



International Virtual Observatory System for Water Resources Information

Lewis Leinenweber (1) and Luis Bermudez (2)

(1) Open Geospatial Consortium, United States (lleinenweber@opengeospatial.org), (2) Open Geospatial Consortium, United States (lbermudez@opengeospatial.org)

Sharing, accessing, and integrating hydrologic and climatic data have been identified as a critical need for some time. The current state of data portals, standards, technologies, activities, and expertise can be leverage to develop an initial operational capability for a virtual observatory system. This system will allow to link observations data with stream networks and models, and to solve semantic inconsistencies among communities.

Prototyping a virtual observatory system is an inter-disciplinary, inter-agency and international endeavor. The Open Geospatial Consortium (OGC) within the OGC Interoperability Program provides the process and expertise to run such collaborative effort. The OGC serves as a global forum for the collaboration of developers and users of spatial data products and services, and to advance the development of international standards for geospatial interoperability.

The project coordinated by OGC that is advancing an international virtual observatory system for water resources information is called Climatology-Hydrology Information Sharing Pilot, Phase 1 (CHISP-1). It includes observations and forecasts in the U.S. and Canada leveraging current networks and capabilities. It is designed to support the following use cases:

- 1) Hydrologic modeling for historical and near-future stream flow and groundwater conditions. Requires the integration of trans-boundary stream flow and groundwater well data, as well as national river networks (US NHD and Canada NHN) from multiple agencies. Emphasis will be on time series data and real-time flood monitoring.
- 2) Modeling and assessment of nutrient load into the lakes. Requires accessing water-quality data from multiple agencies and integrating with stream flow information for calculating loads. Emphasis on discrete sampled water quality observations, linking those to specific NHD stream reaches and catchments, and additional metadata for sampled data.

The key objectives of these use cases are:

- 1) To link observations data to the stream network, enabling queries of conditions upstream from a given location to return all relevant gages and well locations. This is currently not practical with the data sources available.
- 2) To bridge differences in semantics across information models and processes used by the various data producers, to improve the hydrologic and water quality modeling capabilities.

Other expected benefits to be derived from this project include:

- Leverage a large body of existing data holdings and related activities of multiple agencies in the US and Canada.
- Influence data and metadata standards used internationally for web-based information sharing, through multiple agency cooperation and OGC standards setting process.
- Reduction of procurement risk through partnership-based development of an initial operating capability verses the cost for building a fully operational system using a traditional “waterfall approach”.
- Identification and clarification of what is possible, and of the key technical and non-technical barriers to continued progress in sharing and integrating hydrologic and climatic information.
- Promote understanding and strengthen ties within the hydro-climatic community. This is anticipated to be the first phase of a multi-phase project, with future work on forecasting the hydrologic consequences of extreme weather events, and enabling more sophisticated water quality modeling.