British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

EarthServer

# Delivery & querying of 3D spatial models

John Laxton, *British Geological Survey*

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# What is EarthServer?

- An FP7 Project started in September 2011 of 3 year duration
- Aims to deliver ‘big’ coverage data over the web (~20Tb per service partner)
- Using rasdaman open source software (developed by Jacobs University)
- Based on OGC WCS & WCPS standards
- Integration of WCPS and XQuery to allow coverages to be queried along with their metadata description
- Project will develop a range of coverage visualisation clients: 3D, mobile, immersive etc

# What is GeoSciML?

- A GML–based data transfer standard for the exchange of digital geoscientific information
- Describes features typically found on geological maps, and extensible to other geoscience data such as drilling, sampling, and analytical data.
- GeoSciML provides a standard data structure for a suite of common geologic features
  - Geologic units
  - Structures
  - Earth materials
  - Boreholes
  - Specimens
  - Geologic timescale
- Underpinned by several established OGC and ISO standards
  - Web Feature Service (WFS – ISO 19142)
  - Geography Markup Language (GML – ISO 19136)
  - Observations & Measurements (O&M – ISO 19156)
  - SWE Common.

# What are we trying to do?

- Use case (part 1): 'To deliver geological 3D models over the web so that they are accessible and visualisable to non-experts using standard browsers'
- Use case (part 2): 'To enable users to query the models – *'get all geological units of predominantly sand lithology within 25m of the surface'*
- EarthServer is delivering 35 surfaces of a 3D geological model of Glasgow as a set of coverages
- Fraunhofer (a project partner) have developed a 3D visualisation client

# Glasgow 3D model

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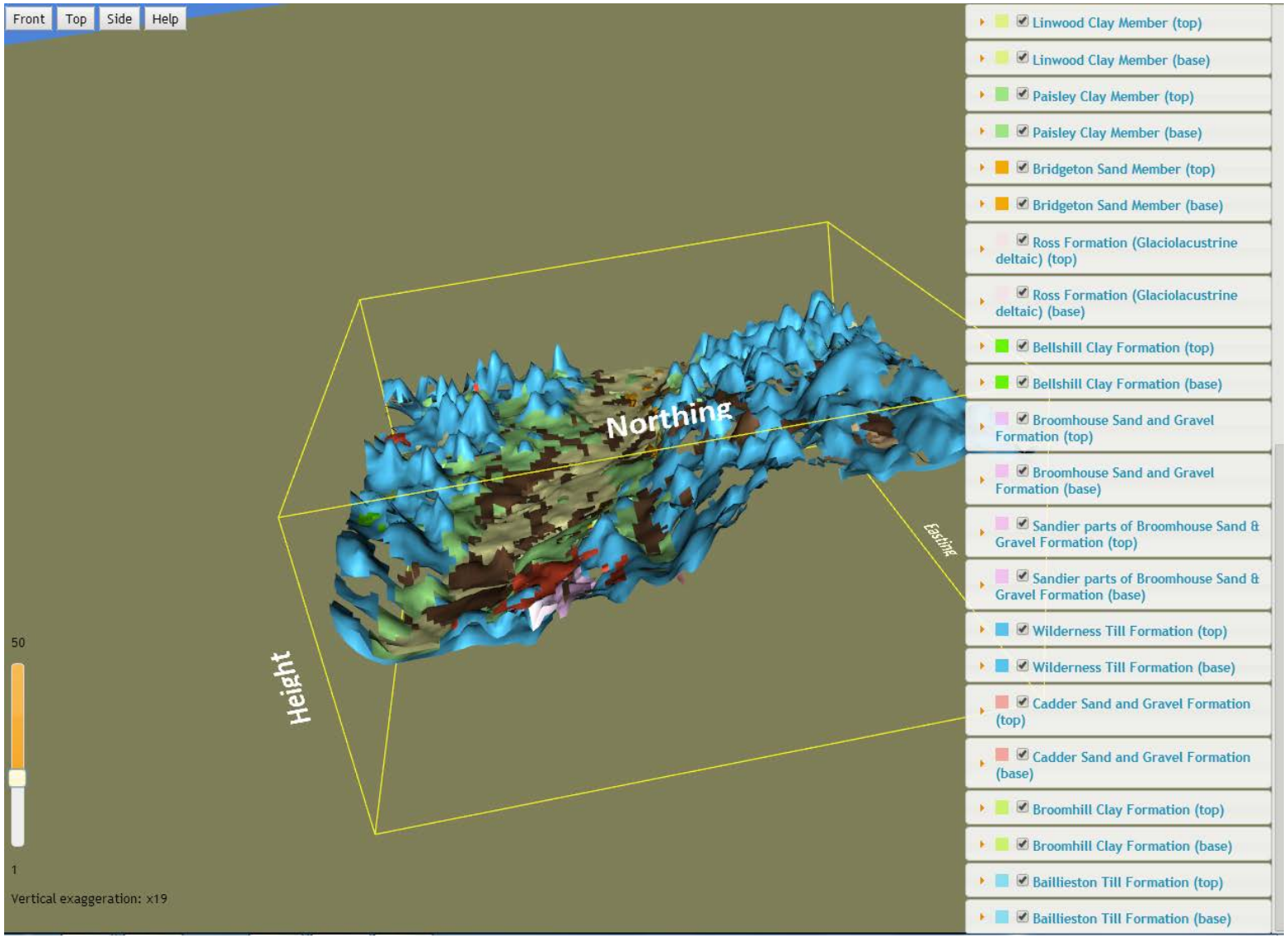


EarthServer

# What is xWCPS?

- Being developed by project partners ATHENA
- New language – xQuery enabled WCPS
- Designed to allow traditional WCPS queries to be combined with queries of coverage metadata
- An **extension of WCPS** with expressions that exploit array descriptive metadata using Xquery
- A demonstrator is available at: http://earthserver2.madgik.di.uoa.gr:8080/xWCPSApplication/

# Where have we got?

- Used GeoSciML to describe one of the bounding geologic units to a surface in the Glasgow 3D model
- Inserted GeoSciML into coverage metadata for the surface
- Begun xWCPS query testing:

```
for $c in /server[@endpoint =
    'http://earthserver.bgs.ac.uk/petascope']/formal/lastimage/harvested/coverages/coverage
for $comp in $c/coveragedescription/*[local-name()='CoverageDescription']/*[local-
    name()='metadata']//*[local-name()='GeologicUnit']//*[local-name()='composition']
where
$comp//*[local-name()='lithology']/@*[local-name()='title'] = 'Silt'
and
$comp//*[local-name()='proportion']//*[local-name()='upperValue']=5
return encode($c,"png")
```

# Next steps

- Continue query testing to develop ‘useful’ queries
- Add GeoSciML metadata for all Glasgow surfaces
- Develop user-friendly query interface (probably beyond end of project)