

A large-scale offshore wind farm is shown in a blue-tinted, hazy atmosphere. The wind turbines are arranged in a grid pattern across the ocean. The foreground features a prominent, detailed view of a single turbine, showing its three blades and the tower structure. The background shows several other turbines receding into the distance, creating a sense of depth and scale.

Cloud and AI Technologies are Revolutionizing Hydrography

The cloud-native TrueOcean platform

Our mission is to continuously advance people's ability to access, visualise, and use their ocean and geospatial data.



Founded in 2011



Ocean Big Data Specialists



+65 employees



Megatrends



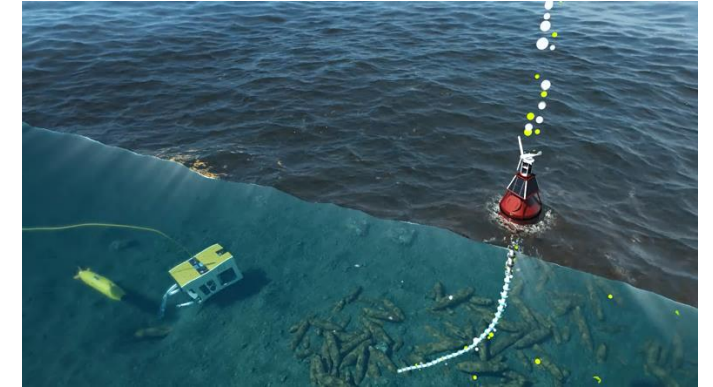
Industrialisation

Expansion of renewable energies and underwater infrastructures



Autonomy

Autonomous systems and new generations of sensors



Connectivity

Connectivity increases and allows smarter data workflows

Challenges with Ocean Data



Growing amount



File formats



Finding data



Visualization



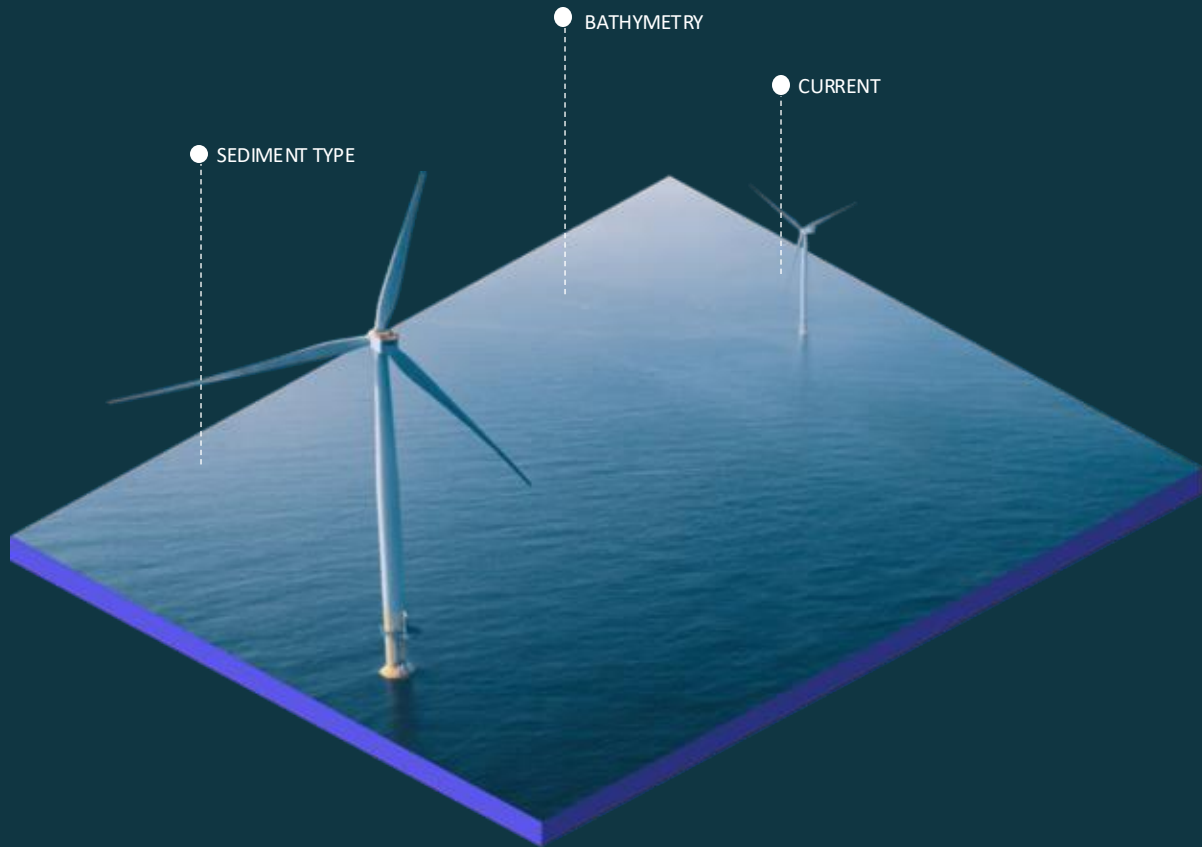
Collaboration



Information

Our solution: TrueOcean

Implementing new technologies like cloud computing, big data and AI is crucial for successfully handling complex underwater data today and in the future.



Managing petabytes of ocean data

Cloud-agnostic technology development

Ingesting and standardizing raw sensor data

Integration of big data technologies and AI

Sample Files October 2024

Info **Files** Uploads 4 Shares External sources Users

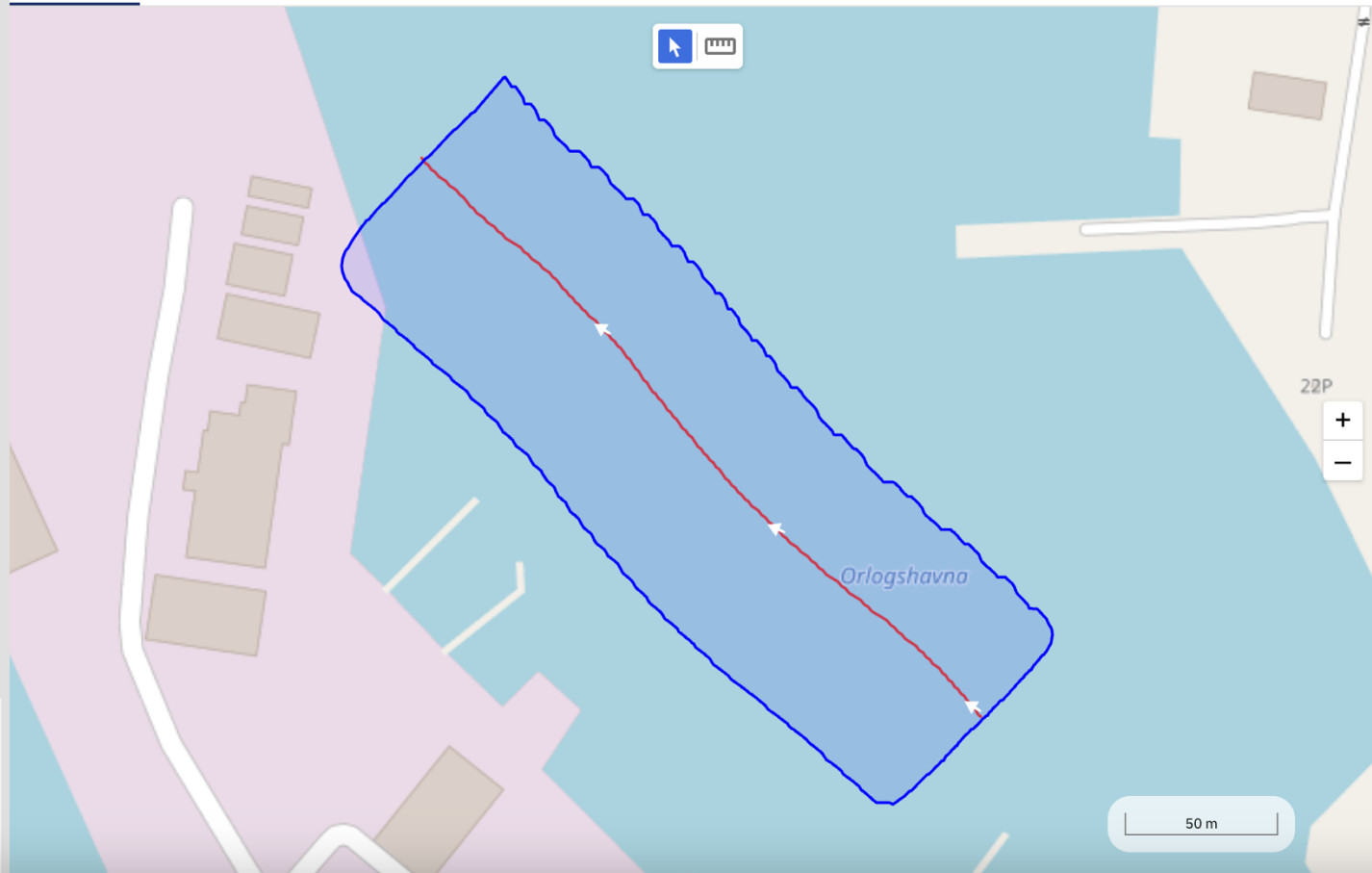
Sample Files October 2024

- > Documents
- > Images
- > Multi Beam Echo Sounder
- > Navigation and GPS
- > Pointclouds
- > Seismic
- ▼ Side Scan Sonar
 - ▼ jsf
 - 153057.jsf
 - 153457.jsf
 - 153918.jsf
 - 20181106123506.jsf
 - 20190822101044.jsf
 - 20190822101044_ok.jsf
 - 20190823182032.jsf
 - VHN_SUR_06...0558-U.jsf
 - > sdf
 - > sds
 - > xtf
- > Sound Velocity Profiles
- > Tables & Spreadsheets

Sample Files October 2024 > Side Scan Sonar > jsf > 153057.jsf

Add to Map Share Manage WMS

Overview **Metadata** Table Preview



Metadata

File Information

SONAR	
Type	SSS
Model	
DATAGRAMS	
N MEASring	167
Navigation Offsets	1
Pitch Roll Data	1,729
Pressure Sensor Reading	4,157
Sonar Data	11,992
System Information	1
Data Format	
one short per sample, envelope data	
Endianness	LE
Format Revision	rev 10
Number Of Channels	2
Number Of Samples	6,3
Sample Interval	0
Sampling Frequency	54.656

- ☰
- Home
- Maps
- Projects
- Uploads
- Shares
- Logs
- JW

Sample Files October 2024

Info **Files** Uploads 4 Shares External sources Users

Sample Files October 2024

Sample Files October 2024 > Side Scan Sonar > jsf > 153057.jsf

Add to Map Share Manage WMS

Overview Metadata Table **Preview**



- > Documents
- > Images
- > Multi Beam Echo Sounder
- > Navigation and GPS
- > Pointclouds
- > Seismic
- ▼ Side Scan Sonar
 - ▼ jsf
 - 153057.jsf
 - 153457.jsf
 - 153918.jsf
 - 20181106123506.jsf
 - 20190822101044.jsf
 - 20190822101044_ok.jsf
 - 20190823182032.jsf
 - VHN_SUR_06...0558-U.jsf
 - > sdf
 - > sds
 - > xtf
- > Sound Velocity Profiles
- > Tables & Spreadsheets

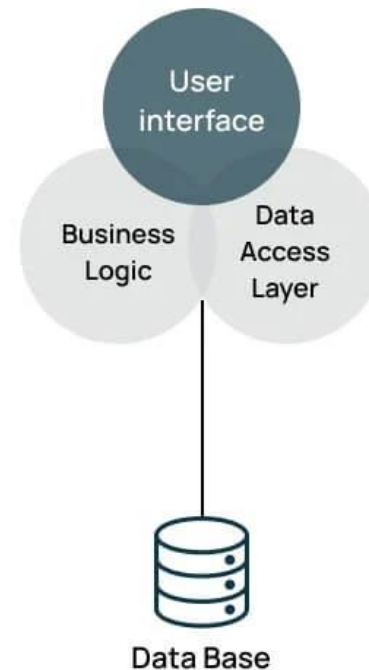


Architecture

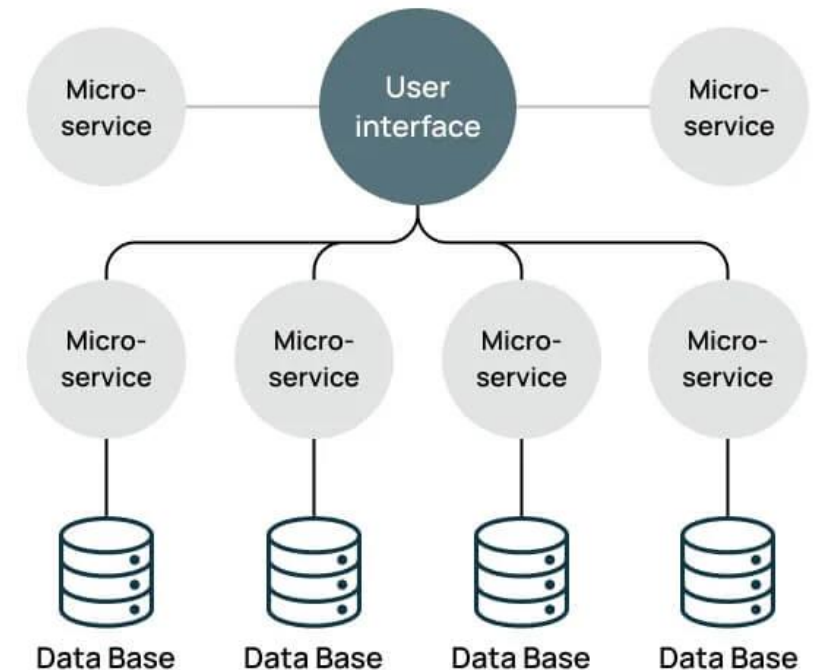
Background

- Cloud-agnostic architecture which allows the technology to be used everywhere
- Focus on the decoupling of components and horizontal scalability
- Development of Kubernetes-based Apache Spark for large-scale data processing
- Use of special file formats for efficiency, scalability and future viability

Monolithic Architecture



Microservice Architecture



File Formats

Why do we need new approaches?

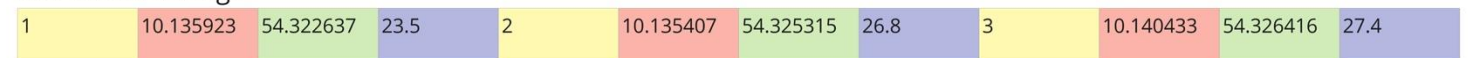
- Binary data formats and scalable cloud computing simply does not work
- Transforming hydrographic data into cloud-native columnar data structures
- Optimizing data structures and for cloud environments and distributed computing
- Allows the scalability of computing by specifically designed algorithms



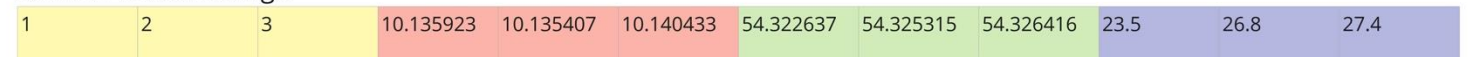
example data

ID	LONG	LAT	ELEVATION
1	10.135923	54.322637	23.5
2	10.135407	54.325315	26.8
3	10.140433	54.326416	27.4

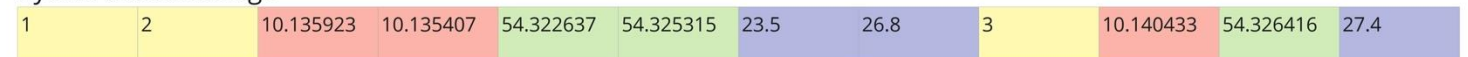
row-based storage



column-based storage



hybrid-based storage



Parquet file



Supported Domains

Multibeam

GSF, XTF, ALL, KMALL, S7K, JSF,
R2Sonic, XSE, SeaBeam, QPD, FAU

Side Scan Sonar

XTF, JSF, SDF, SDS, S7K, SON,
CODA, SBD

Subbottom Profiler

XTF, JSF, SDF

Seismic

SEGY, SEGD

Raster/Vector

SHP, GDB, GeoJSON, KML, GeoTiff,
JPG, PNG, ASC

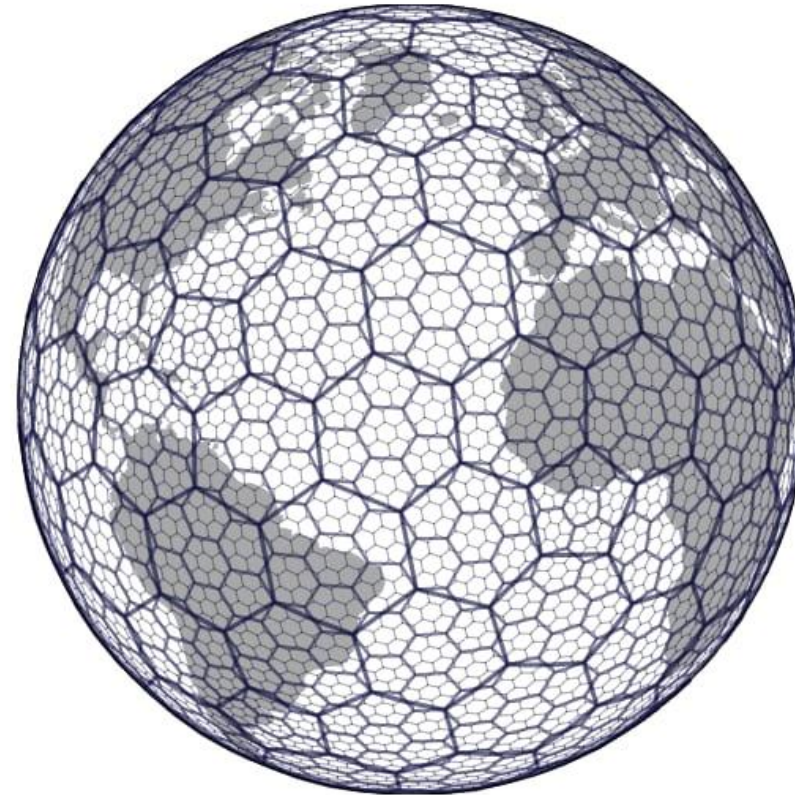
Other

LAS, LAZ, PTS, ASC, XYZ, TXT, CSV,
AGS, XLSX, DOCX, PDF, XML, S12,
UKOOA, MOV, MP4, WEBM, BMP,
JPG, PNG, WCD, RAW

Geoindexing

Background

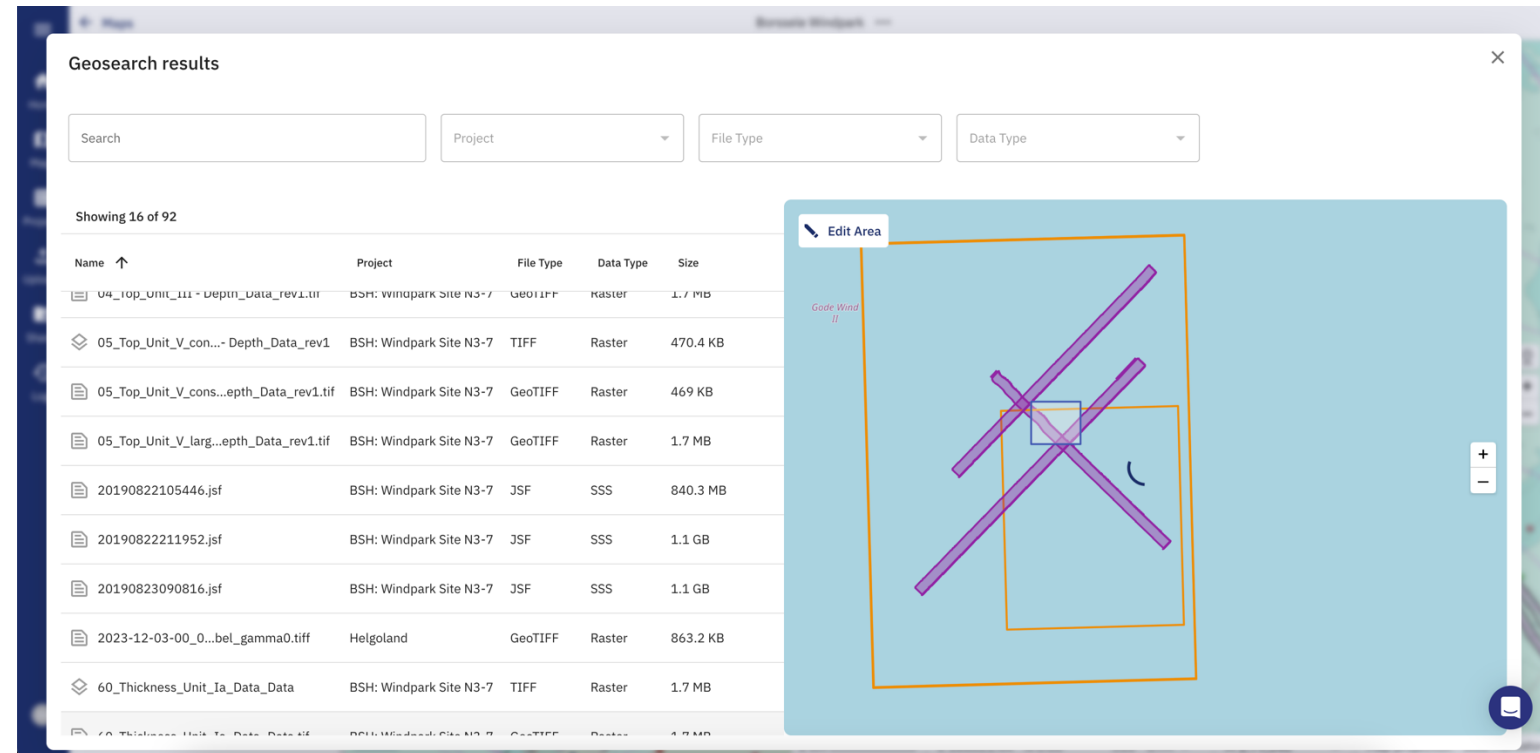
- Usage of Hexagons instead of square grids for equal-distance neighbor relationships
- Multi-resolution approach scalable from global to local levels
- High efficiency and speed by finding neighbors and being able to cluster data
- Great data storage efficiency useful for storing and managing large-scale datasets



Geoindexing

Background

- Geospatial search capability integrated into the TrueOcean platform technology
- Parsing the raw sensor data and applying a highly adapted and efficient version of the fast-marching algorithm
- Using geospatial search functionality inside application of via API-based approaches

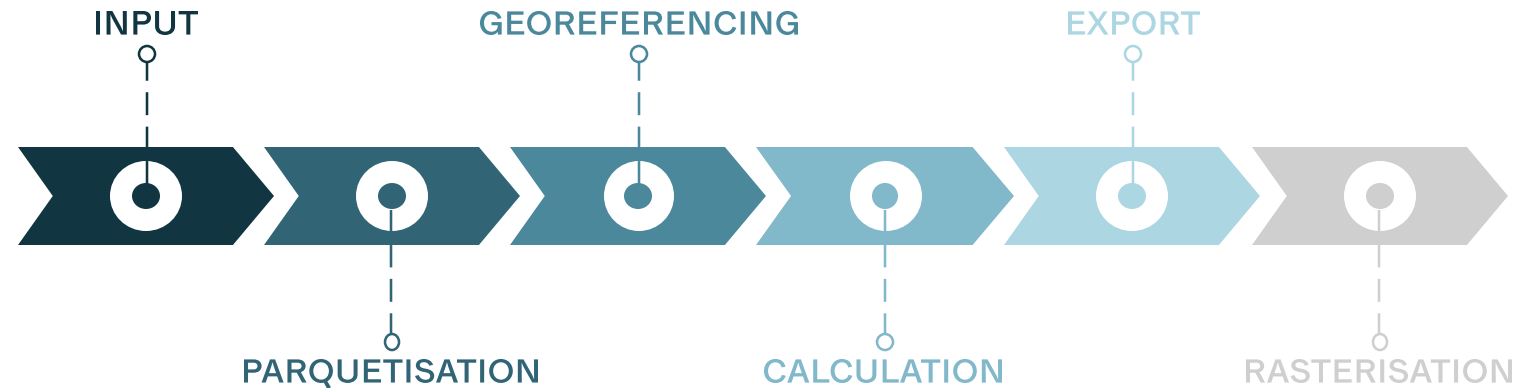


The screenshot displays a web application interface for geospatial search. At the top, there is a search bar and several filter dropdowns labeled 'Project', 'File Type', and 'Data Type'. Below the search bar, it indicates 'Showing 16 of 92' results. A table lists the search results with columns for Name, Project, File Type, Data Type, and Size. To the right of the table is a map view with an 'Edit Area' button and a zoom control. The map shows a blue area with a yellow rectangle and a purple 'X' shape overlaid on it.

Name	Project	File Type	Data Type	Size
04_Top_Unit_V...-Depth_Data_rev1.tif	BSH: Windpark Site N3-7	GeoTIFF	Raster	1.7 MB
05_Top_Unit_V_cons...-Depth_Data_rev1	BSH: Windpark Site N3-7	TIFF	Raster	470.4 KB
05_Top_Unit_V_cons...epth_Data_rev1.tif	BSH: Windpark Site N3-7	GeoTIFF	Raster	469 KB
05_Top_Unit_V_larg...epth_Data_rev1.tif	BSH: Windpark Site N3-7	GeoTIFF	Raster	1.7 MB
20190822105446.jsf	BSH: Windpark Site N3-7	JSF	SSS	840.3 MB
20190822211952.jsf	BSH: Windpark Site N3-7	JSF	SSS	1.1 GB
20190823090816.jsf	BSH: Windpark Site N3-7	JSF	SSS	1.1 GB
2023-12-03-00_0...bel_gamma0.tiff	Helgoland	GeoTIFF	Raster	863.2 KB
60_Thickness_Unit_Ia_Data_Data	BSH: Windpark Site N3-7	TIFF	Raster	1.7 MB
60_Thickness_Unit_Ia_Data_Data.tif	BSH: Windpark Site N3-7	GeoTIFF	Raster	1.7 MB

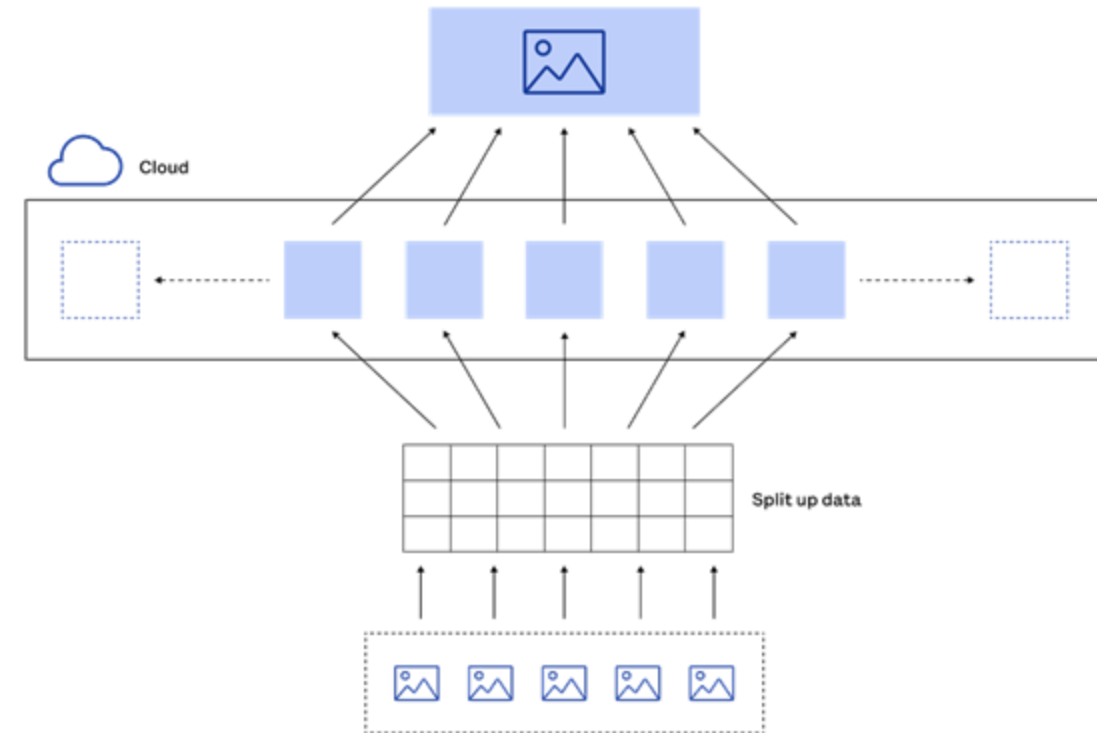
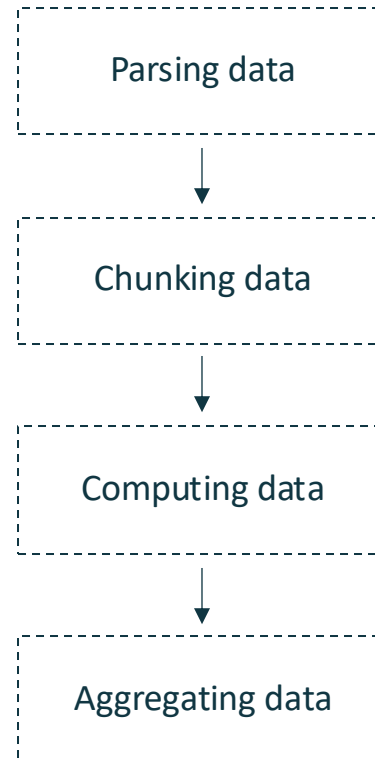
Background

- Computing of hydrographic and geospatial data is done classically on desktop systems
- Processing is heavily time consuming and often conducted in semi-manual approaches
- Scalability is only possible to achieve by vertical resource adaption
- TrueOcean is introducing a new paradigm of processing hydrographic and geospatial data

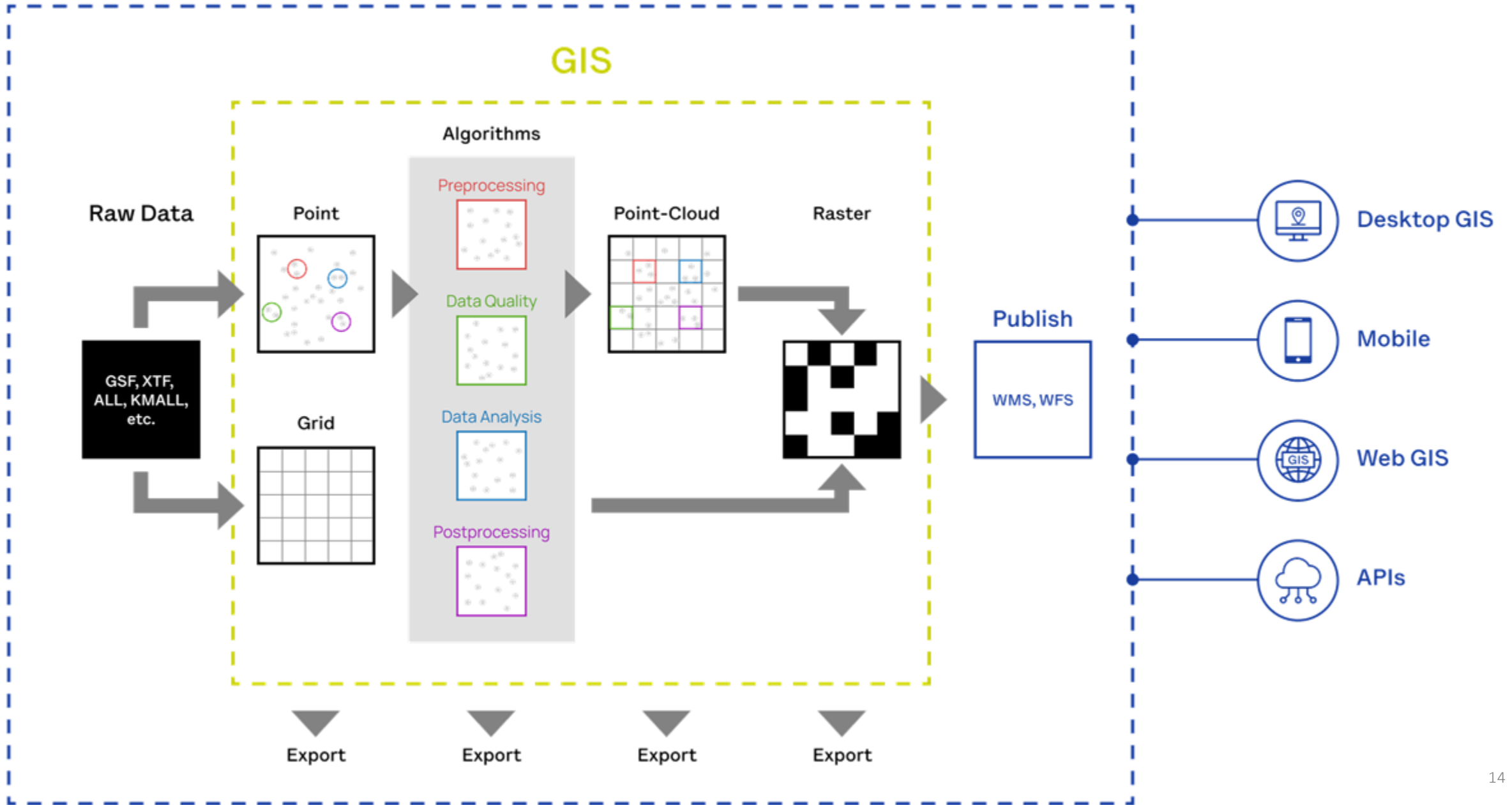


Background

- Computing of hydrographic and geospatial data is done classically on desktop systems
- Processing is heavily time consuming and often conducted in semi-manual approaches
- Scalability is only possible to achieve by vertical resource adaption
- TrueOcean is introducing a new paradigm of processing hydrographic and geospatial data



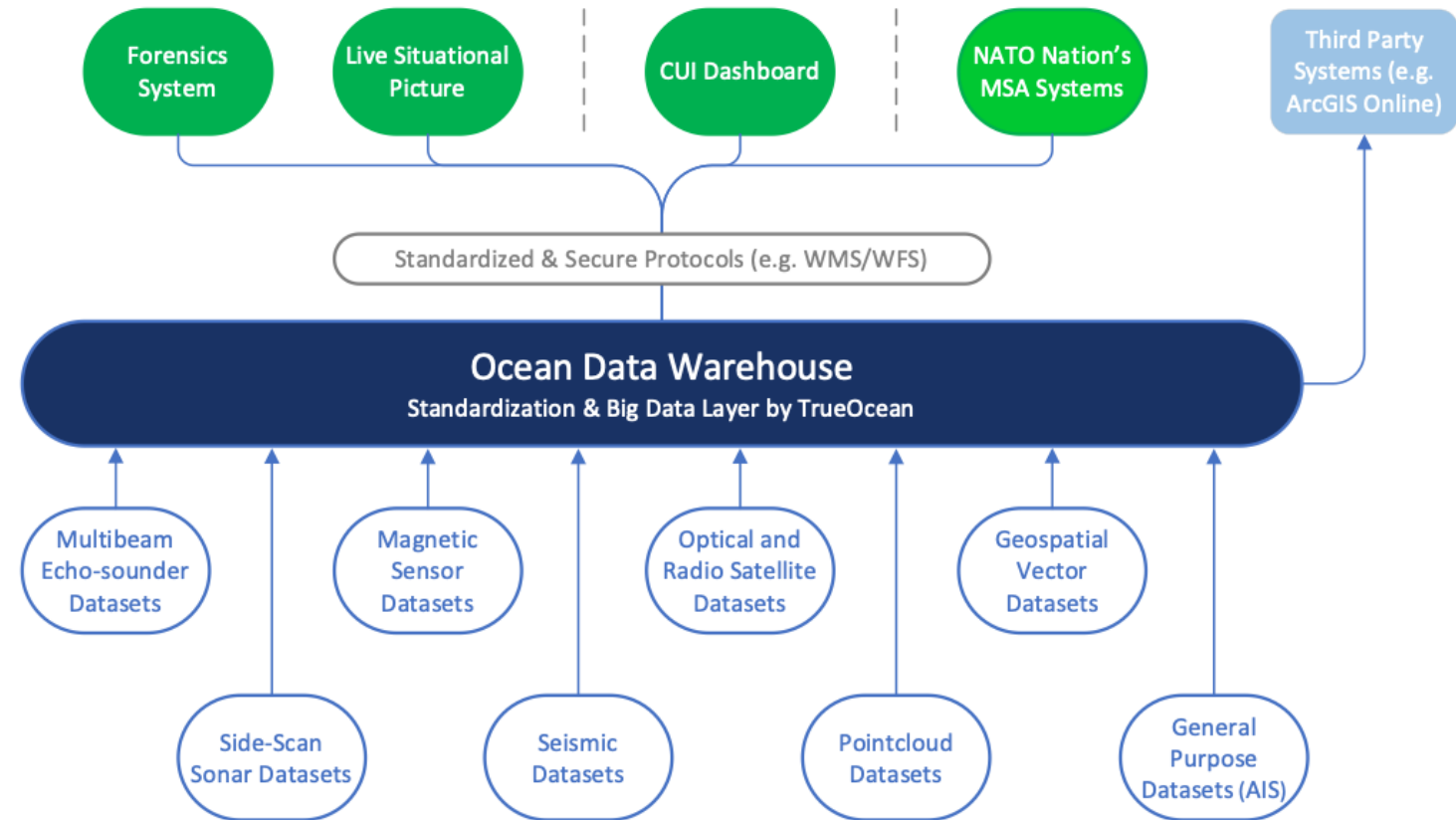
GIS



Ocean Data Warehouse

Background

- TrueOcean acts in several cases as a so called „Ocean Data Warehouse“
- It is an underlying layer for ingesting, standardizing and outputting ocean datasets
- Due to it's standardization approaches it is streaming data via protocols into third party systems
- API-based integration allows usage of the system in existing hydrographic and geospatial environments



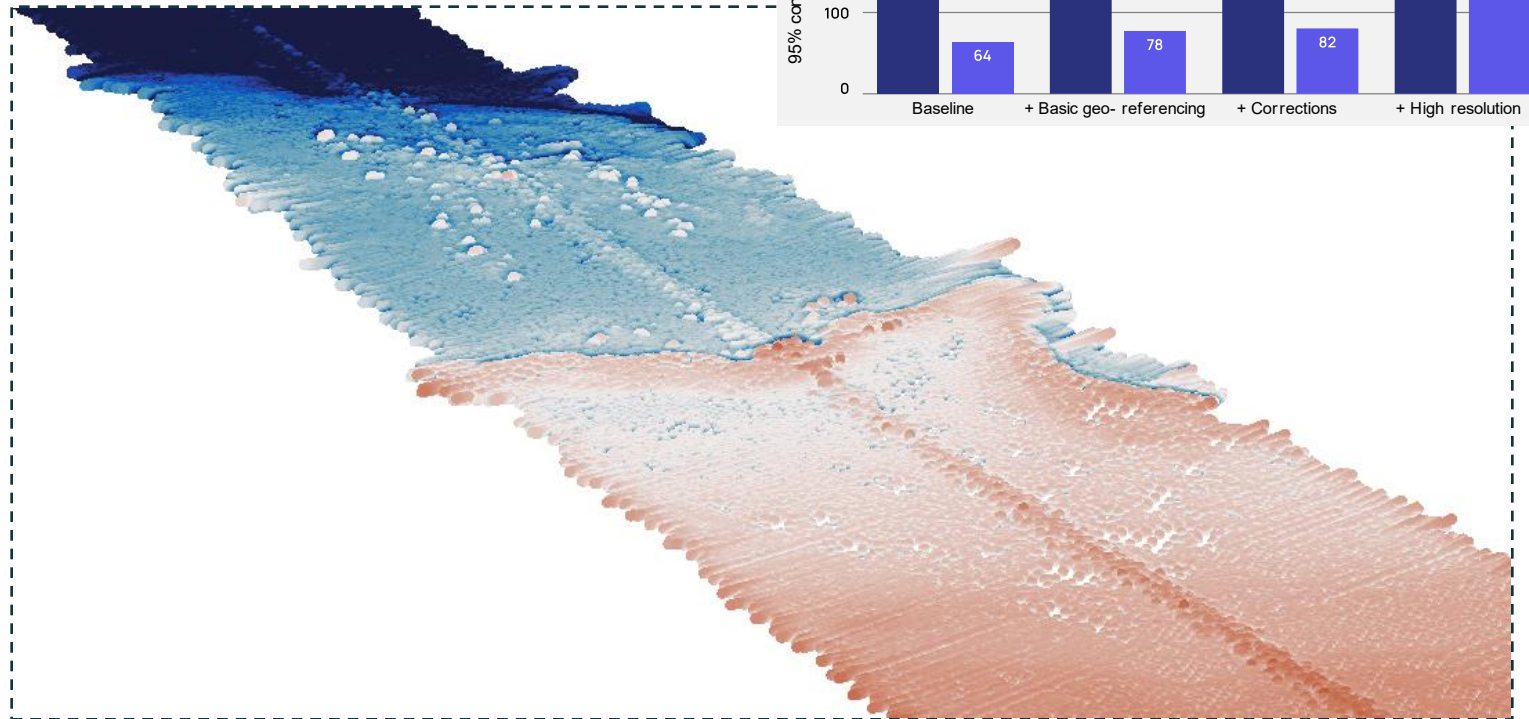
AI and GPUs

Three different projects we are right now working on in the context of AI and Accelerated Computing

Accelerated Computing

Physics-informed AI

Sensor Fusion



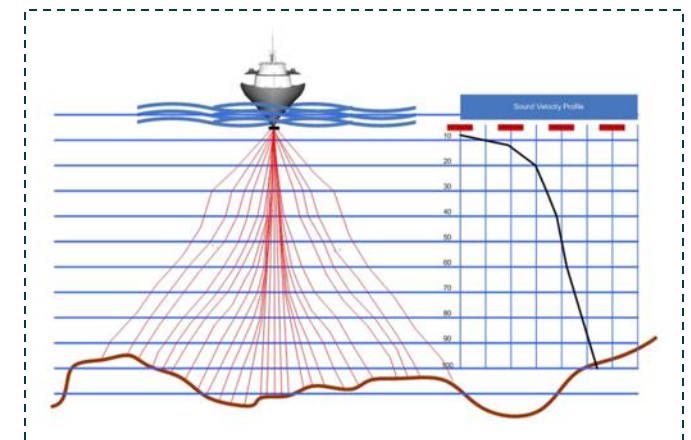
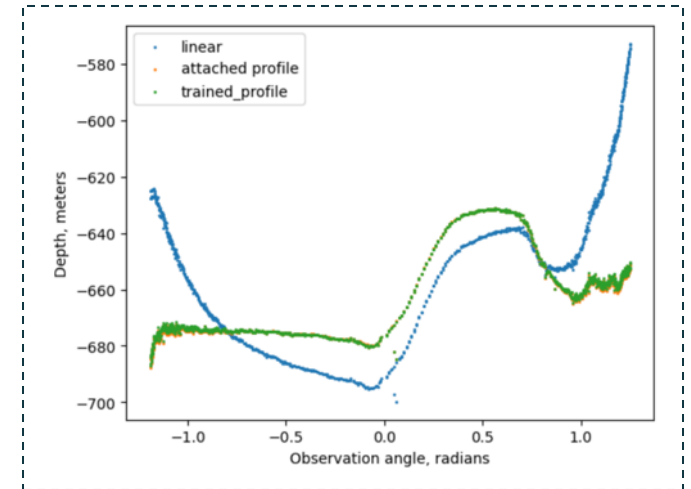
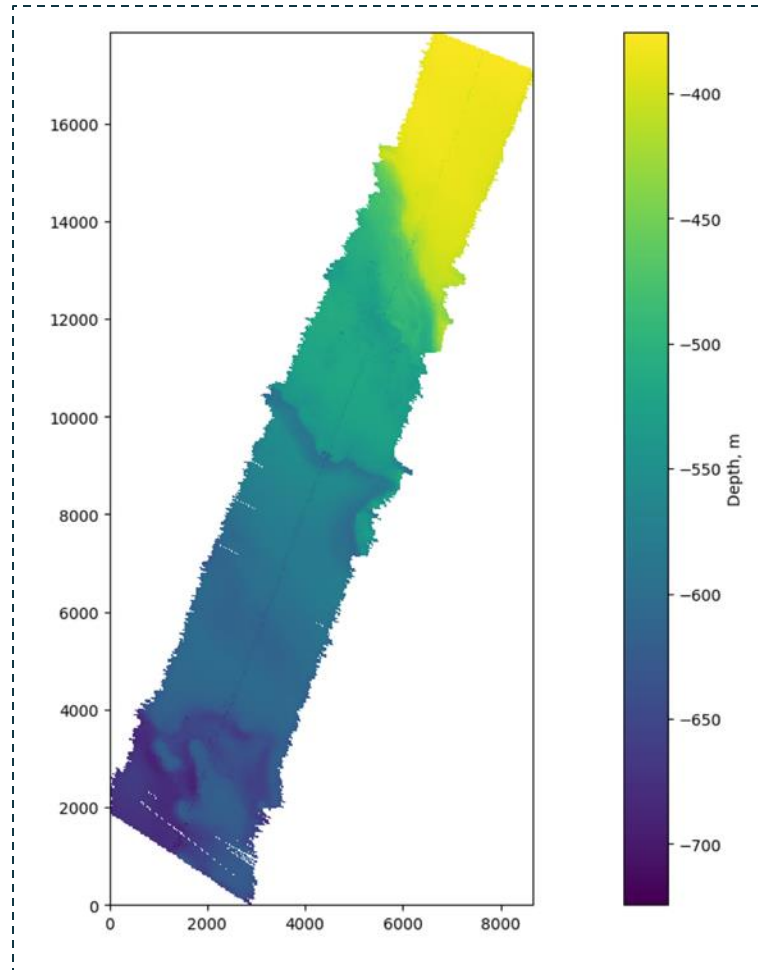
AI and GPUs

Three different projects we are right now working on in the context of AI and Accelerated Computing

Accelerated Computing

Physics-informed AI

Sensor Fusion



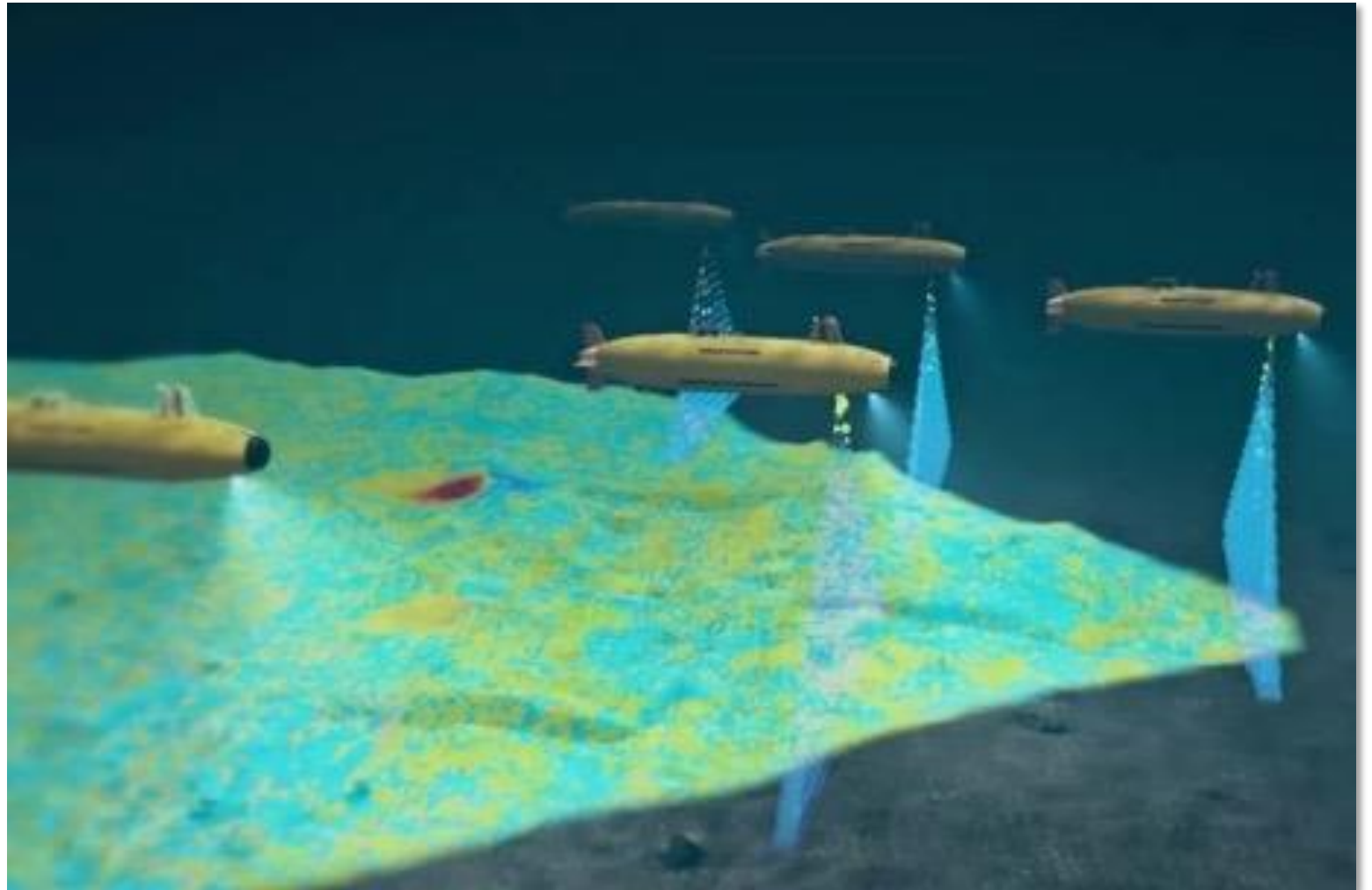
AI and GPUs

Three different projects we are right now working on in the context of AI and Accelerated Computing

Accelerated Computing

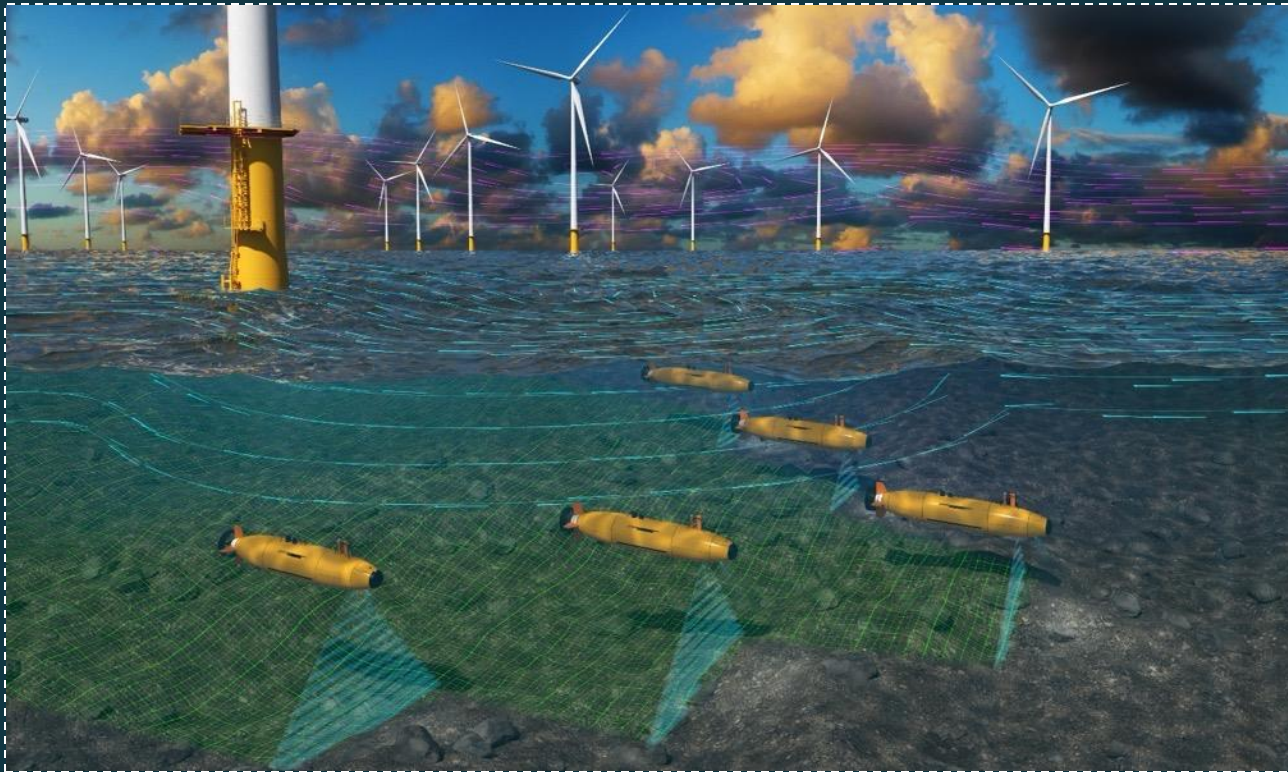
Physics-informed AI

Sensor Fusion



Summary

TrueOcean introduces a new paradigm of how ocean data is used in organisations



Cloud-native collaboration, management and workflow optimizations

Raw sensor data technology

Advanced cloud computing for big ocean data processing and analytics

Decentralization and Edge in the future

Thank you

