THREE DIMENSIONAL WEB VISUALISATION FOR NEW ZEALAND'S GROUNDWATER AQUIFERS

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1 Background

3D geodata visualisation has long been in the domain of desktop or high-end computers. Web mapping in 3D is getting popular among geosciences as well as for the general public. Several implementations show feasibility, with Google Earth possibly being the most popular and most advanced.

However, many core technologies are either proprietary, closed source or are not mature enough for easy use with Open Geospatial Consortium (OGC) based geo data web-services. With X3D, x3dom and WebGL a new era of 3D web visualisations is approaching.

Keywords

3D, OGC, WebGIS, X3D-Earth

2 Challenges

X3D is has limited geospatial referencing support and no semantic understanding of OGC based geo data input. Thus, 'How can OGC geo data sources be integrated into an X3D scene graph to create a meaningful data view?'

3 Objectives

- Describing a geospatially referenced X3D scene graph
- Enrich the service with elements from geo data from OGC web services, like WMS, WFS or WCS
- Load and render X3D document via x3dom in the browser

4 Methodology, data used and case study area

Based on the findings in Klug and Kmoch (2014) we present a 3D mapping approach based on an OGC web services orchestration context.

This context is encoded within a WMC (OGC *Web Map Context*) document and transported to a WPS (OGC *Web Processing Se*rvice). This process parses the WMC document and generates a X3D scene graph, which will be returned as XML document. This XML document is then loaded into the browser via x3dom.

We use two case study areas – The Mondsee catchment in Austria and the Horowhenua area in New Zealand. We use different datasets including hydro-climate, topography, geology and land use related data.

5 Results

The process produces X3D scenes dynamically, which can be loaded and viewed in a web browser using the x3dom JavaScript library. The figures show an overview scene from both case study areas.

The elevation surfaces in the 3D views is based on DEM information from GeoTIFF/WCS services. These WCS are known beforehand, as they are only indirectly employed in lightweight web maps via colour scale map.

6 Discussion and Outlook

3D information, particular high resolution surfaces and raster tend to be problematic in lightweight environments like the web browser. X3D supports Level of Detail (LOD) in general, but the dynamic creation in the presented project does not allow for pre-rendering of tiles. Thus, a suitable method is needed to handle different zoom-levels and scales effectively.

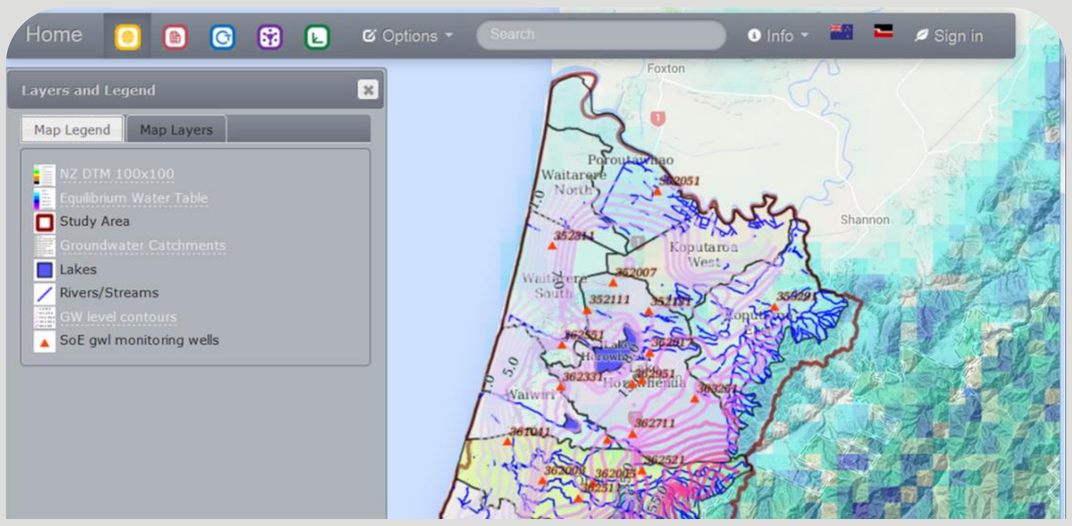

Fig.1: Horowhenua catchment, with hydrological datasts over a DEM

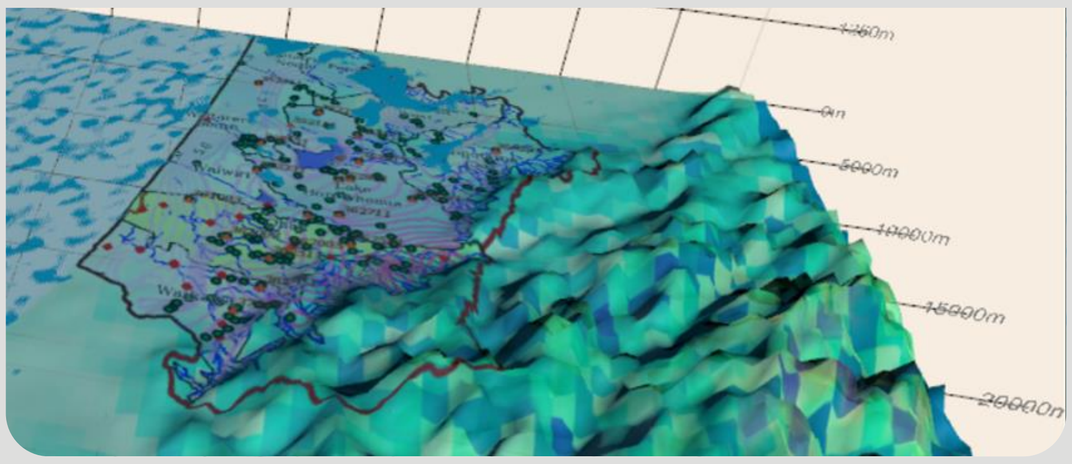

Fig.2: Horowhenua catchment, with hydrological features in 3D

References

- Klug, H. and A. Kmoch (2014): A SMART groundwater portal: An OGC web services orchestration framework for hydrology to improve data access and visualisation in New Zealand. In: Computers & Geosciences 69: 78-86.
- Open Geospatial Consortium (OGC), Standards: http://www.opengeospatial.org/standards/
- Extensible 3D: http://www.web3d.org/realtime-3d/x3d/what-x3d
- x3dom: http://www.x3dom.org/
- Mondsee Landscape Lab, Webgis: http://mondseewebgis.hermannklug.com/