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Ocean data, delivered.

Automating Hydrographic Data Collection while still maintaining regulatory compliance using Uncrewed Surface Vessels

Duncan Mallace/Benoît Poyelle – XOCEAN - Hydro 2022

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INTRODUCTION

Data as a **Service**

Using Uncrewed Surface Vessels (USVs), XOCEAN offers data collection services to Surveyors, Companies and Agencies.

- Fixed Price, Turnkey Service
- Data Delivery & Quality Guarantees

SAFETY

No Offshore Personnel

ENVIRONMENT

Carbon Neutral Data

ECONOMIC

Significant Savings

Highly **differentiated** value proposition

Hornsea:
World's largest offshore wind farm supplying 2.5M homes

Örsted

Traditional Method

- **Safety:** Large crew offshore
- **Emissions:** Significant emissions
- **Business Model:** High day rates

XOCEAN Solution: USV

- **Safety:** No personnel offshore
- **Emissions:** 1,000x lower
- **Business Model:** Data as a Service

World class customers, with offices and deployments across 18 markets

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Over **150 projects** across **18 jurisdictions** internationally.

International offices in Ireland, US, Canada, UK, Norway and Australia.

PGS
ROVCO
SHEARWATER
Shell
RWE
FUGRO
MPI Offshore

Örsted
innogy
sse Renewables
DTC
Simply Blue Group
px
PERENCO
HORIZON MARITIME

DEEPOCEAN
VATTENFALL
REACH SUBSEA
Harbour Energy
MMT
IIC TECHNOLOGIES
Fisheries and Oceans Canada
Pêches et Océans Canada

bp
Sonardyne SOUND IN DEPTH
Clearwater
TOTAL
Foras na Mara Marine Institute
Briggs
Seadrill

5

The **environment** and **sustainability** at our core

ENVIRONMENT: Over the next 5 years, we will displace the emission of one million tons of carbon

ENVIRONMENT: Over the next decade, we will support the development of over 100 gigawatts of offshore wind.

SAFETY: In the next 5 years, we will avoid over 5 million seafarer exposure hours

GENDER BALANCE: Over the next decade we will operate at more than triple the IMO average for seafarers

International Day for **Women in Maritime**

Leading an **employment revolution** in the maritime industry

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ALTERNATE CAREER PATHS:
Route for offshore operatives to come ashore.

REMOTE FIRST:
Access to the best talent globally through remote operations.

GENDER:
Unlocking talent through operating at 31x the industry average.

HEADCOUNT

■ 2020   ■ 2021   ■ 2022

- 2020: 43
- 2021: 102
- 2022: 192
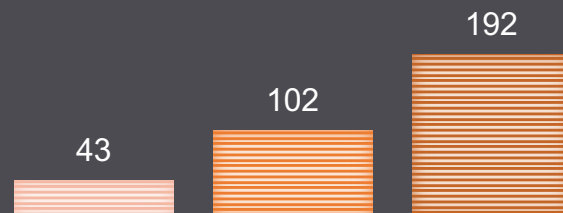
We operate the **largest fleet** of **survey class USVs**

World largest fleet of uncrewed survey vessels

- X-25 in production, new build every 4 weeks.

- Over 70,000 hours of system operation. 1.4PB of data collected.

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SURVEY AUTOMATION

Vertically integrated **acquisition** and **data analytics** platform

WORKFLOW

XOCEAN CyberDeck
Cloud hosted command & control platform

1.4 Petabytes

XOCEAN CyberDrive
Cloud data processing & analytics platform (AWS)

USV Pilot

Hydrographic Surveyor

Data

SURVEY AUTOMATION

10
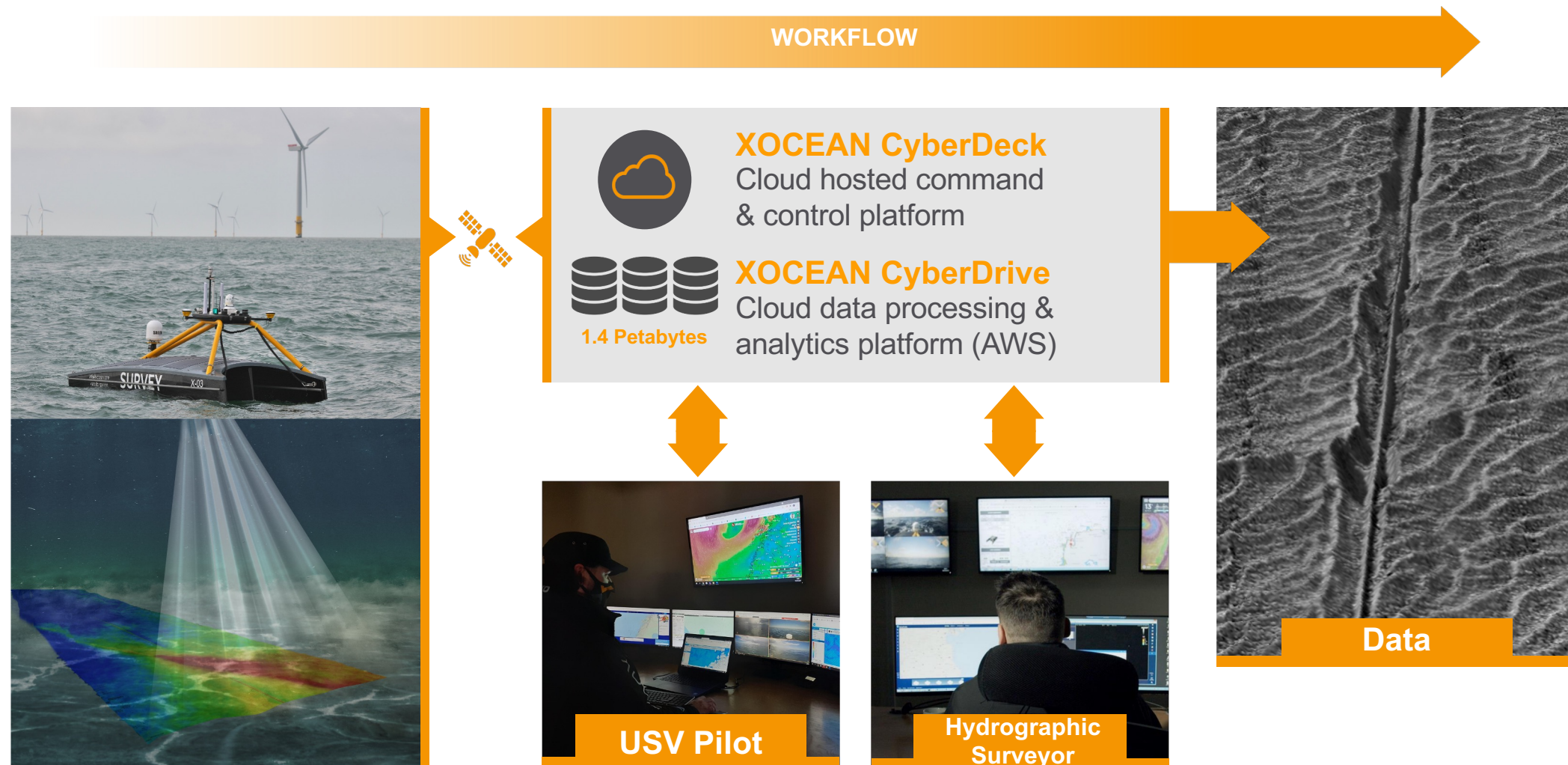
Dynamically working to the seabed

SURVEY AUTOMATION

AUTOMATICALLY GENERATED SURVEY LINES:
Line generated by monitoring swath width and feeding it to the autopilot.

AUTOMATIC NEXT LINE & START/STOP LOGGING:
A series of pre-defined lines can be run.

DEPTH & PROXIMITY ALARMS & ACTIONS:
USV automatically stops when it gets to a certain depth or distance from seabed or feature.
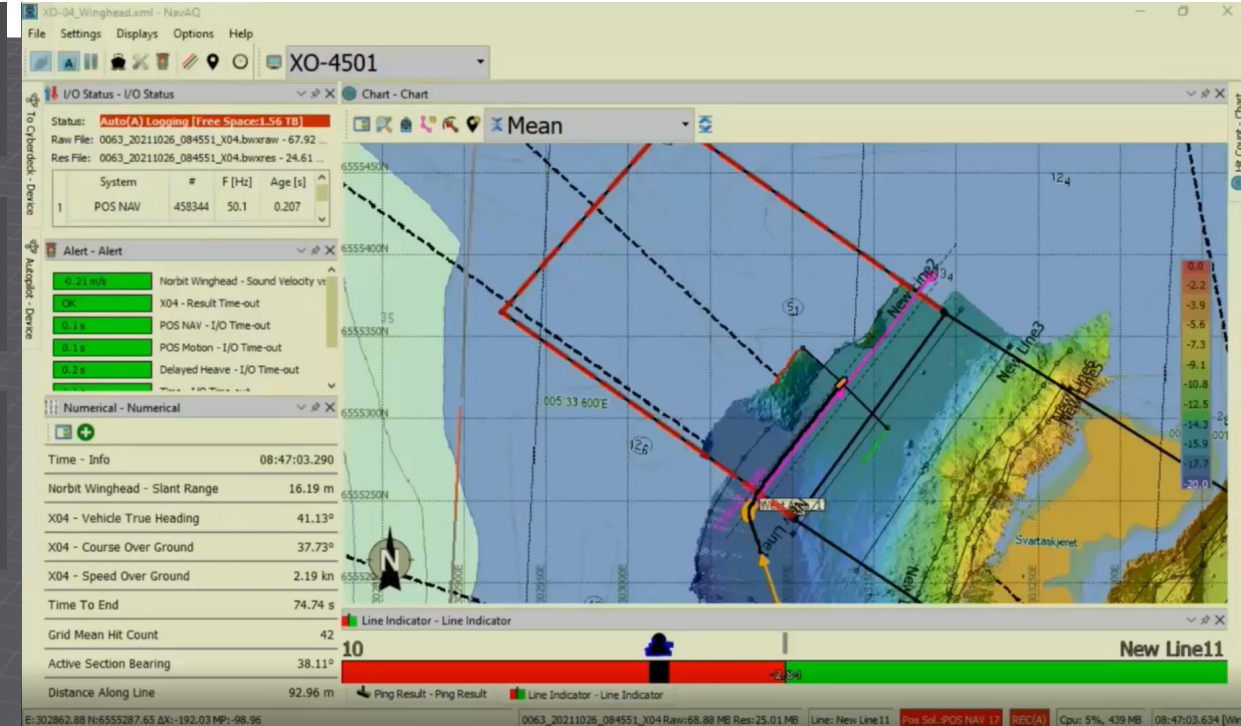
Adjusting to the data

SURVEY AUTOMATION

SURVEY SPECIFICATION DEFINED:
Every survey has a sounding density & overlap requirement.

CONTINOUSLY MONITOR DATA WITHIN CELLS:
Data being fed from the acquisition software to app which monitors soundings in cells and outputs metrics.

ADJUST EITHER SONAR OR USV:
Swath or vessel speed can be automatically adjusted to ensure specification is matched at all times. Critical to link with USV Command & Control.

150°

Below Specification = Potential Extreme Cost

Goldilocks Zone

Above Specification = Inefficient survey + increased post-processing cost (data storage, processing time, transmission time)

100°

Swath angle

0 kt   Speed   8 kt
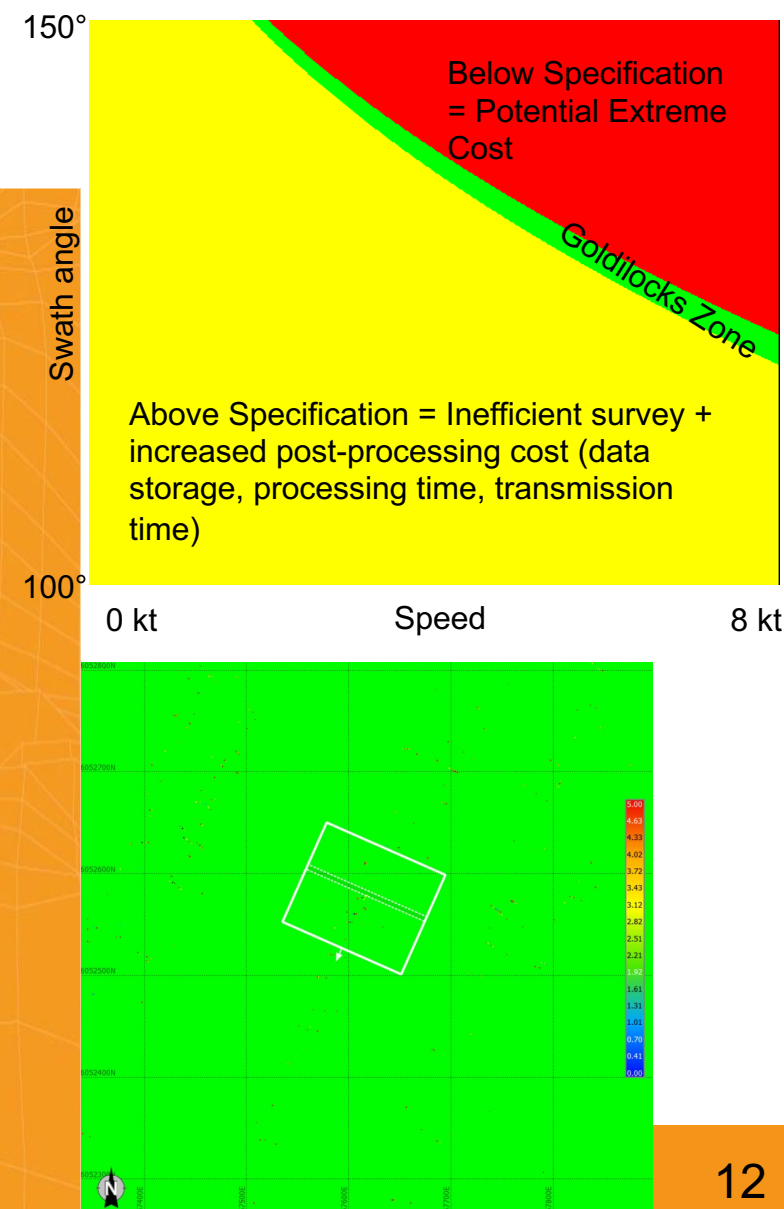
Automating the progress

EACH SURVEY HAS A BUDGET:

Accurate progress reporting is required for sound business practice. When operating multiple USVs on a single project it is vitally important to know the project progress accurately.

SURVEY INFORMATION AUTOMATICALLY UPLOADED TO AZURE:

Traditional survey log information such as start/stop logging, USV speed..

SURVEY METRICS AVAILABLE TO EVERYONE IMMEDIATELY:

Survey data in company wide QGIS projects & on CyberDeck.

Automating the progress

Soon:
Web based survey log -> POSTSQL DB
Data fusion with GIS data
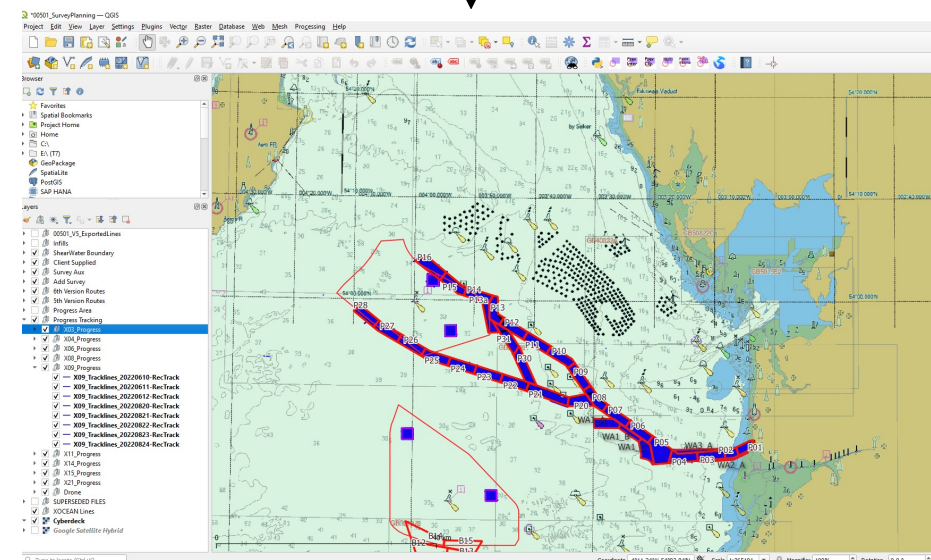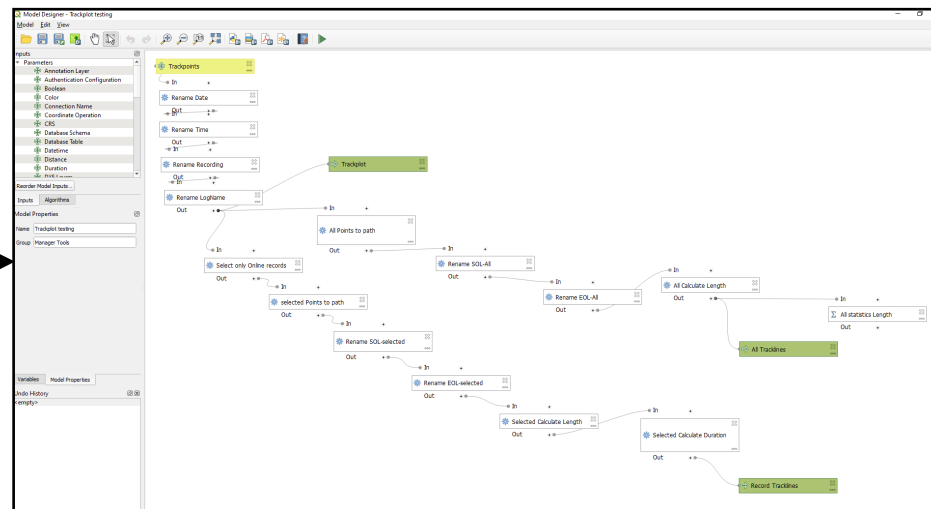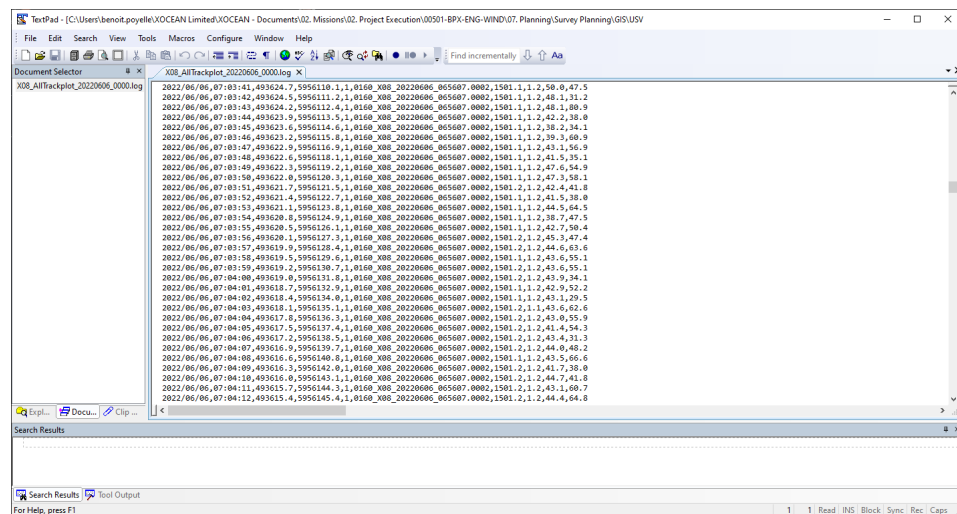
Automating the progress

Soon:

Ascii Log -> PostGIS DB -> Geoserver -> real time tracking/display available to all with WMS/WFS
- QGIS
- Cyberdeck
- BeamworX suite
- Global mapper

Processing the data on the USV

REALTIME XYZ COMPUTED FOR EACH BEAM:
Using accurate GNSS & refraction corrections.

FILES AUTOMATICALLY IMPORTED:
When a file is closed, it automatically gets imported to AutoClean.

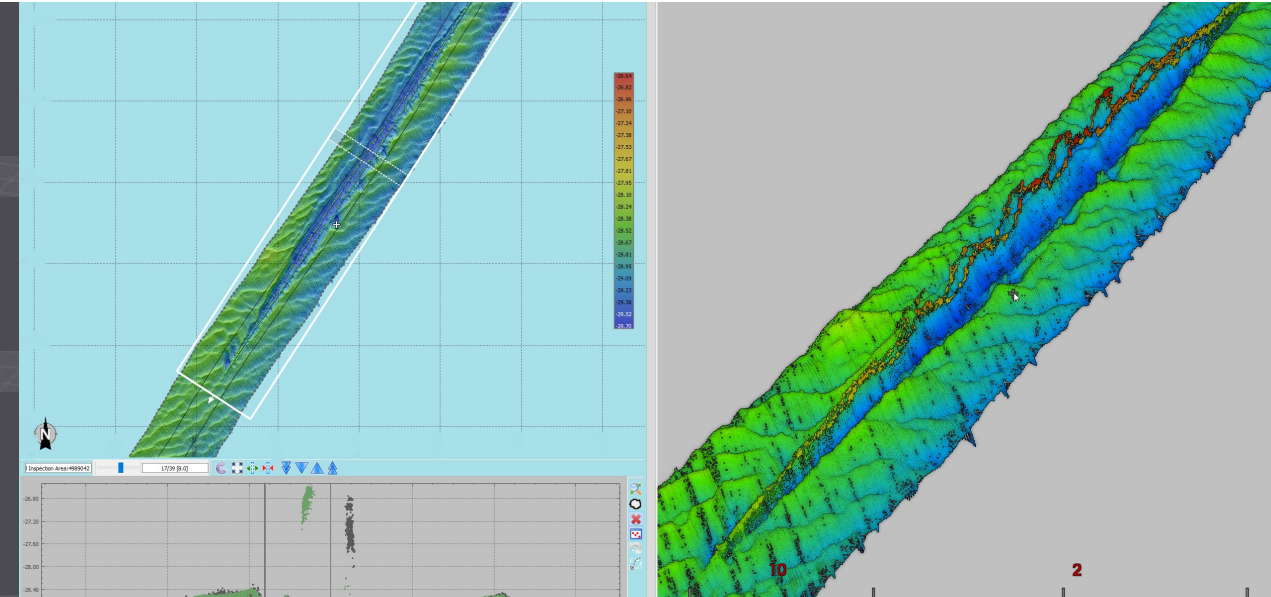**DTM UPDATED & METRICS UPDATED:**
DTM is automatically updated and sounding density/standard deviation computed for each new or updated cell.

INITIAL FILTERING:
The bathymetric data can be filtered once imported to remove most major outliers.

BACKSCATTER PROCESSING:
Initial backscatter processing performed on import. Full processing can be achieved at certain intervals manually.

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