

WEB-BASED MULTI-DIMENSIONAL DATA VISUALISATION TECHNIQUES FOR HYDROGEOLOGY

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Characterisation of a hydrogeological setting is a multi-faceted complex task. The assessment of usefulness and quality of relevant data is a major challenge. Statistical analysis and visual exploration of the datasets demand practical support by computer applications. Although a variety of software for this purpose is freely available nowadays, they require a good understanding of the technology or programming language for application in complex hydrogeological settings. Thus, integrated proprietary software products are often used to analyse and particularly provide high-quality visualisation of the system (Raiber, White et al. 2012). However, these software tools are typically desktop programs with a strict licensing scheme and a limited extensibility and lack of interoperability with other applications.

We present an open and free to use web-based (platform independent) framework to enable retrieval, exploration and visualisation of hydro-climate time series data as well as three-dimensional geological information via a web browser. How distributed data and processing services can be linked to prepare an on-demand 3D visualisation of geological and hydrological data (Klug and Kmoch 2014) is demonstrated. A flexible toolbox design enables extensibility via open standards (Castronova, Goodall et al. 2013).

The method developed is applied to a case study area presented (Fig. 1), which is the Horowhenua district in the Manawatu-Wanganui region. Available datasets of 3D geology, hydrology and hydrogeology are combined and serve as example data for demonstrating the framework.

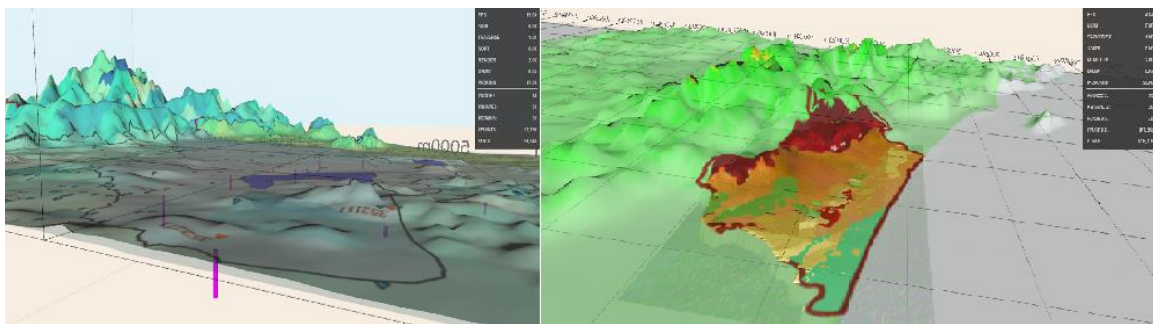


Figure 1: Two 3D scenes with a base DEM and (l.) wells and catchment delineations, (r.) geological layers

Castronova, A. M., J. L. Goodall, et al. (2013). "Models as web services using the Open Geospatial Consortium (OGC) Web Processing Service (WPS) standard." *Environmental Modelling & Software* **41**(0): 72-83.

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." *Computers & Geosciences* **69**(0): 78-86.

Raiber, M., P. A. White, et al. (2012). "Three-dimensional geological modelling and multivariate statistical analysis of water chemistry data to analyse and visualise aquifer structure and groundwater composition in the Wairau Plain, Marlborough District, New Zealand." *Journal of Hydrology* **436–437**(0): 13-34.