


Coastal & Marine Resources Centre
Ionad Acmhairní Cústa is Mara






Marine Geographic Information Systems & High Performance Computing Network

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Marine Geographic Information Systems & High Performance Computing Network

- Higher Education Authority
- UCC
- NUI Galway
- Sept. 2002 – Aug 2005

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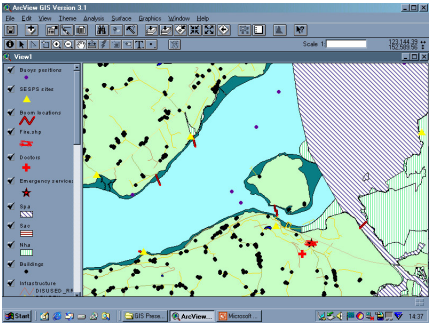
HyperGIS

Intergration of...

- Geographic Information Systems (GIS)
- High Performance Computing (HPC)

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Geographic Information Systems



- Collect
- Store
- Retrieve
- Transform
- Display

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High Performance Computing Network

- Computational Grid
- Access to distributed computing resources
- Secure
- Grid Ireland



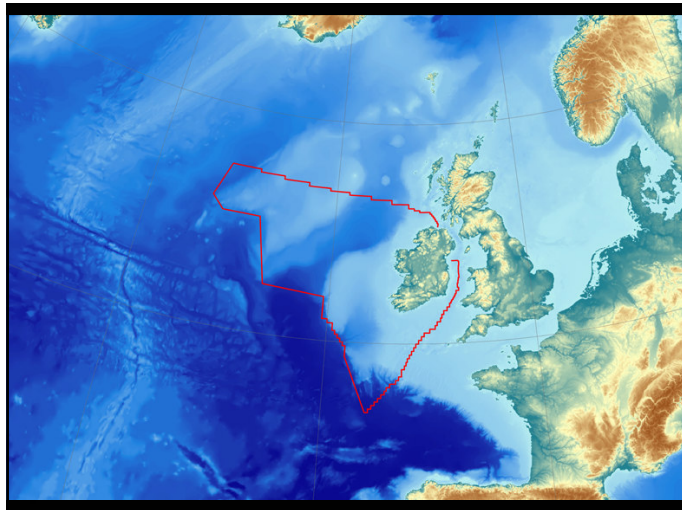
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Marine Grid



- Geological Survey of Ireland (GSI)
- NUI Galway, UCD, UCC
- Marine Institute

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GSI's National Seabed Survey



- Bathymetry
- Temperature
- Salinity
- Multibeam sonar data
- Sub bottom profiles
- Magnetic anomaly
- Gravity anomaly

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HyperGIS main tasks

- Connect to Marine Grid
- Integrate datasets
- Metadata standards (ISO 19115:2003)
- Data mining algorithms
- Hydrodynamic model of North East Atlantic
- 3D/4D visualisation and analysis

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3D/4D Visualisation - Technologies

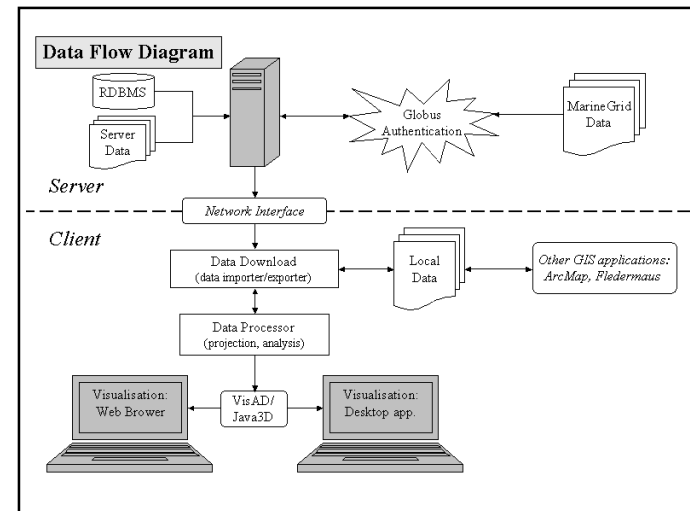
- Java3D
- VisAD
(Visualisation for Algorithm Development)
- Globus toolkit

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VisAD

- Open source Java component library
- Mathematical model for viewing numerical data
- Interactive visualisation and analysis
- Display uses Java3D
 - Web browser
 - Desktop application

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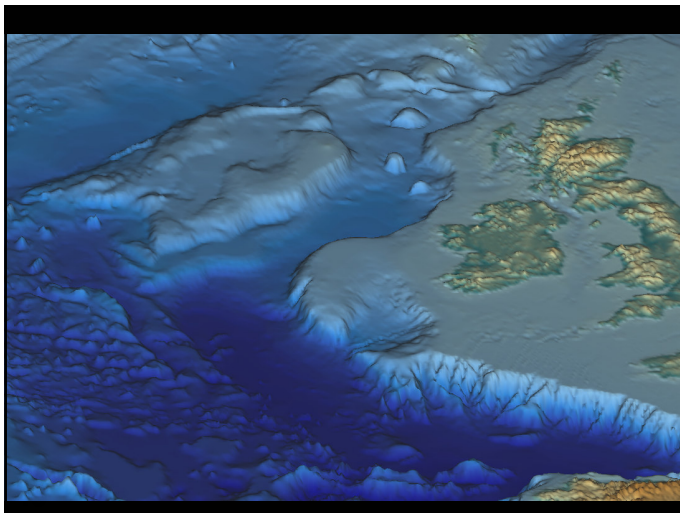
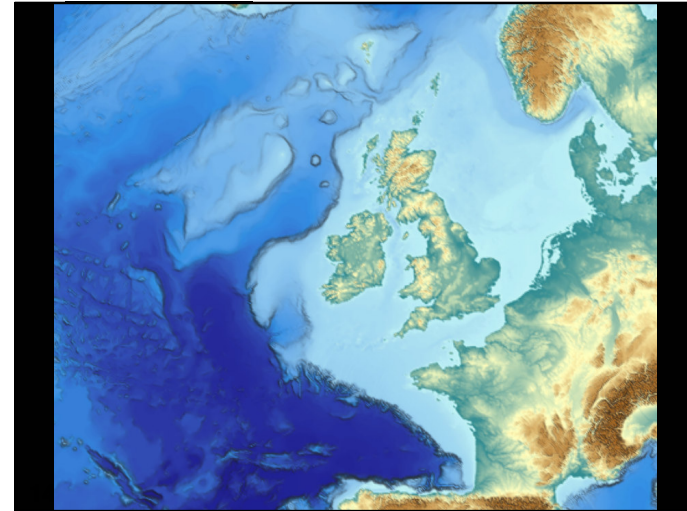


Visualisation – Bathymetry data

Visualising ocean depth

- GEBCO ocean bathymetry (low resolution)
- National Seabed Survey (high resolution)

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Visualisation – Hydrodynamic data

Visualising Hydrodynamic model results

- Ocean circulation
- Salinity
- Temperature

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Hydrodynamic model

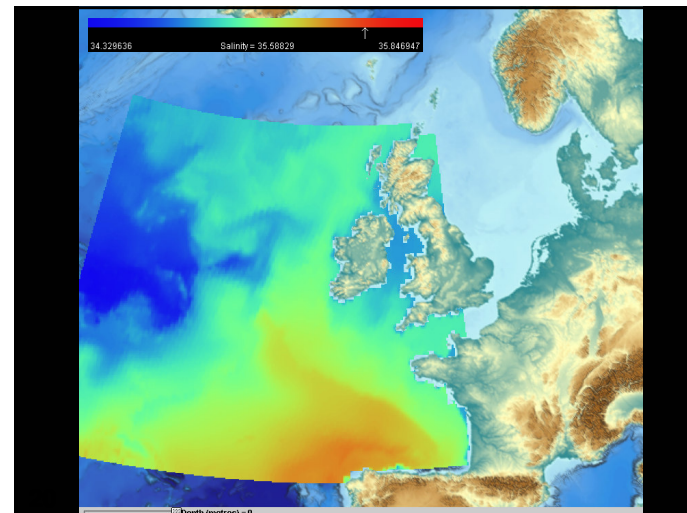
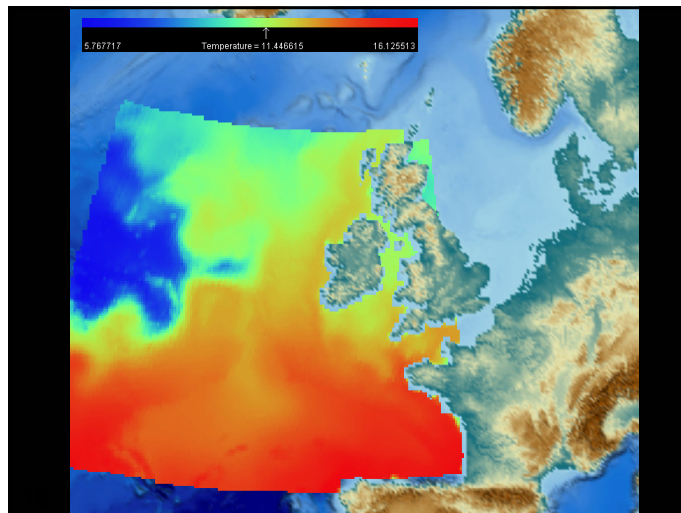
- 4D model
 - x : longitude
 - y : latitude
 - z : depth
 - t : time

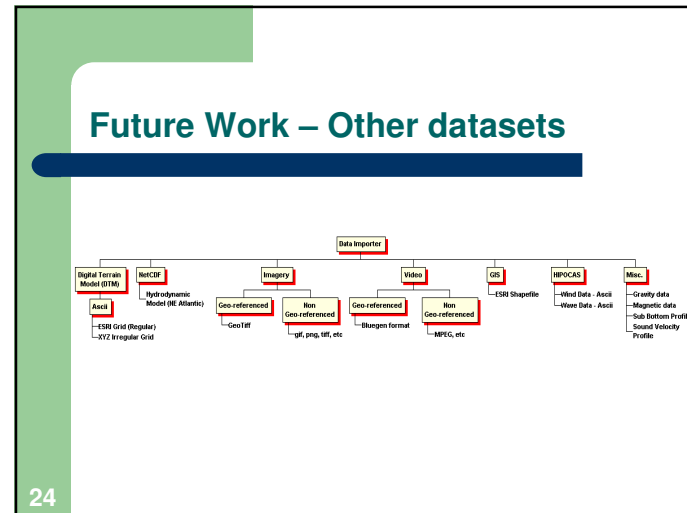
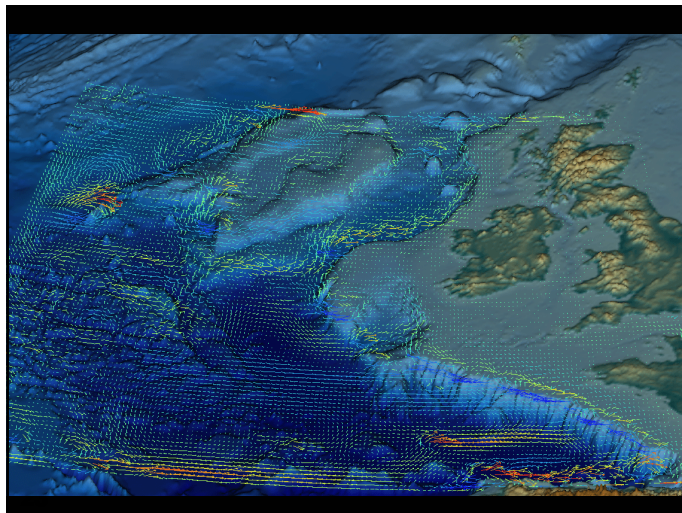
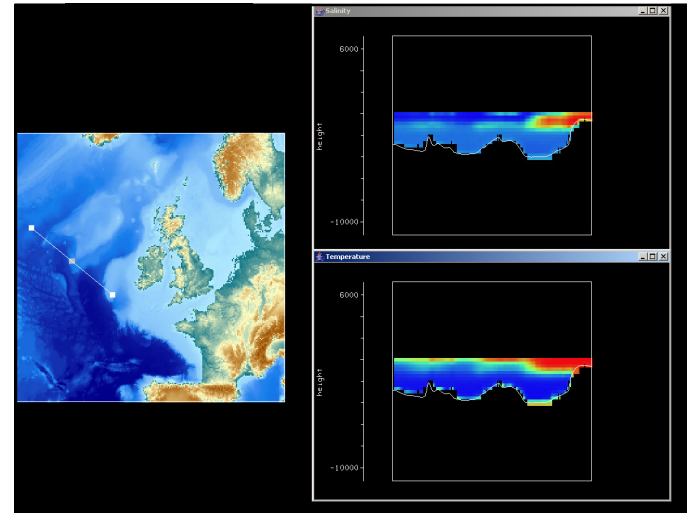
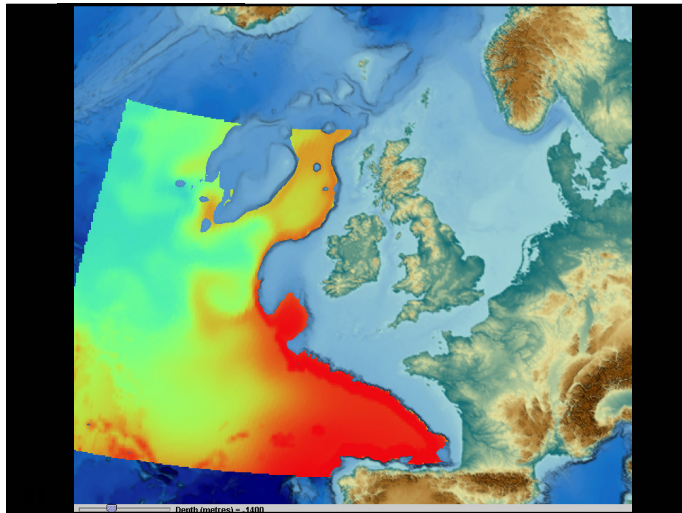
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Hydrodynamic model

- Initial model simulations ...
 - Low resolution
 - Hindcast
- As model results verified...
 - Higher resolution simulations
 - Forecast ocean circulation into the future

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Future Work – Tool Development

- Assist in investigation/interpretation of...
 - Physical influences on Irish fisheries
 - Influxes of phytoplankton along Irish coast
 - Physical and biological sedimentary processes
 - Complex seabed forms
 - Geological structures

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Conclusions

- Marine Grid Infrastructure
- Central data storage
- Projects...
 - Rapid Hydrodynamic modelling
 - Data mining
 - Visualisation

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