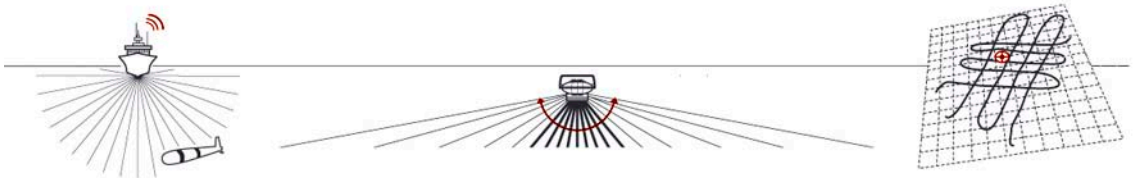
New ways to share and visualize marine geophysical data

4th GEBCO Science Day

BREST 29th, September 2009 – Philippe ALAIN

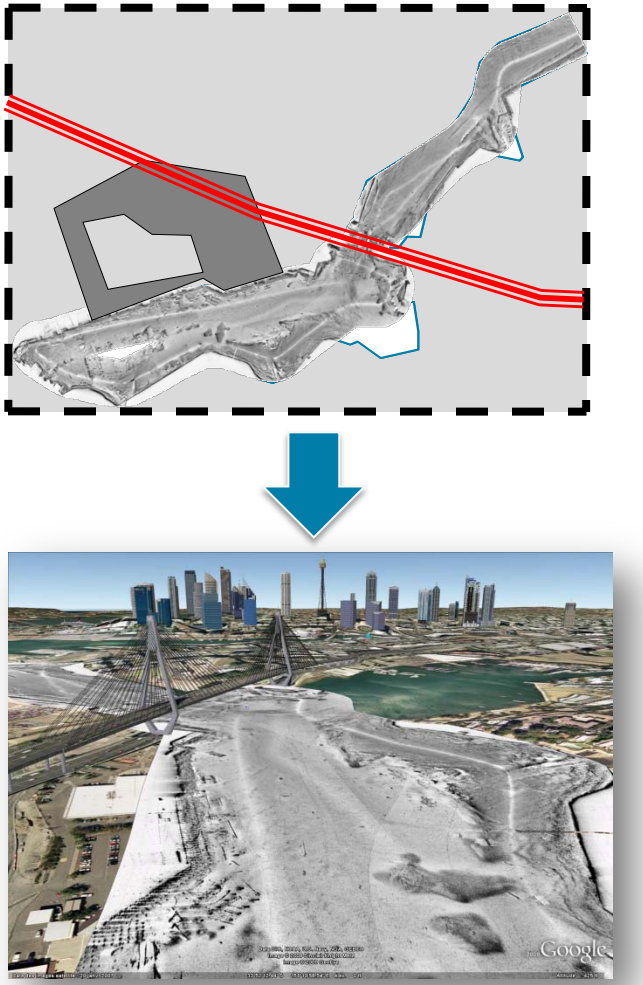


TO SAIL • TO SOUND • TO ANALYSE

IXSEA

Introduction

- A growing number of organizations, universities, port authorities, survey companies, etc. are looking for new tools to visualize and share marine geophysical data.
- While the interest of a final paper or digital report is still of great importance, the ability to compare and merge multiple data sources and dig into the data is now available to anyone.
- Most geophysical packages are use proprietary formats and dedicated viewers. It results in long conversion times to standard GIS formats.
- DELPH software is built on modern GIS standards, removing conversion bottlenecks and easing geophysical data sharing.

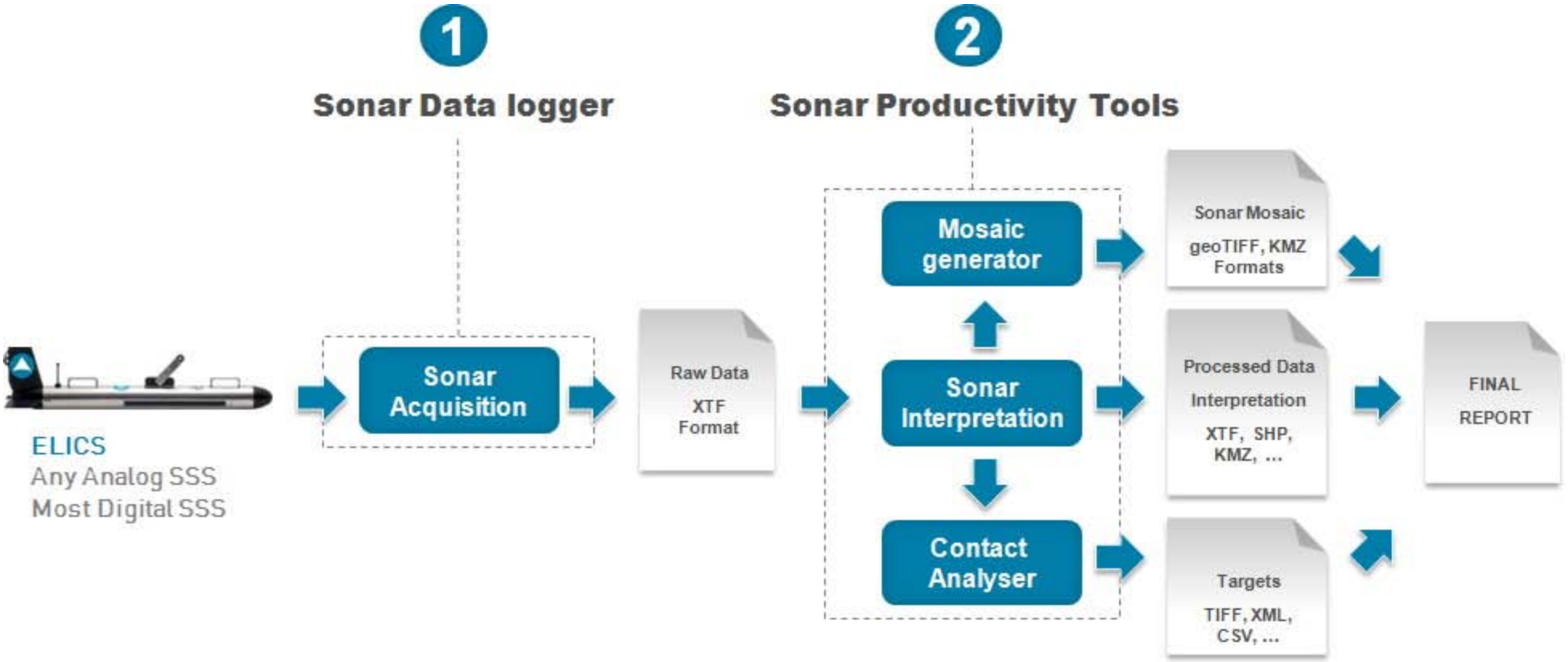


Side-Scan Sonar Data

DELPH Sonar Acquisition

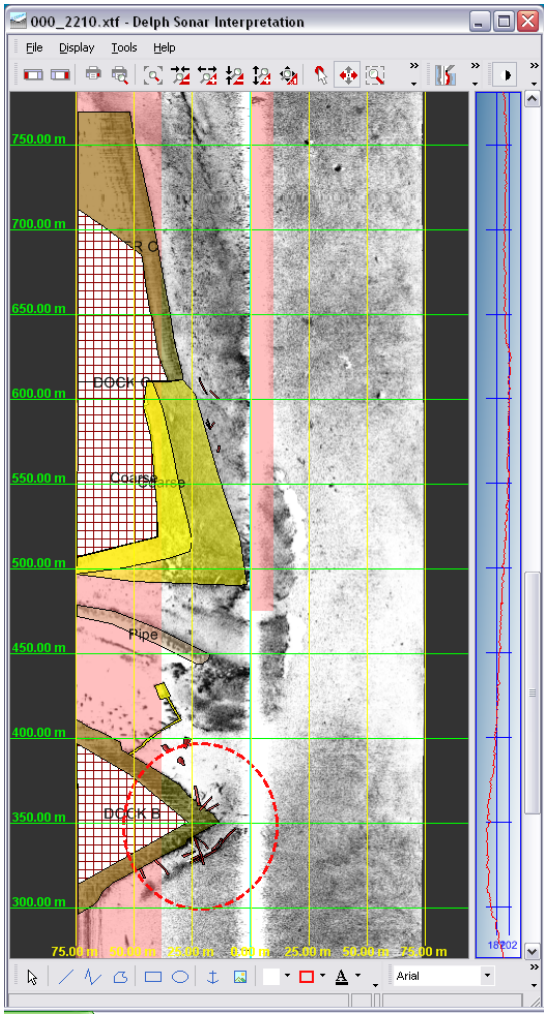
DELPH Sonar INterpretation

Side-Scan Sonar Data Flow



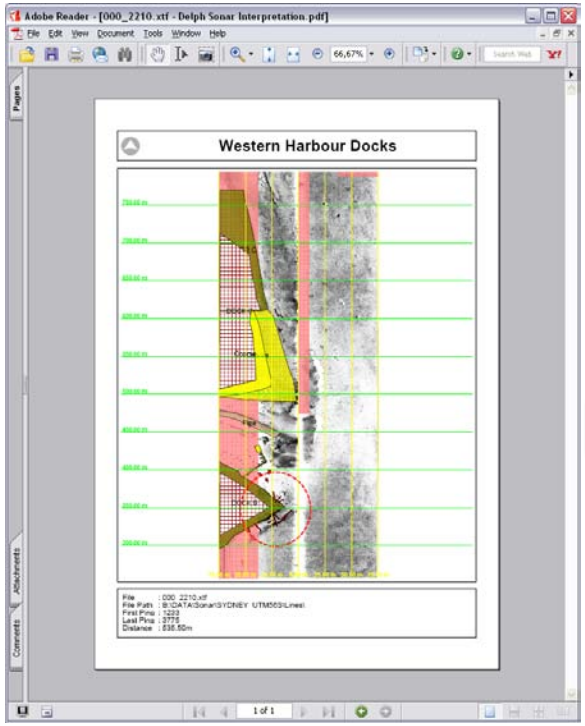
- Side-Scan sonars commonly deliver digital raw data that is stored in industry standard XTF format.
- Signal processing and mosaicking lead to backscatter maps – mosaics - for use in GIS applications.

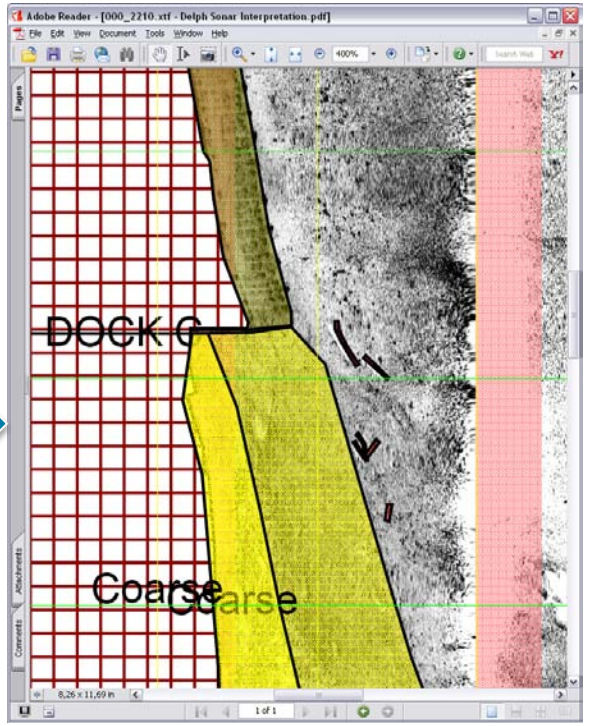
Side-Scan Sonar Data – Interpretation results

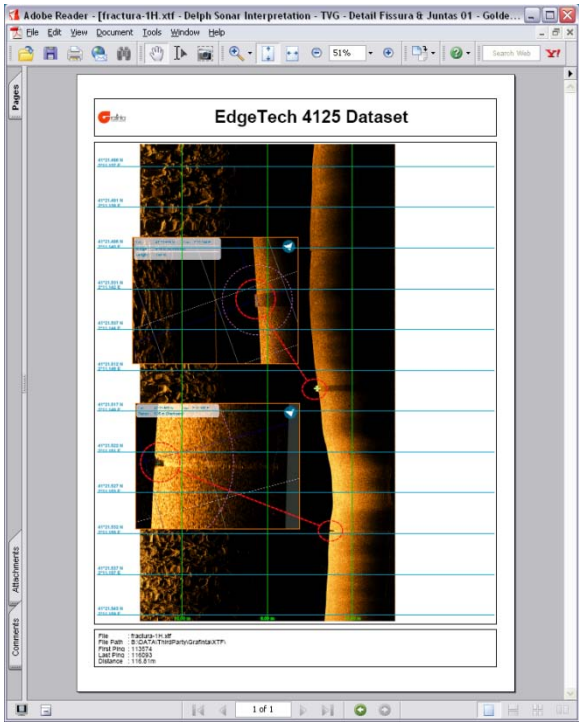


- Profile annotation and feature contouring in DELPH save synthetic information to KML or ShapeFile Layers.
- Benefits: Synthetic and Lightweight interpretation results

Side-Scan Sonar Data – Interpretation results





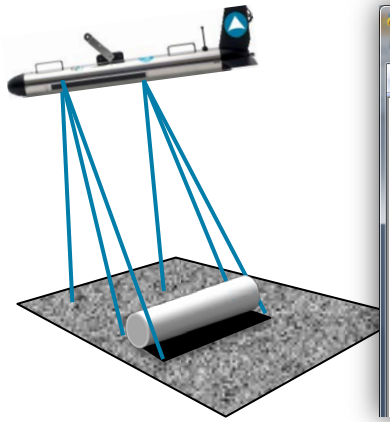


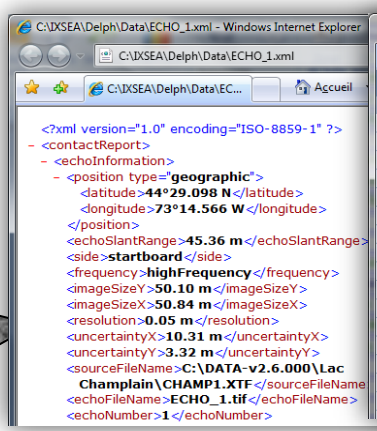
- PDF Printing drivers can be used to create documents at a desired size (A4, A3, A0) and at a desired resolution (300, 600 dpi) to share sonar data at an optimal resolution.

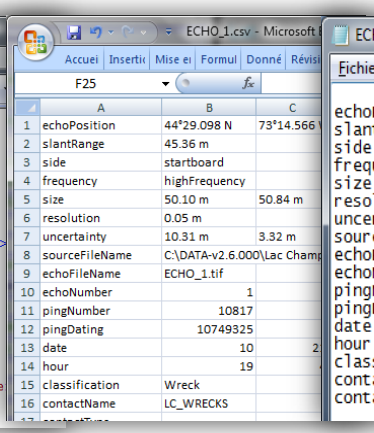
- Benefits: Interpreted profiles with sonar imagery can be shared in a lightweight standard format.

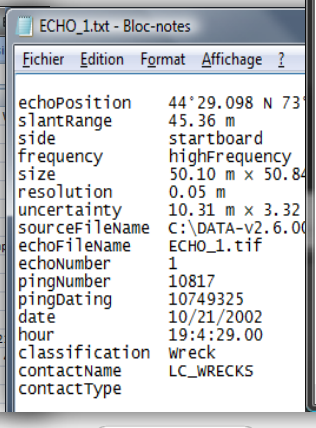
Side-Scan Sonar Data – Targets

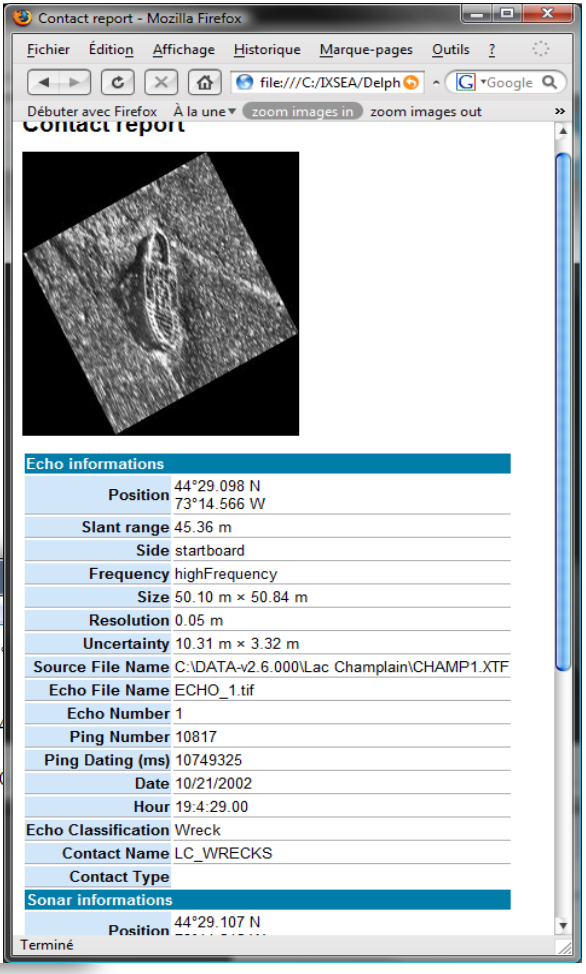
- Side-Scan Sonar targets are created in geoTIFF file format that can easily be used in any GIS or picture viewer
- HTML export can help to constitute a repository of contact information
- XML, CSV, ASCII reports help data integration in third party systems











XML CSV ASCII HTML

Side-Scan Sonar Data – Mosaic

- DELPH natively creates Side-Scan Sonar mosaics as a compilation of multiple geoTIFF tiles to reduce the volume of data due to uncovered areas.
- Data tiling also speeds the data access, allowing « level of details » optimisations in common GIS systems.
- Using data tiles avoids the limit in file size regardless of the format.
- Mosaics can also be saved to a single geoTIFF file when needed
- All tiles can be exported to the KMZ format (reprojection to WGS84, conversion to PNG tiles with no-data masking) to be shared and displayed in GoogleOcean.

Side-Scan Sonar Data – Mosaic

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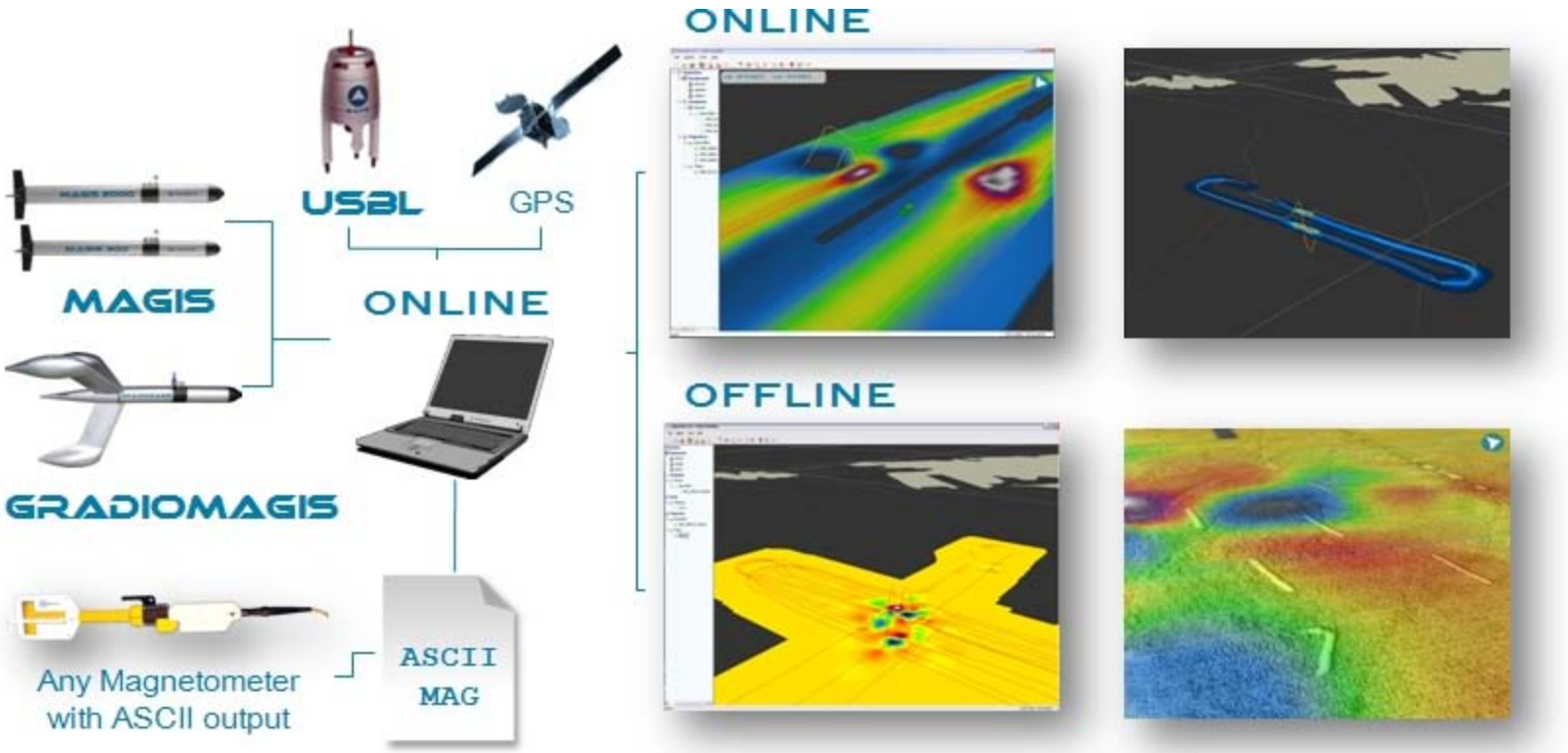
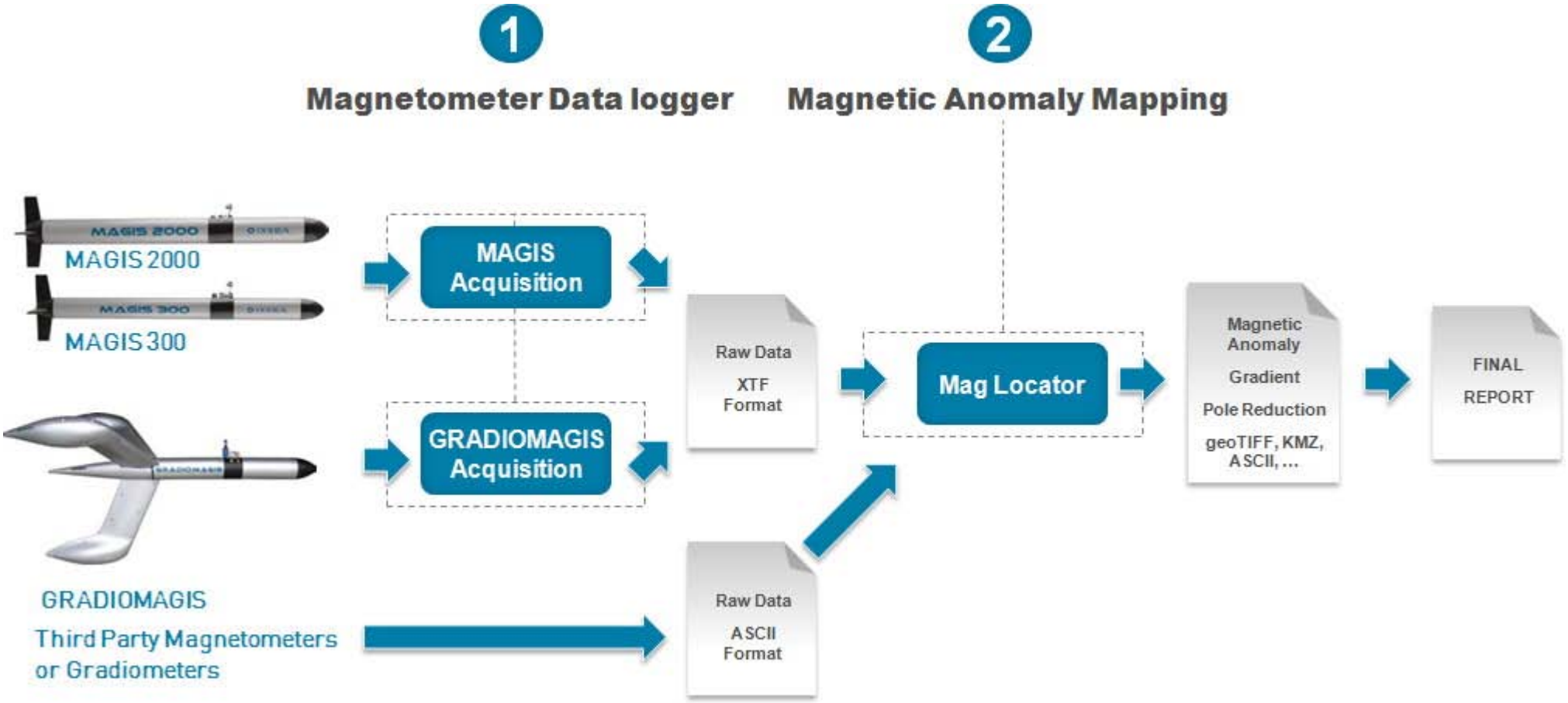
Magnetometer Data



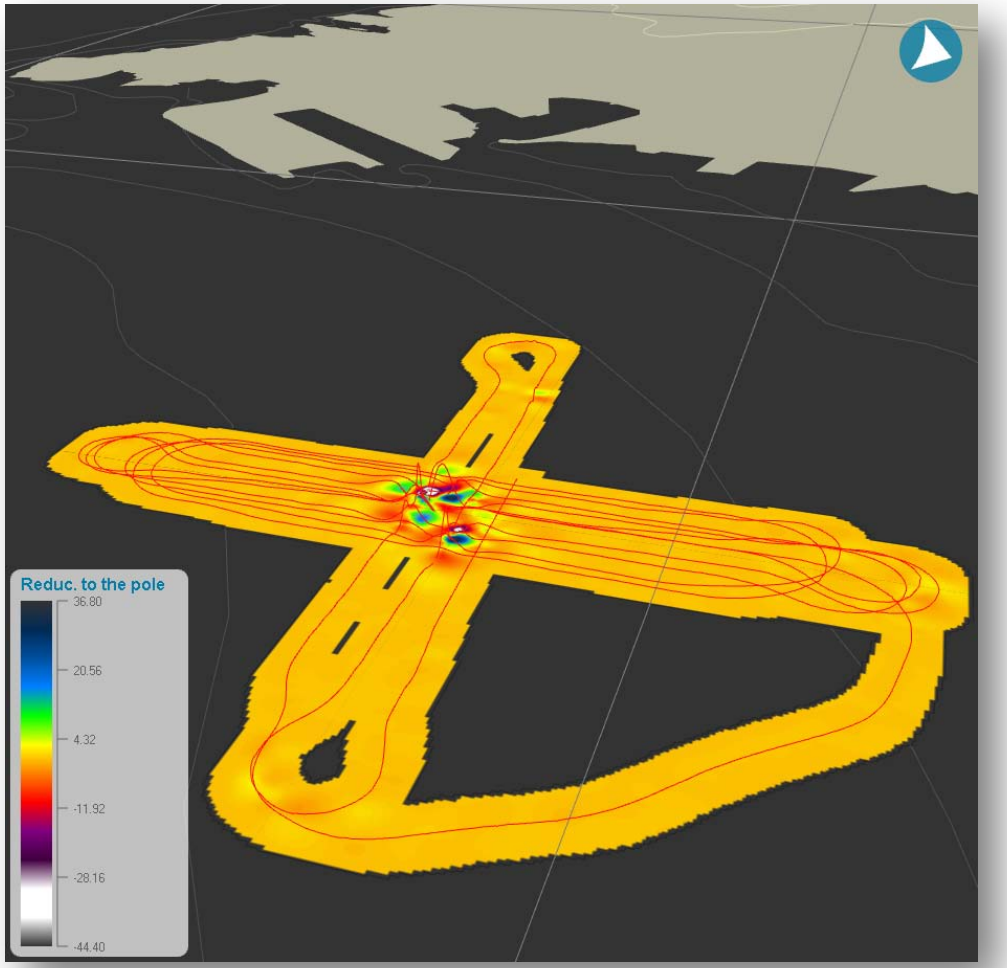
DELPH MAG LOCATOR

Magnetometer Data Flow



Magnetometer Data - Maps

- Magnetic maps are natively created as a compilation of multiple geoTIFF tiles.
- DELPH uses ESRI ArcGIS components to represent spatial data in a 3D environment including the magnetic map and the magnetic anomaly vector which one is a XYZ ShapeFile
- Standard GIS formats can be used as background information (geoTIFF, ShapeFile, DXF).
- Additional datasets can be added to the geographic view (sub-bottom interpretation, side-scan mosaics …)



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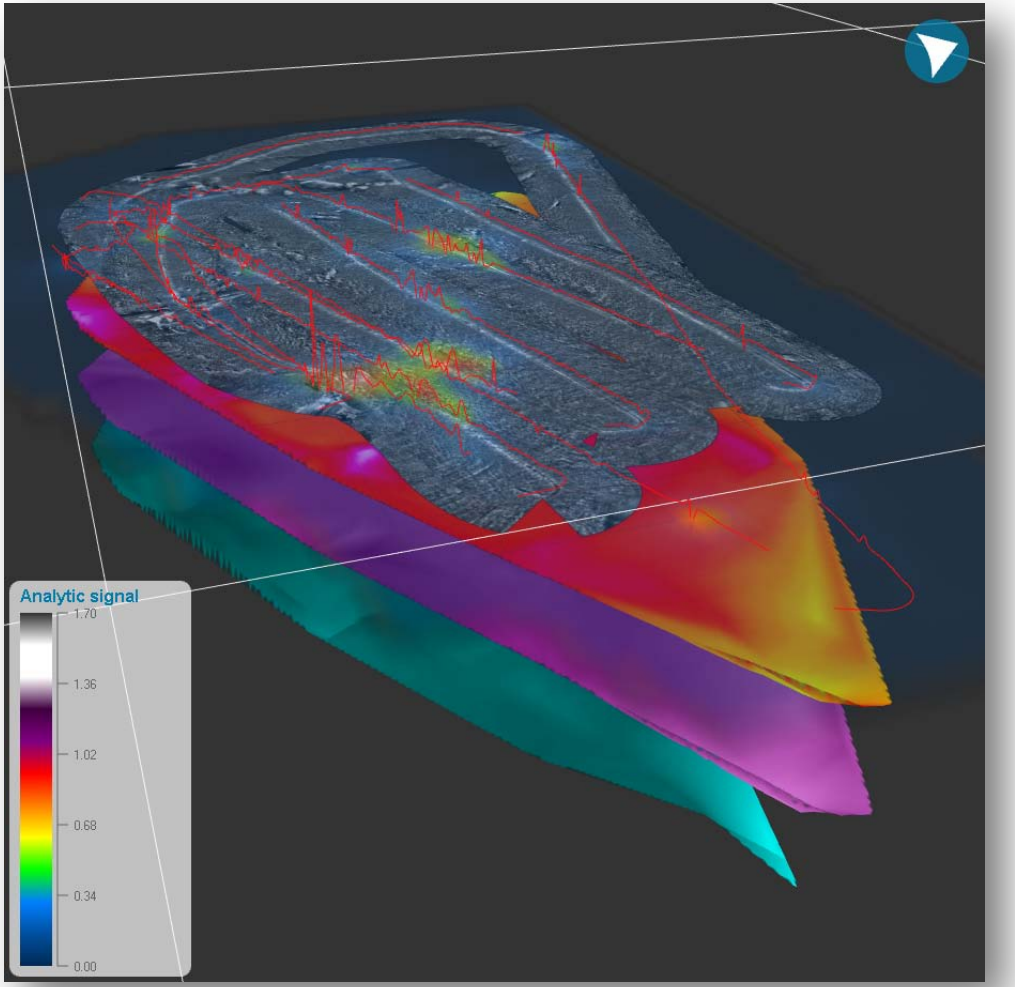
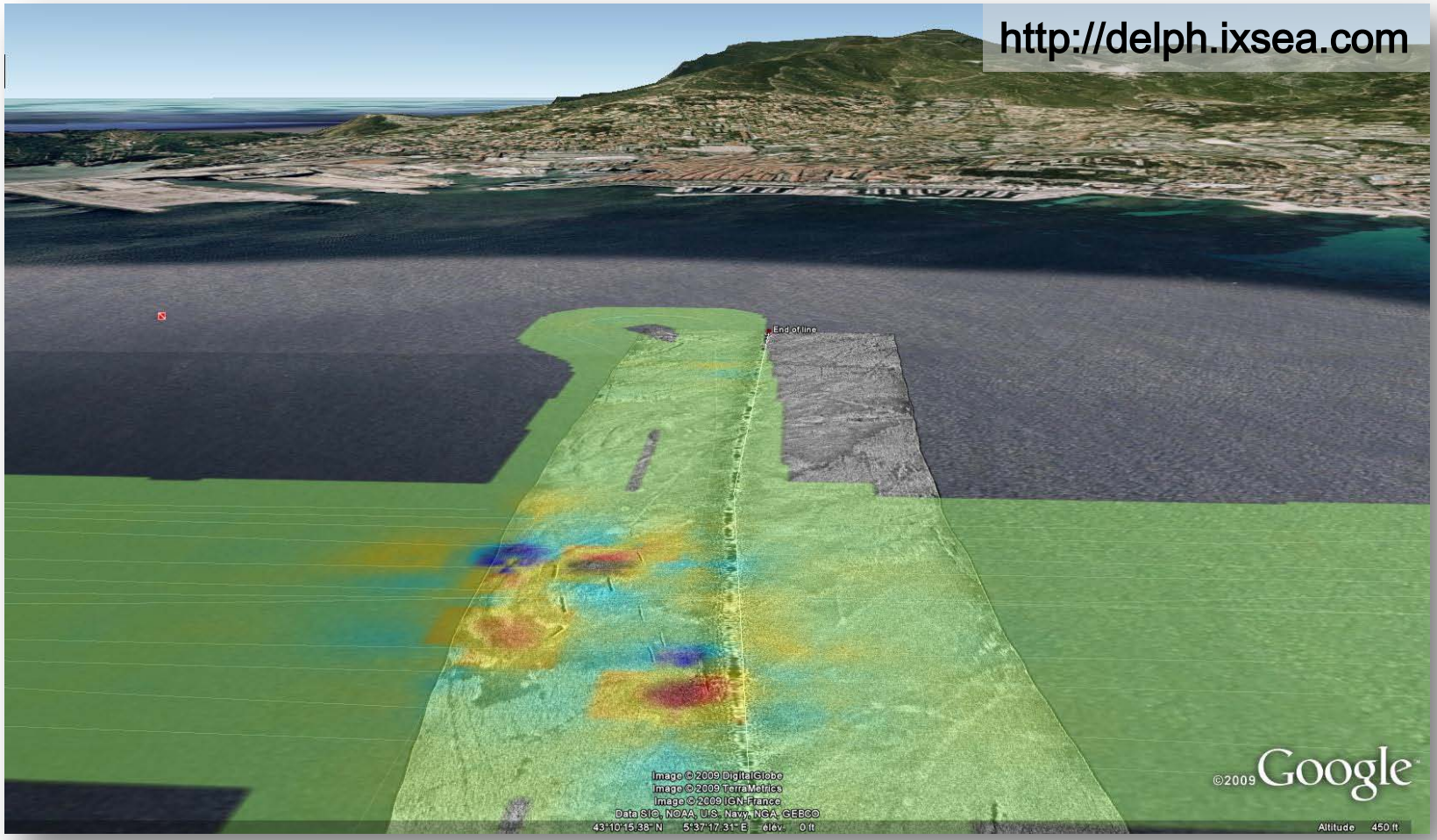


Magnetometer Data - Maps

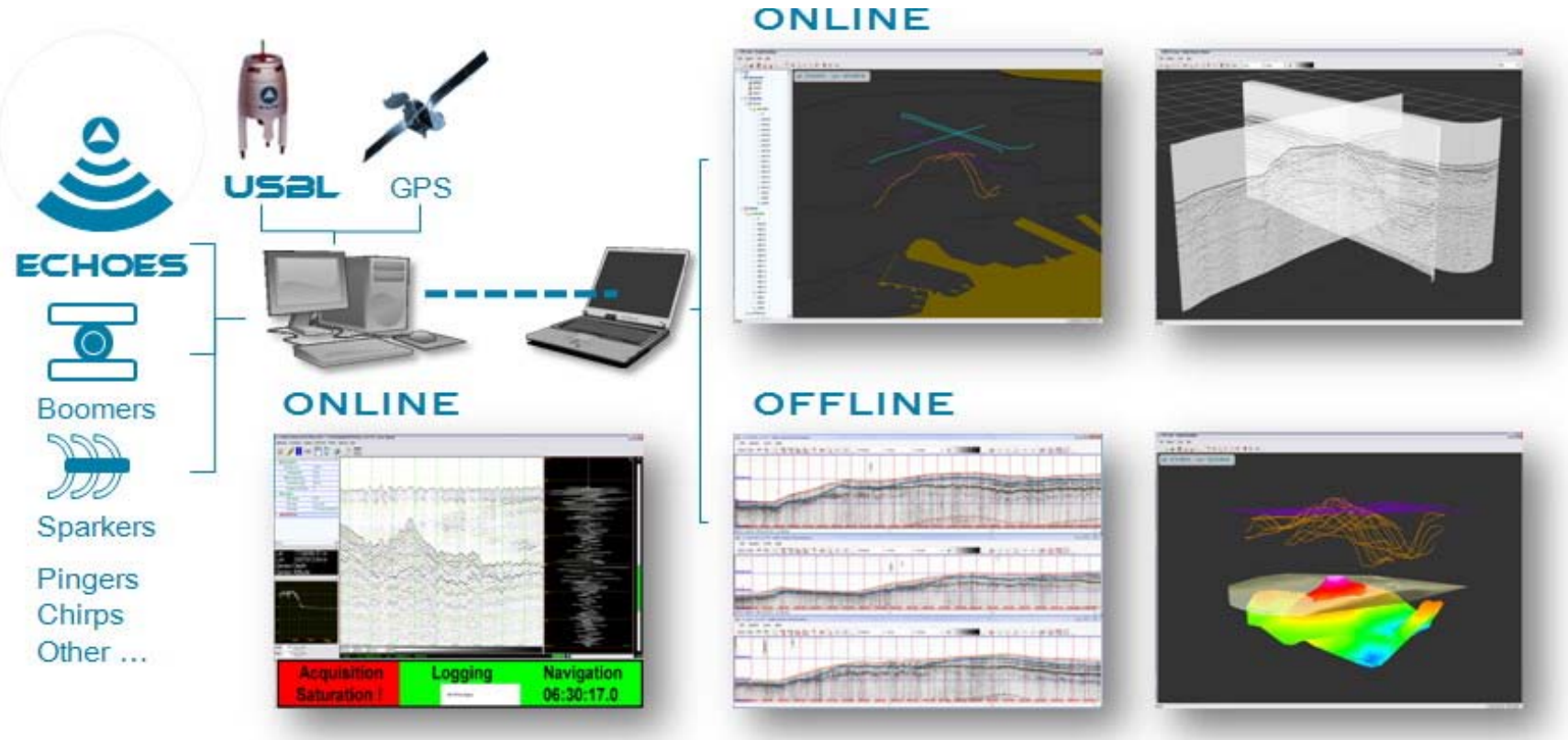
- Magnetic data is often difficult to interprete since it is not « imagery »
- Other data types including sonar backscatter, bathymetry, sub-bottom information provide additional information to understand the observed anomalyes (topography, visible objects, wrecks, pipelines, cables, etc.)
- DELPH simplifies the way to achieve a magnetic map, provides 3D multi-sensor visualization tools but how to share that data to final customers how don't use geophysical software ?
- DELPH KMZ export capability fits this need by creating GoogleOcean layers including the magnetic map and navigation tracks.
- GoogleOcean transparency feature allows the overlay of the magnetic map and the side-scan sonat mosaic.

Magnetometer Data - Maps

Magnetometer Data - Maps



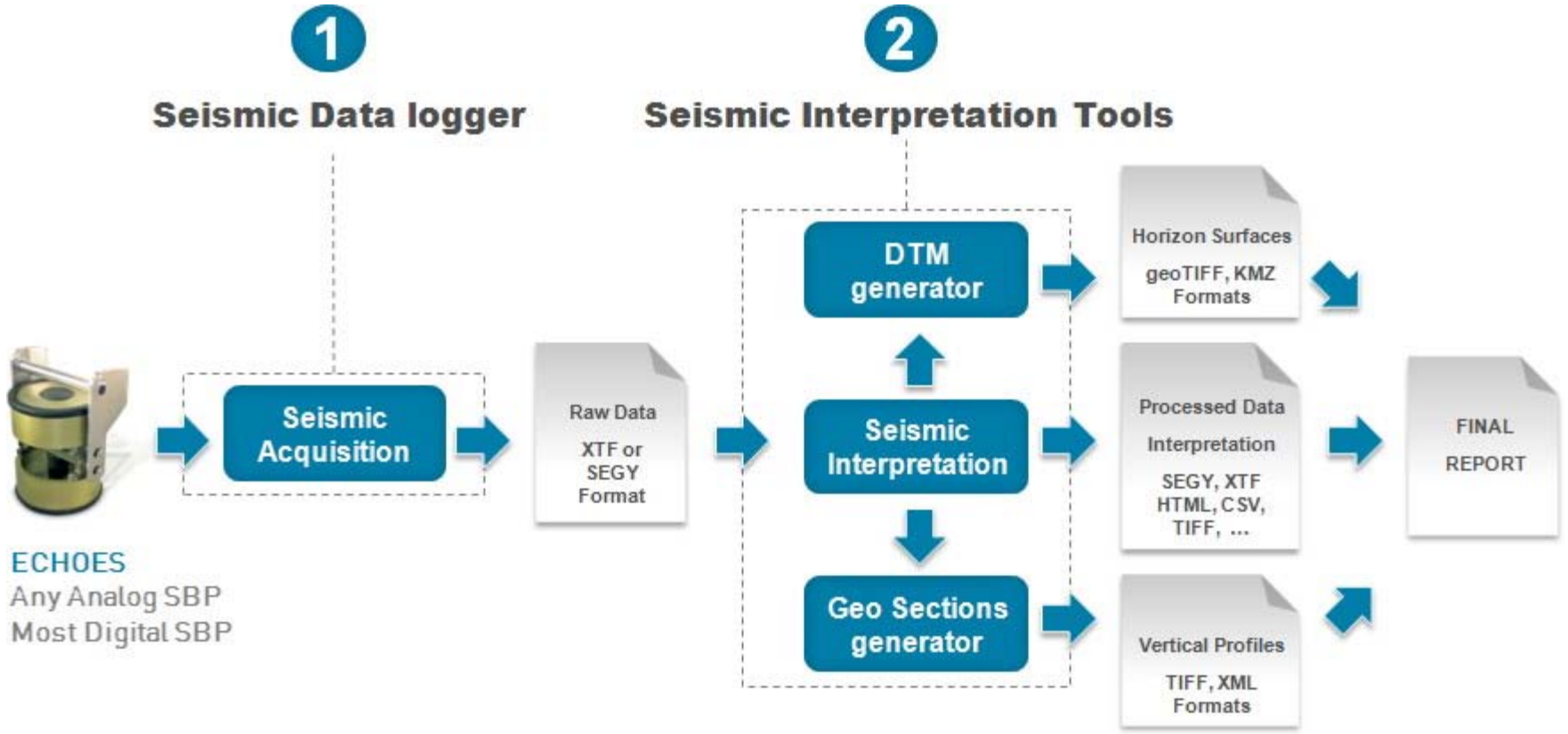
Sub-Bottom Data



DELPH SEISMIC Acquisition

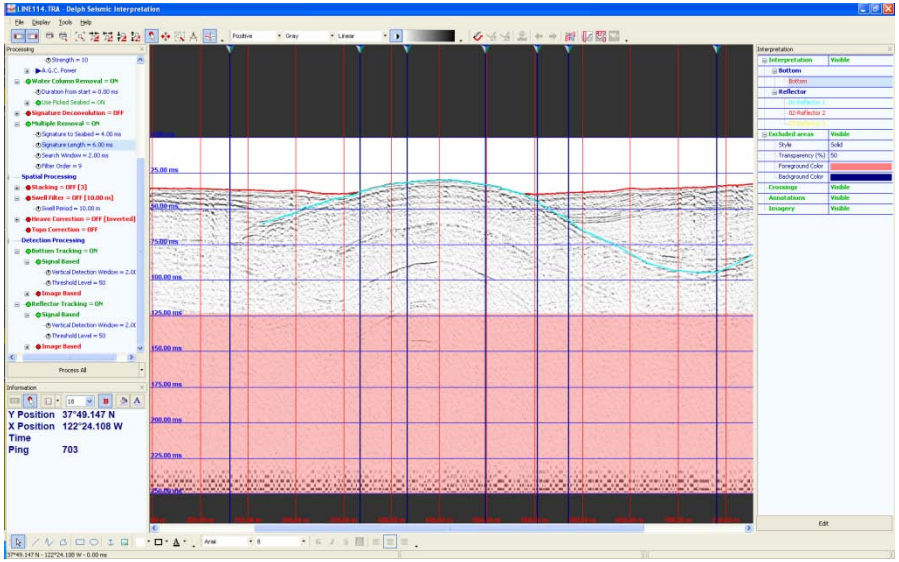
DELPH SEISMIC INterpretation

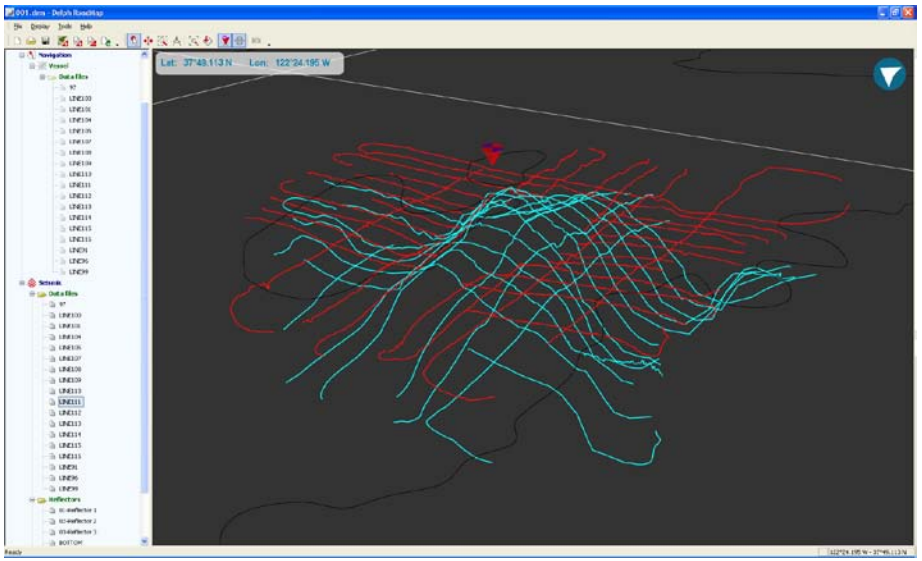
Sub-Bottom Data Flow



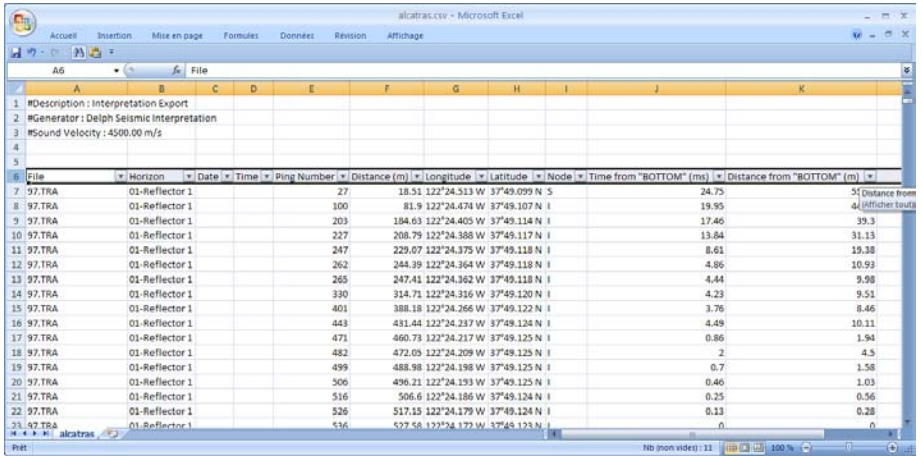
- Sub-Bottom data is commonly acquired and stored in industry standard SEGY format.
- Most interpretation reports include paper plots and formated text files of picked horizons.

Sub-Bottom Data - Interpretation





- Interpretation on vertical planes is difficult to understand in space
- Acoustic reflectors picked on the seismic profiles lead to XYT shapefiles
- CSV formatted text files can be used in modelling software and GIS databases

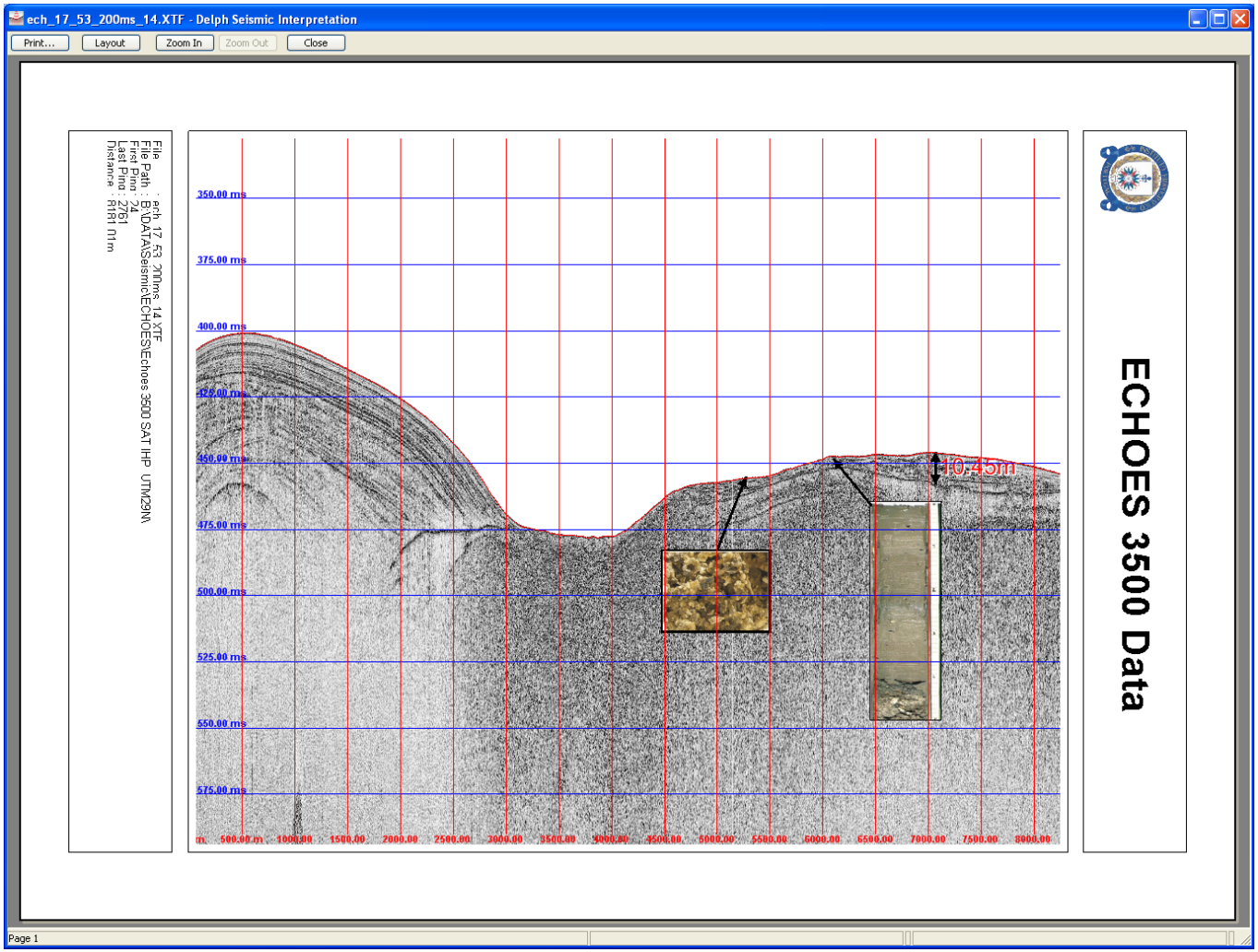


	A	B	C	D	E	F	G	H	I	J	K
1	#Description : Interpretation Export										
2	#Generator : Delph Seismic Interpretation										
3	#Sound Velocity : 4500.00 m/s										
4											
5											
6	File	Horizon	Date	Time	Ping Number	Distance (m)	Longitude	Latitude	Node	Time from "BOTTOM" (ms)	Distance from "BOTTOM" (m)
7	97.TRA	01-Reflector 1			27		18.51 122°24.513 W	37°49.099 N	S	24.75	5
8	97.TRA	01-Reflector 1			100		81.9 122°24.474 W	37°49.107 N	I	19.95	4
9	97.TRA	01-Reflector 1			203		184.63 122°24.405 W	37°49.114 N	I	17.46	39.3
10	97.TRA	01-Reflector 1			227		208.79 122°24.388 W	37°49.117 N	I	13.84	31.13
11	97.TRA	01-Reflector 1			247		229.07 122°24.375 W	37°49.118 N	I	8.61	19.38
12	97.TRA	01-Reflector 1			262		244.39 122°24.364 W	37°49.118 N	I	4.86	10.93
13	97.TRA	01-Reflector 1			265		247.41 122°24.362 W	37°49.118 N	I	4.44	9.98
14	97.TRA	01-Reflector 1			330		314.71 122°24.316 W	37°49.120 N	I	4.23	9.51
15	97.TRA	01-Reflector 1			401		388.18 122°24.266 W	37°49.122 N	I	3.76	8.46
16	97.TRA	01-Reflector 1			443		431.44 122°24.237 W	37°49.124 N	I	4.49	10.11
17	97.TRA	01-Reflector 1			471		460.73 122°24.217 W	37°49.125 N	I	0.86	1.94
18	97.TRA	01-Reflector 1			482		472.05 122°24.209 W	37°49.125 N	I	2	4.5
19	97.TRA	01-Reflector 1			499		488.98 122°24.198 W	37°49.125 N	I	0.7	1.58
20	97.TRA	01-Reflector 1			506		496.21 122°24.193 W	37°49.125 N	I	0.46	1.03
21	97.TRA	01-Reflector 1			516		506.6 122°24.186 W	37°49.124 N	I	0.25	0.56
22	97.TRA	01-Reflector 1			526		517.15 122°24.179 W	37°49.124 N	I	0.13	0.28
23	97.TRA	01-Reflector 1			536		527.58 122°24.172 W	37°49.123 N	I	0	0

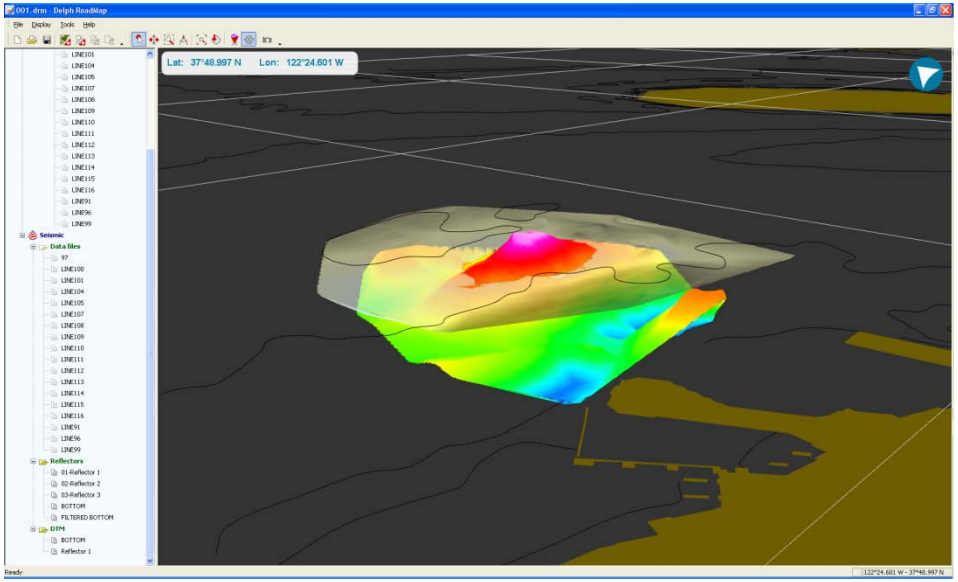
Sub-Bottom Data - Interpretation

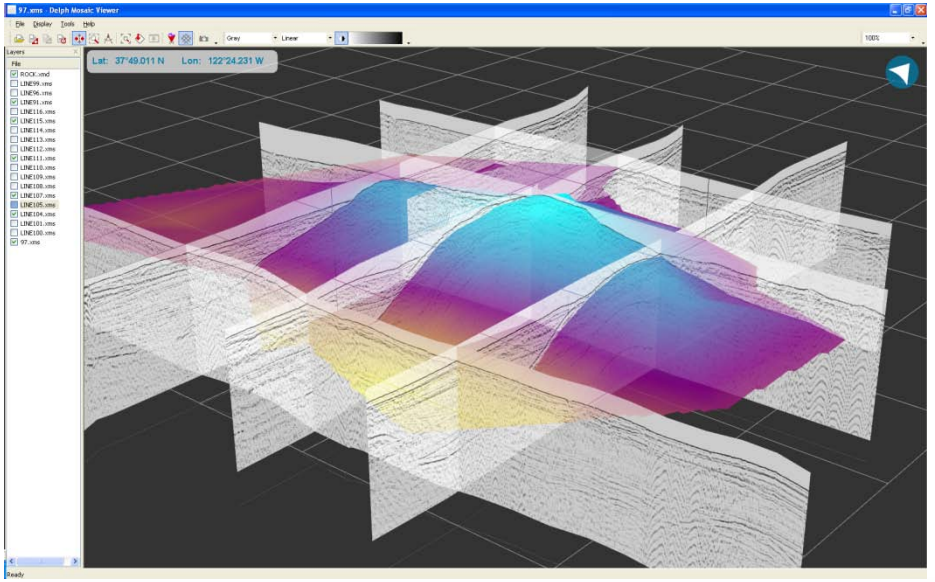
- PDF Printing drivers can be used to create documents at a desired size (A4, A3, A0) and a desired resolution (300, 600 dpi) allowing to share interpreted seismic profiles at any resolution.

- Benefits:
  Interpreted profiles can be shared in a lightweight standard format.

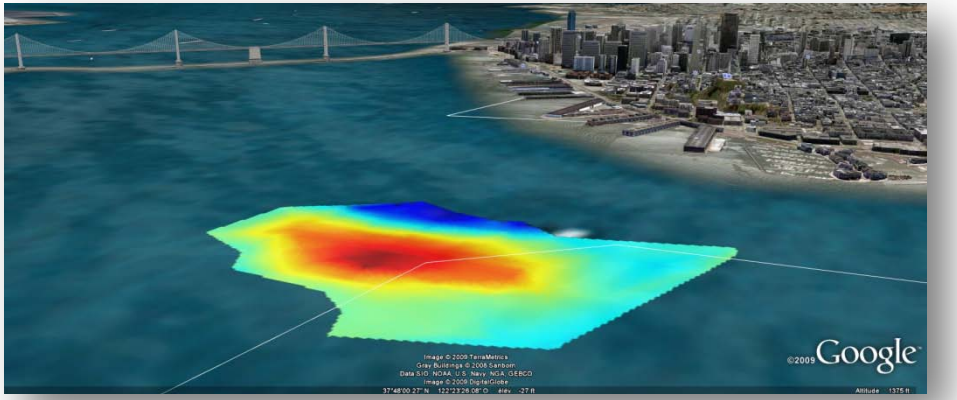


Sub-Bottom Data - Maps



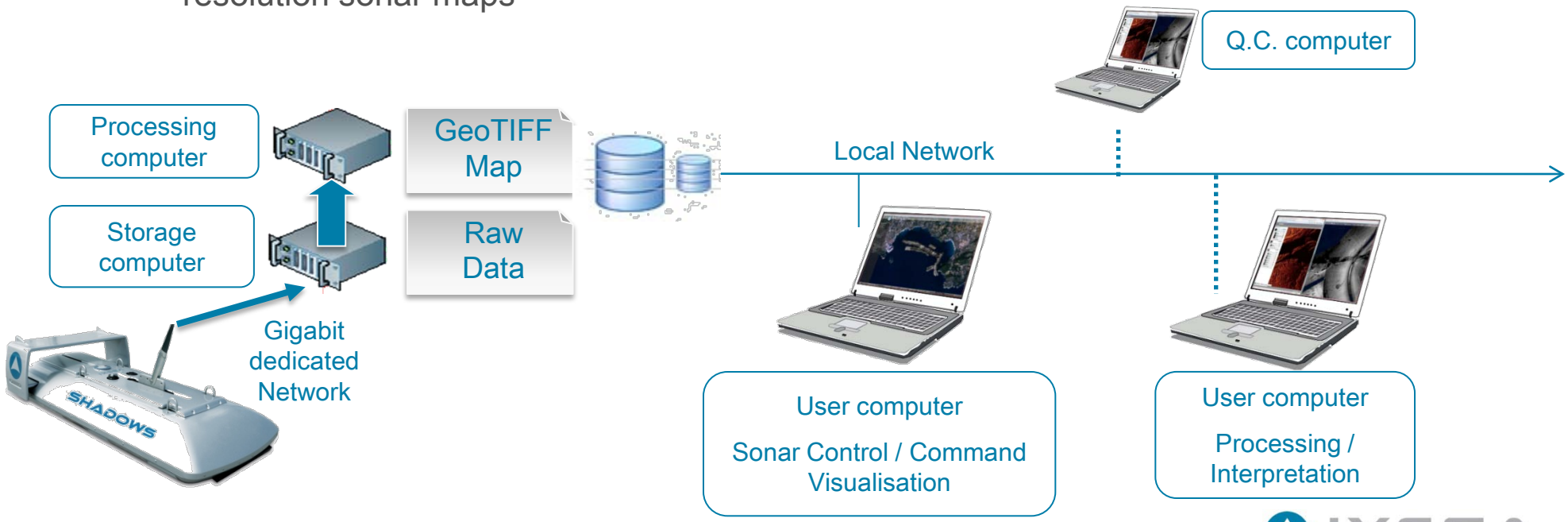


- DELPH Seismic creates geo-referenced vertical view of the sub-bottom profiles and models the picked horizons to build geoTIFF maps that can be exported to KMZ layers

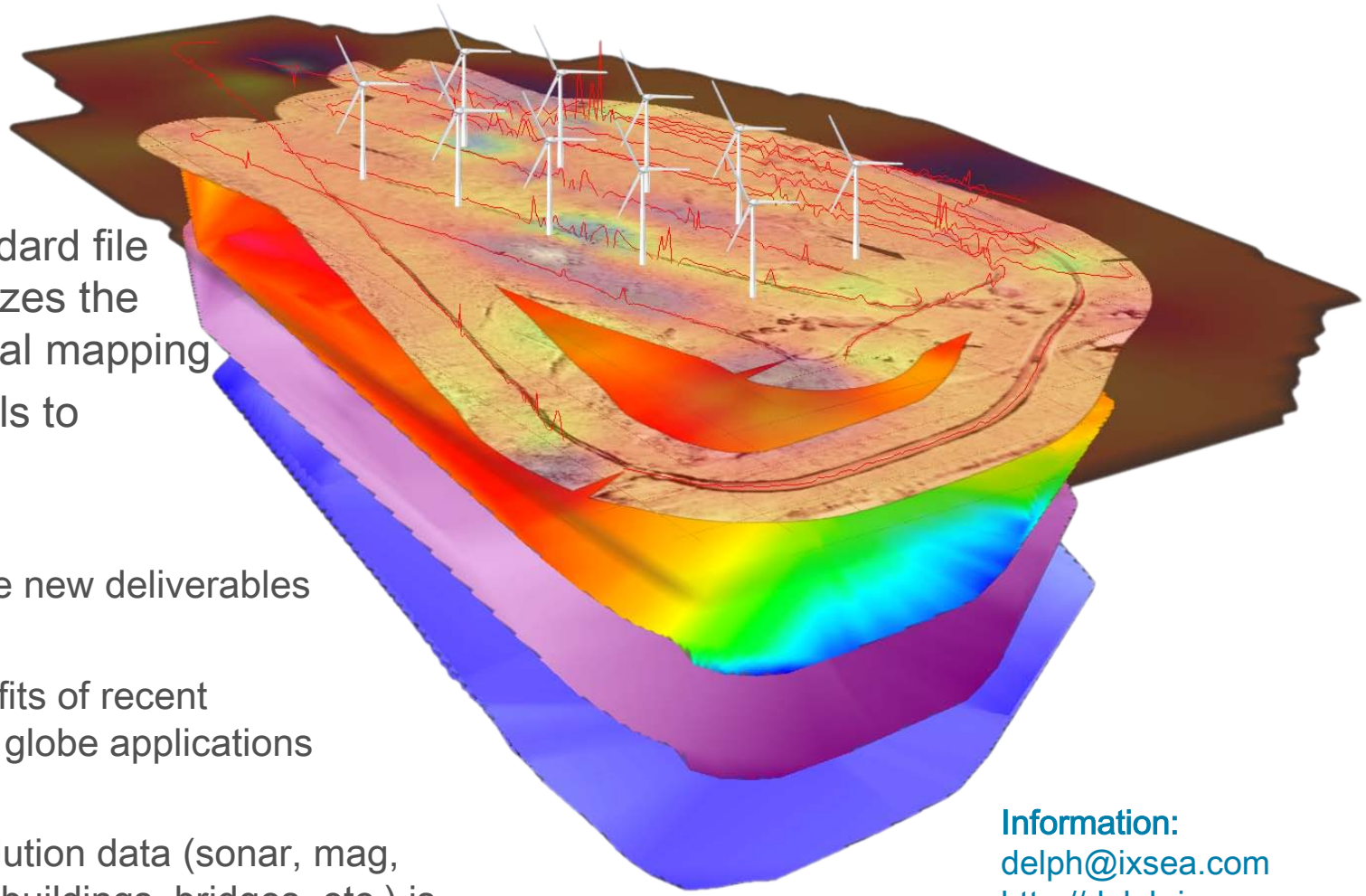


To go further …

- Data Dissemination
  - Surveying huge areas with multiple sensors increases the data volume a lot. Data-centers and dynamic access to data through web-based protocols will become a standard tool.
  - Sample Integration: SHADOWS mapping sonar
    Factory developments and integration allow web-based access to large scale high resolution sonar maps



Conclusion



Native supporting standard file formats not only optimizes the work-flow in geophysical mapping but also offers new tools to share/distribute data:

- Digital products become new deliverables
- Data visualization benefits of recent developments with the globe applications
- Integration of high resolution data (sonar, mag, etc.) with surface data (buildings, bridges, etc.) is now possible

Information:
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