

## Improving access to groundwater data using GroundWaterML2

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### *Abstract:*

Sharing of groundwater data across national and international borders, and between government, industry and academic organisations, is essential for a wide range of environmental, economic and agricultural activities. However, the storage and management of groundwater data is distributed across many agencies and organisations, in disparate databases and formats. Discovering, accessing, interpreting, reformatting and using this data can present considerable challenges for the end-user. Interoperability provides the capacity to transfer and use information in a uniform and efficient manner across multiple organisations and information technology systems. It encompasses the use of communication protocols to achieve technical interoperability, the use of common data models to achieve syntactic interoperability and the use of controlled vocabularies to achieve semantic interoperability.

GroundWaterML2 is a Geography Mark-up Language (GML) developed by the Open Geospatial Consortium (OGC) Hydro Domain Working Group. It is intended as the authoritative international standard for the transfer of groundwater feature data, including data about water wells, aquifers, and related entities. The OGC initiated an interoperability experiment to develop and test the model for commercial, technical, scientific, environmental and policy use cases. CSIRO, the Bureau of Meteorology and Federation University Australia contributed to the design of GroundWaterML2, and established separate OGC web services delivering data out of the National Groundwater Information System (NGIS) and Federation University Australia databases. These services delivered borehole location and construction details, downhole geology, hydrogeologic unit information, groundwater discharge properties, and groundwater fluid property observations.

Migrating these services to production would allow users and clients, such as the 'Visualising Victoria's Groundwater' and 'Australian Groundwater Explorer' portals, to access data from multiple providers in a standard format.

*Keywords:* groundwater, groundwaternl2, hydrogeology, interoperability, open geospatial consortium, standards, mark-up language.