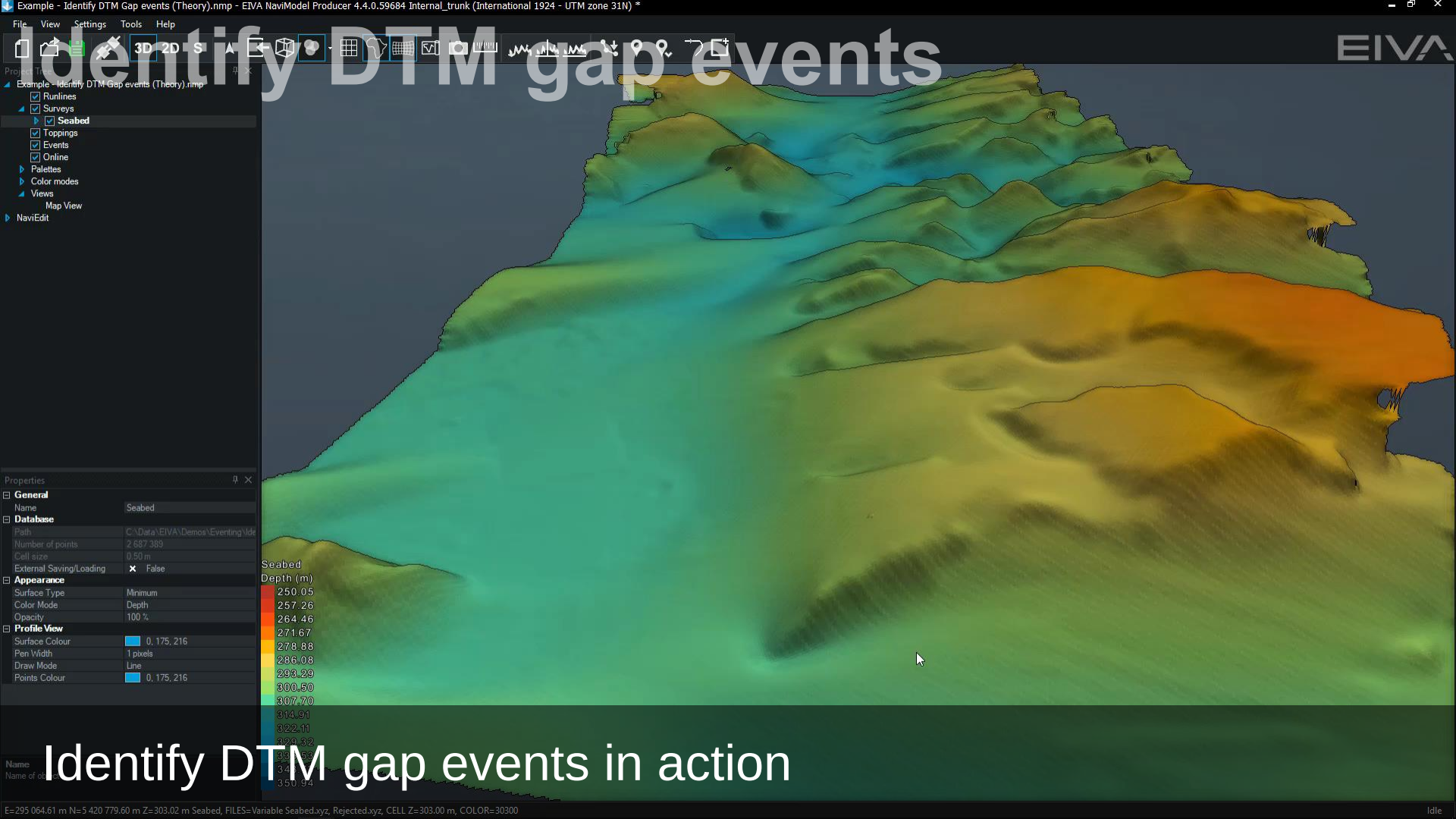
EIVA

MARINE SURVEY SOLUTIONS

Interpretation


Project - EIVA NaviModel Producer 4.4.0.59605 Internal_trunk (WGS 84 - UTM zone 15N) *
File
View
Settings
Tools
Help
Interpretation
Catenary
Cleaning
Design
DTM
Eventing
Follow
Geodetic Network
Lines
Live Data
Live Point Clouds
Maps
Measurements
Misc
Patch Test...
Pipe
Point-clouds
Tidal Prediction
Video-recording
New
QC
Create Event Collection
Identify pipe freespan events...
Identify pipe burial events...
Identify pipetracker rejected events...
Identify DTM gap events...
Identify DTM rock events...
Eventing from sources other than video / stills
Idle


Example - Identify DTM Rock events (Real-life).nmp - EIVA NaviModel Producer 4.4.0.60385 RC0 *
File View Settings Tools Help
3D 2D S
Identify DTM rock events
Project Tree
Example - Identify DTM Rock events (Real-life).nmp
Maps
Runlines
Surveys
Benchmark.db
Benchmark (DTM interpolated).db
Example 1 (flat seabed).db
Example 2 (variable seabed).db
Example 3 (seabed depression).db
Toppings
Events
Digitized Lines
Measures
Online
Palettes
Color modes
Views
Properties
General
Name
Example 2 (variable seabed).db
Database
Path
Number of points
10 835 178
Cell size
0.20 m
External Saving/Loading
False
Appearance
Surface Type
Minimum
Color Mode
Depth
Opacity
100 %
Profile View
Surface Colour
255, 239, 0
Pen Width
1 pixels
Draw Mode
Line
Points Colour
255, 239, 0
Identify DTM rock events in action
Idle


Example - Identify DTM Gap events (Theory).nmp - EIVA NaviModel Producer 4.4.0.59684 Internal_trunk (International 1924 - UTM zone 31N) *
File View Settings Tools Help
3D 2D S
Identify DTM gap events
EIVA
Project Tree
Example - Identify DTM Gap events (Theory).nmp
Runlines
Surveys
Seabed
Toppings
Events
Online
Palettes
Color modes
Views
Map View
NaviEdit
Properties
General
Name Seabed
Database
Path C:\Data\EIVA\Demos\Eventing\Ide
Number of points 2 687 389
Cell size 0.50 m
External Saving/Loading False
Appearance
Surface Type Minimum
Color Mode Depth
Opacity 100 %
Profile View
Surface Colour 0, 175, 216
Pen Width 1 pixels
Draw Mode Line
Points Colour 0, 175, 216
Seabed
Depth (m)
250.05
257.26
264.46
271.67
278.88
286.08
293.29
300.50
307.70
314.91
322.11
329.32
350.94
Identify DTM gap events in action
E=295 064.61 m N=5 420 779.60 m Z=303.02 m Seabed, FILES=Variable Seabed.xyz; Rejected.xyz, CELL Z=303.00 m, COLOR=30300
Idle

Example - Identify Pipe Freespan and Burial events (Theory).nmp - EIVA NaviModel Producer 4.4.0.59613 Internal_trunk (WGS 84 - UTM zone 32N) *

File View Settings Tools Help

Identify pipe freespan events

EIVA

Example - Identify Pipe Freespan and Burial events (Theory)
- Runlines
- Surveys
- Toppings
- Events
  - Freespans
- Pipes
  - KP 0.000 to KP 0.036
- Digitized Lines
- Measures
- Online
- Palettes
- Color modes
- Views
  - Map View
- NaviEdit

Properties

General	
Name	Map View
Setup	
Positive up	False
View Scale	1
Heading	269.75 deg
Pitch	86 deg
Distance	10.44 m
Follow	
Object	<NONE>
View zone size	50 %
Animate	
Circulate Speed	0
Sync	
Key	
DTM Points	
Draw Points	False
Environment	
Detail level	high
Atmosphere	Sky
Clipping plane	

Event Window

Events: 4

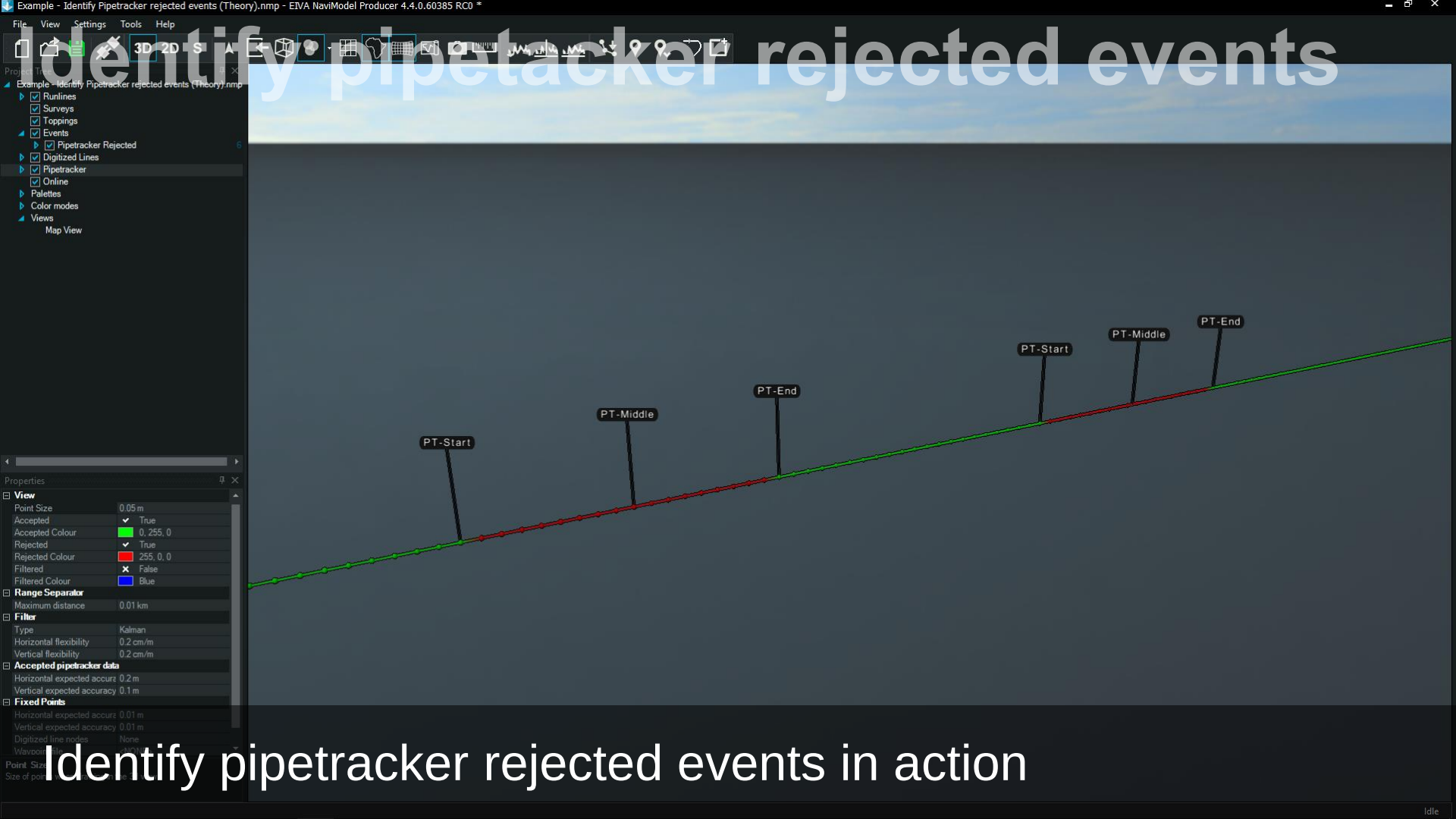
All Events

Name	Easting	Northing	Depth	Length	Width	Height	Volume	Area	Linked Height	Linked Length	Linked Min/Max Depth at KP	Level 1 (Dynamic)	Level 2 (Dynamic)	Level 3 (Dynamic)	Annc (Dyn
Start	0.500	4.500	-0.500	0.000	0.000	0.000	0.000	0.000	1.000	2.000		Start	KP 0.004000		Frees
End	0.500	6.500	-0.500	0.000	0.000	0.000	0.000	0.000	1.000	2.000		End	KP 0.006000		Frees
Start	0.500	10.510	-0.500	0.000	0.000	0.000	0.000	0.000	1.000	6.000		Start	KP 0.010010		Frees
End	0.500	16.500	-0.500	0.000	0.000	0.000	0.000	0.000	1.000	6.000		End	KP 0.016000		Frees

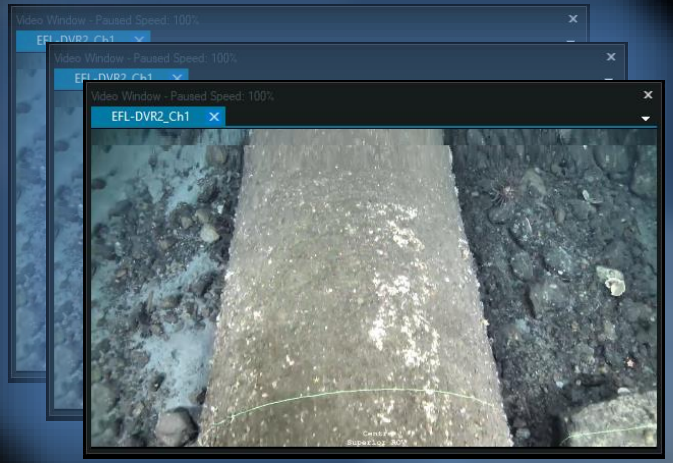
Freespan Heights and Lengths are auto populated

E=0.64 m N=5.28 m Z=0.78 m TIN (KP 0.005) (DOL 0.14 m)

Idle


Example - Identify Pipetracker rejected events (Theory).nmp - EIVA NaviModel Producer 4.4.0.60385 RC0 *
File View Settings Tools Help
3D 2D S
Identify pipetracker rejected events
Example - Identify Pipetracker rejected events (Theory).nmp
Runlines
Surveys
Toppings
Events
Pipetracker Rejected
Digitized Lines
Pipetracker
Online
Palettes
Color modes
Views
Map View
Properties
View
Point Size 0.05 m
Accepted True
Accepted Colour 0, 255, 0
Rejected True
Rejected Colour 255, 0, 0
Filtered False
Filtered Colour Blue
Range Separator
Maximum distance 0.01 km
Filter
Type Kalman
Horizontal flexibility 0.2 cm/m
Vertical flexibility 0.2 cm/m
Accepted pipetracker data
Horizontal expected accura 0.2 m
Vertical expected accuracy 0.1 m
Fixed Points
Horizontal expected accura 0.01 m
Vertical expected accuracy 0.01 m
Digitized line nodes None
PT-Start
PT-Middle
PT-End
PT-Start
PT-Middle
PT-End
Identify pipetracker rejected events in action
Idle

NaviSuite Deep Learning



Images analysed and classified one-by-one

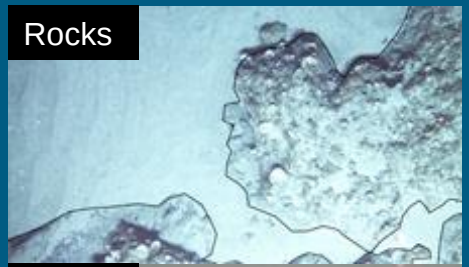
Objects Identified:

Seabed	100%
Pipeline	97%
Anode	0%
Fieldjoint	0%
Flange	0%

Deep Learning is faster than real-time:

15 minutes of video = 1 minute processing time (Cloud Server)

NaviSuite Deep Learning



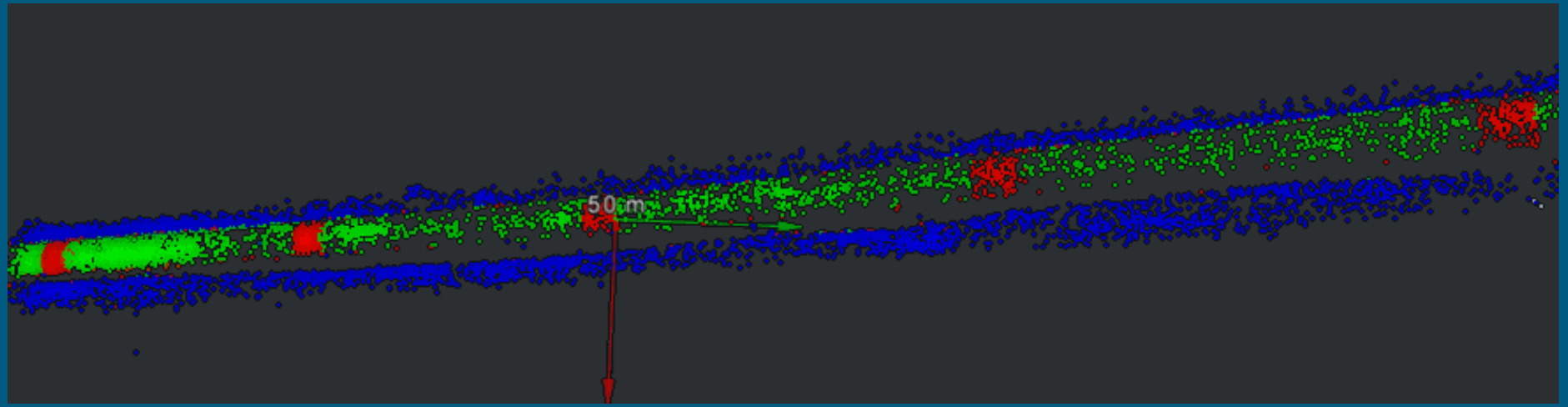
Deep Learning is trained on diverse data sets…

AUV onboard processing

EIVA NaviSuite Deep Learning running on our AUV onboard computer providing real-time video QC and top of pipe position.

Camera-based product tracker for AUV integration

AUV onboard processing

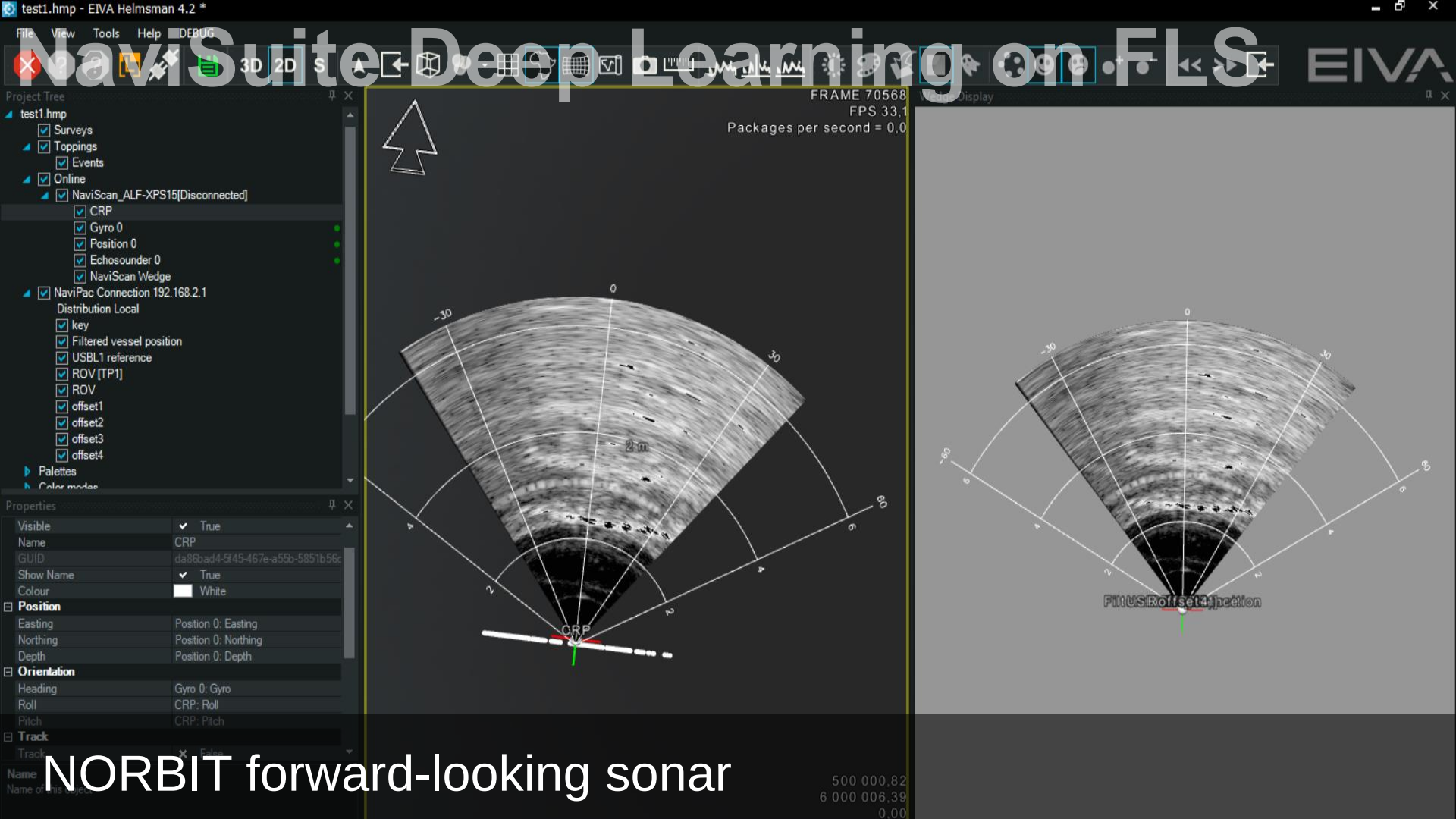


We can assign classification flags for every data point by combining the VSLAM sparse point cloud with Deep Learning.

Pipeline (green), Fieldjoints (red) and Seabed (blue).

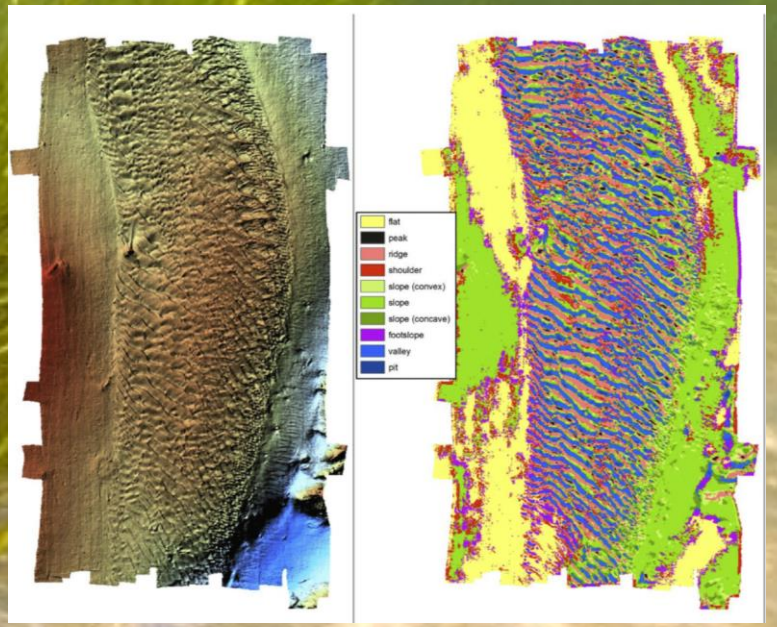
Enabling autonomy – What an AUV ‘can see’ in realtime

NaviSuite Deep Learning on FLS



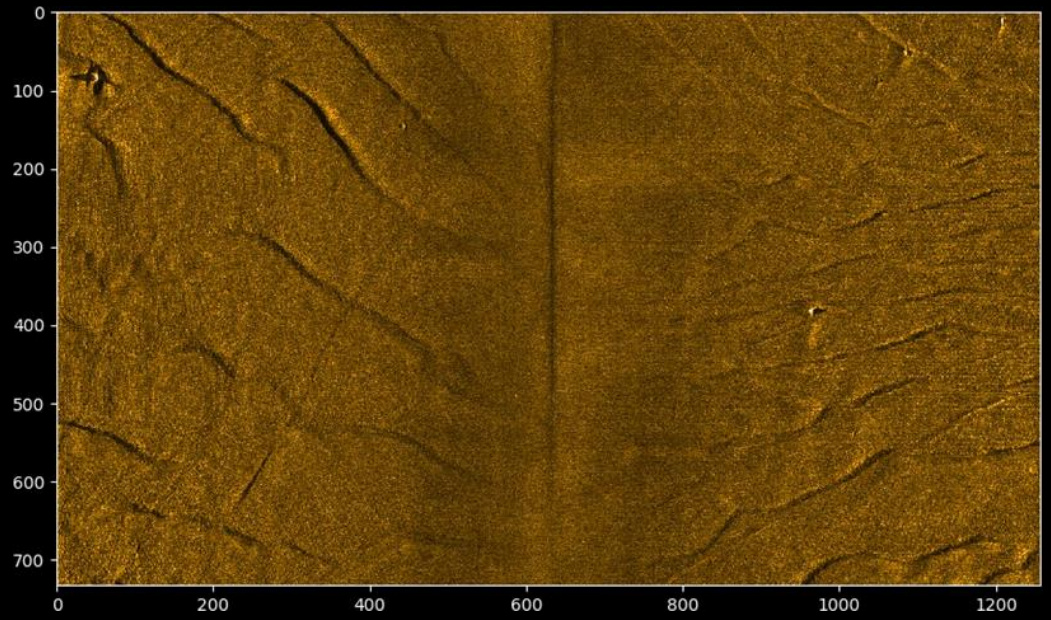
NORBIT forward-looking sonar

NaviSuite Deep Learning



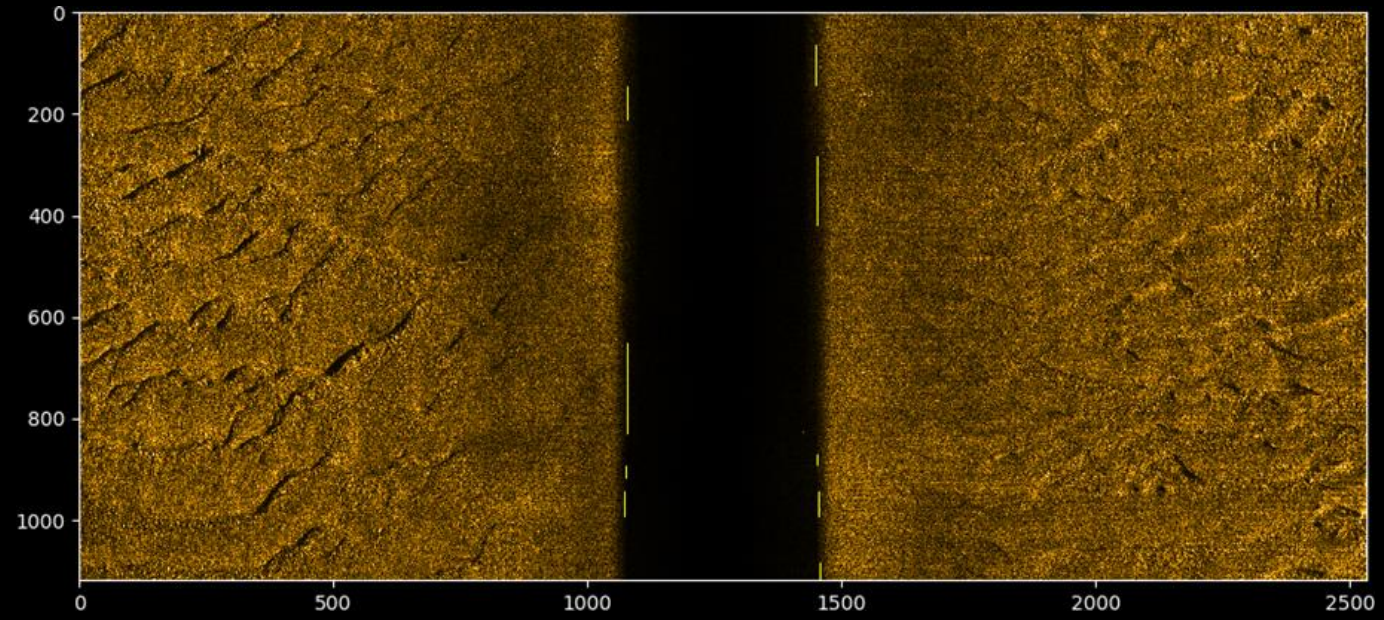
We are training habitat mapping and seabed classification

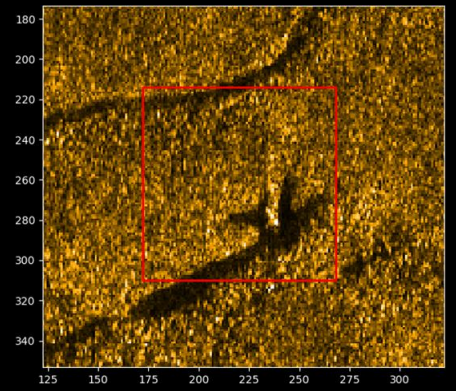
Deep Learning on Sidescan



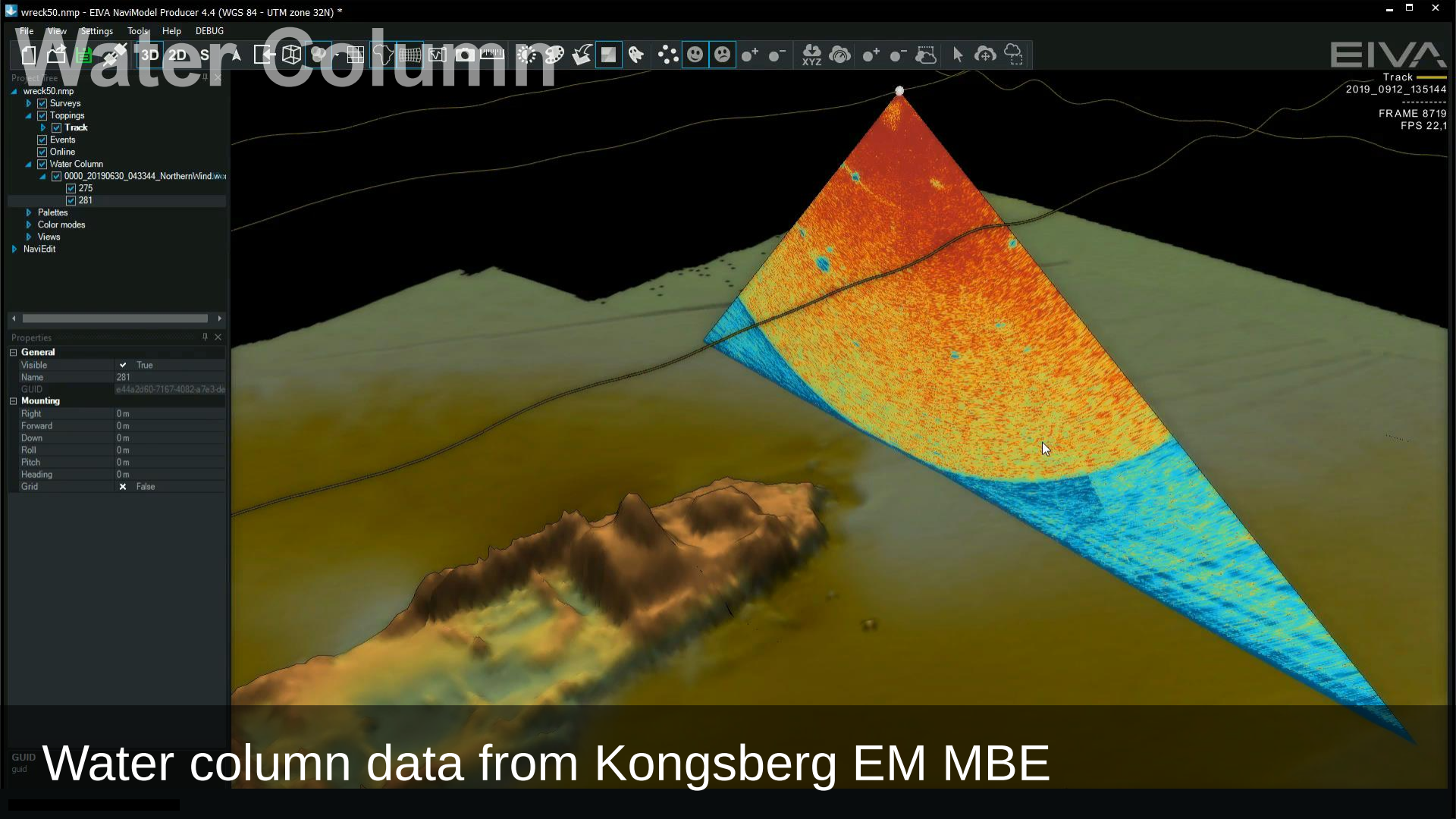
New ATR algorithm on sidescan and backscatter data

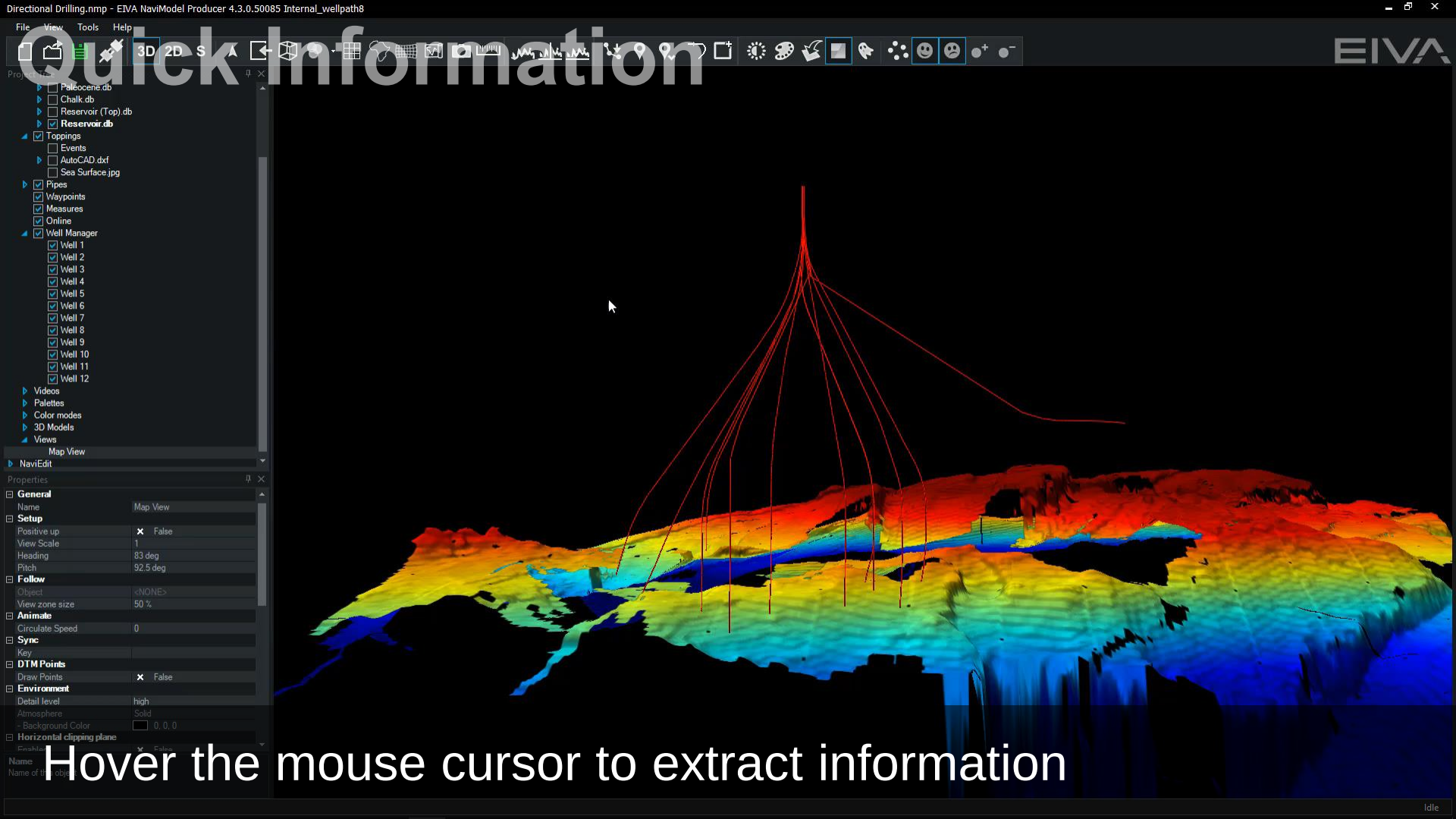
Deep Learning on Sidescan

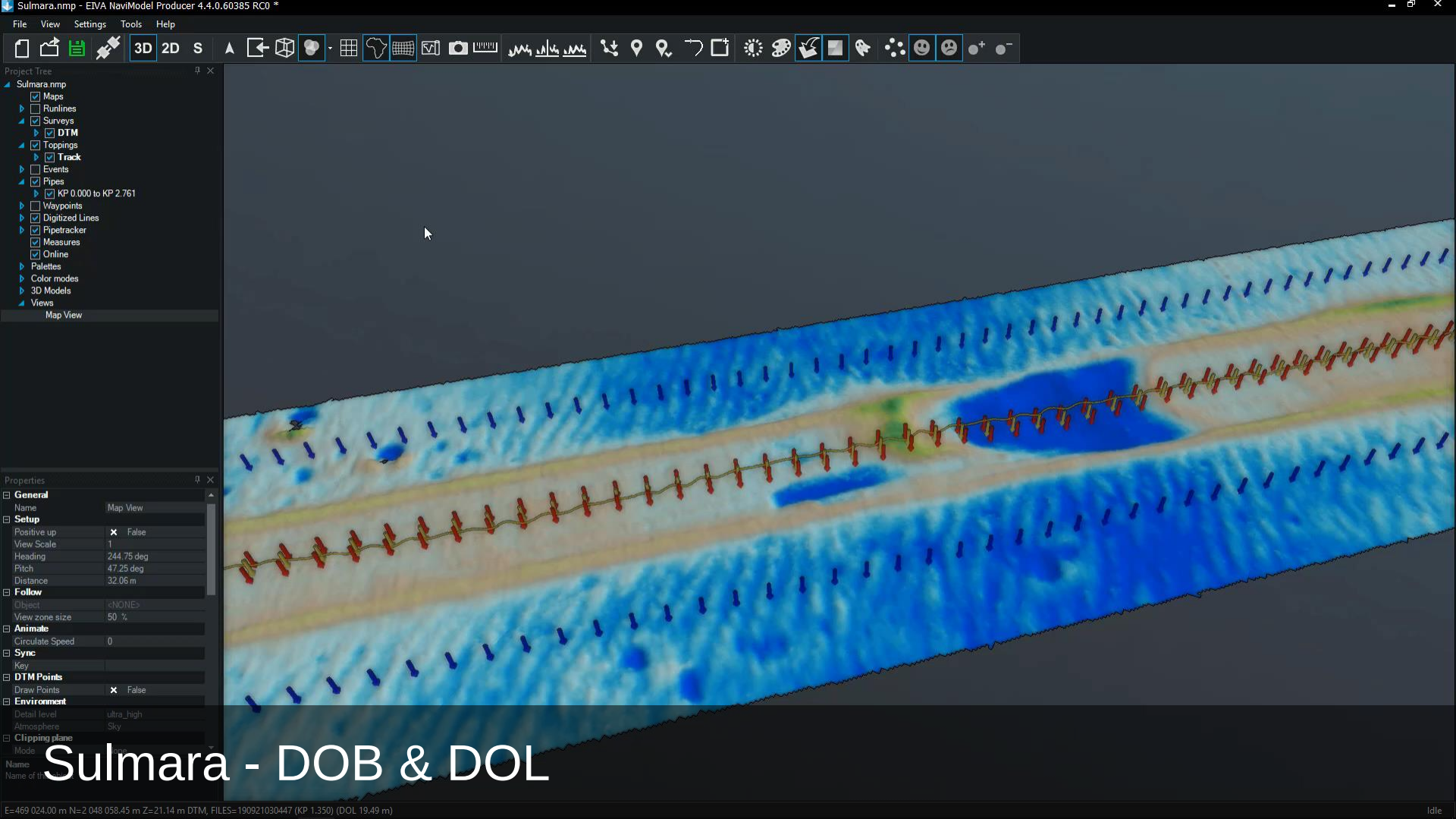




New ATR algorithm on sidescan and backscatter data


wreck50.nmp - EIVA NaviModel Producer 4.4 (WGS 84 - UTM zone 32N) *
File View Settings Tools Help DEBUG
Water Column
EIVA
Project Tree
wreck50.nmp
Surveys
Toppings
Track
Events
Online
Water Column
0000_20190630_043344_NorthernWind
275
281
Palettes
Color modes
Views
NaviEdit
Properties
General
Visible True
Name 281
GUID e44a2d60-7167-4082-a7e3-de
Mounting
Right 0 m
Forward 0 m
Down 0 m
Roll 0 m
Pitch 0 m
Heading 0 m
Grid False
Track
2019_0912_135144
FRAME 8719
FPS 22,1
GUID
guid
Water column data from Kongsberg EM MBE


Directional Drilling.nmp - EIVA NaviModel Producer 4.3.0.50085 Internal_wellpath8
File View Tools Help
3D 2D S
Quick Information
EIVA
Paleocene.db
Chalk.db
Reservoir (Top).db
Reservoir.db
Toppings
Events
AutoCAD.dxf
Sea Surface.jpg
Pipes
Waypoints
Measures
Online
Well Manager
Well 1
Well 2
Well 3
Well 4
Well 5
Well 6
Well 7
Well 8
Well 9
Well 10
Well 11
Well 12
Videos
Palettes
Color modes
3D Models
Views
Map View
NaviEdit
Properties
General
Name Map View
Setup
Positive up False
View Scale 1
Heading 83 deg
Pitch 92.5 deg
Follow
Object <NONE>
View zone size 50 %
Animate
Circulate Speed 0
Sync
Key
DTM Points
Draw Points False
Environment
Detail level high
Atmosphere Solid
Background Color 0, 0, 0
Horizontal clipping plane
Hover the mouse cursor to extract information
Idle


Sulmara.nmp - EIVA NaviModel Producer 4.4.0.60385 RC0 *
File View Settings Tools Help
3D 2D S
Project Tree
Sulmara.nmp
Maps
Runlines
Surveys
DTM
Toppings
Track
Events
Pipes
KP 0.000 to KP 2.761
Waypoints
Digitized Lines
Pipetracker
Measures
Online
Palettes
Color modes
3D Models
Views
Map View
Properties
General
Name Map View
Setup
Positive up False
View Scale 1
Heading 244.75 deg
Pitch 47.25 deg
Distance 32.06 m
Follow
Object <NONE>
View zone size 50 %
Animate
Circulate Speed 0
Sync
Key
DTM Points
Draw Points False
Environment
Detail level ultra_high
Atmosphere Sky
Clipping plane
Mode
Name
Sulmara - DOB & DOL
E=469 024.00 m N=2 048 058.45 m Z=21.14 m DTM, FILES=190921030447 (KP 1.350) (DOL 19.49 m)
Idle

QC

QC

- Over the last few years we have seen more and more clients using our software for checking the quality of acquired survey data.
- In 2017 we started a project with BP UK to develop a QC toolbox.
- BP recognised that their own QC varied from region to region and also between departments.
- The toolbox is now utilised worldwide by BP.

EIVA QC Toolbox

- Stand-alone software for survey data QC

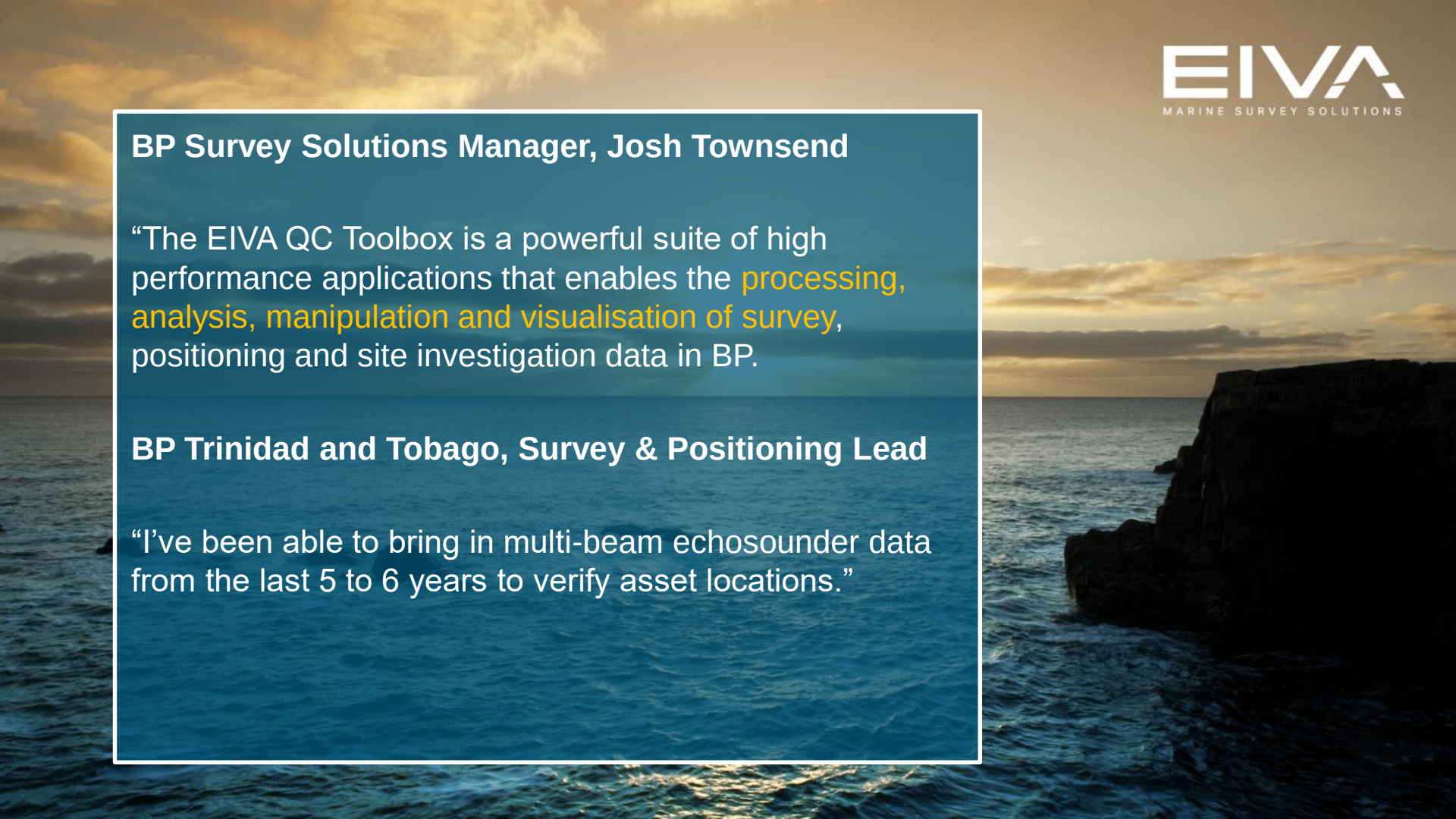
- Software includes:
  - NaviEdit Pro
  - NaviModel Analyser +
  - Catenary option

- …plus a number of feature extensions based upon BP input

Operator Purpose

- Quality Control sub-contractor data
  - Multibeam & Laser
  - Seismic
  - Pipeline
  - Events

- Check
  - Catenary calculations
  - Metrology results
  - Tide files
  - Site preparations
  - Rig placement and anchors

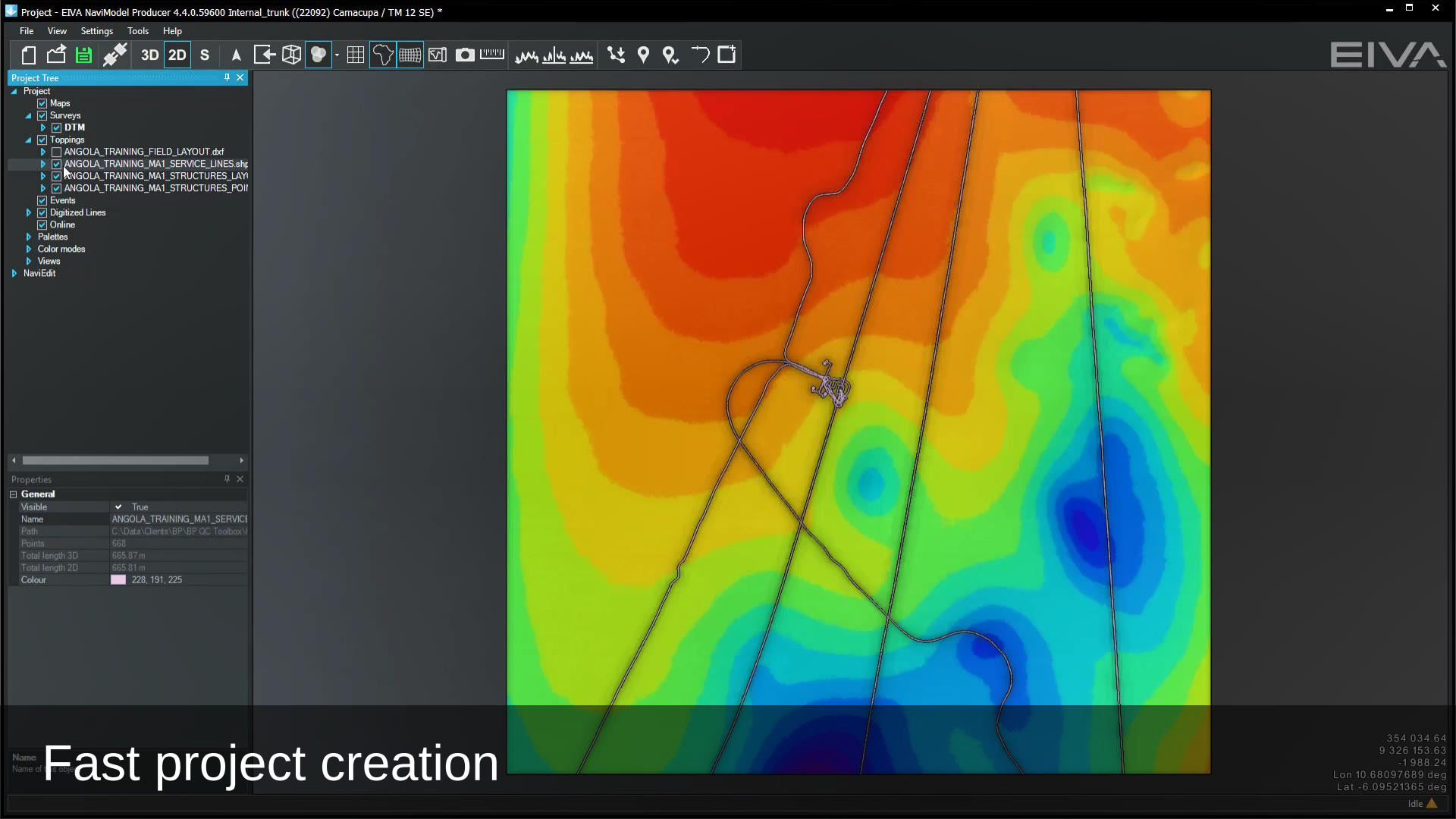


BP Survey Solutions Manager, Josh Townsend

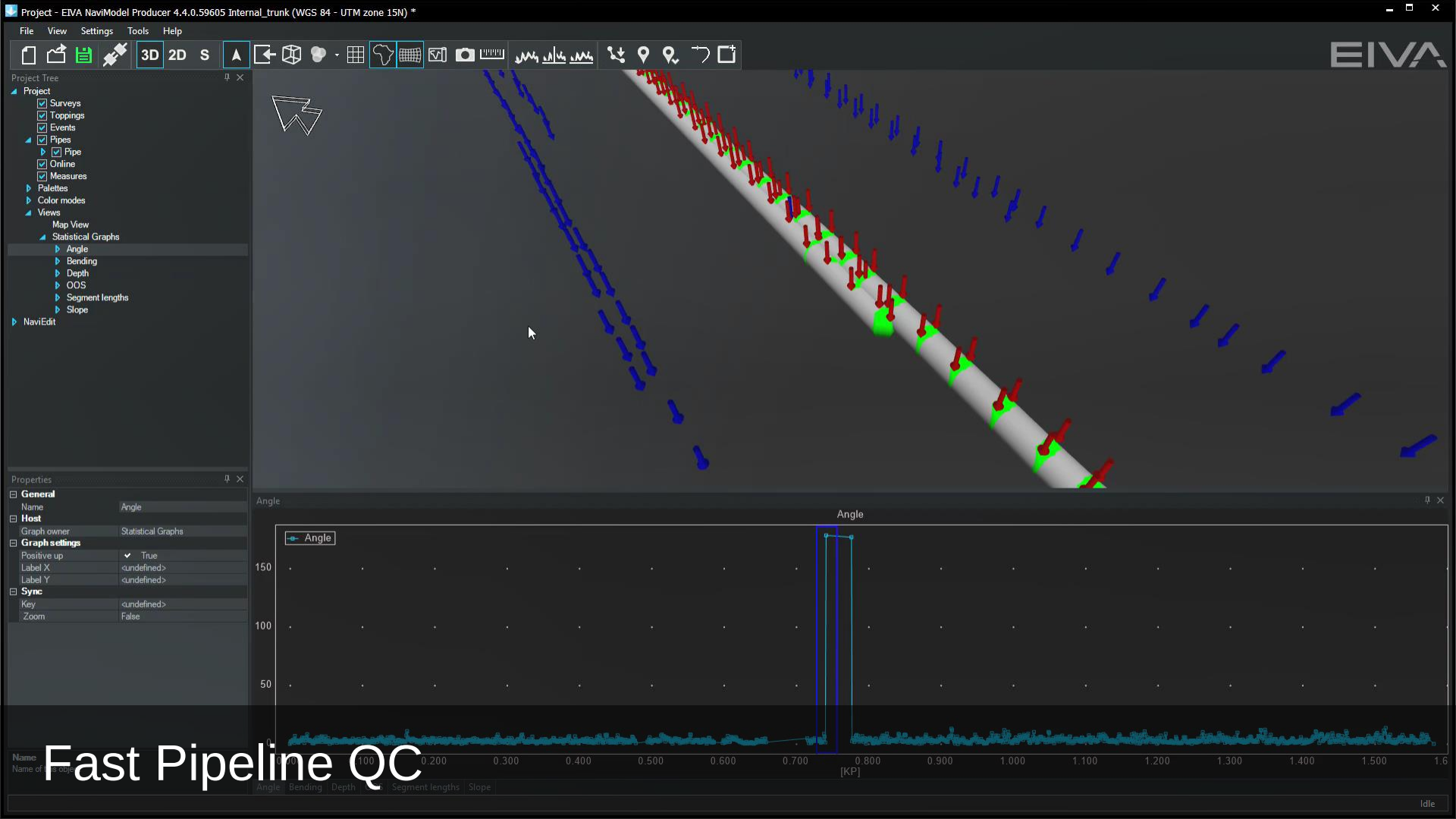
"The EIVA QC Toolbox is a powerful suite of high performance applications that enables the processing, analysis, manipulation and visualisation of survey, positioning and site investigation data in BP.

BP Trinidad and Tobago, Survey & Positioning Lead

"I've been able to bring in multi-beam echosounder data from the last 5 to 6 years to verify asset locations."

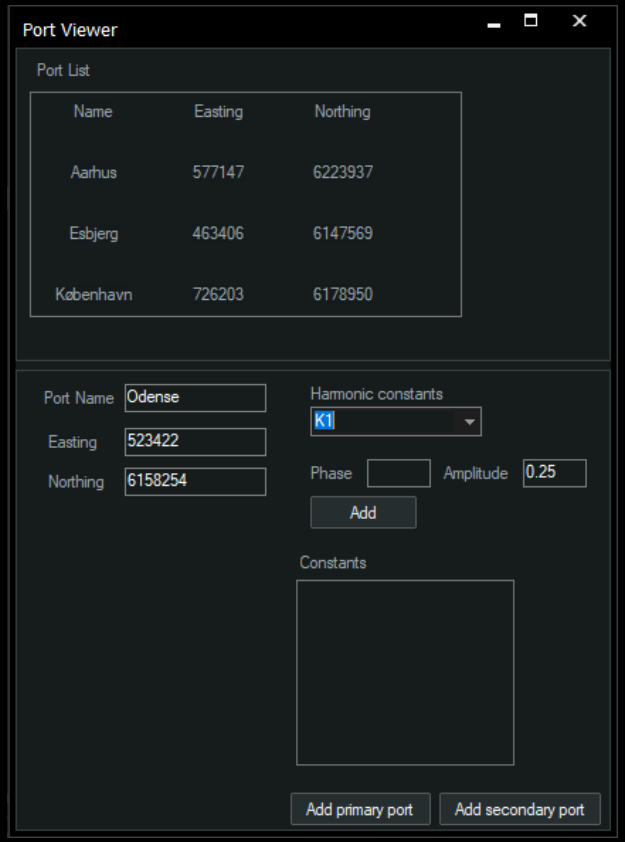


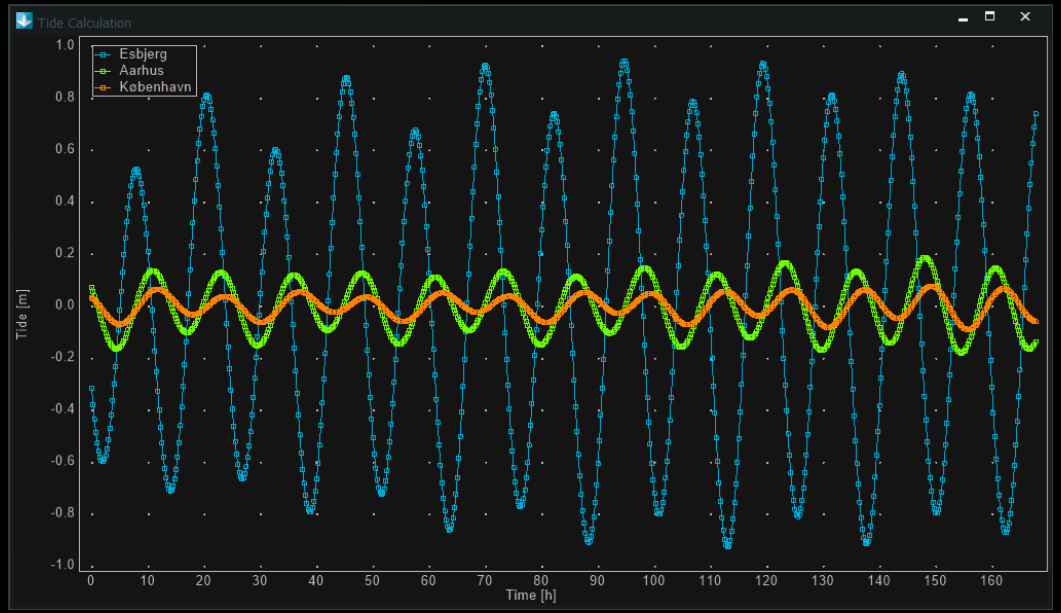
Fast project creation



Fast Pipeline QC

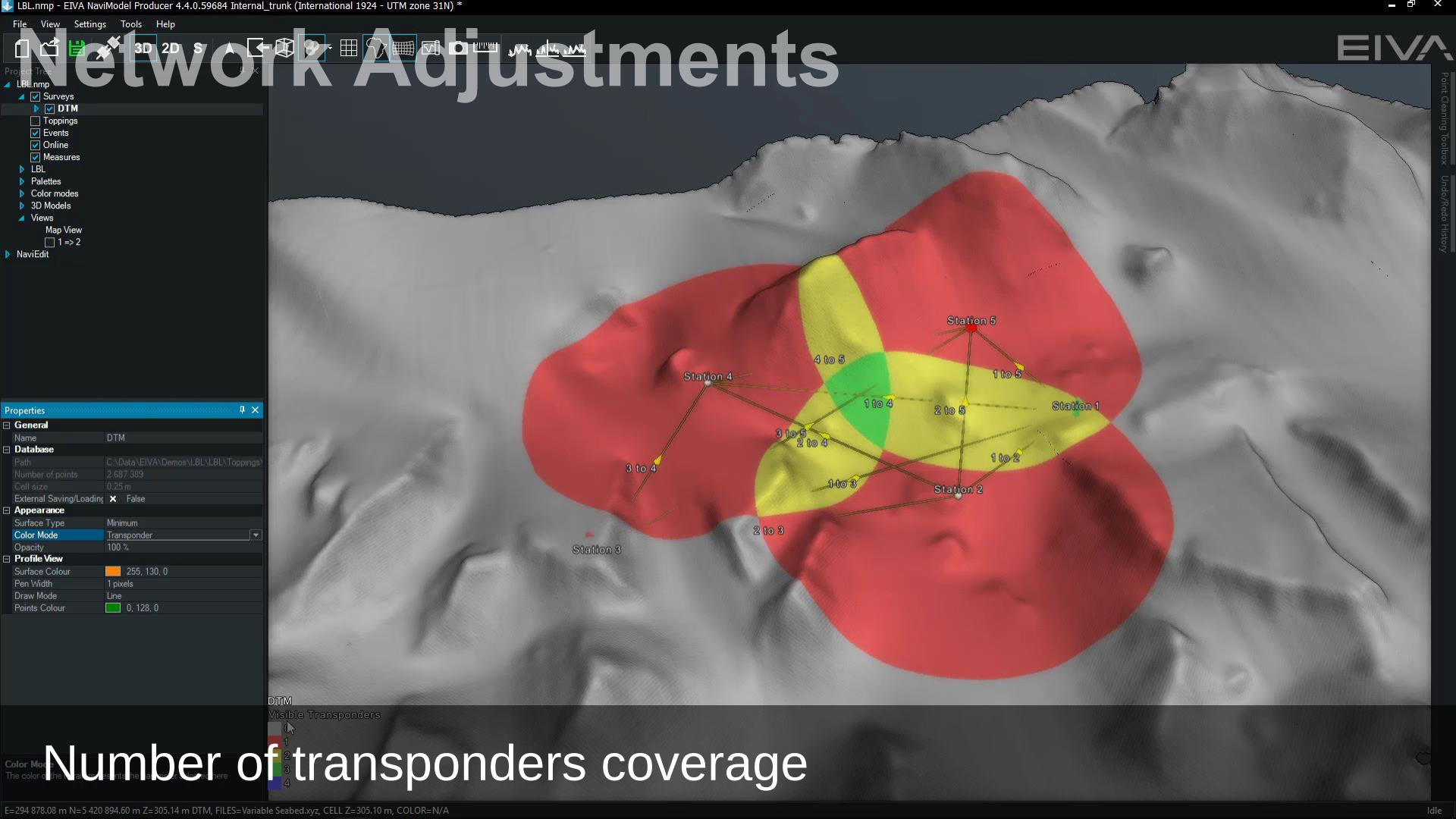
Tidal Predictions





Tide calculation based on harmonic constituents from the admiralty tide tables.
Tides can be visualised in NaviModel or exported as a text file.

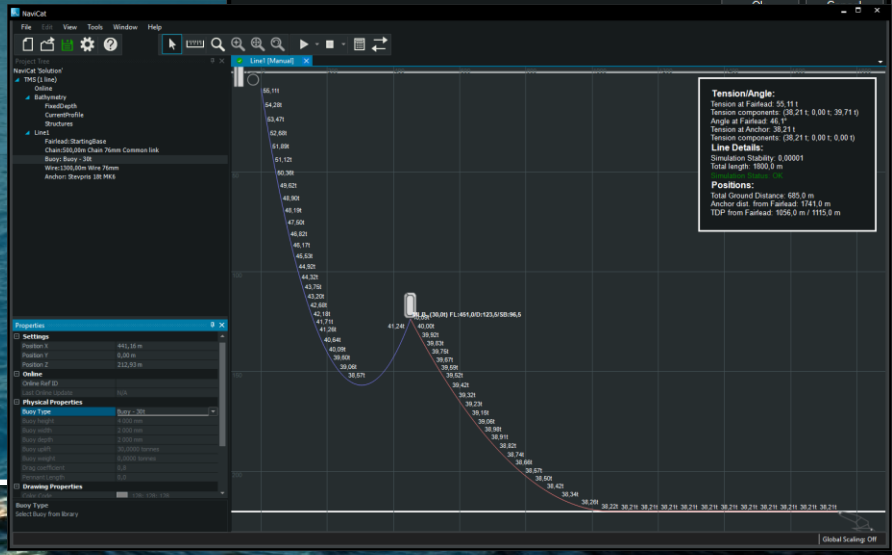
Network Adjustments



Number of transponders coverage

Catenary calculations

- Based on a physics simulation engine, using a material's properties (elasticity, stiffness, drag in water, friction on seabed, weight in water), water currents and vessel position
- Calculates catenary, tensions along lines, touchdown points, cable lengths etc (depending on available information)
- Very fast, 'near instant' results, so very useful both as planning, as re-planning, and for live monitoring

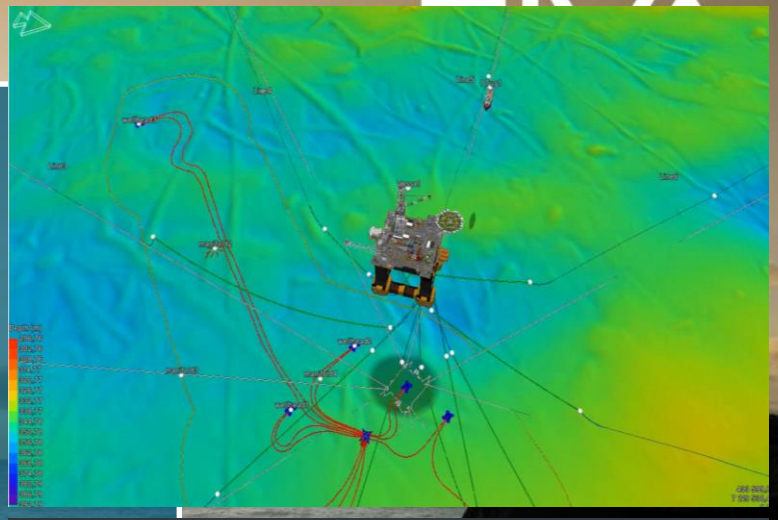


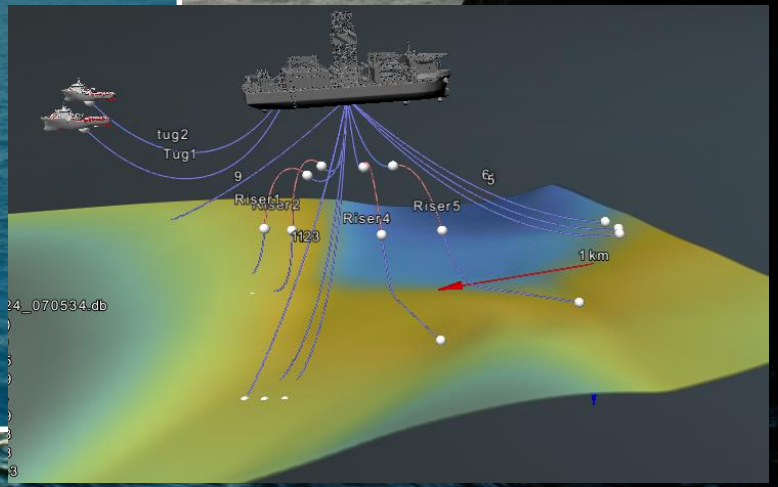
Catenary visualisation

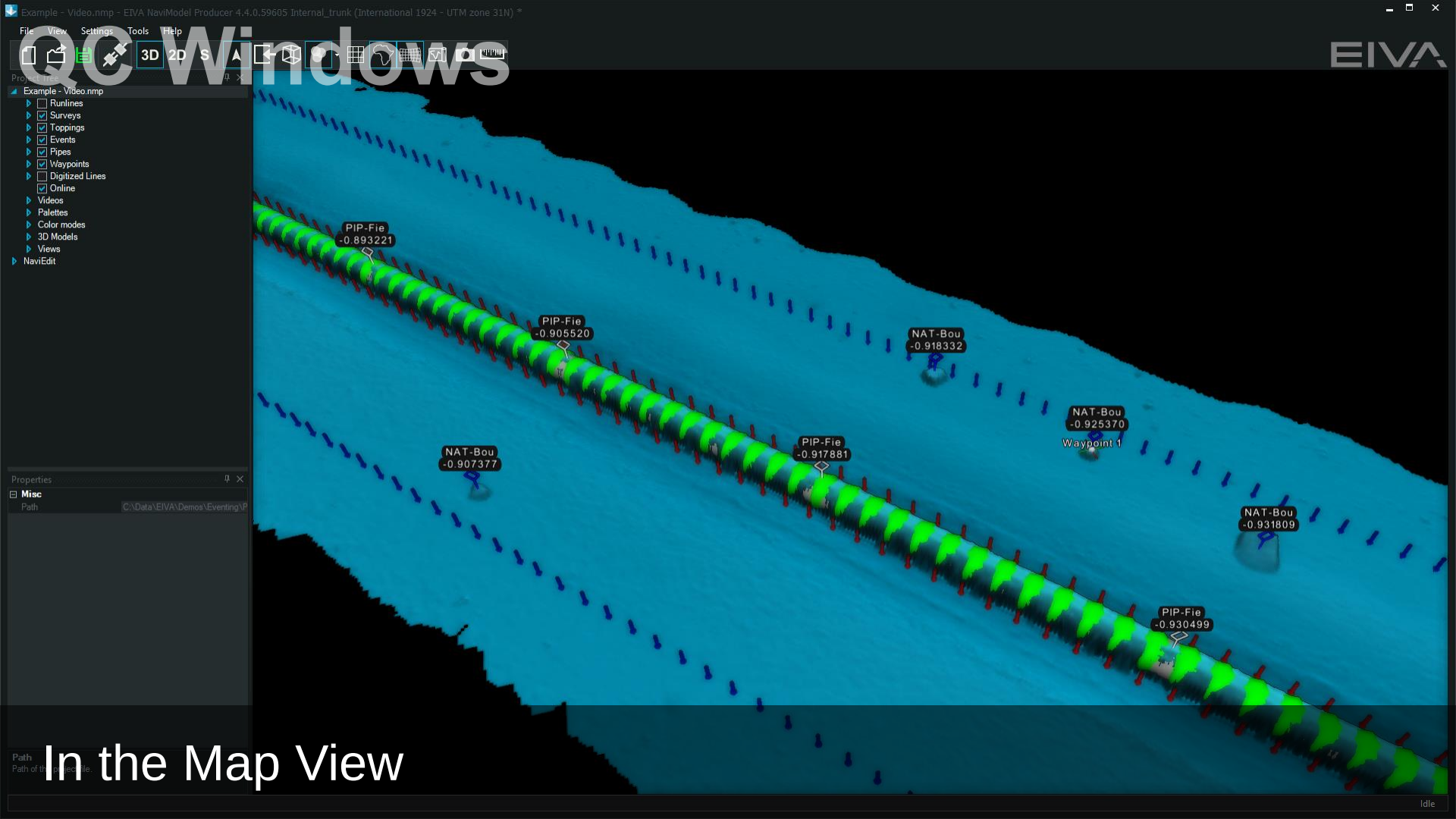
- Catenaries for anchors and risers can all be visualised in 3D together with other site information and live objects positions in NaviModel Analyser

- Visualisation is real time, ie can be connected to a NaviPac server onboard the vessel if required, thereby updating tug and barge positions and recalculating catenaries in real time as vessels moves

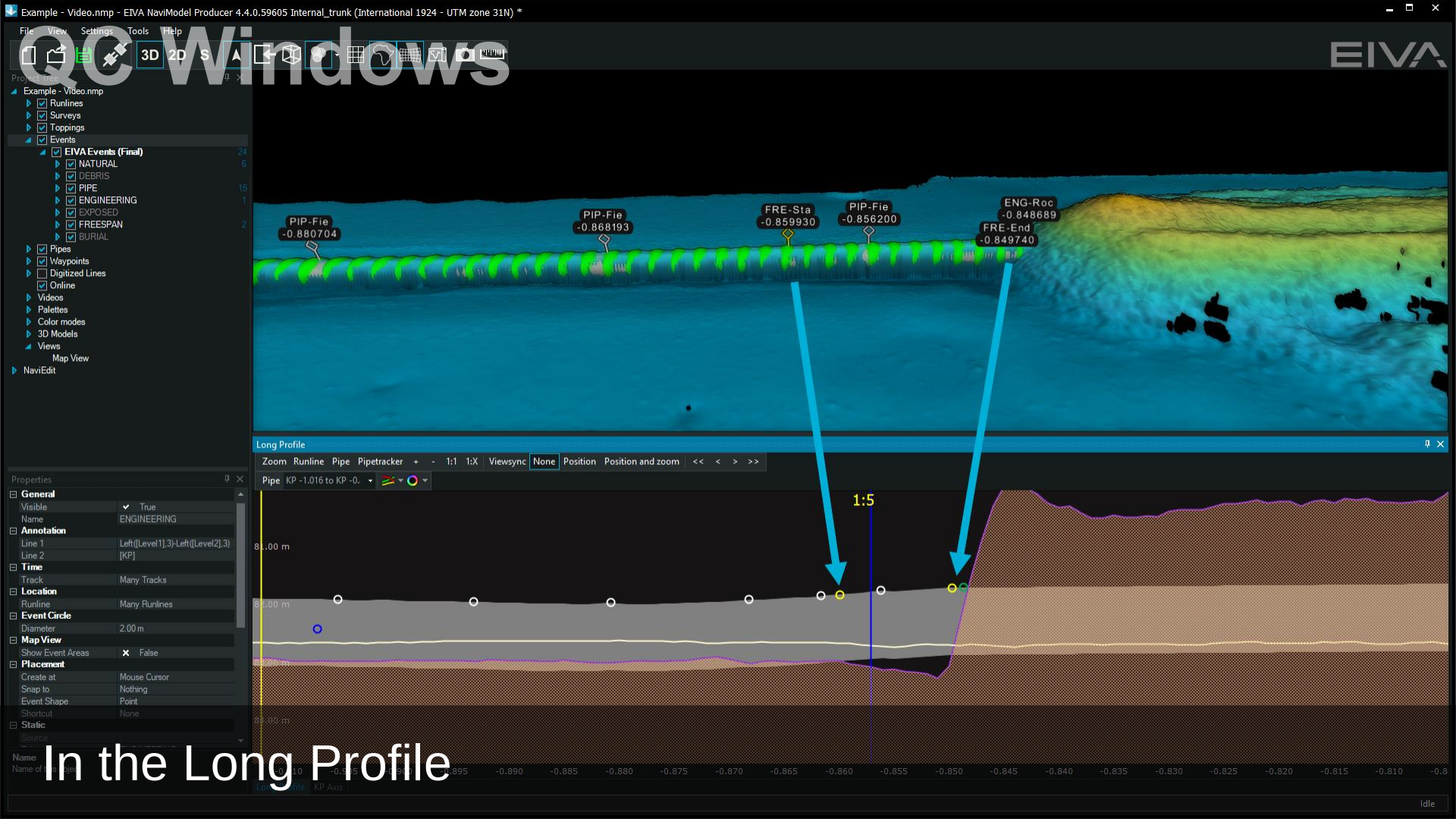
- Calculated catenaries can also be sent to NaviPac on board the vessel for display on bridge etc



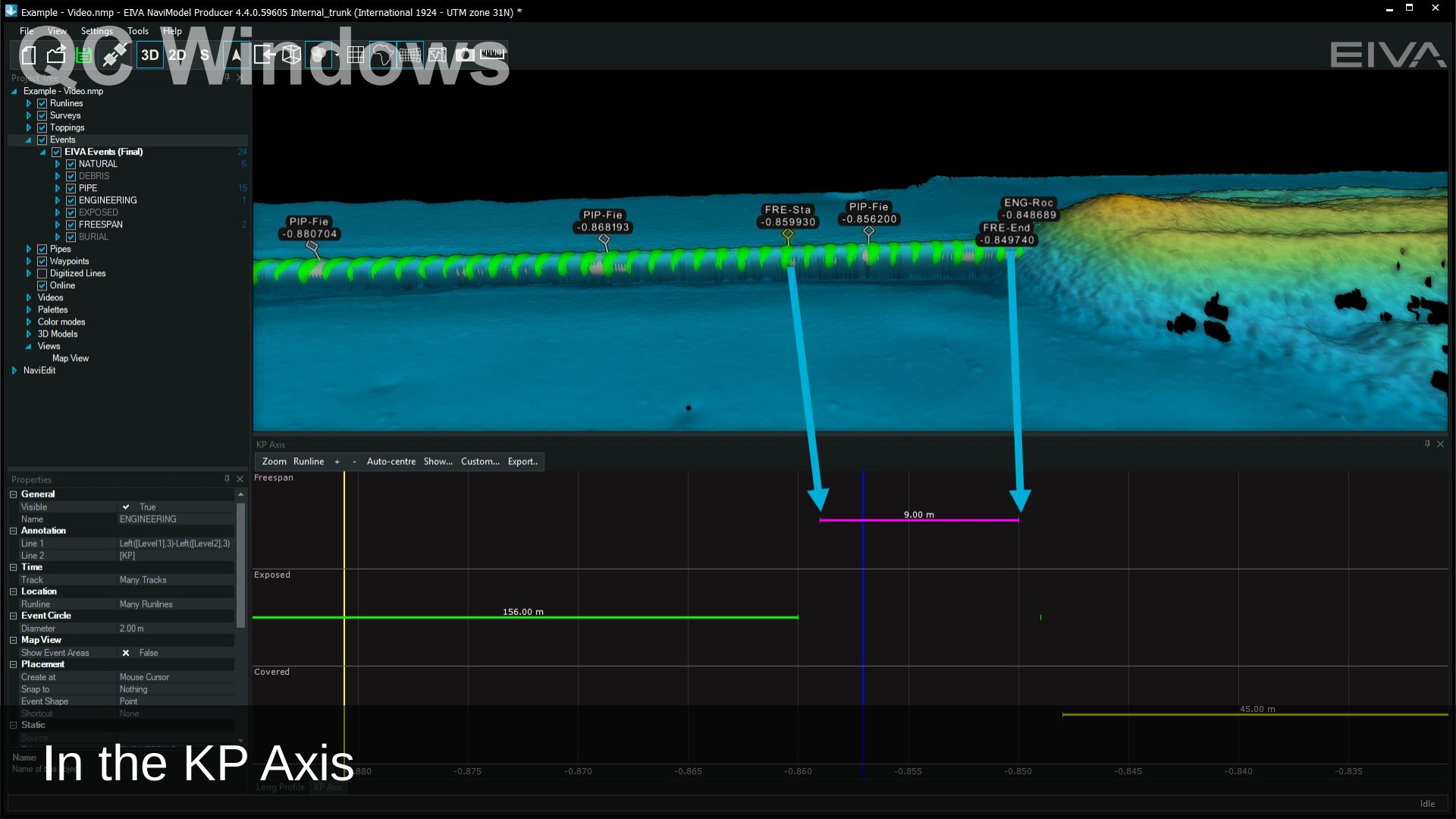




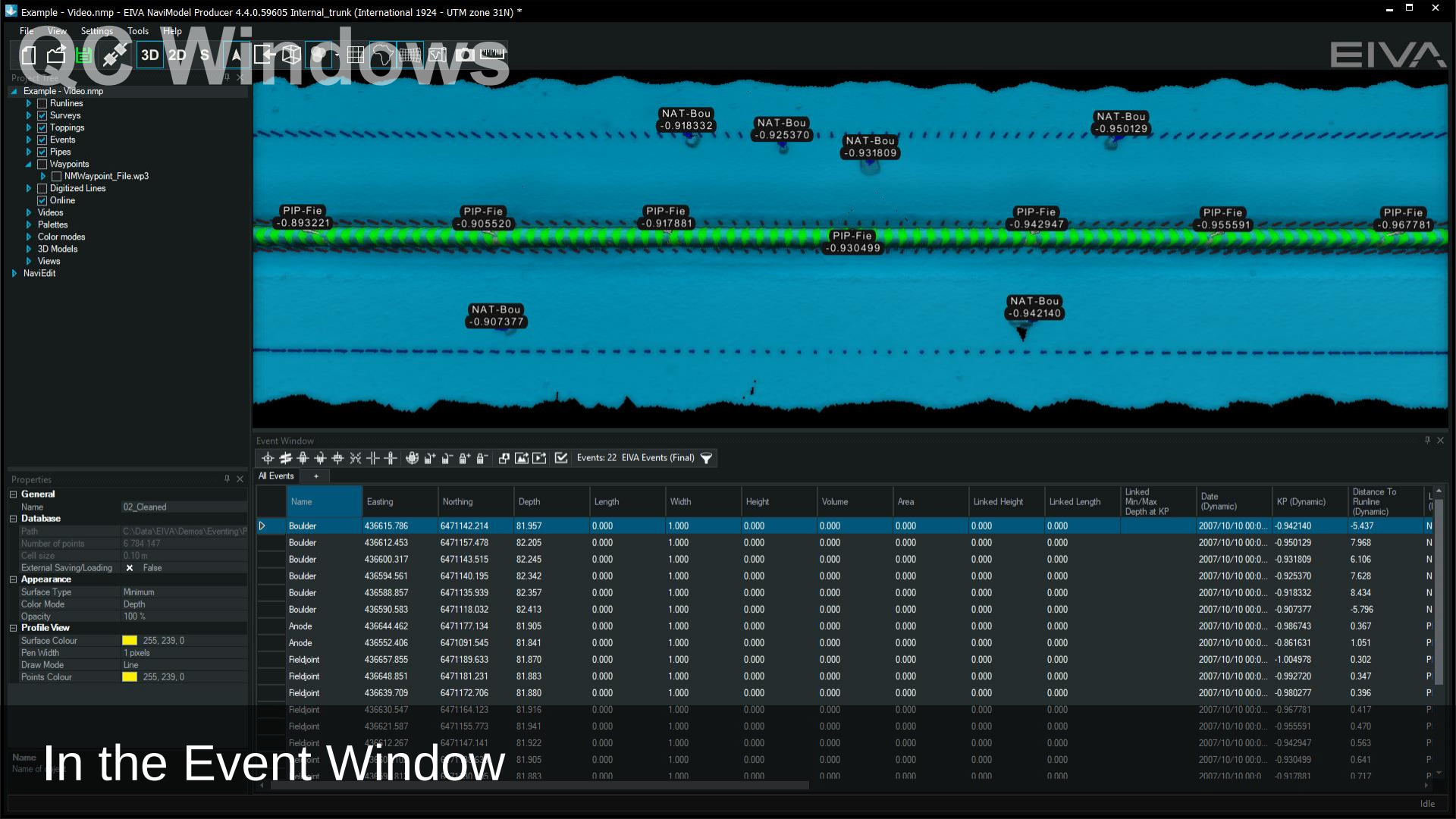
In the Map View

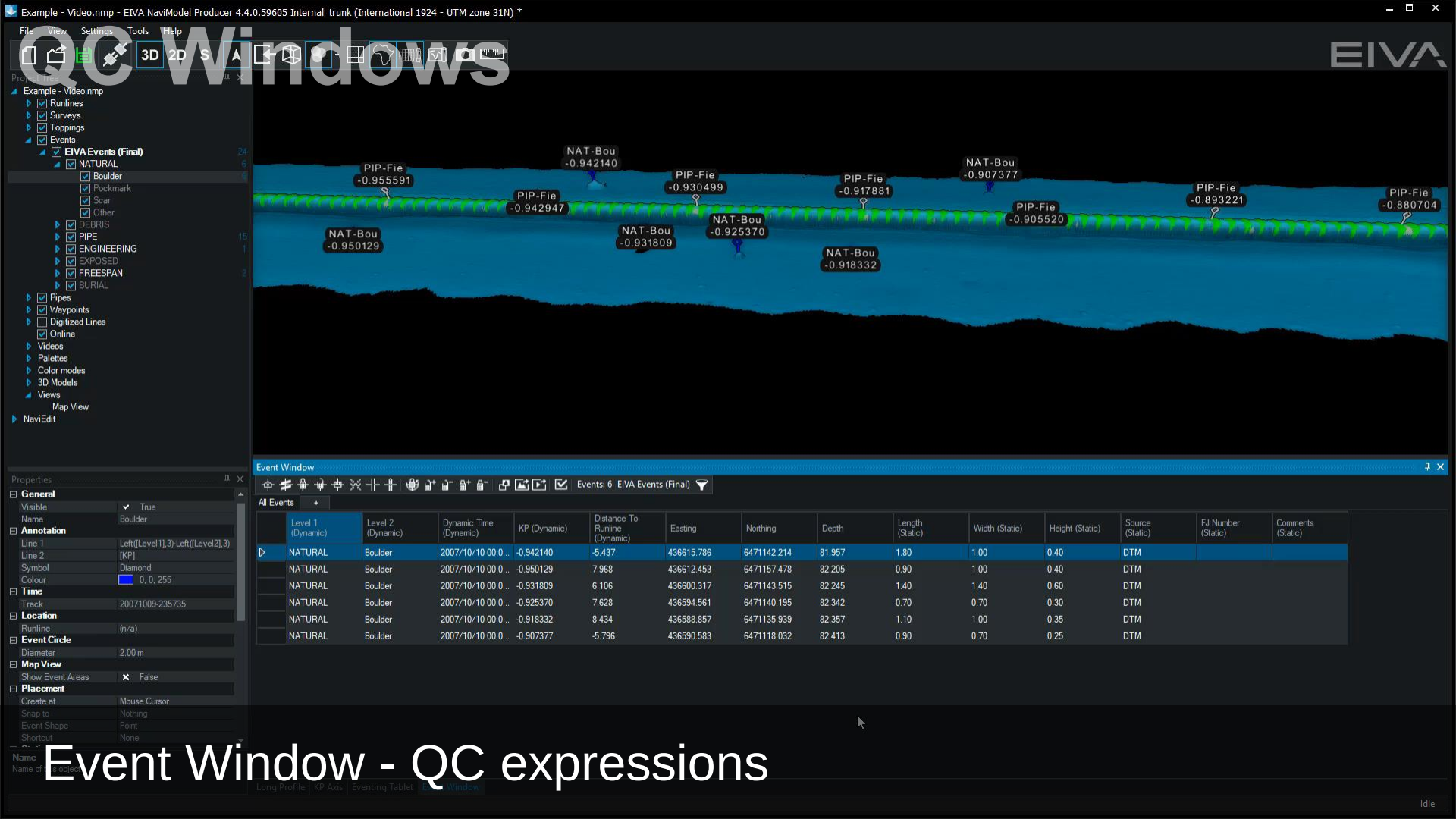


In the Long Profile



In the KP Axis


Example - Video.nmp - EIVA NaviModel Producer 4.4.0.59605 Internal_trunk (International 1924 - UTM zone 31N) *
File View Settings Tools Help
3D 2D
QC Windows
EIVA
Example - Video.nmp
Runlines
Surveys
Toppings
Events
Pipes
Waypoints
NMWaypoint_File.wp3
Digitized Lines
Online
Videos
Palettes
Color modes
3D Models
Views
NaviEdit
NAT-Bou -0.918332
NAT-Bou -0.925370
NAT-Bou -0.931809
NAT-Bou -0.950129
PIP-Fie -0.893221
PIP-Fie -0.905520
PIP-Fie -0.917881
PIP-Fie -0.930499
PIP-Fie -0.942947
PIP-Fie -0.955591
PIP-Fie -0.967781
NAT-Bou -0.907377
NAT-Bou -0.942140
Event Window
Events: 22 EIVA Events (Final)
All Events
Properties
General
Name 02_Cleaned
Database
Path C:\Data\EIVA\Demos\Eventing\P
Number of points 6 784 147
Cell size 0.10 m
External Saving/Loading False
Appearance
Surface Type Minimum
Color Mode Depth
Opacity 100 %
Profile View
Surface Colour 255, 239, 0
Pen Width 1 pixels
Draw Mode Line
Points Colour 255, 239, 0
Name
Name
Boulder 436615.786 6471142.214 81.957 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.942140 -5.437
Boulder 436612.453 6471157.478 82.205 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.950129 7.968
Boulder 436600.317 6471143.515 82.245 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.931809 6.106
Boulder 436594.561 6471140.195 82.342 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.925370 7.628
Boulder 436588.857 6471135.939 82.357 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.918332 8.434
Boulder 436590.583 6471118.032 82.413 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.907377 -5.796
Anode 436644.462 6471177.134 81.905 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.986743 0.367
Anode 436552.406 6471091.545 81.841 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.861631 1.051
Fieldjoint 436657.855 6471189.633 81.870 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -1.004978 0.302
Fieldjoint 436648.851 6471181.231 81.883 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.992720 0.347
Fieldjoint 436639.709 6471172.706 81.880 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.980277 0.396
Fieldjoint 436630.547 6471164.123 81.916 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.967781 0.417
Fieldjoint 436621.587 6471155.773 81.941 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.955591 0.470
Fieldjoint 436612.267 6471147.141 81.922 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.942947 0.563
Fieldjoint 436603.... 6471138.... 81.905 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.930499 0.641
Fieldjoint 436594.... 6471129.... 81.883 0.000 1.000 0.000 0.000 0.000 0.000 0.000 2007/10/10 00:0... -0.917881 0.717
In the Event Window
Idle



Event Window - QC expressions

Compare Event Collections in action

EIVA

MARINE SURVEY SOLUTIONS

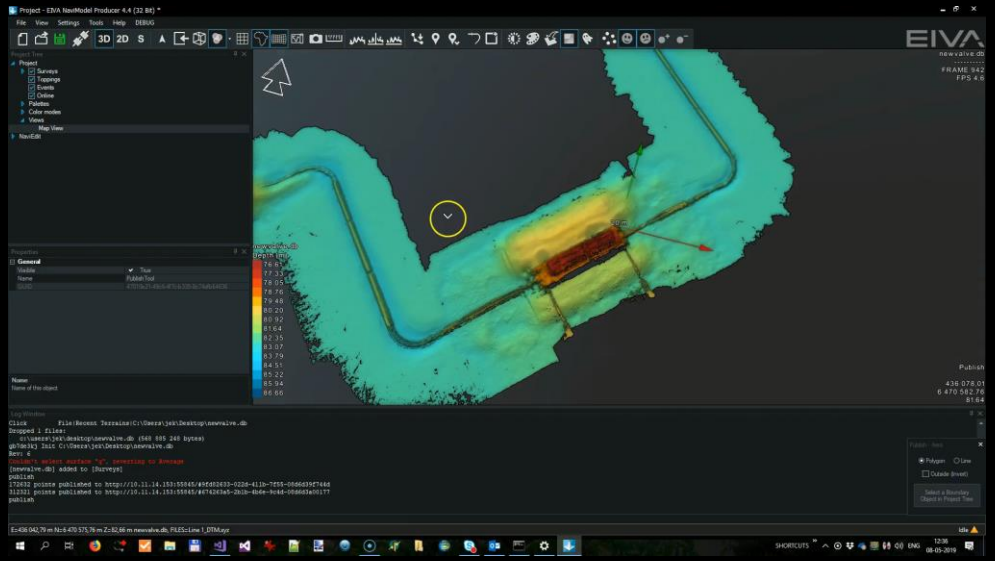
Future Trends

NaviModel Web Viewer

- Thin client, runs in a browser
- No client-side installation, access anywhere

- Project can be published to a web server, i.e. cloud enabled
- No need to move all data

- Proof of concept works on point clouds



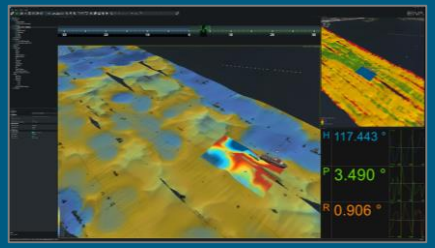
Proof of concept for an EIVA web viewer

AUV Onboard Processing

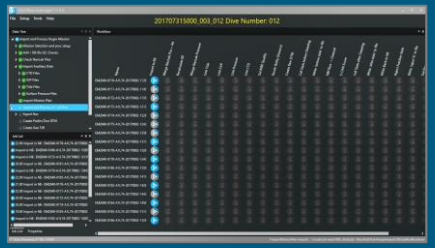
EIVA
MARINE SURVEY SOLUTIONS

NaviSuite Embedded
Payload computer

NaviSuite Machine Learning
Payload computer

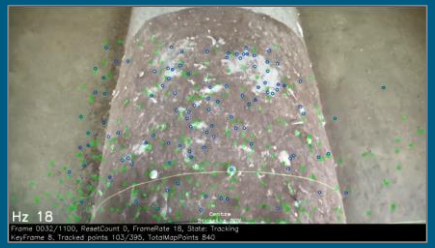


NaviScan
Sonar / Laser acquisition



Workflow Manager
Automated processing

Deep Learning
QC of camera data



VSLAM
Camera tracking

Automation occurring inside all vehicles


QUESTIONS?