

# An Evaluation of CARIS Bathy DataBASE as a Bathymetric Data Management Solution for CHS Quebec



*Canadian Hydrographic Conference 2008*



# Outline

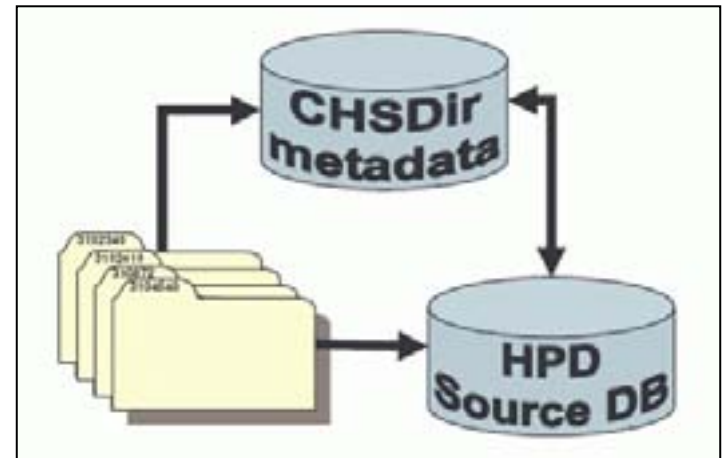
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- CHS' operational workflows
- The CARIS Bathy DataBASE solution
- Evaluation at CHS Quebec Region
  - Loading
  - Management
  - Extraction
- Integration consideration
- CARIS Bathy DataBASE future developments



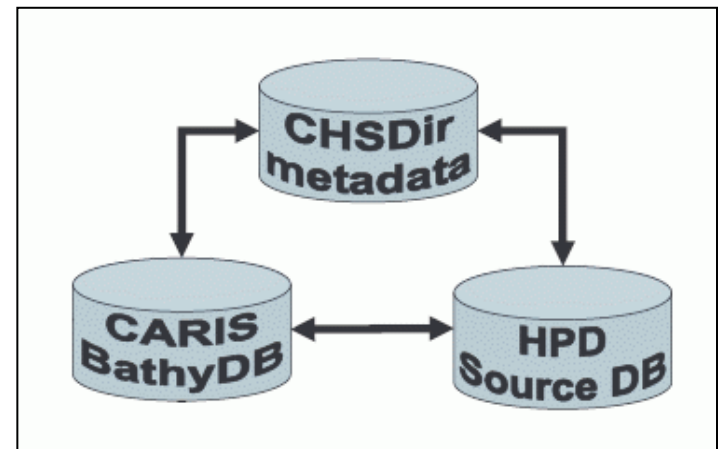
# CHS Operational Workflow

- HPD for low-density data
- Bathymetric data is file-based
- Nationwide metadata database



Current operational workflow (Source: CHS)

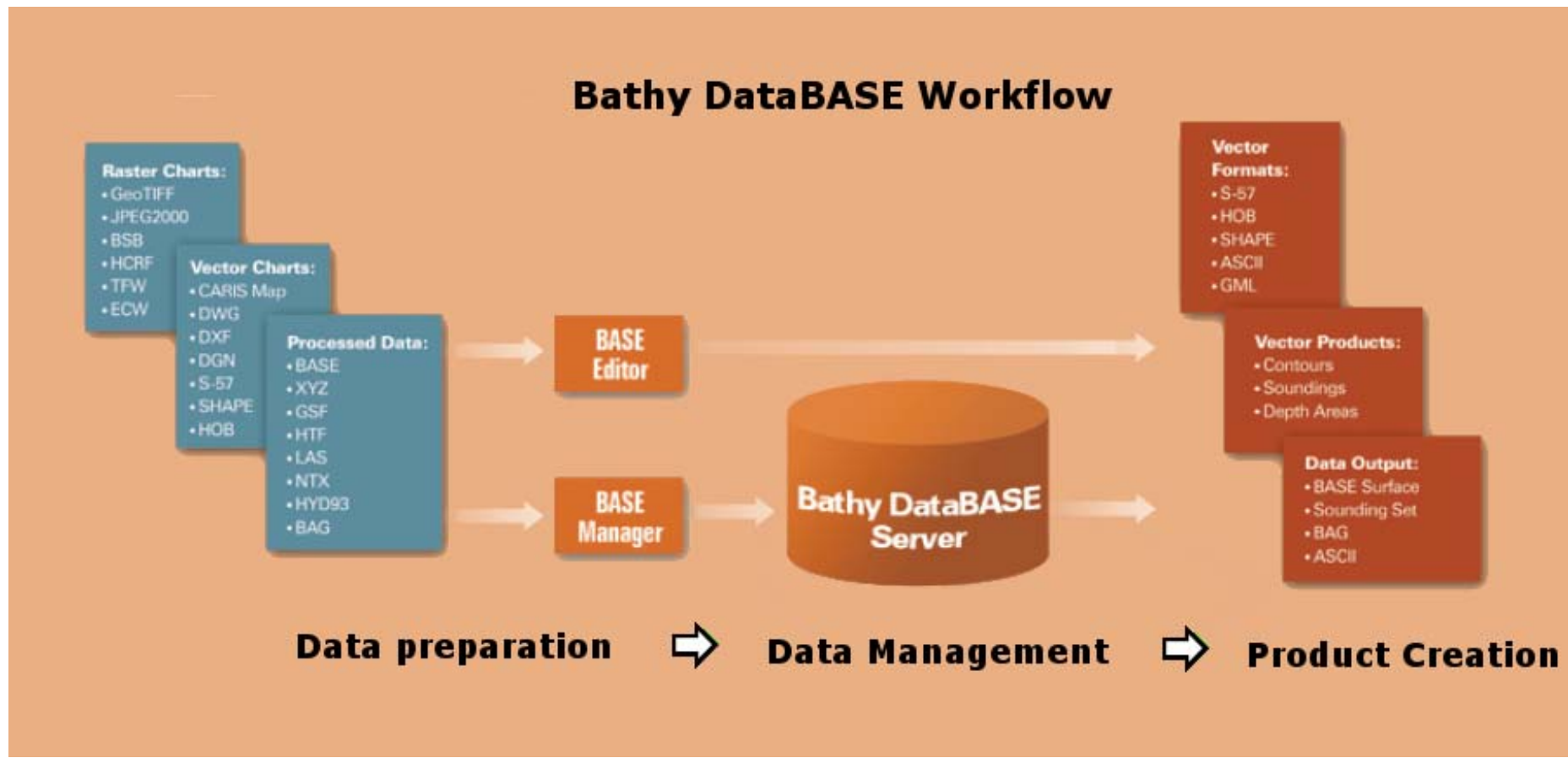
- Full database architecture
  - Better integration
  - Improved data traceability
  - Minimal loss of information



Future operational workflow (Source: CHS)



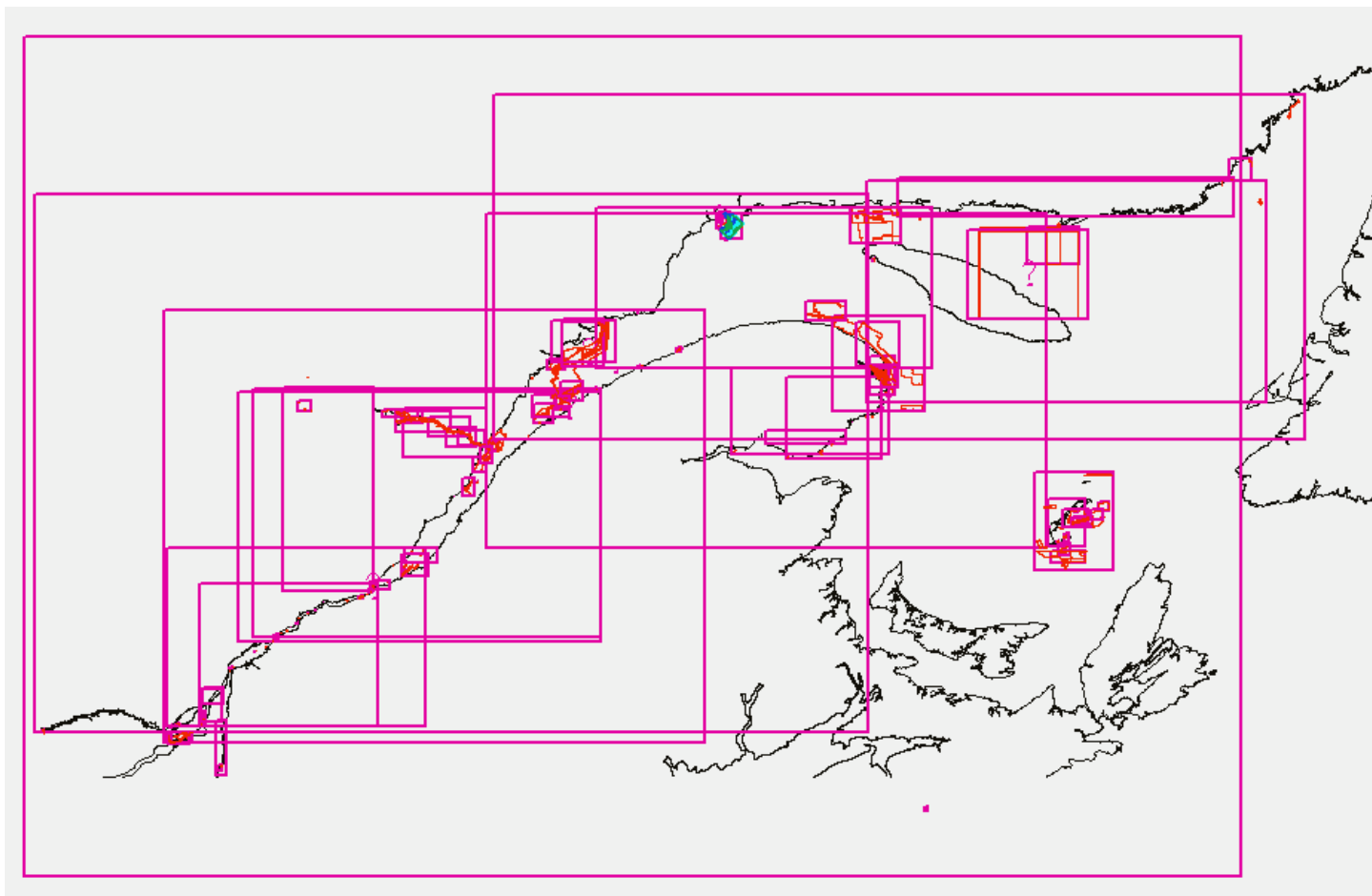
# Bathy DataBASE Solution



Source: CARIS



# Managing a database of surveys...

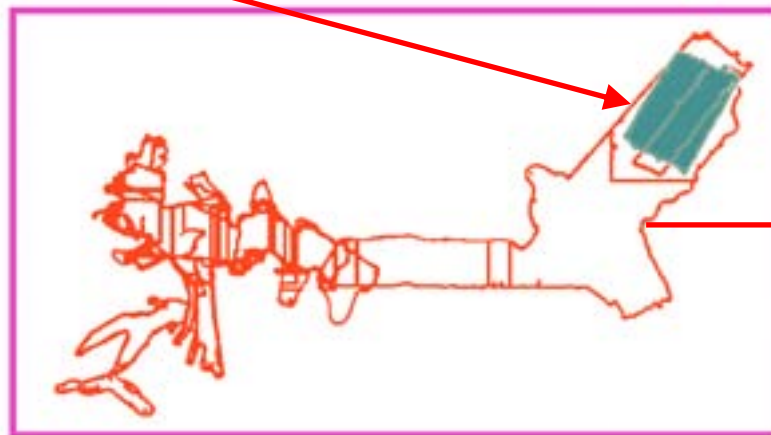




# ...containing datasets.

Attribute	Attribute Name	Value
SURID1	Survey date - start	
SURID2	Survey date - end	
ISURID	Chart name	60-2004 1011_01_01 (range 10_100m)
TICD01	Technique of sounding measurement	Sounding by multi-beam
SPID01	Application system used in survey	SPID00
SPID02	Positioning system used in survey	GPS
REVID	Name of acquisition vessel	F112-Corvet
STAT01	Status	Completed
DATE01	Last modification	2017/04/26 09:59:00
DATE02	Creation time	2017/04/26 09:57:00
SPUR	Category of bathymetric surface	Standard
SPUR01	Sounded surface resolution	1.00 m
SPUR02	Storage Type	Standard
SPUR03	Sounded at	2017/04/26
SPUR04	Depth range - value 1	
SPUR05	Depth range - value 2	
SPUR06	Height/bathymetry units	
SPUR07	Horizontal datum	
SPUR08	Depth units	
SPUR09	Vertical datum	
CATD01	Category of zone of confidence in data	
CATD02	Completion date	
POSACC	Positional accuracy	
POSACC	Sounding accuracy	
SURTRF	Survey title	
SPUR01	Original representation	
SPUR02	Information	Unknown
SPUR03	Information in national language	
RECDAT	Recording date	
RECDAT	Recording indication	
SURDAT	Survey date	
SURIND	Survey indication	

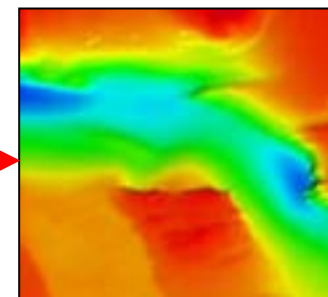
Dataset attribute table



Dataset contained within a survey



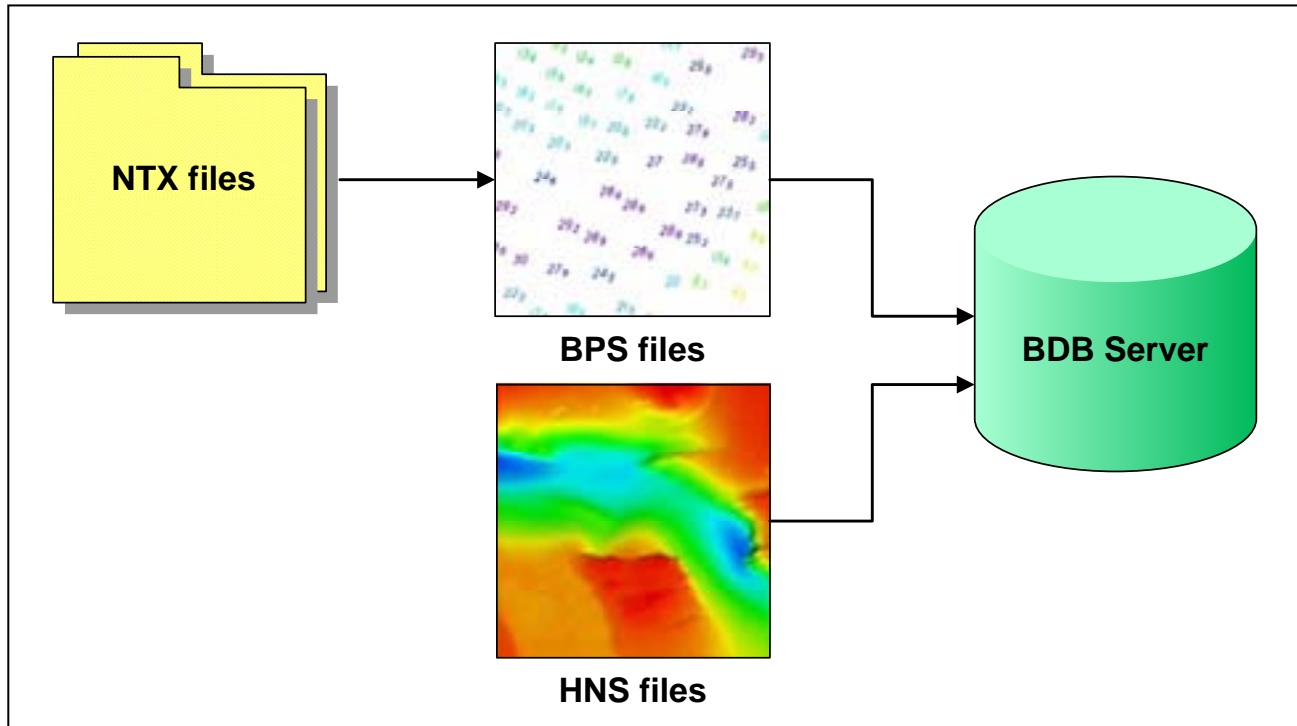
Sounding Set



BASE Surface



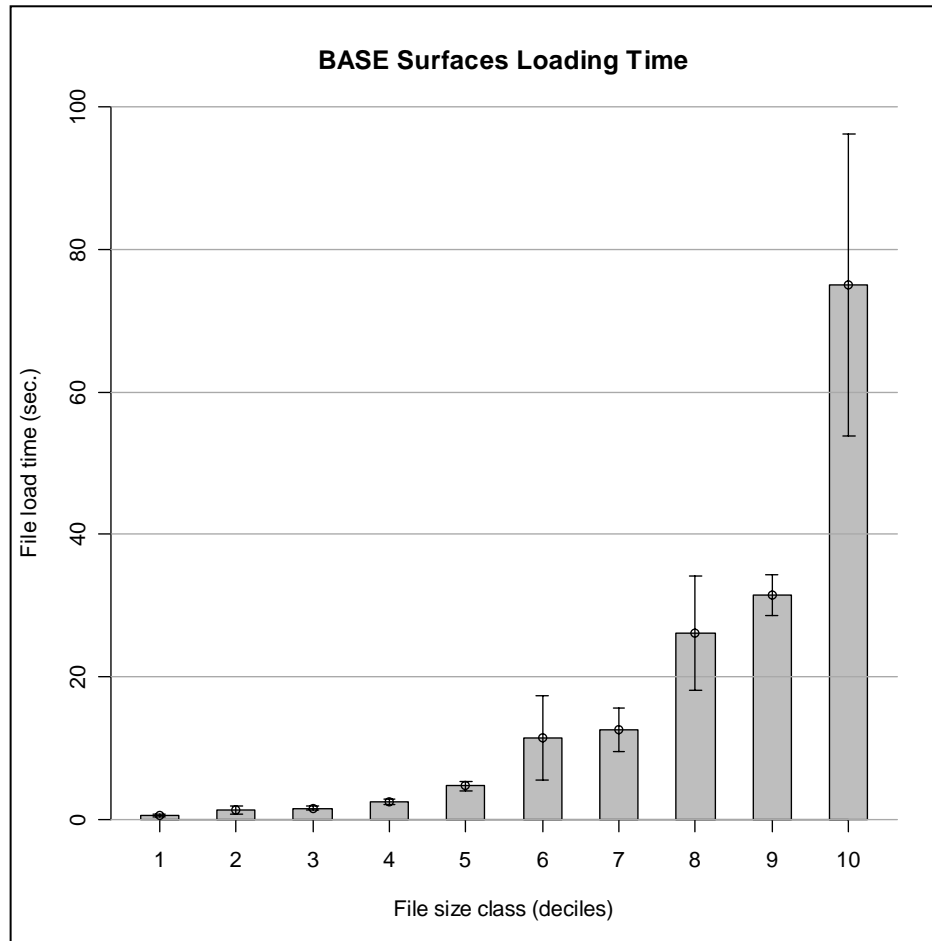
# Loading Method



Simple workflow for loading



# Performance Analysis

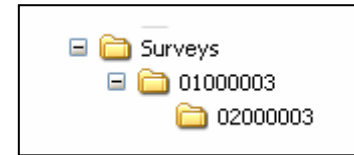




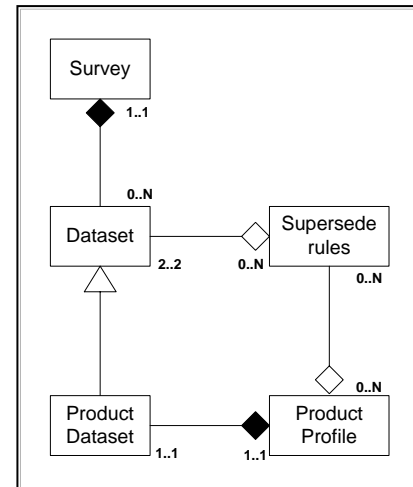


# Data Management

- Entity integrity
  - Unique dataset identifier
- Attribute domain integrity
  - Guaranteed by pair of XML files
- Referential integrity
  - Relationship rules between objects

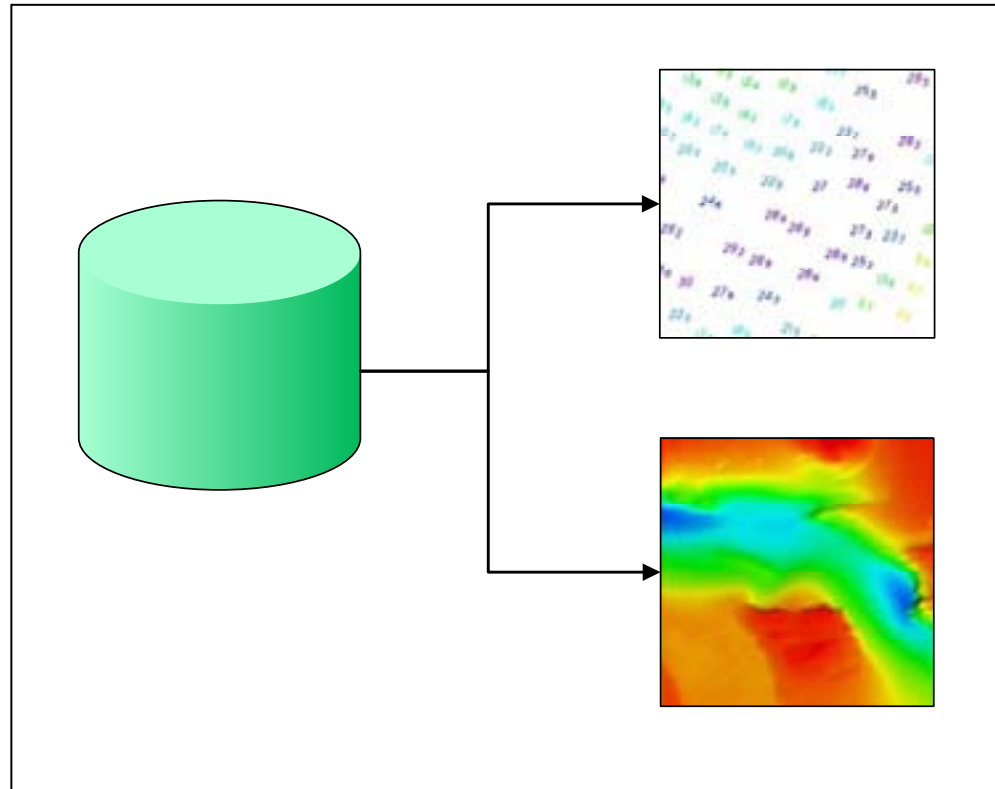


```
<!-- Systeme d'acquisition utilise pour le leve -->  
<AttributeClass Acronym="acqsys" ExternalID="11113" ID="11113"  
Type="ENUMERATION">  
  <Name>Acquisition system used in survey</Name>  
  <Description>Remarks: </Description>  
  <ExpectedValues>  
    <ExpectedValue Description="EM3002" Value="11"/>  
    <ExpectedValue Description="EM710" Value="12"/>  
  </ExpectedValues>  
</AttributeClass>
```





# Extraction methods



Simple workflow for extraction

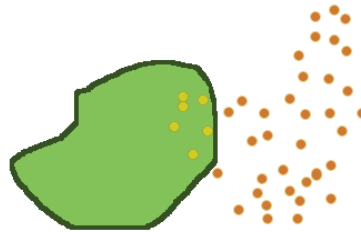


# Extraction methods

## Possible types of dataset combinations



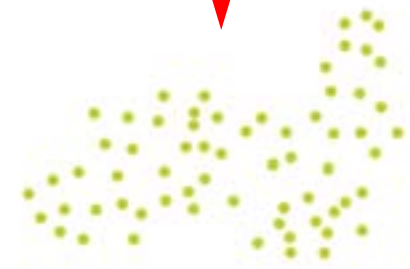
Between BASE surfaces



Between BASE surfaces  
and sounding sets



Between sounding sets

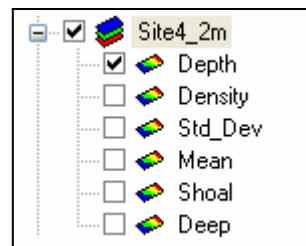




# Dataset Conflict Resolution

## 10 supersede rules

- Logical operators:  $<$ ,  $>$ ,  $=$ ,  $\neq$
- 2 rules apply at node level



Layers

- 8 rules apply at dataset level

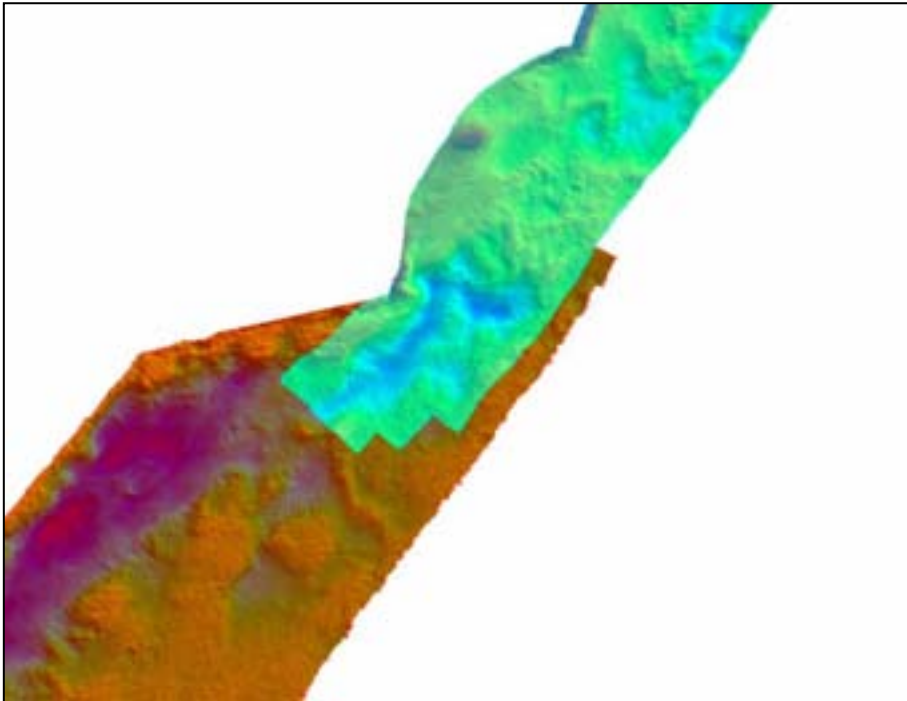


Table Attributes

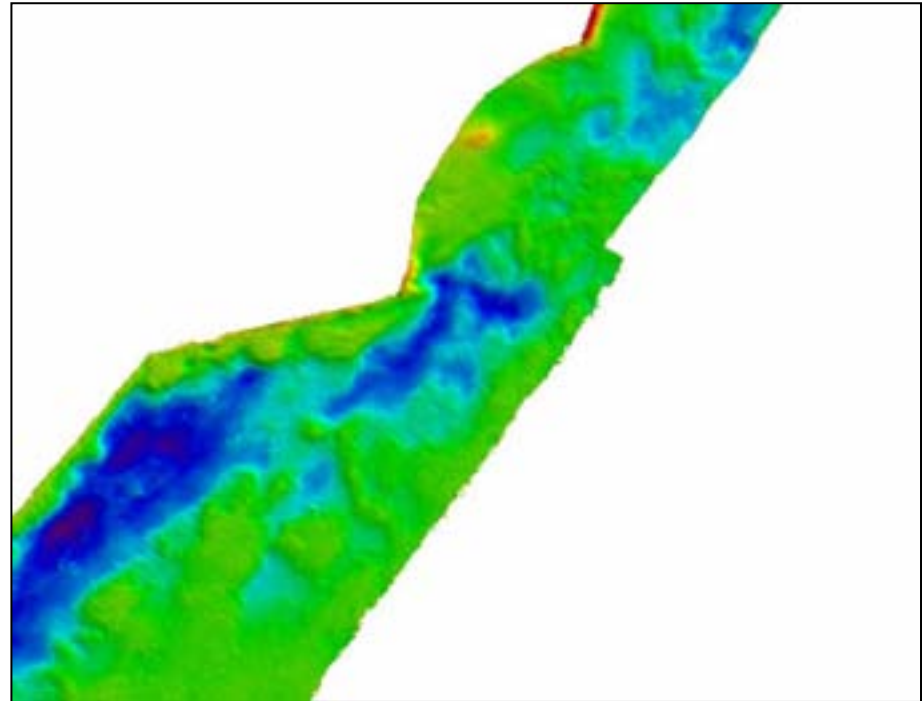


# BASE Surface Combining

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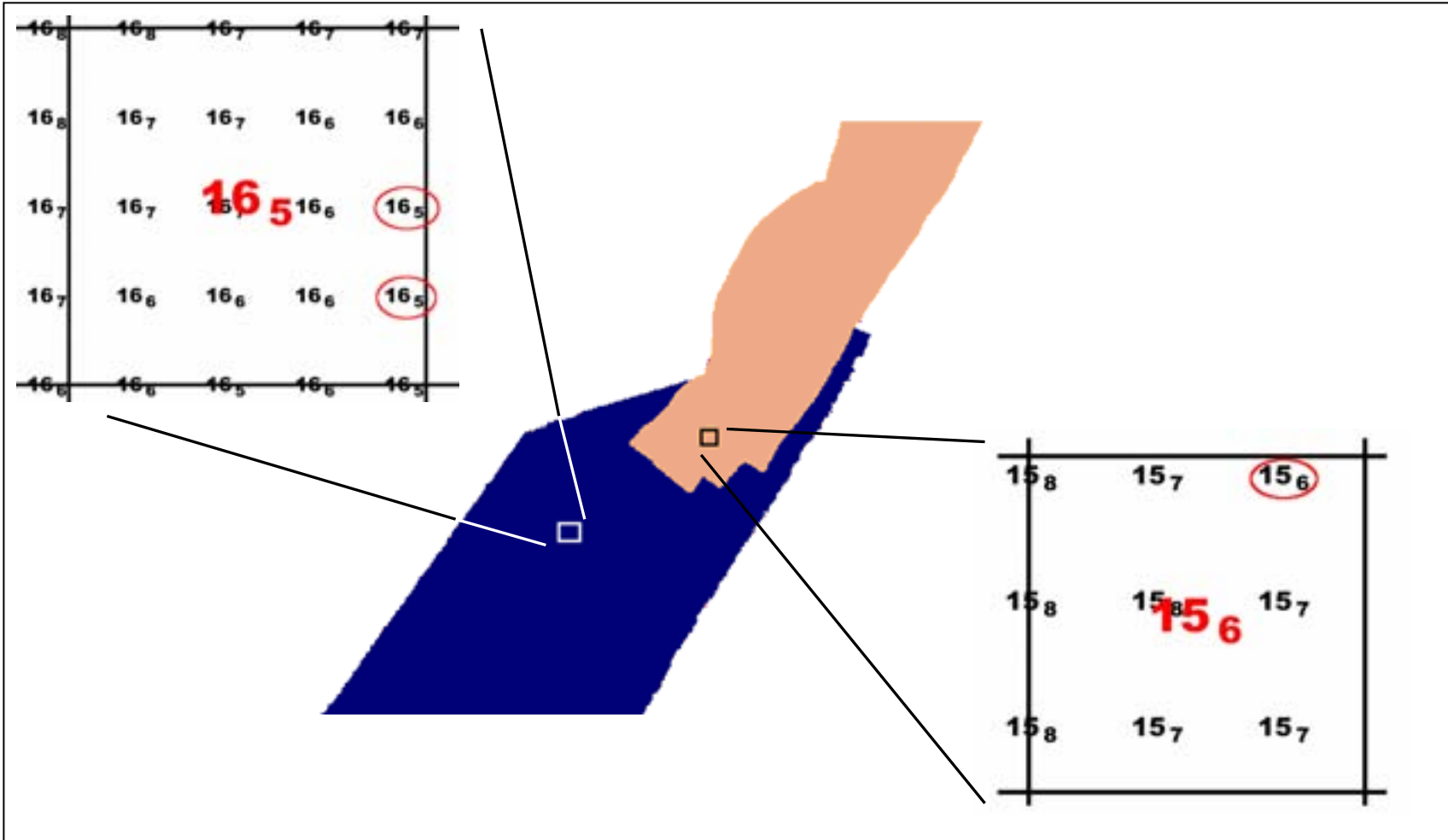
Overlapping BASE Surfaces in the Port of Montreal area.  
Resolution is 0.75m and 0.5m @ 1:3600 scale



Seamless combined BASE Surface in the Port of Montreal area.  
Resolution is 2m @ 1:3600 scale



# Surface attribution

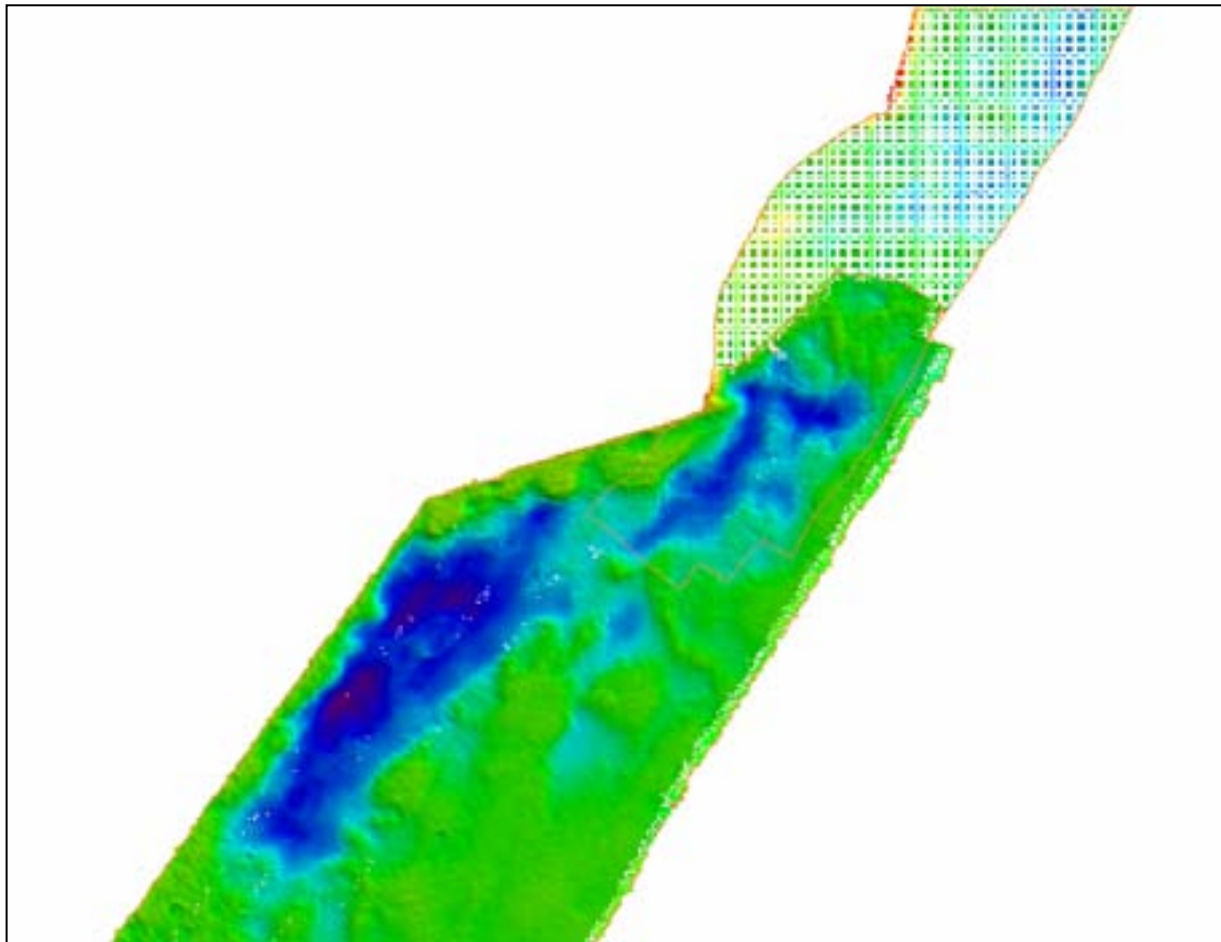


Contribution layers showing variations in decimation process within a dataset and within two overlapping datasets. Scale is 1:3600



# The Need for Variable Resolution

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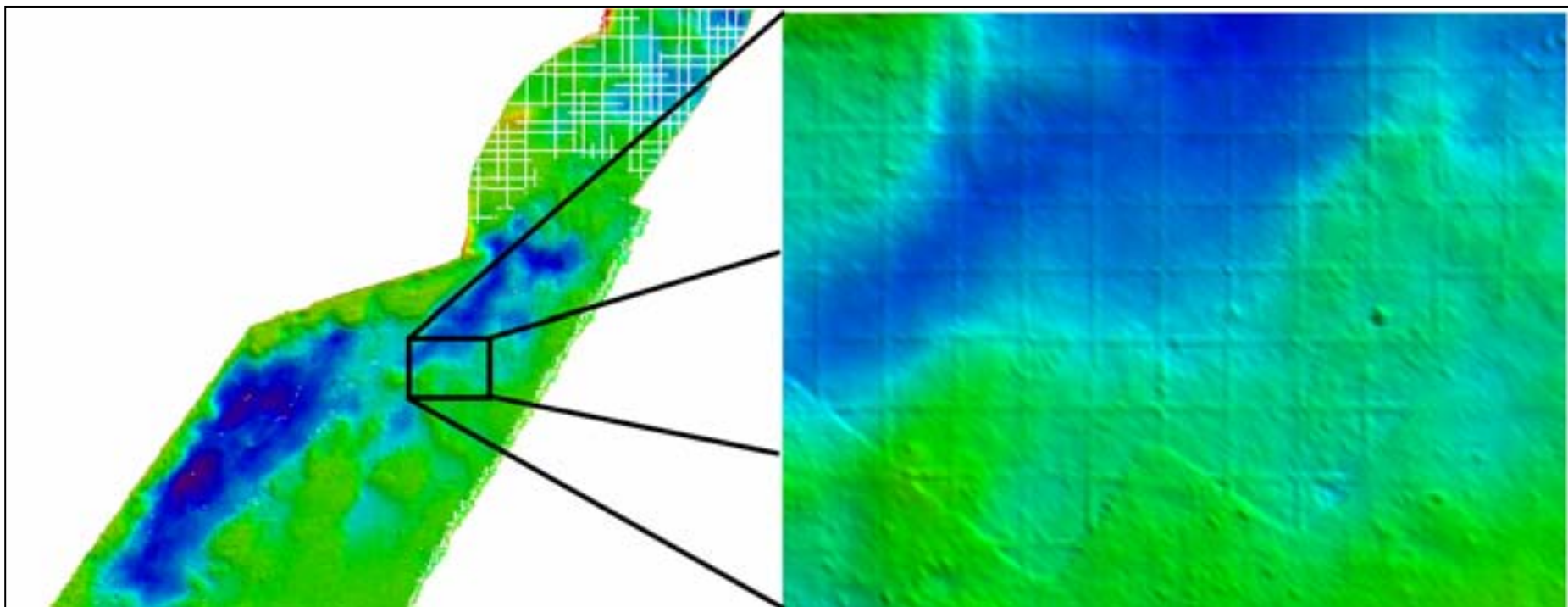


BASE Surfaces Combination in the Port of Montreal area.  
Resolution is 0.5m @ 1:3600 scale



# Change of Projections issues

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BASE Surfaces Combination in the Port of Montreal area.

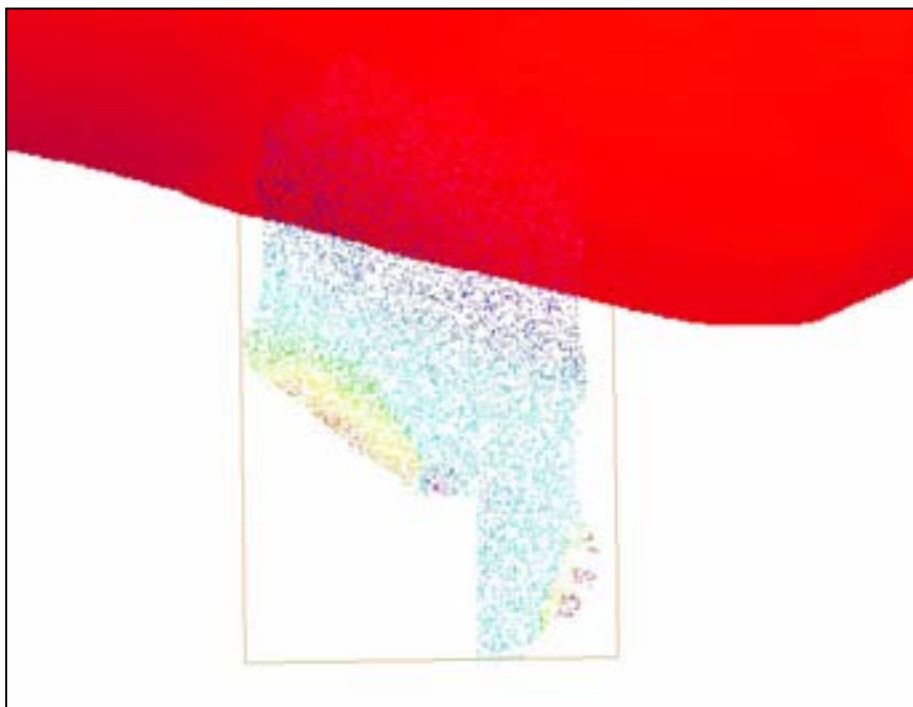
Resolution is 1m @ 1:3600 scale

Scales are 1:3600 and 1:500

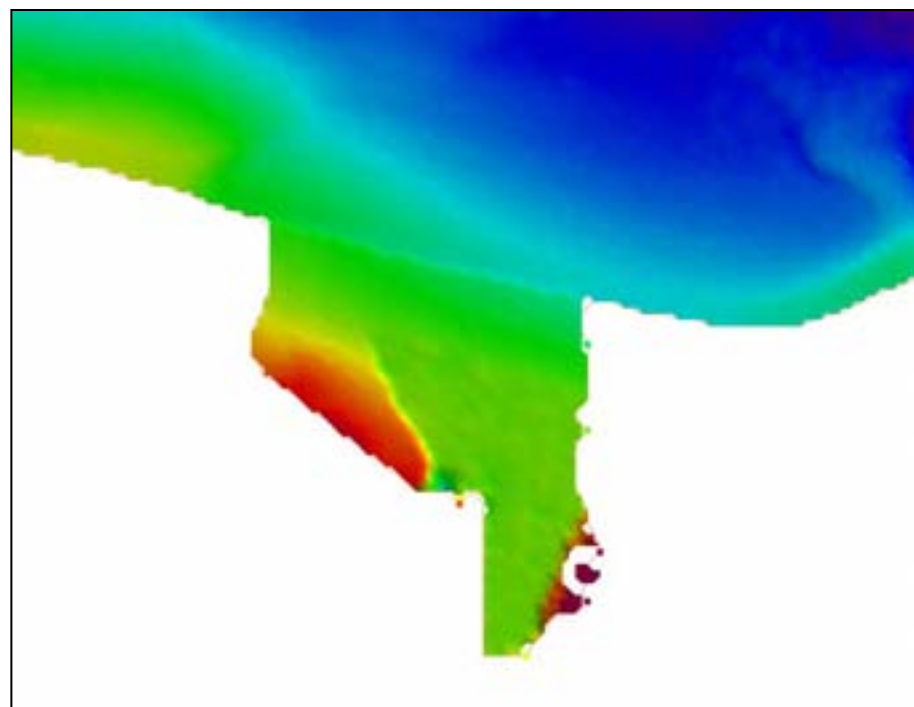




# BASE Surface and Sounding Set Combining



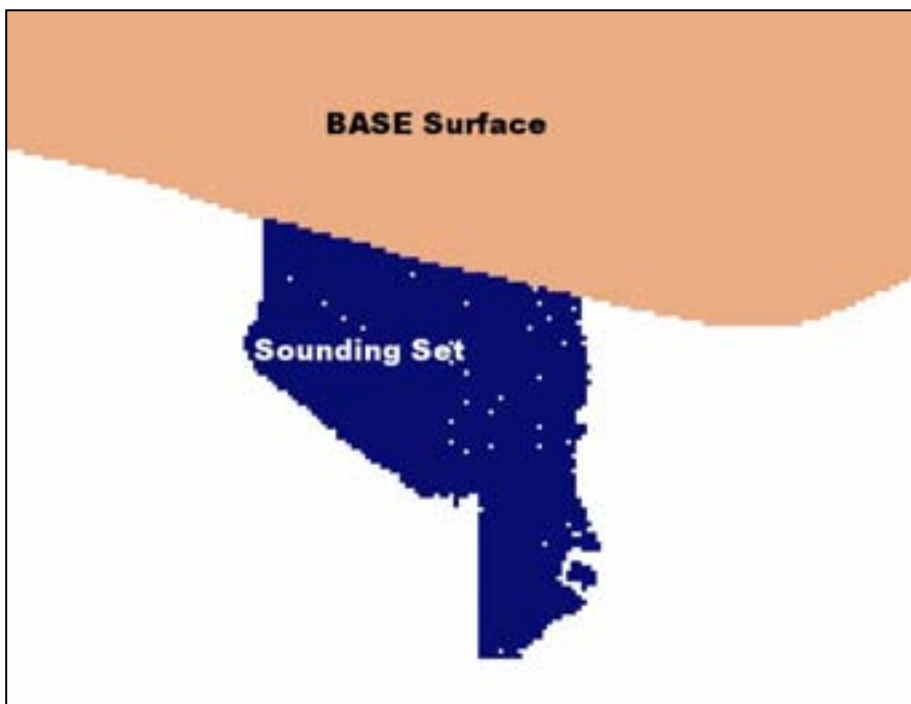
Overlapping BASE Surface and Sounding Set in the Sept-Îles area.  
Resolution of BASE Surface is 4m @ 1:6000 scale



Seamless combined BASE Surface in the Sept-Îles area.  
Resolution is 10m @ 1:6000 scale  
Notice the shoal bias for Sounding Sets



# BASE Surface and Sounding Set Combining



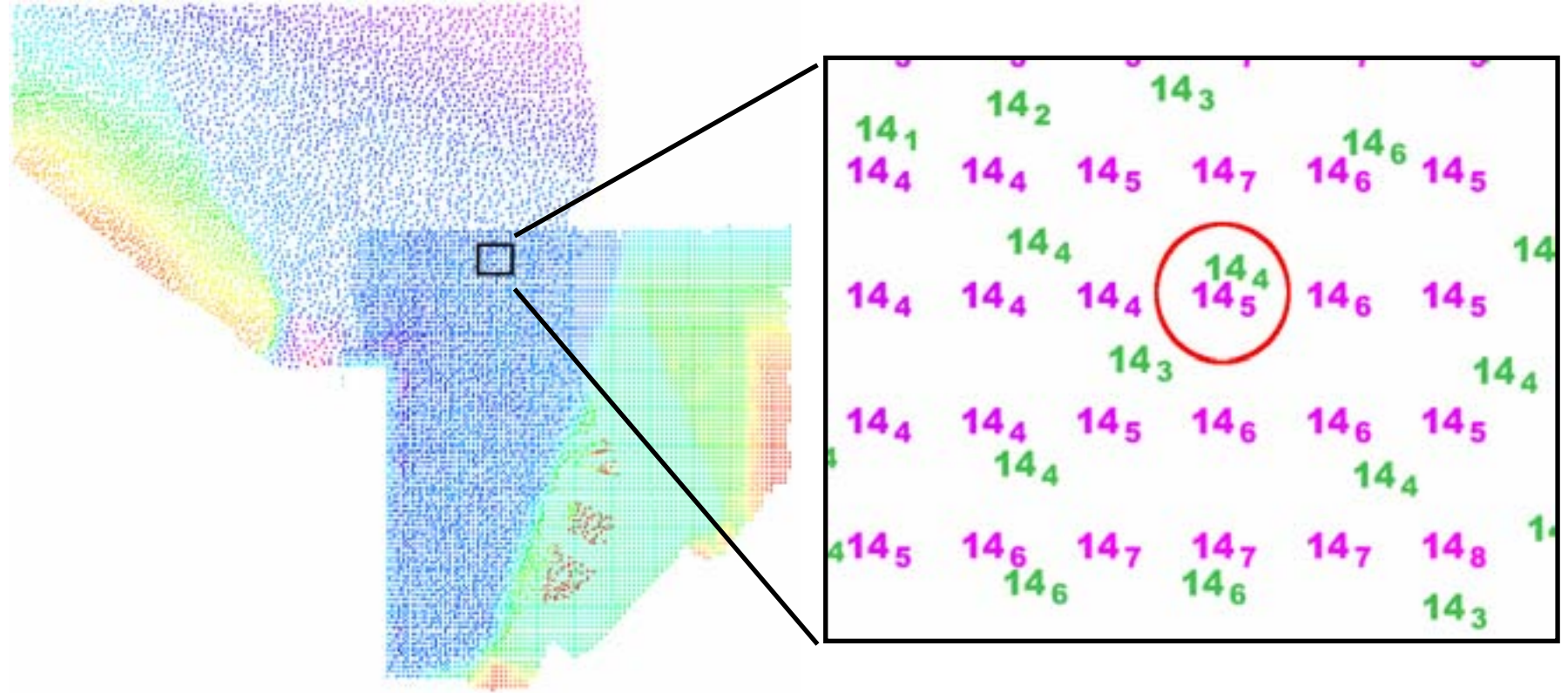
Contribution layers showing BASE Surface precedence at dataset level. Spatial resolution is 8m, too high for Sounding Set. Scale is 1:6000.



Contribution layers showing Sounding Set precedence at dataset level. BASE Surface gets selected in 'holes' of overlapping area: Dataset level attribution works at node level. Spatial resolution is 8m, too high for Sounding Set. Scale is 1:6000.



# Sounding Set Combining





# CHS Integration considerations

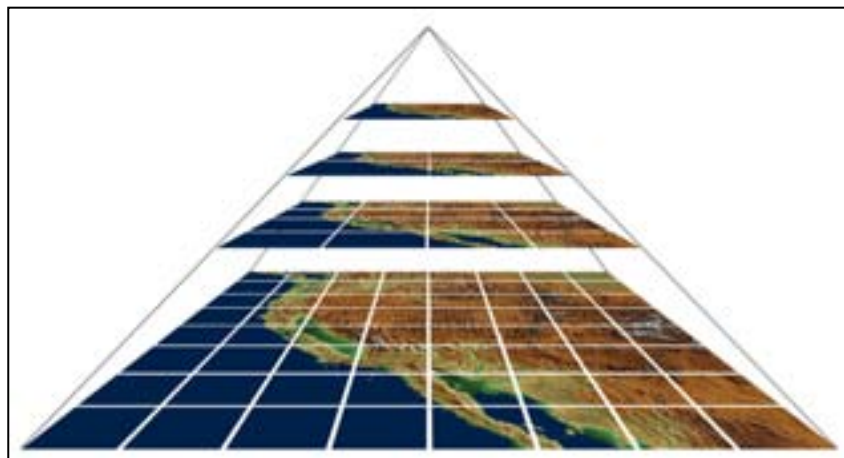
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- Standardization of storage formats
  - Navigation surface vs. sounding sets
- Metadata duplication between BDB and CHSDir
- Data integrity and traceability along CARIS workflow
- Vertical datum adjustment
- Training of personnel



# Future Developments

- Phase I:
  - New surface storage format
    - Geographic coordinate systems support
    - Multi-resolution
  - Adapted and improved functionality

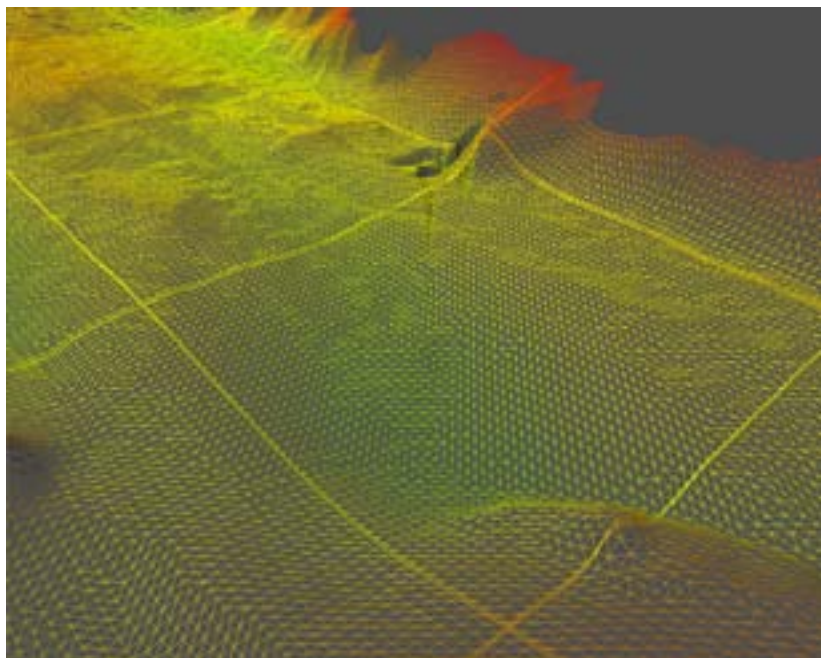


Source: Maps Alive: Viewing Geospatial Information on the WWW  
<http://www.geckil.com/~harvest/www6/Technical/Paper130/Paper130.html>

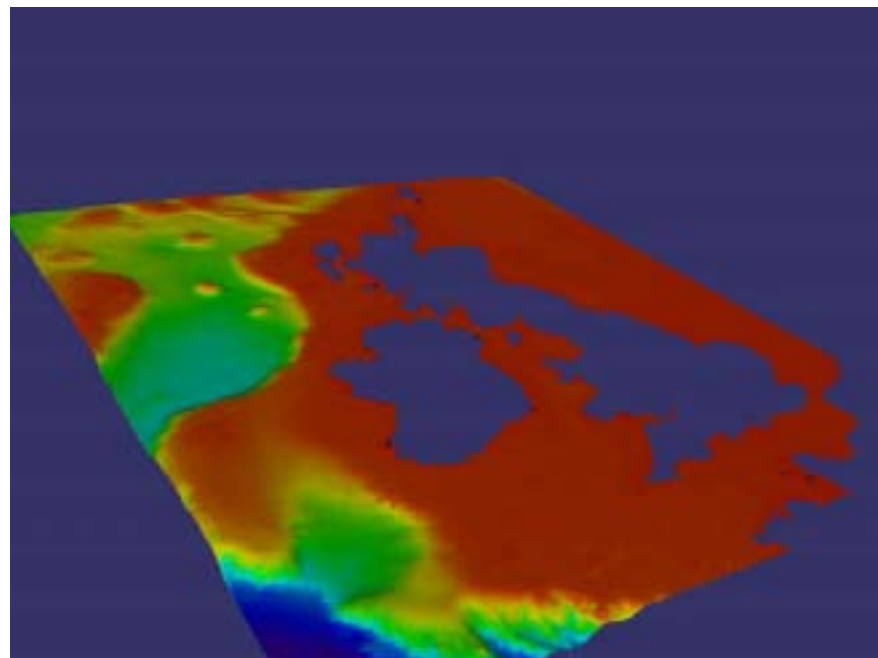


# Future Developments

- Phase II:
  - Master Surface
  - Seamless Coverage solution
  - Adapted and improved functionality



Source: CARIS



Source: CARIS

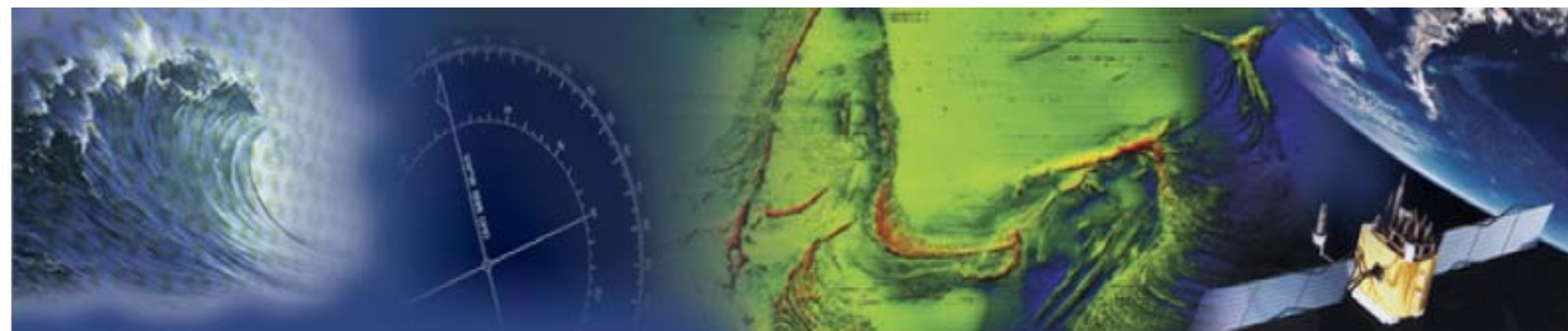


# Conclusion

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- Current operational workflow not optimum
- Evaluation highlights benefits and needed improvements
- Remaining considerations need to be addressed





**Thank you for your attention**

***caris***

