

The Australian Hydrological Geospatial Fabric (Geofabric)

The Australian Hydrological Geospatial Fabric (Geofabric) is a highly specialised geographic information system that is a key information resource for the Bureau of Meteorology in producing its regular water resource assessments and national water accounts. This project will bring the Geofabric into its third phase of development, automate some of its processes, and ensure its extended use by transferring management and maintenance knowledge to the Bureau.

April 2013

Transforming Australia's water resources information

The need to accurately monitor, assess and forecast the availability, condition and use of Australia's water resources is now more important than ever. The past decade of severe drought and recent extreme climatic events in Australia pose significant challenges to the management of Australia's water resources as we attempt to deal with an ever-increasing demand for water. The Water Information Research and Development Alliance is transforming the way Australia manages water resources, by bringing together the research and development expertise of CSIRO's Water for a Healthy Country Flagship in water and information sciences, and the Bureau of Meteorology's operational role in hydrological analysis and prediction.

Objective

The Bureau of Meteorology and the water information community in Australia have broadly adopted the Geofabric product suite. Within the Bureau, the Geofabric provides a consistent spatial framework – a hydrological gazetteer – against which water information analysis can be referenced. Following the successful

release of Geofabric Phase 2 products, the project team is now focused on supporting the sustained production, delivery and future evolution of the Geofabric. The project will concentrate on transferring tools, methods and knowledge to the Bureau, to enable the:

- design of new and derived products that conform to the Geofabric conceptual model
- production of Geofabric products using executable workflows incorporating quality assurance processes
- implementation of Geofabric V3 (upgrade to one-second digital elevation model base).

A geographic information system for Australia's hydrological network

The Bureau of Meteorology developed the Australian Water Resources Information System (AWRIS) to capture all the water information it gathers from around the nation and to deliver, in turn, high-quality water resource information and services essential to managing our valuable water resources. The Bureau's information system is spatially enabled using the Geofabric as a reference dataset of water features to locate and cross-associate water information against.

The Geofabric is a specialised geographic information system that registers the geographic and topological relationships between important features of Australia's hydrological system, such as rivers, reservoirs, lakes, aquifers, drains and monitoring points. It also stores the boundaries of drainage divisions, catchments, aquifers and priority aquatic ecosystems.

A key aspect of the Geofabric is its ability to represent the various hydrologic features in different ways and at different scales, yet relate all of these products via a set of persistent ("contracted") reference points known as 'Contracted Nodes'. This ensures that the Geofabric can deliver on its vision to be the 'spatial framework upon which Australia's water information related activities are based and through which they are related'.

The Bureau began using the Geofabric to model the fluxes of water between hydrological features on a national basis in October 2010. It supports the Bureau's regular water resource assessments and is used in producing the National Water Account.



Australian Government
Bureau of Meteorology



Water Information
DATA > INFORMATION > INSIGHT

Key research areas

The Geofabric project will continue to support the design of an integrated framework of geospatial data products upon which Australia's water information-related activities are based. As well as continuing work on the model-driven process to support the maintenance of a large and evolving set of interrelated Geofabric products, the team will ensure the long-term sustainability of the Geofabric as a coherent suite of products by transferring the management and maintenance of the conceptual model, and its relationships, to the Bureau of Meteorology. The team will build the capacity of the Bureau to manage and evolve Geofabric

models and to use modelling tools to create new products and services. This includes executing workflows to create updated Geofabric products based on new data sources or the refinement of processing algorithms or parameter sets.

Delivering Outcomes

Since the completion of the Geofabric Conceptual Model, a coherent suite of Geofabric products has been created, and the Bureau of Meteorology publicly released Version 2.1 of the Geofabric products in November 2012. The hydrological concepts and their descriptions contained within the conceptual model have been aligned with relevant international hydrology

domain models, with the result that the conceptual model has been proposed as a candidate for a World Meteorological Organization (WMO) Hydrology model (HY_Features model) through the Open Geospatial Consortium/WMO Hydrology Domain Working Group.

Efforts are also focused on implementing a scientific workflow engine to support automated Geofabric production and the use of Linked Data principles to enable multiple representations of Geofabric features.

The Geofabric project will:

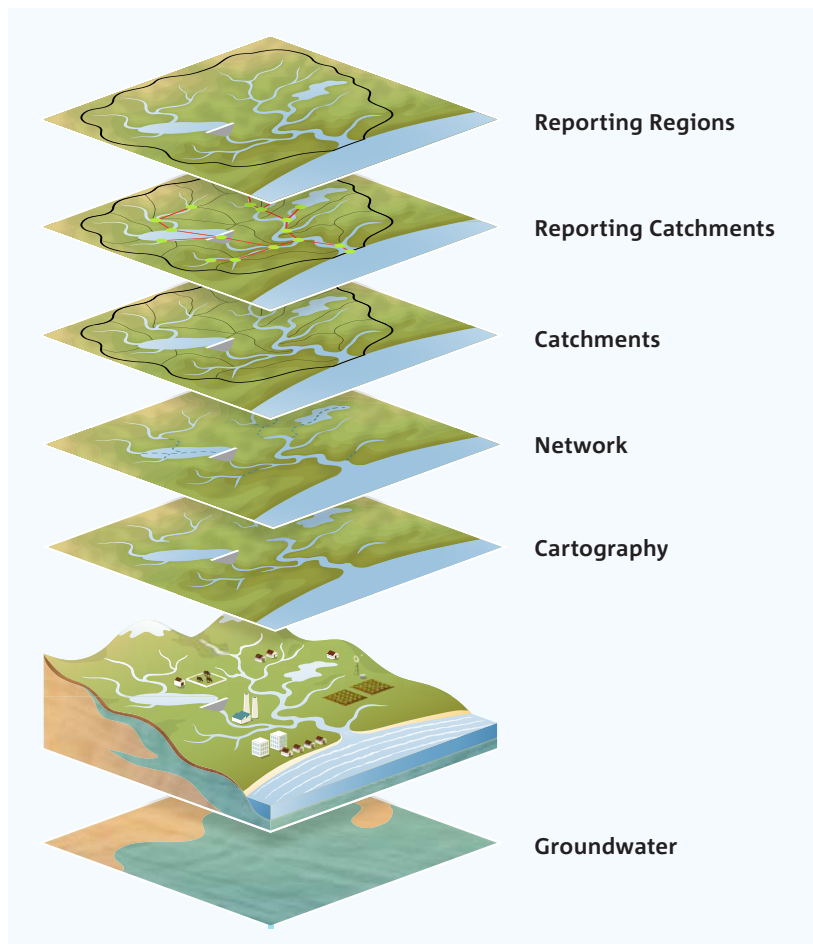
- ♦ provide continued support to the Bureau to further evolve the Geofabric product suite through Phase 3
- ♦ transition Geofabric modelling and model management activities to the Bureau of Meteorology
- ♦ implement workflow technologies, to support the automated production of Geofabric products
- ♦ link Geofabric products, via their automated production, to other projects' datasets through service-oriented architectures and the use of Linked Data.

Partners

From 2008 to 2013, the Water Information Research and Development Alliance is delivering the scientific and research innovation required by the Bureau to fulfil its national water information mandate. Through a strategic investment of \$50 million over five years, more than 40 researchers are focusing on several challenging areas. These include large-scale information architectures, earth observation, hydrological modelling, water accounting, water resource assessment and water forecasting.

Other partners in the Geofabric project include:

- ♦ Sparx Systems
- ♦ OGC/WMO Hydrology Working Group
- ♦ Joint Research Center of the European Union
- ♦ Geoscience Australia
- ♦ ANU Fenner School of Environment and Society



The conceptual architecture of the Geofabric.

CONTACT US

t 1300 363 400
+61 3 9545 2176
e enquiries@csiro.au
w www.csiro.au

YOUR CSIRO

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.

FOR FURTHER INFORMATION

Mr Nicholas Car
Geofabric Project Leader
CSIRO's Water for a Healthy Country Flagship
t 61 7 3833 5600
e Nicholas.Car@csiro.au

Find out more about the Water Information Research and Development Alliance at www.csiro.au/partnerships/WIRADA