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# INTERNATIONAL STANDARDISATION OF WATER INFORMATION EXCHANGE: ACTIVITIES OF THE WMO/OGC HYDROLOGY DOMAIN WORKING GROUP

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This paper outlines the activities and current results of the joint World Meteorological Organization (WMO) and Open Geospatial Consortium (OGC) Hydrology Domain Working Group (Hydro DWG) in its efforts to develop standards for the interoperable exchange of hydrologic information.

## THE NEED FOR STANDARDS IN HYDROLOGIC INFORMATION EXCHANGE

Hydrologic information is generated and published by many government, research, commercial and citizen groups around the world. The formats and protocols used to share the data are extremely heterogeneous, with little agreement about semantics of hydrologic measurements, description of hydrologic features, or metadata content. As a result, it is challenging to integrate water data from multiple sources, especially across jurisdictional boundaries. A broad consensus on hydrologic data sharing formats is needed to ensure that the information can be reliably discovered, interpreted, accessed and integrated. This has been the focus of the Hydrology Domain Working Group (Hydro DWG), established in 2009 as a joint working group of the World Meteorological Organisation (WMO) and the Open Geospatial Consortium (OGC). It consists of members from government, research and the commercial sectors and it plays an important role by bringing together organisations to agree on ways to significantly improve our ability to share water information.

## WATERML 2.0 PART 1: TIME SERIES

In September 2012, the OGC adopted ”WaterML2.0 Part 1: Time series” as an OGC Standard [1]. At its 14th Session in November 2012 the WMO Commission for Hydrology adopted a resolution that commences a process to register this standard as a joint WMO/ISO standard [2].

WaterML2.0 Part 1 is the first international standard for encoding water observation time series, developed by members of the Hydro DWG and the WaterML2.0 Standards Working Group (established in 2011) after several years of specification work and interoperability experiments. Built on widely used OGC and ISO standards, it represents a breakthrough for linking local to global water information sources into large water information networks and enabling efficient analysis and modelling of water data across information sources.

The support for WaterML2.0.Part.1 is growing; amongst others the US Federal Geographic Data Committee (FGDC) and EU Commission Regulation No 1253/2013 endorsed it as a standard in addition to the US Federal Government, which endorsed it as an official component of the civil Earth observation strategy.

## HYDROLOGIC FEATURES MODEL – HY_FEATURES

No standard conceptual model for hydrologic feature identification was available before the creation of the Hydro DWG [3]. The WMO/OGC HY_Features model for the identification of hydrologic features independent from application and scales was developed and published as an OGC Discussion Paper [4]. This model allows referencing hydrologic features across scientific sub-disciplines in hydrology using commonly agreed concepts. The HY-Features model, is designed as a set of interrelated Application Schemas using ISO 19103 Conceptual Schema Language and ISO 19109 General Feature Model. It is factored into relatively simple components that can be reviewed, tested and extended independently [5]. First implementations were done in the framework of the Australian Geofabric implementation of HY-Features connecting observations, monitoring sites and hydrological features. The HY-Features model was used successfully to mediate between multiple hydro conceptual feature models within the framework of the OGC Web Services Phase 10 Cross-Community Interoperability Testbed (OWS10 CCL).

## CURRENT ACTIVITIES

Current activities involve the development of a Sensor Observation Service Profile for Hydrology (SOS 2.0) [6] and a profile for Water Quality data transfer (WaterML-WQ). At the most recent OGC Technical Committee meeting it has been proposed to publish SOS 2.0 as an OGC Discussion Paper and WaterML-WQ as an OGC Best Practice Paper.

Further work is focused on the development of standardized communication of descriptions of surface and groundwater features (GroundWaterML), ratings, gaugings, and sections (WaterML 2.0 Part 2) and an information model of river geometry, streambed characteristics, and flow (RiverML).

## CURRENT ACTIVITIES

WMO/OGC Hydro DWG participation is voluntary and the further development of standards for the whole domain is based on individuals and groups who are dedicated to this cause. Their contributions are acknowledged.

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