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Cloud and AI Technologies are Revolutonizing Hydrography

The cloud-native TrueOcean platform

HYDRO 2024

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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

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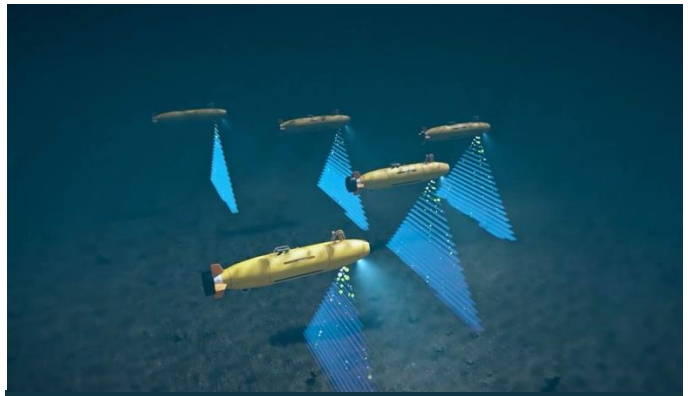
Megatrends

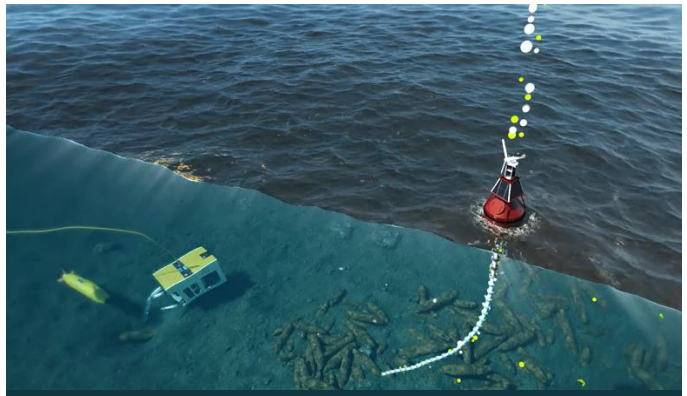
Industrialisation

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

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Growing amount

File formats

Finding data

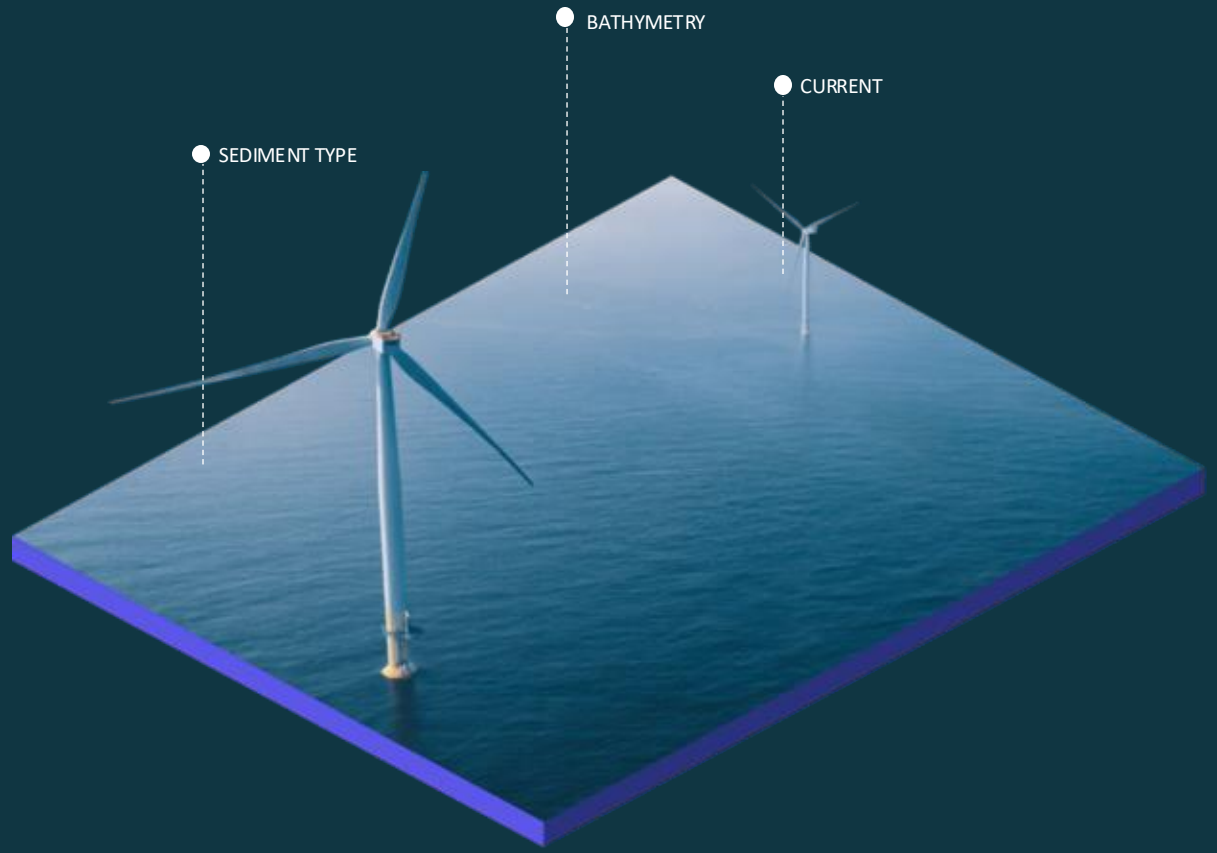
Visualization

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

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Logs

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- 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

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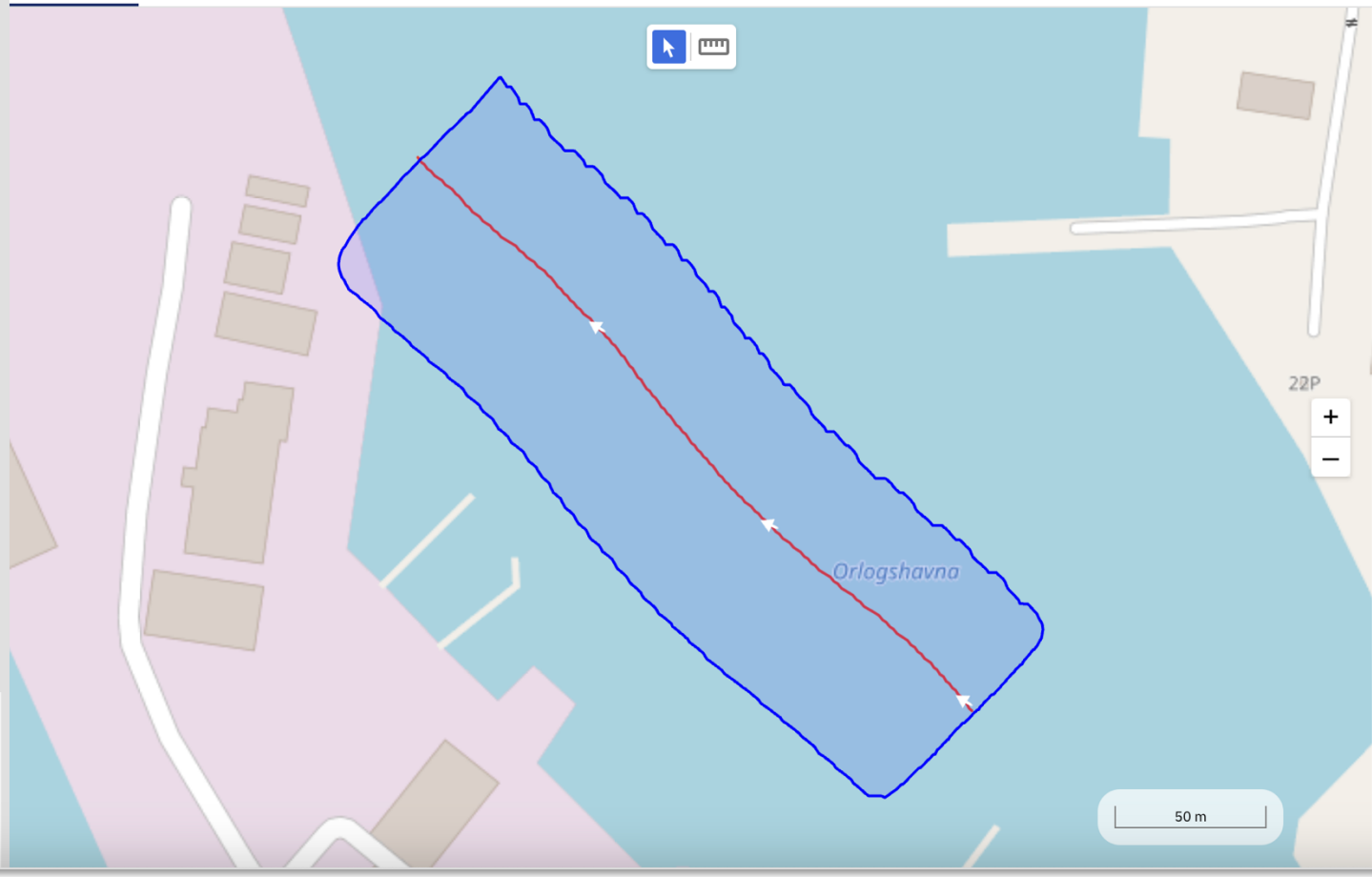
Overview | Metadata | Table | Preview



Metadata

File Information

SONAR

Type	SSS
Model	

DATAGRAMS

N MEAString	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

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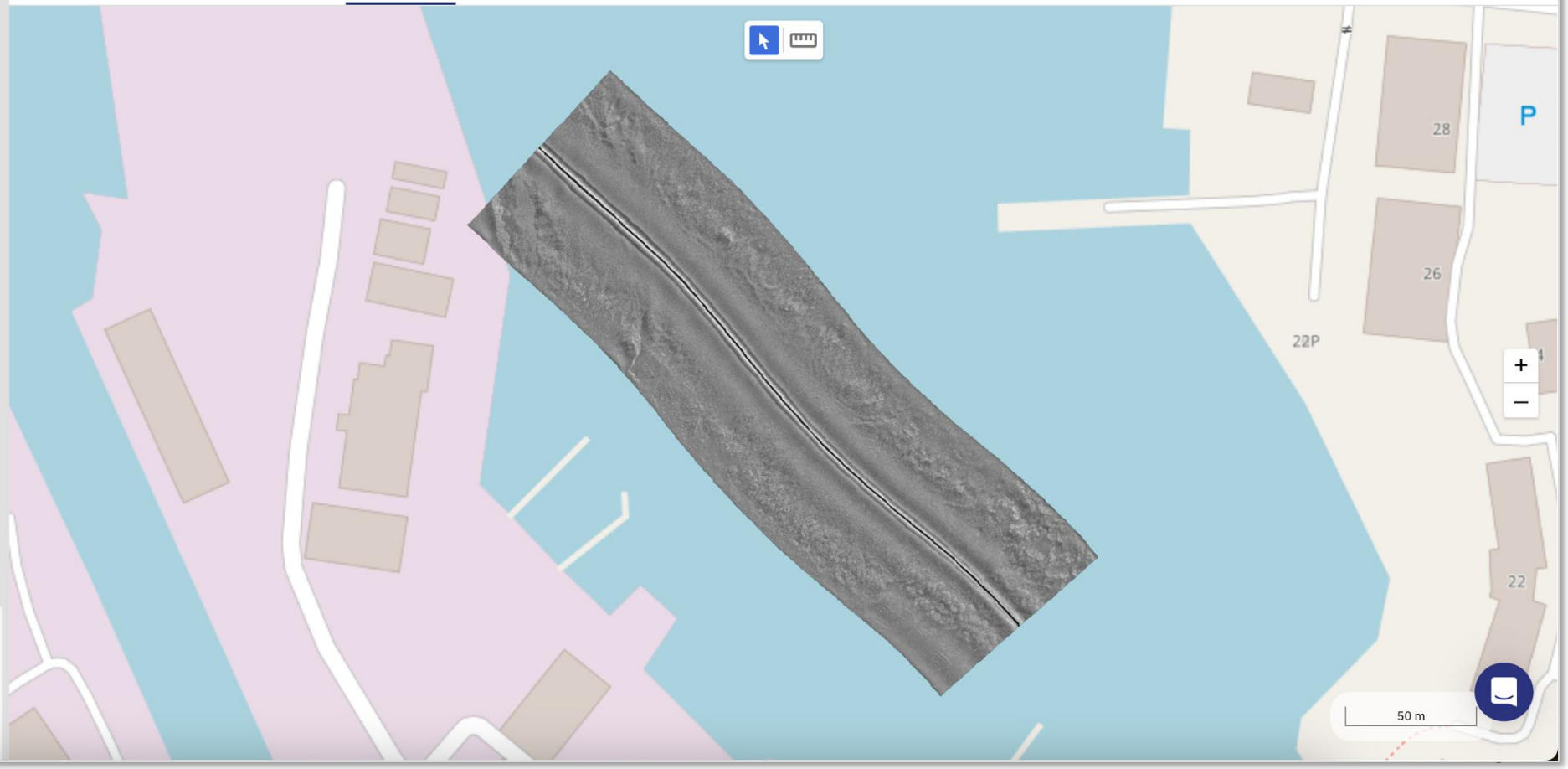
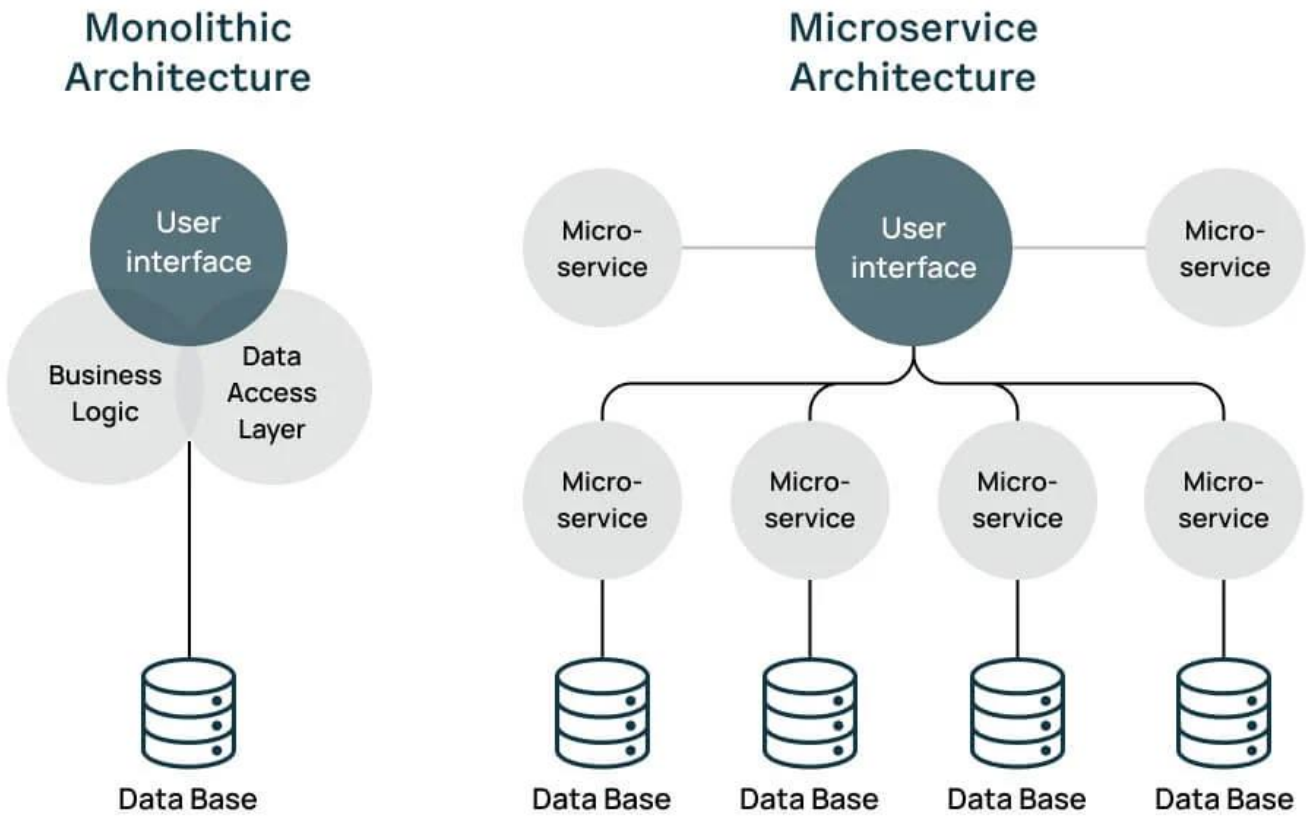


Architecture

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



File Formats

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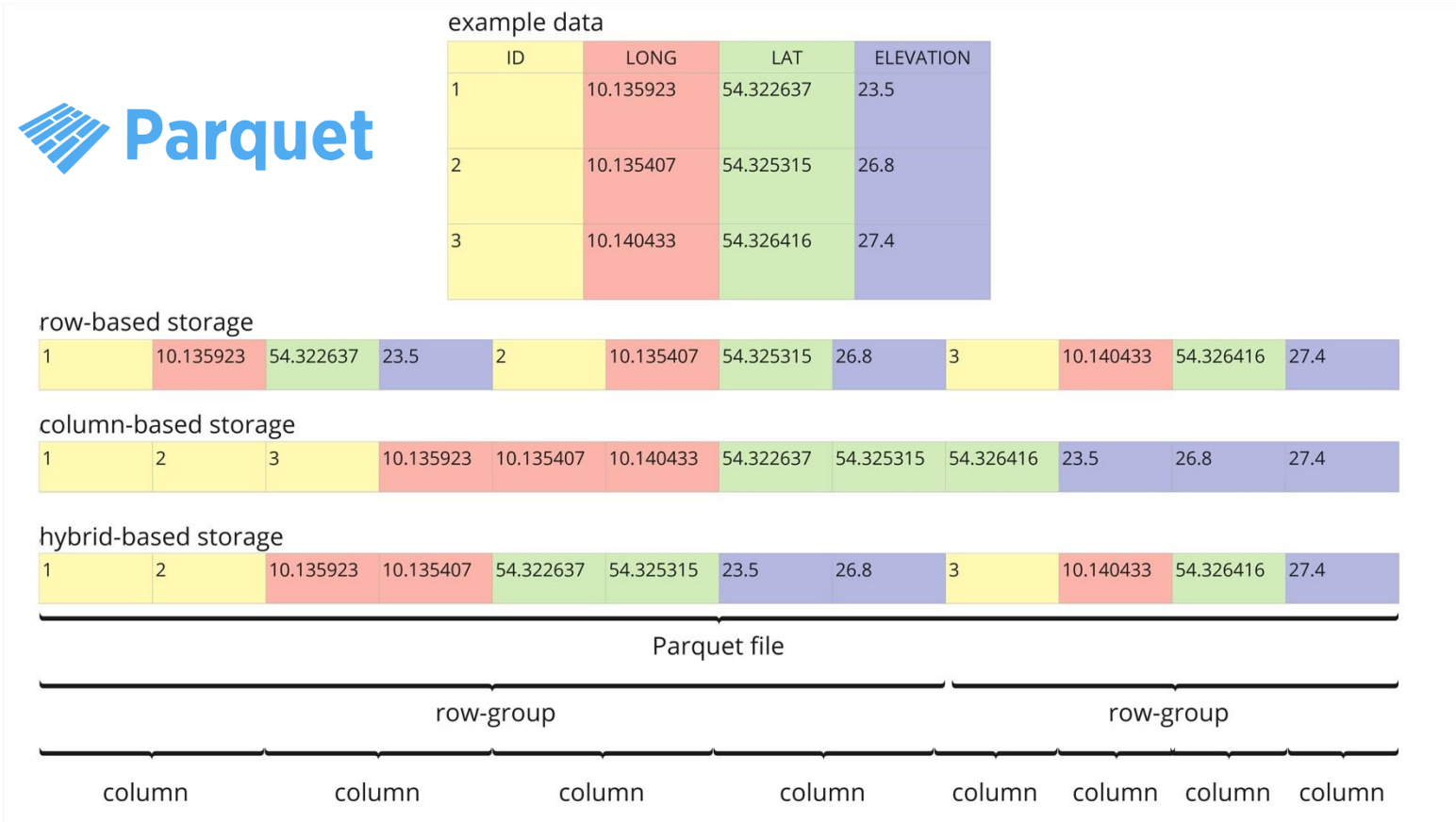
Why do we need new approaches?

- 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



Supported Domains

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Multibeam	Side Scan Sonar	Subbottom Profiler
GSF, XTF, ALL, KMALL, S7K, JSF, R2Sonic, XSE, SeaBeam, QPD, FAU	XTF, JSF, SDF, SDS, S7K, SON, CODA, SBD	XTF, JSF, SDF

Seismic	Raster/Vector	Other
SEGY, SEGD	SHP, GDB, GeoJSON, KML, GeoTiff, JPG, PNG, ASC	LAS, LAZ, PTS, ASC, XYZ, TXT, CSV, AGS, XLSX, DOCX, PDF, XML, S12, UKOOA, MOV, MP4, WEBM, BMP, JPG, PNG, WCD, RAW

Geoindexing

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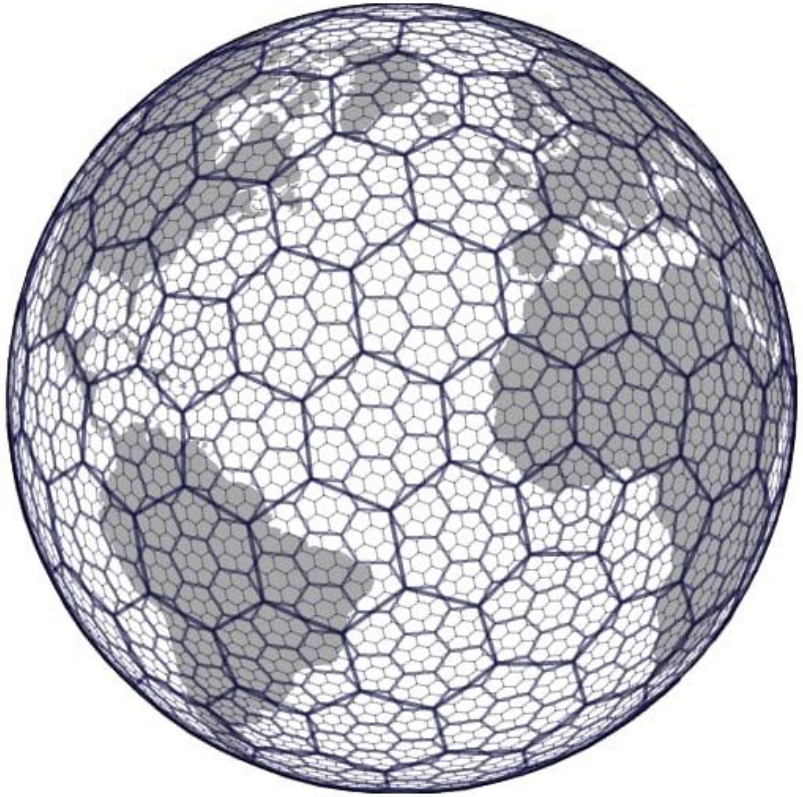
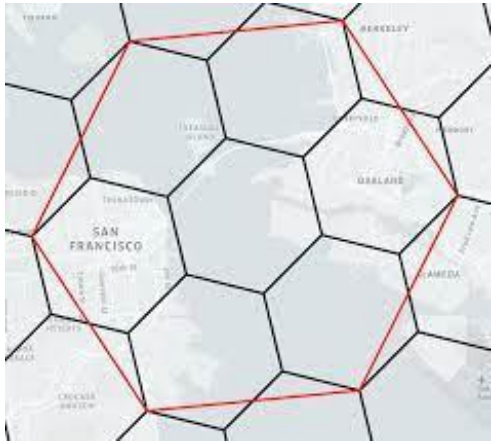
Background

- 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 neighboors and being able to cluster data
- Great data storage efficiency useful for storing and managing large-scale datasets





Geoindexing

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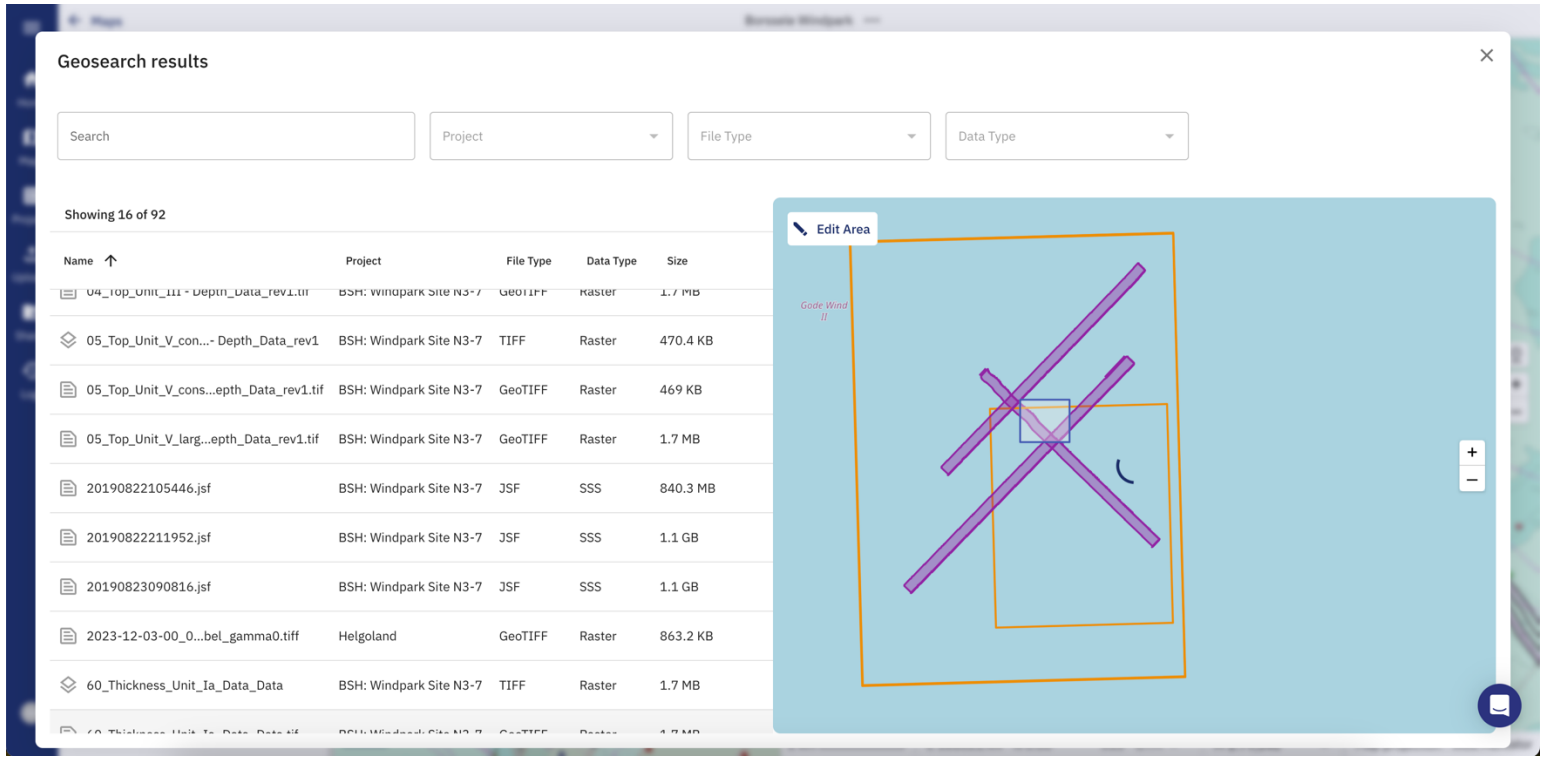
Background

- 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



Big Data

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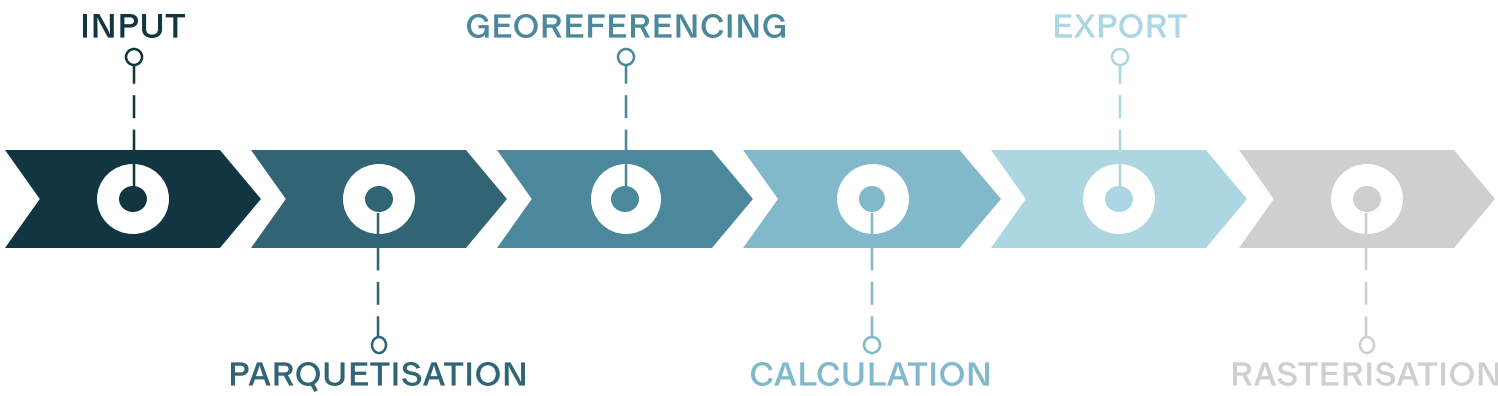
Background

- 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



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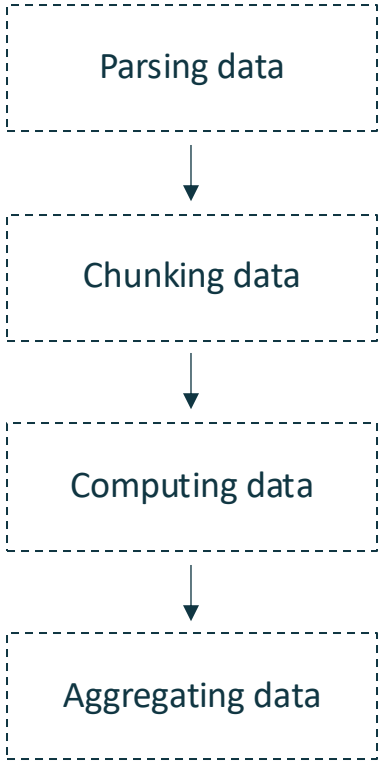

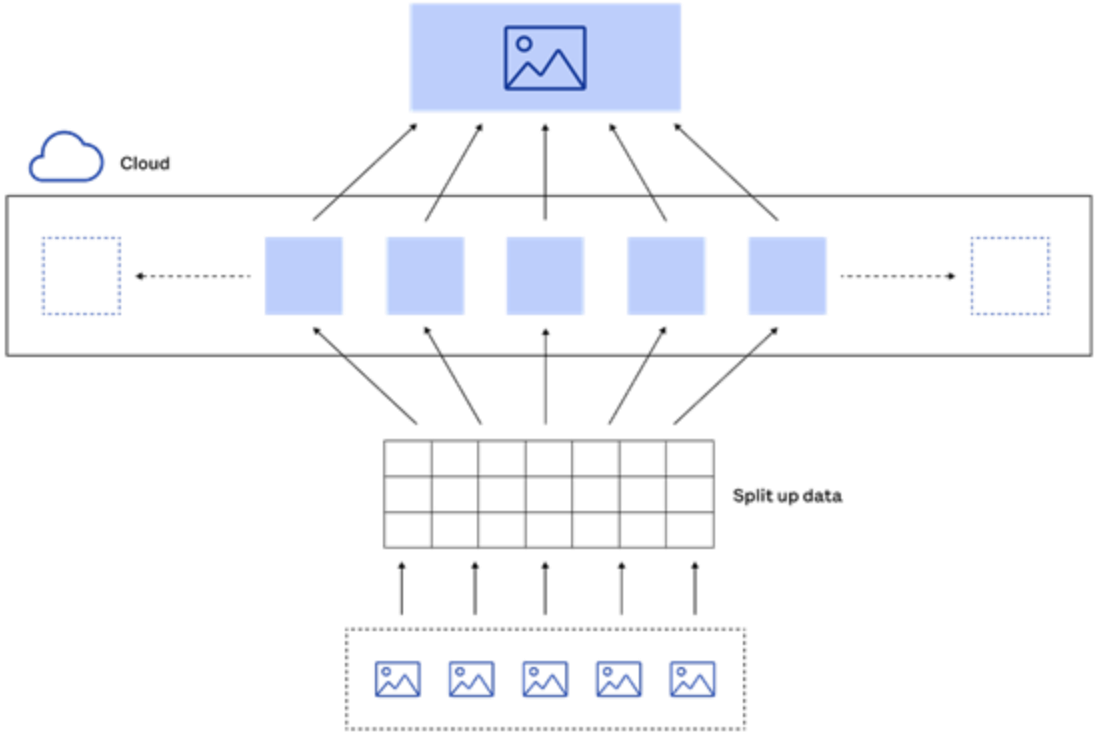

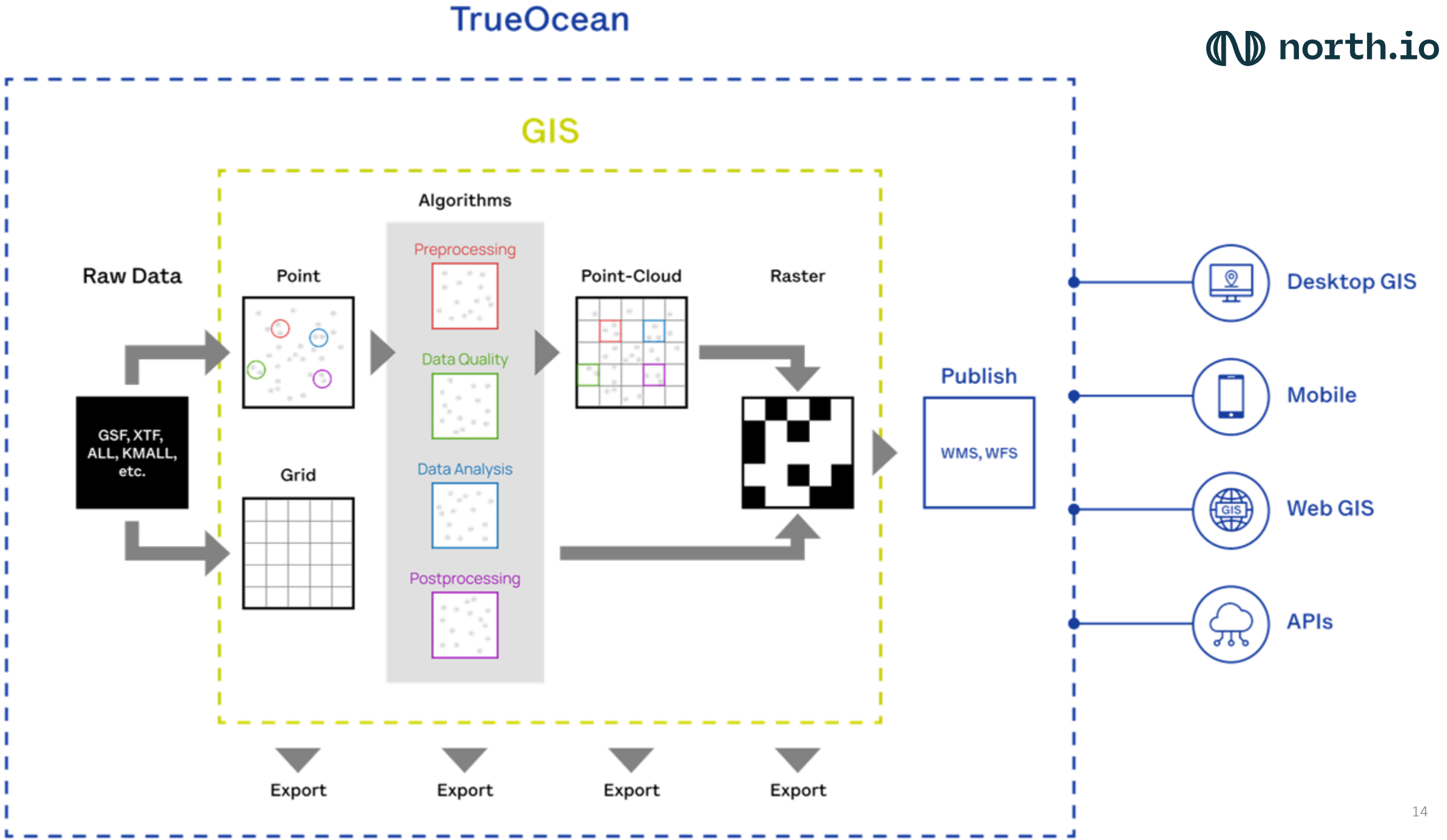
TrueOcean
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GIS
Algorithms
Raw Data
Point
Preprocessing
Point-Cloud
Raster
Data Quality
Publish
GSF, XTF, ALL, KMALL, etc.
WMS, WFS
Grid
Data Analysis
Desktop GIS
Mobile
Web GIS
GIS
Postprocessing
APIs
Export
Export
Export
Export

Ocean Data Warehouse

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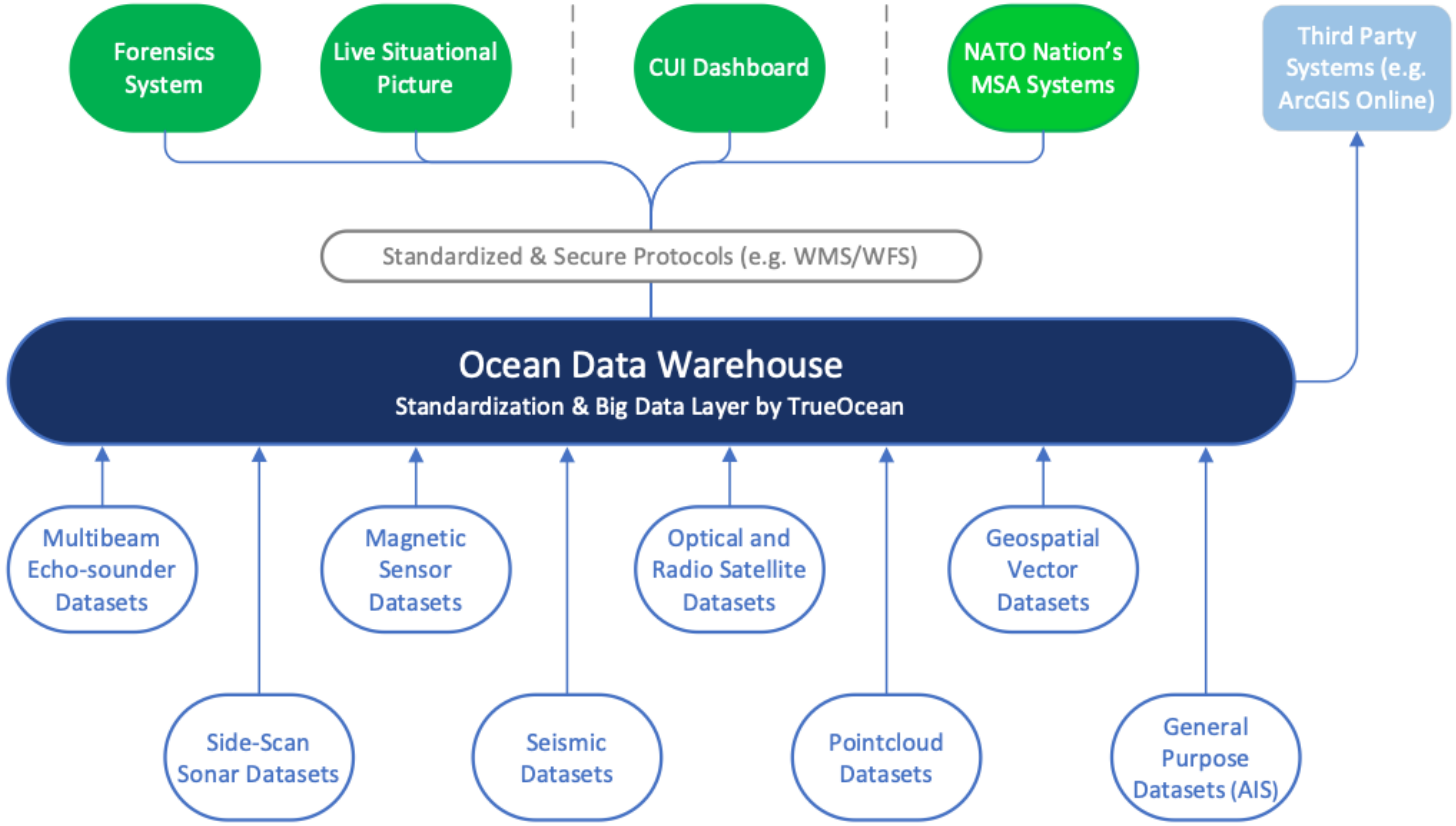
Background

- 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 hydgrodaphic and geospatial environments



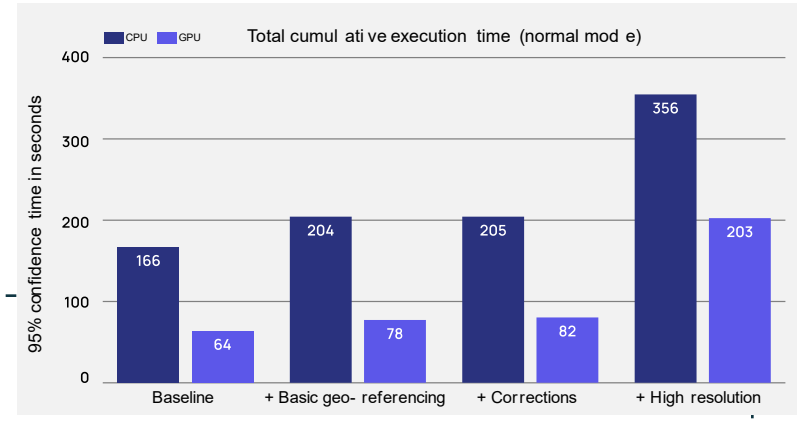
AI and GPUs

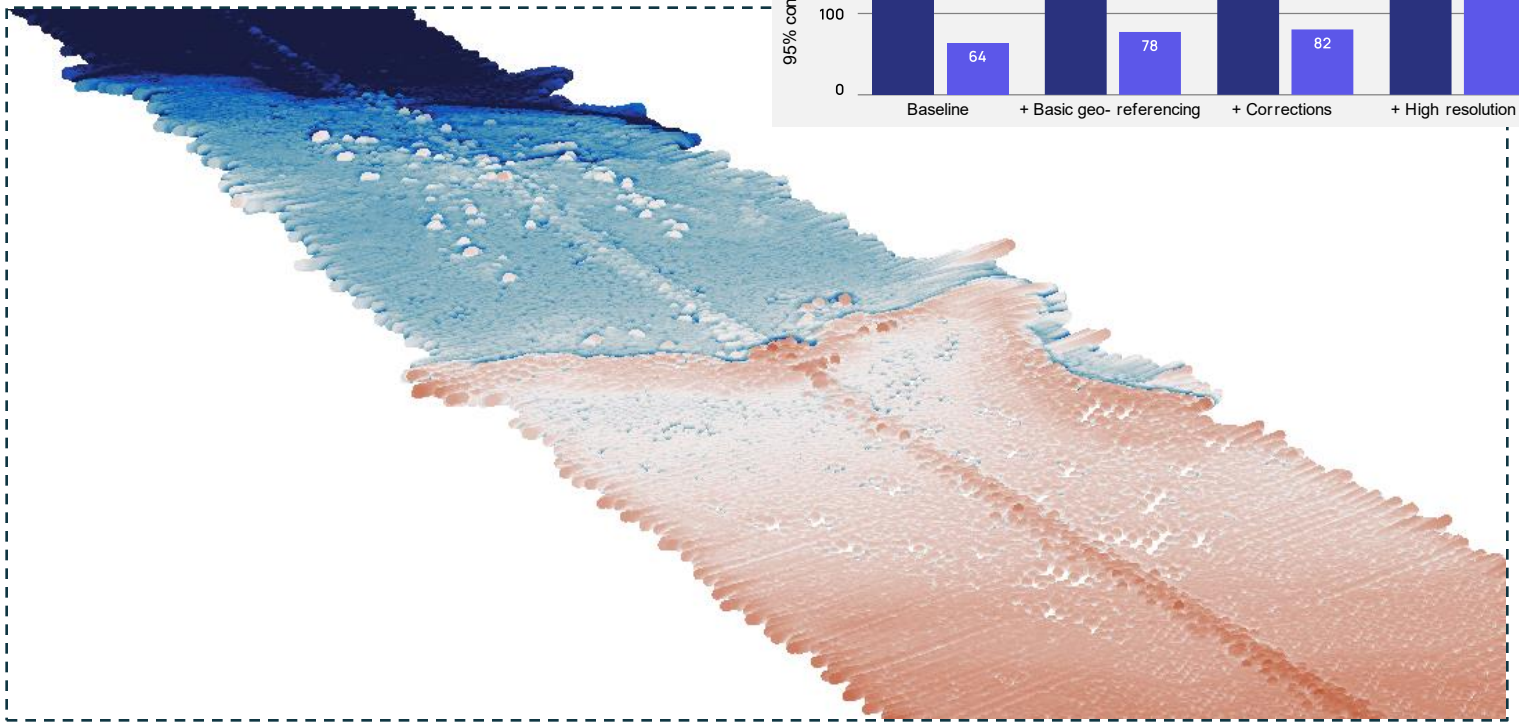
Three different projects we are right now working on in the context of AI and Accelerated Computing

Accelerated Computing

Physics-informed AI

Sensor Fusion





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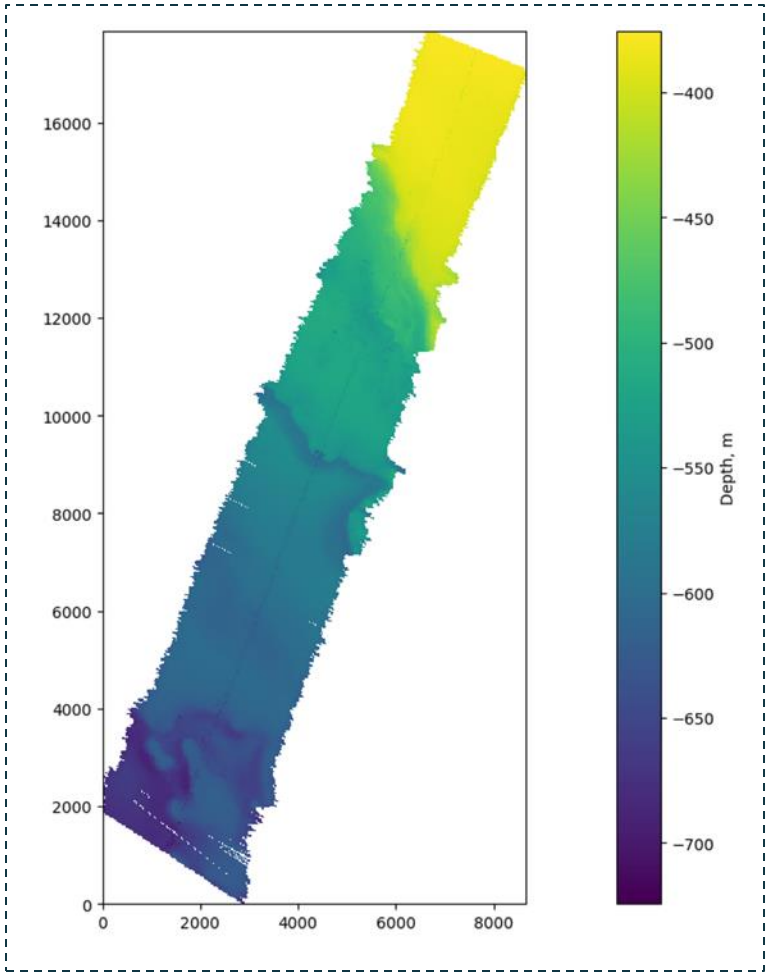

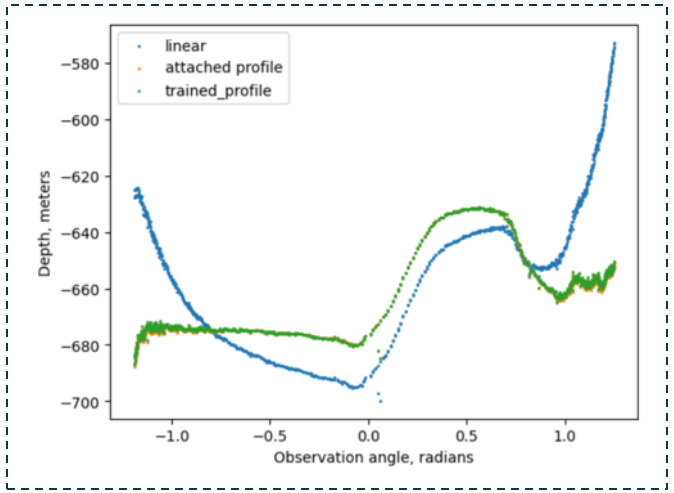

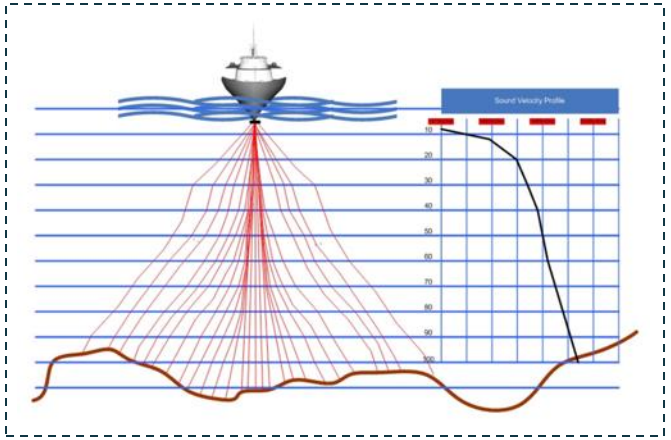

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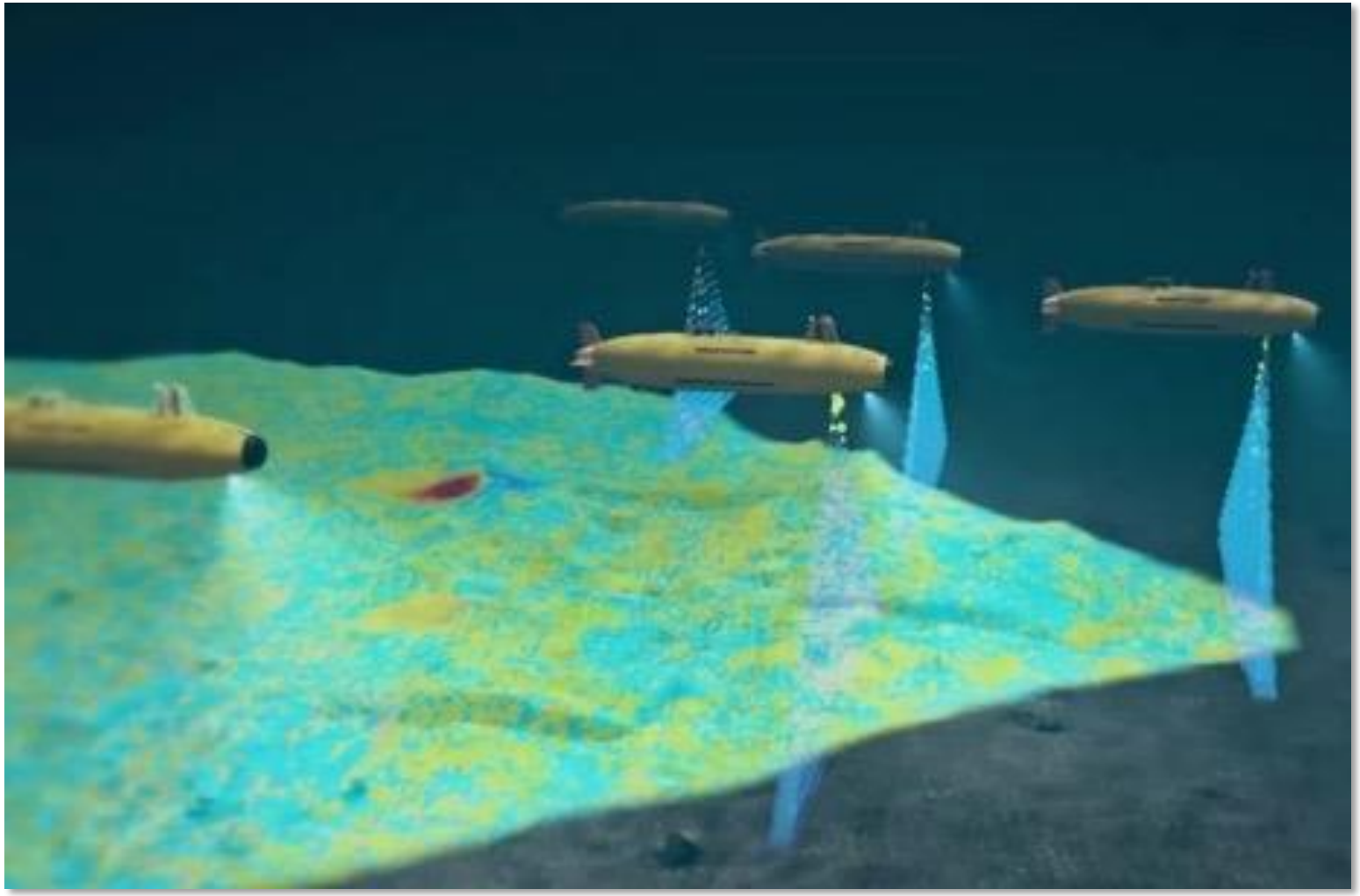

Summary

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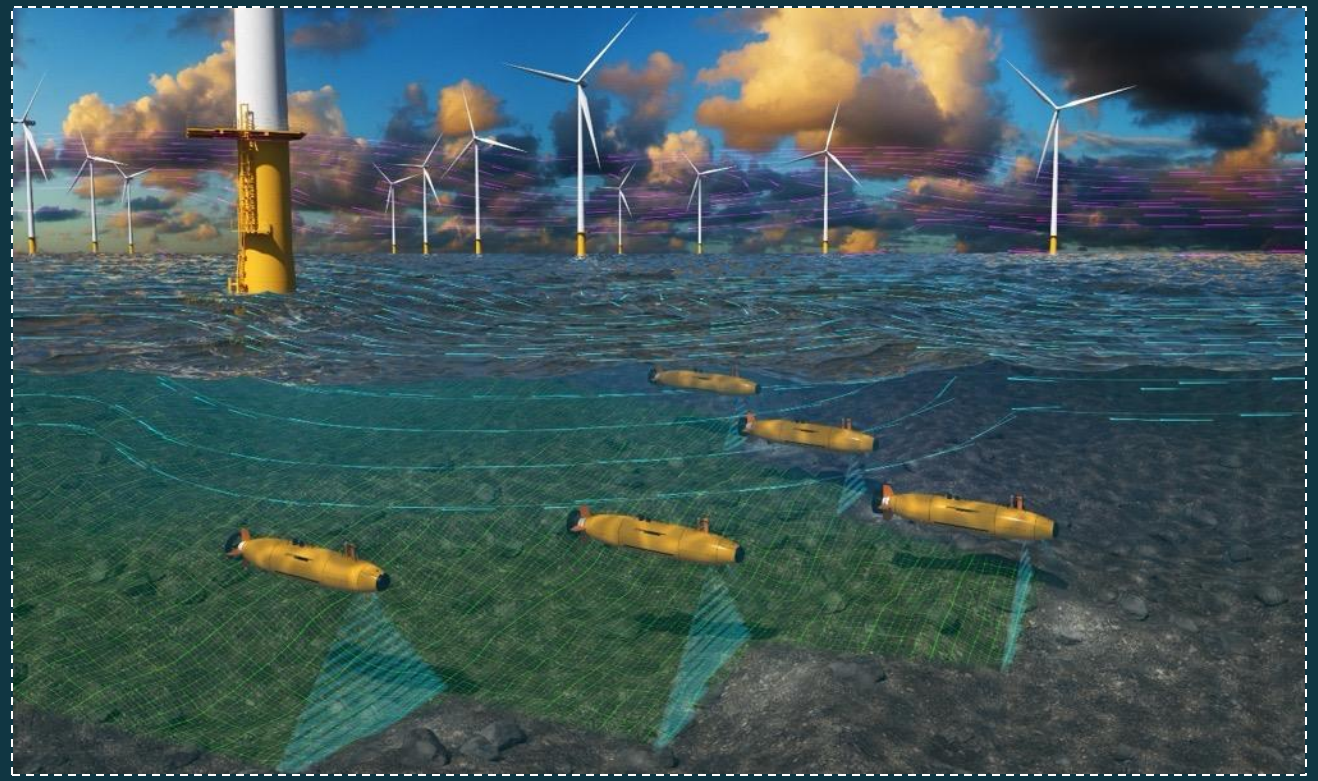
TrueOcean introduces a new paradigm of how ocean data is used in organisations



- 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