

# IntellinQ

Spatial Data Management

**Managing and processing  
massive amounts of maritime  
point cloud data with GeolinQ**

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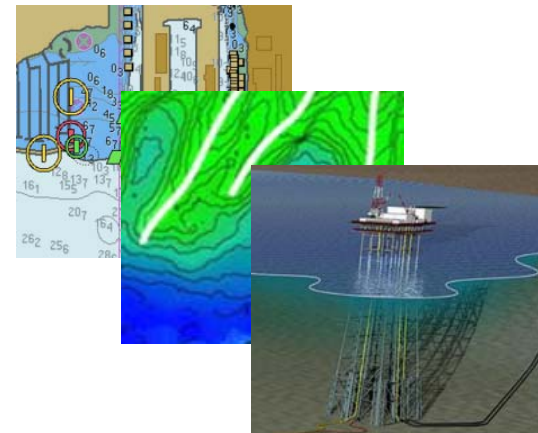
Milan Uitentuis and Mark Terlien

## Contents

- Spatial data management for maritime point clouds
- Challenges:
  - Changing data and metadata definitions
  - Querying and viewing point clouds
  - Easy sharing of point cloud data
  - High performance and easy administration
- GeolinQ as integrated point cloud management solution

## Spatial Data Management

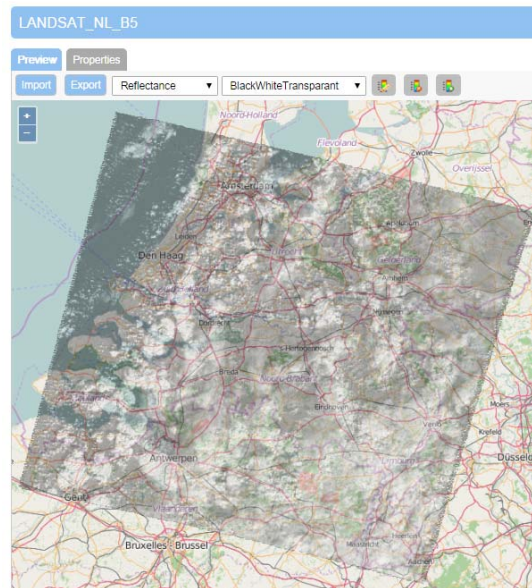
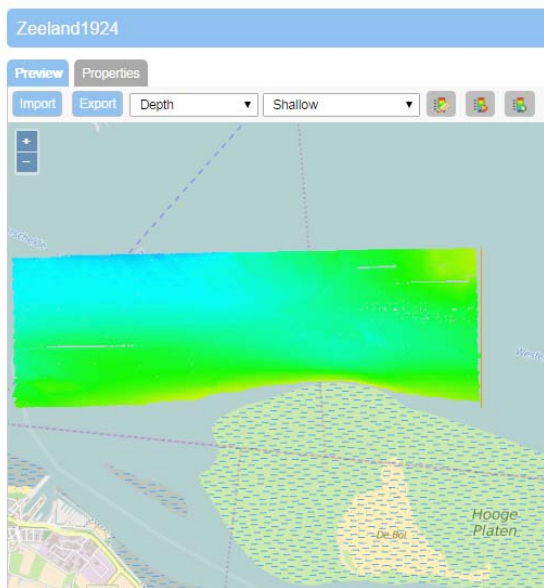
- What is Maritime Spatial Data Management?
  - Making spatial data discoverable, accessible and usable by a variety of users and applications
  - Integration of maritime datasets into information products for:
    - Safe navigation
    - Morphological analysis
    - Coastal zone management
    - Offshore engineering
    - Environmental impact assessment
- Importance of metadata (traceability, liability)



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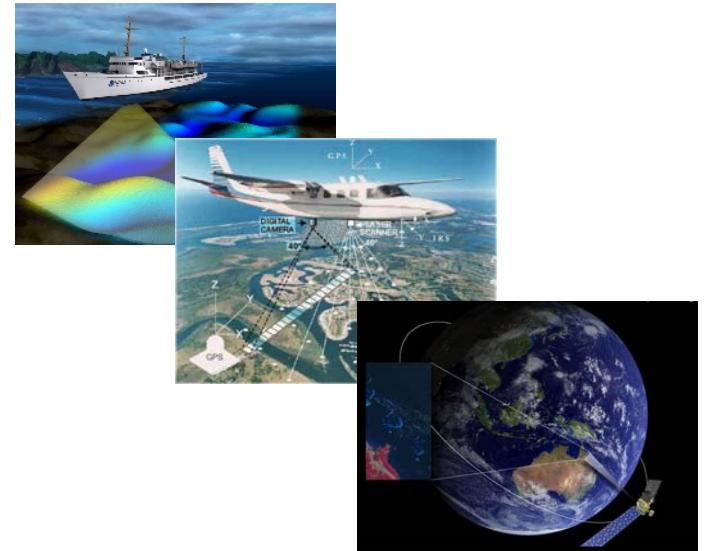
Spatial Data Management

## Maritime Spatial Data Management



## Changing data definitions

- Changing data definitions:
  - Traditionally: x, y, depth
  - Nowadays:
    - Additional attributes (e.g. time)
    - Backscatter data for seabed classification
  - Future:
    - More data to come?



## Different data definitions

```
FAU_ly,      /* position north
FAU_lx,      /* position east
FAU_lz;      /* depth
FAU_time;    /* sounding time
FAU_angle;   /* beam angle
FAU_heave;   /* heave
FAU_roll;    /* roll angle
FAU_bqual;   /* quality and flag
FAU_amplitude; /* amplitude
FAU_pitch;   /* pitch angle
FAU_thsec;   /* sounding time
```

Retrieve depth result	
Depth min	2458.8m
Depth max	2470m
Depth average	2464.6m
Depth standard deviation	0
Elementary surfaces	292
CDI Id	486_156209
Latitude	44.1057129204588
Longitude	-3.848999053683407

## Changing metadata definitions

- Changing metadata definitions:
  - Traditionally:
    - No standardized metadata definitions
    - Metadata for specific domains
  - Nowadays:
    - Metadata standards mostly based on ISO19115 (e.g. S-102)
    - Combination of metadata standards and internal metadata requirements
  - Future:
    - Changing metadata standards and requirements

ISO19115

Configuration

Name *	Bathymetric Survey
Description	<input type="text"/>
Dataset class *	ISO19115
Type class *	No selection
Colour *	<input type="color"/>

Configuration

Taal van de metadata *	No selection
Parent unieke identifier	<input type="text"/>
Hierarchieniveau *	No selection
Hierarchieniveau naam	<input type="text"/>
Verantw. organisatie *	No selection
Verantw. organisatie rol *	No selection
Metadata datum *	<input type="text"/>
Metadata standaard naam *	ISO 19115
Metadata standaard versie *	Nederlandse metadata profiel
Titel van de bron *	<input type="text"/>
Datum van de bron	<input type="text"/>

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## Preview of Point cloud with metadata

Preview Properties

Configuration

Name \* vlissingen


Description

Dataset class \* Bathymetric survey

Type class \* Diepte2

Source coordinate system \* EPSG:28992

Resolution \* cm

Colour \* 

Configuration

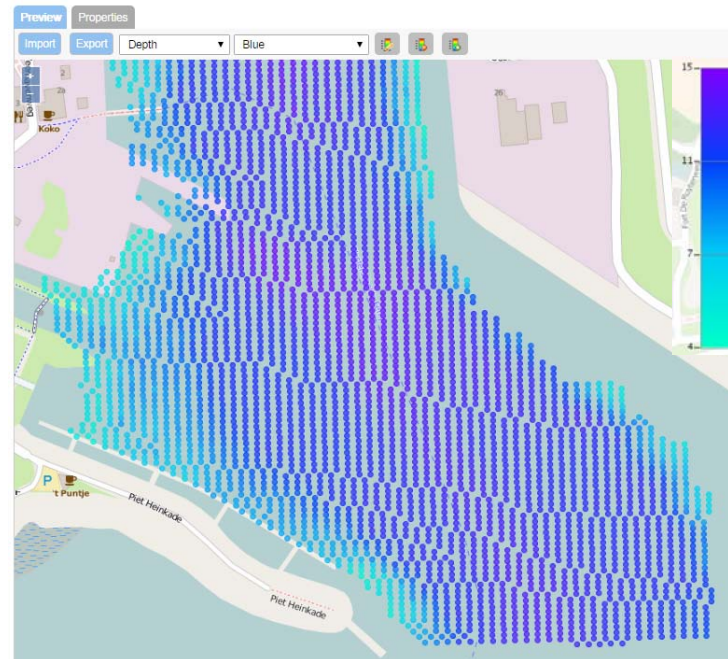
Year \* 2015

Location \* vlissingen

Survey date \* 2015-12-08

Platform \* Snellius

Save Cancel

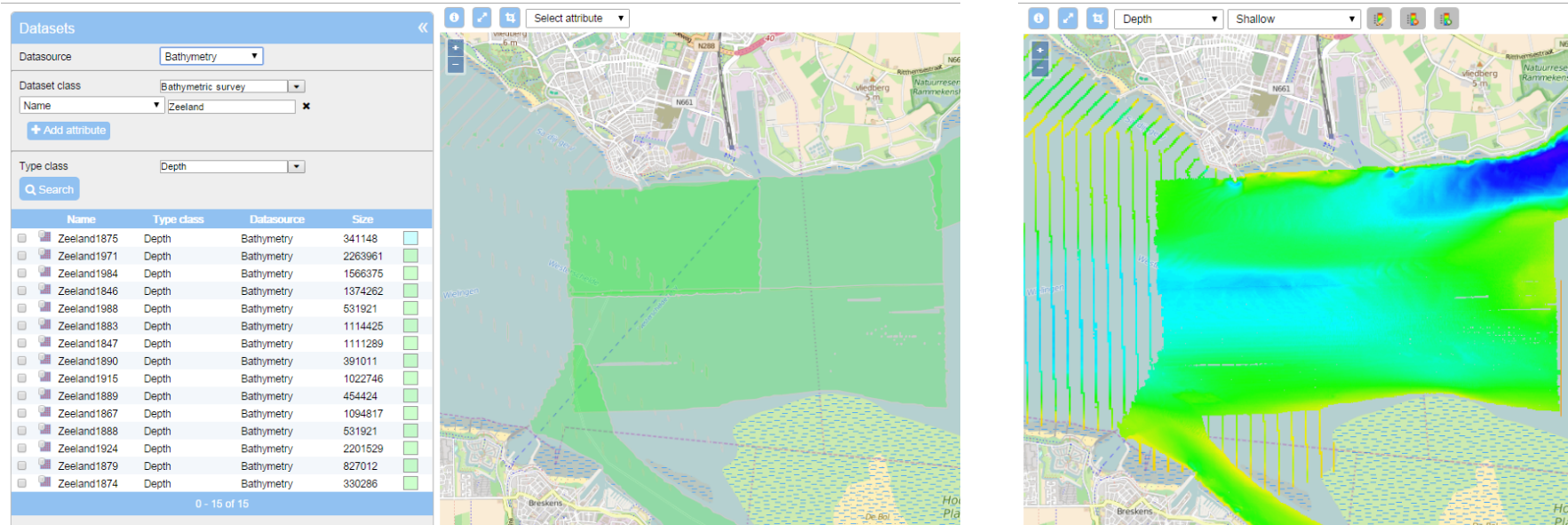




## Querying and viewing point clouds

- Querying on point cloud metadata attributes of different metadata schemas (inheritance) and location
- Showing point cloud footprints on chart
- Visualisation of point cloud data on chart
  
- For integrated quality control of point clouds:
  - Correct coordinate system transformations applied
  - Correct vertical datum
  - Same units for attributes

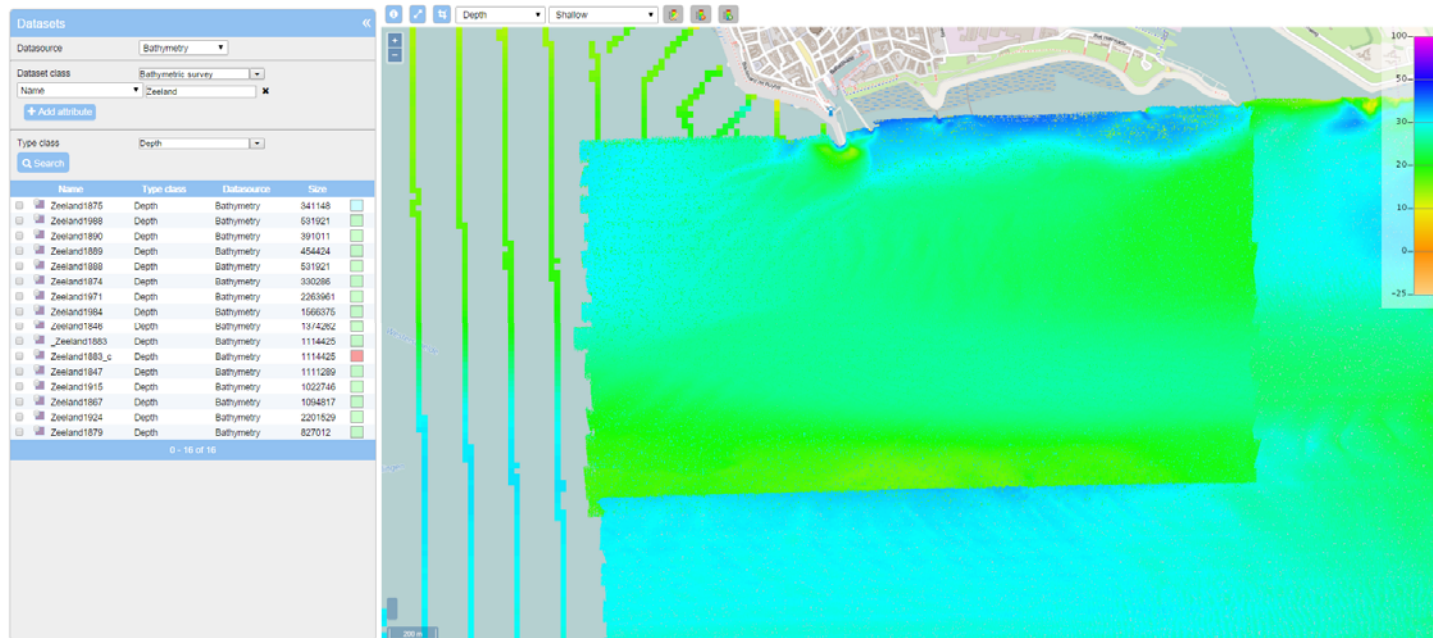
## Point cloud footprints and attribute data on chart



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## Quality control



## Easy sharing of point cloud data

- Web based
- Data must be accessible in multiple ways (file as well as web service)
- Open standards and Open data?
- Spatial and metadata querying
- User-defined styling

## Publishing as service

Datasets

Datasource: Bathymetry

Dataset class: Bathymetric product

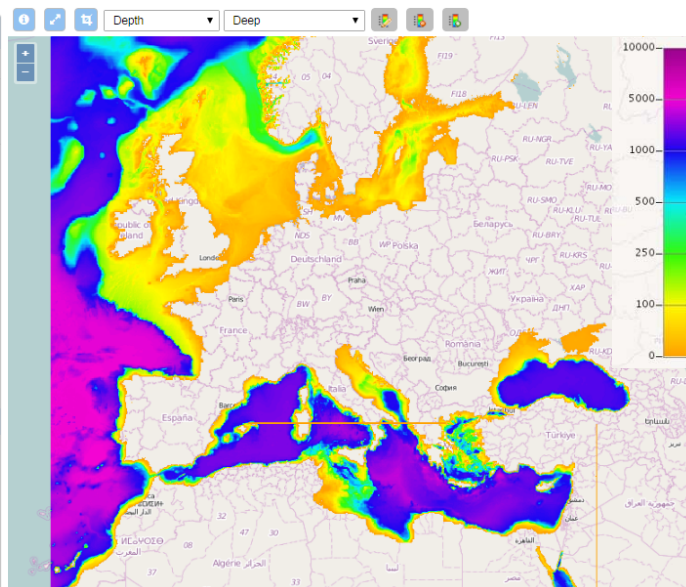
+ Add attribute

Type class: Depth

Q Search

Name	Type class	Datasource	Size
EMODNET_D2	Depth	Bathymetry	9817616
EMODNET_C2	Depth	Bathymetry	34692998
EMODNET_B2	Depth	Bathymetry	64428030
EMODNET_B8	Depth	Bathymetry	43897473
EMODNET_C3	Depth	Bathymetry	14561405
EMODNET_D3	Depth	Bathymetry	12646562
EMODNET_C4	Depth	Bathymetry	25218517
EMODNET_D4	Depth	Bathymetry	18216381
EMODNET_B4	Depth	Bathymetry	27496897

0 - 9 of 9



Layers Service urls Properties

Datasource

Service type: WMS

Name: bathymetry

Description: bathymetry

Active:

Authenticated:

Save Cancel

Layers Service urls Properties

Add Service url

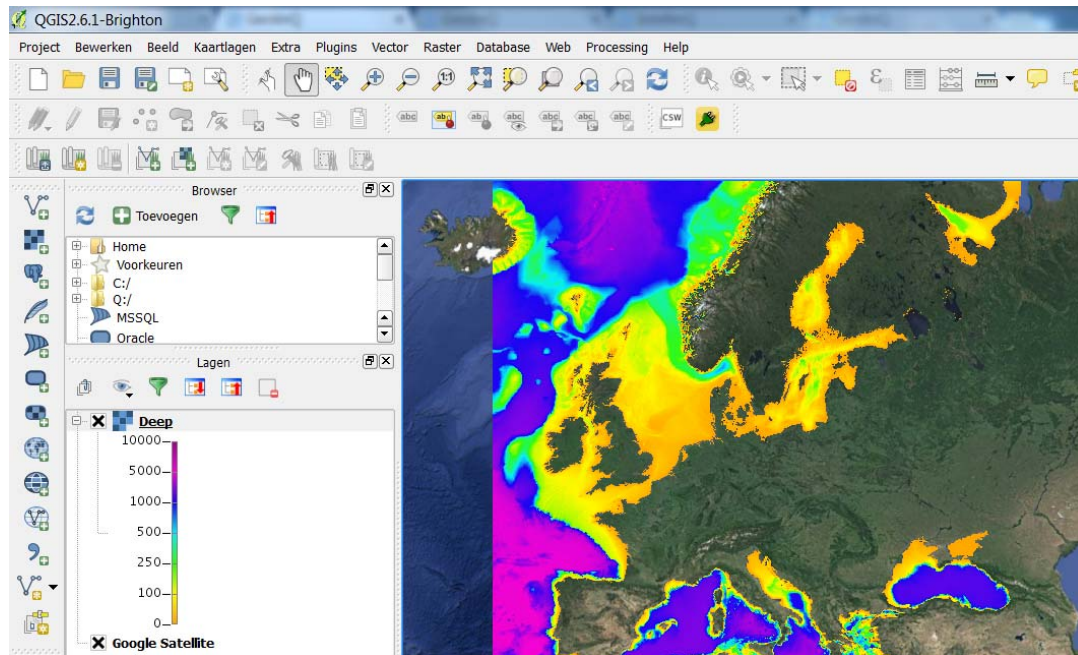
Host	Path
demo.geolinq.nl	/bathymetry

Layers Service urls Properties

Add Layer

Name
Zeeland
EMODNET
AllBathymetry

## Accessing point cloud WMS or Export to file



### Zeeland1888

#### Export config

Column separator \*  Space  Comma  Semicolon  
Decimal separator \*  Point  Comma  
Precision \*   
File name \*   
Target Coordinate System \*

#### Mapping

Include column	Attribute
<input checked="" type="checkbox"/>	X
<input checked="" type="checkbox"/>	Y
<input checked="" type="checkbox"/>	Depth

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## High performance and easy administration

- Easy administration:
  - Centralized database storage of point cloud data and metadata
  - Authentication and authorization
  - Flexible data model and metadata model
  - User-defined styling
- High performance:
  - Database import and spatial indexing
  - Point cloud visualisation and export

## Import algorithm

- No limitations on number of points, point cloud size, physical memory of hard disk size
- Algorithm does not require any prior knowledge about number of points or MBR
- Optimized database storage of data chunks, no proprietary data types (database independent)
- Automatic generation of visualisation pyramid
- Automatic delineation of point cloud foot print (TIN)



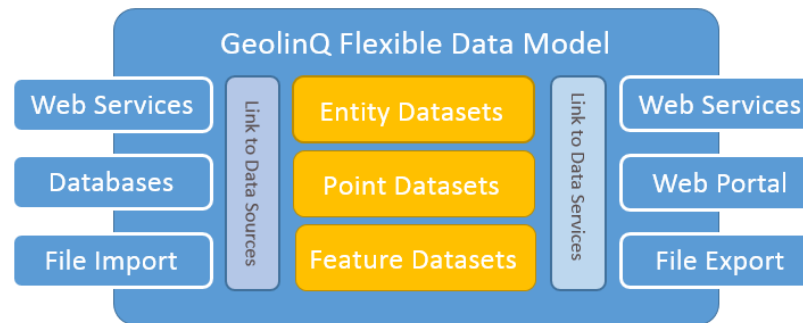
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## GeolinQ as integrated point cloud management solution

Changing metadata definitions

Changing data definition



Easy sharing of point cloud data  
Querying and viewing point clouds

High performance and easy administration

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## Contact

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