



*GEOSS interoperability for  
Weather, Ocean and Water*

**“Improving accessibility,  
exchange and use of  
hydrological data”**

***IGWCO Community of Practice  
Annual Meeting  
29 & 30 May 2014, Tokyo***

**THEME[ENV.2011.4.1.3-1]:** Inter-operable  
integration of shared Earth Observation in the  
Global Context

**Duration:** Sept. 1, 2011 – Aug. 31, 2014

**Total EC funding:** 6,399,098.00 €

**Project Web Site:** [www.geowow.eu](http://www.geowow.eu)



EC Grant Agreement no. 282915

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**with contributions from  
GEOWOW partners**







# ***GEOWOW Overview***

**GEOWOW**'s challenge is to improve Earth Observation data discovery, accessibility and exploitability, and to evolve the Global Earth Observation System of Systems (GEOSS) with a special focus on the Societal Benefit Areas Weather, Ocean Ecosystems and Water.

**GEOSS Infrastructure Evolution** for all stakeholders *with a particular focus on the 'WOW' SBAs:*

- To facilitate discovery, access and use of data and other GEO-resources
- To allow harmonised access to heterogeneous resources
- To promote and simplify data sharing with a particular focus on the GEOSS Data-CORE

## WP5 „Water SBA application development & new GCI components integration“



In the hydrology domain...

- a very **heterogeneous** landscape of **data sources** exists
- water related (sensor) data are served through a **large variety of interfaces and data formats**
- the integration of new data sources into application systems often affords the creation of adapters for specific data access interfaces and interpreters for new data formats



*Pictures: © USGS*





# *The Objectives*

To improve hydrological data sharing GEOWOW aims at:

- Enhancing GEOSS to ensure **interoperability for hydrological applications**
- Developing new functionalities for **hydrological data discovery, access and processing** for the GEOSS Common Infrastructure (GCI)
- Facilitating and demonstrating the **international exchange of hydrological data** by improved features of the GCI
- Providing an **interactive platform for the investigation of hydrological data**





# ***International Framework***

- The GEOOW “Water SBA” approach is based on the **Sensor Web Enablement (SWE) framework of the** Open Geospatial Consortium (OGC)
- The **SWE framework** offers a standards based and interoperable approach for the integration of sensors and sensor data into spatial data infrastructures
- The **OGC Sensor Observation Service (SOS 2.0)** is a core **standard** of the SWE architecture and provides an interface for exchanging sensor data and metadata → **domain independent**
- The **Hydrology Domain Working Group (HDWG)** of the OGC and the World Meteorological Organization (WMO) addresses the international standardization for **hydrological data exchange**

- To contribute to **international standardization** processes in the Hydrology Domain Working Group (HDWG) of the Open Geospatial Consortium (OGC) and the World Meteorological Organization (WMO) to ensure that the developments are **in line with basic principles of the GCI**
- To develop **hydrological data services** that improve the hydrological capabilities and functionalities of the **GEO Discovery and Access Broker and the GCI**
- To demonstrate the benefits of the enhanced functionalities of the GCI for an **interoperable global exchange of hydrological data** through GEOSS domain specific and cross domain **use cases**



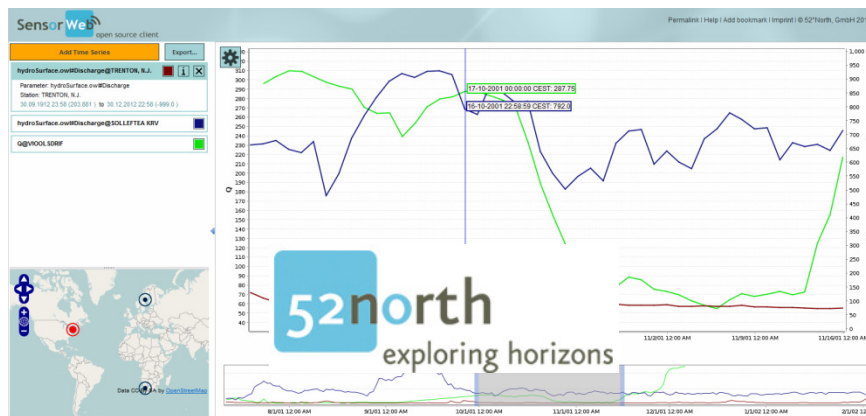
## International standardization

Development of a fully interoperable Hydrology Profile for the OGC SOS 2.0: → optimised interface to access WaterML 2.0 encoded data

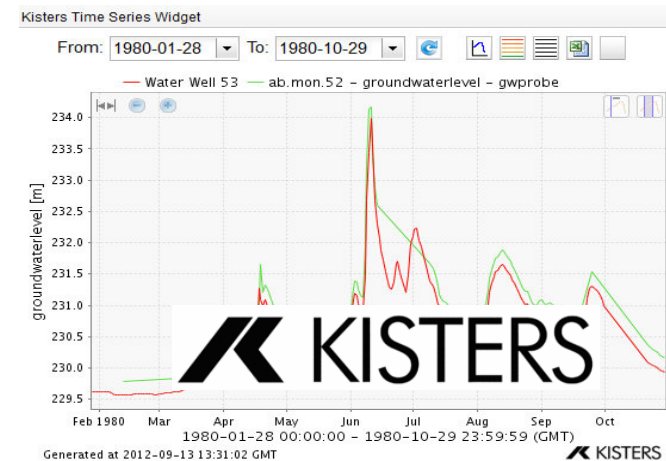
## New functionalities for the GCI

Development of software components containing the Hydrology Profile of the SOS 2.0 standard

Including Web Clients for visualization and comparison of hydrological time series data



*52° North Sensor Web Client*

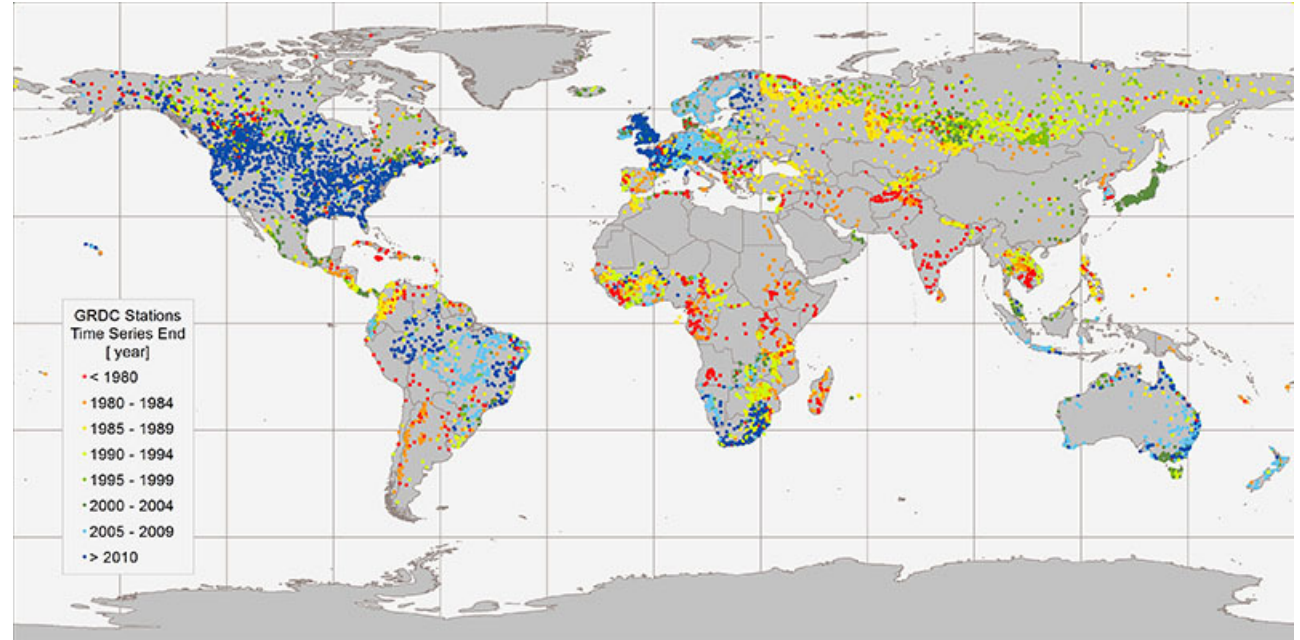


*& KISTERS Time Series Widget*

# Example: River Discharge

## Global Runoff Data Centre

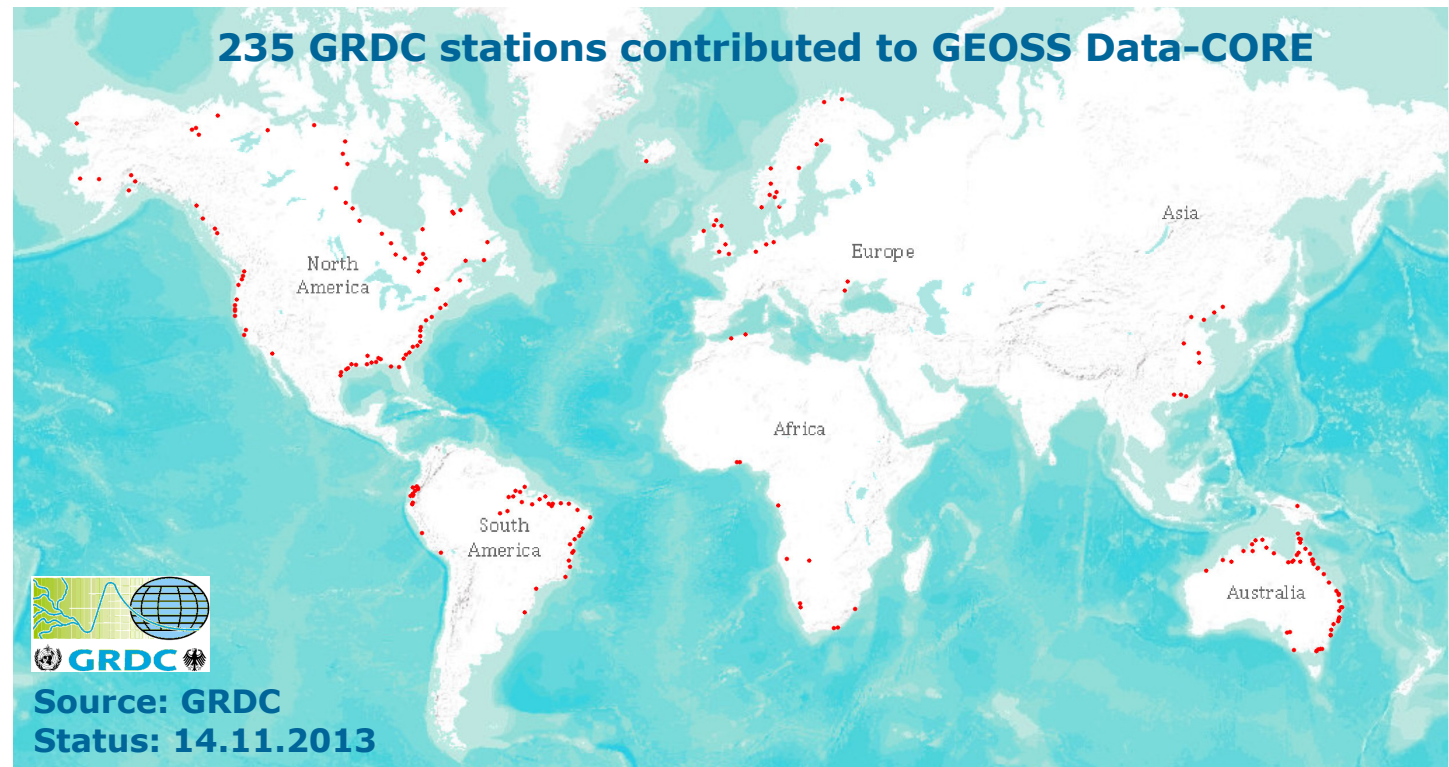
- The world-wide repository for **river discharge data** and associated metadata
- Operates under the auspices of the **WMO**
- Collects river discharge data at daily or monthly intervals from **9000 stations in 158 countries**



8923 stations with monthly discharge data, incl. data derived from daily data (Status: 06 November 2013)  
Koblenz: Global Runoff Data Centre, 2013.

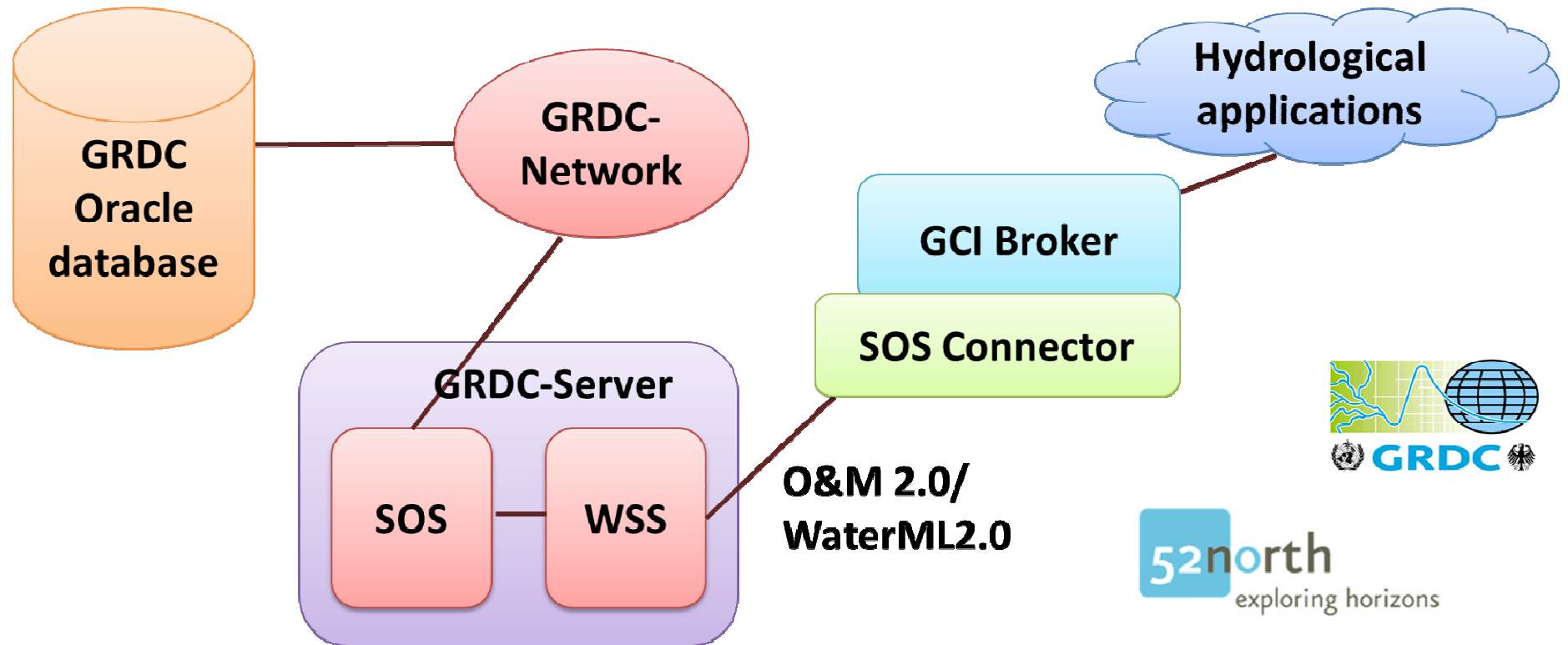
## *Example: River Discharge Contributions to GEOSS Data-CORE*

- Acquisition of discharge time series data for the GEOSS Data-CORE by the GRDC
- Currently **245 GRDC stations** available for **GEOSS Data-CORE**
- On-going efforts to make more stations freely accessible
- **Improved GCI functionalities** developed within GEOWOW allow direct access of these data through the GEO WEB Portal

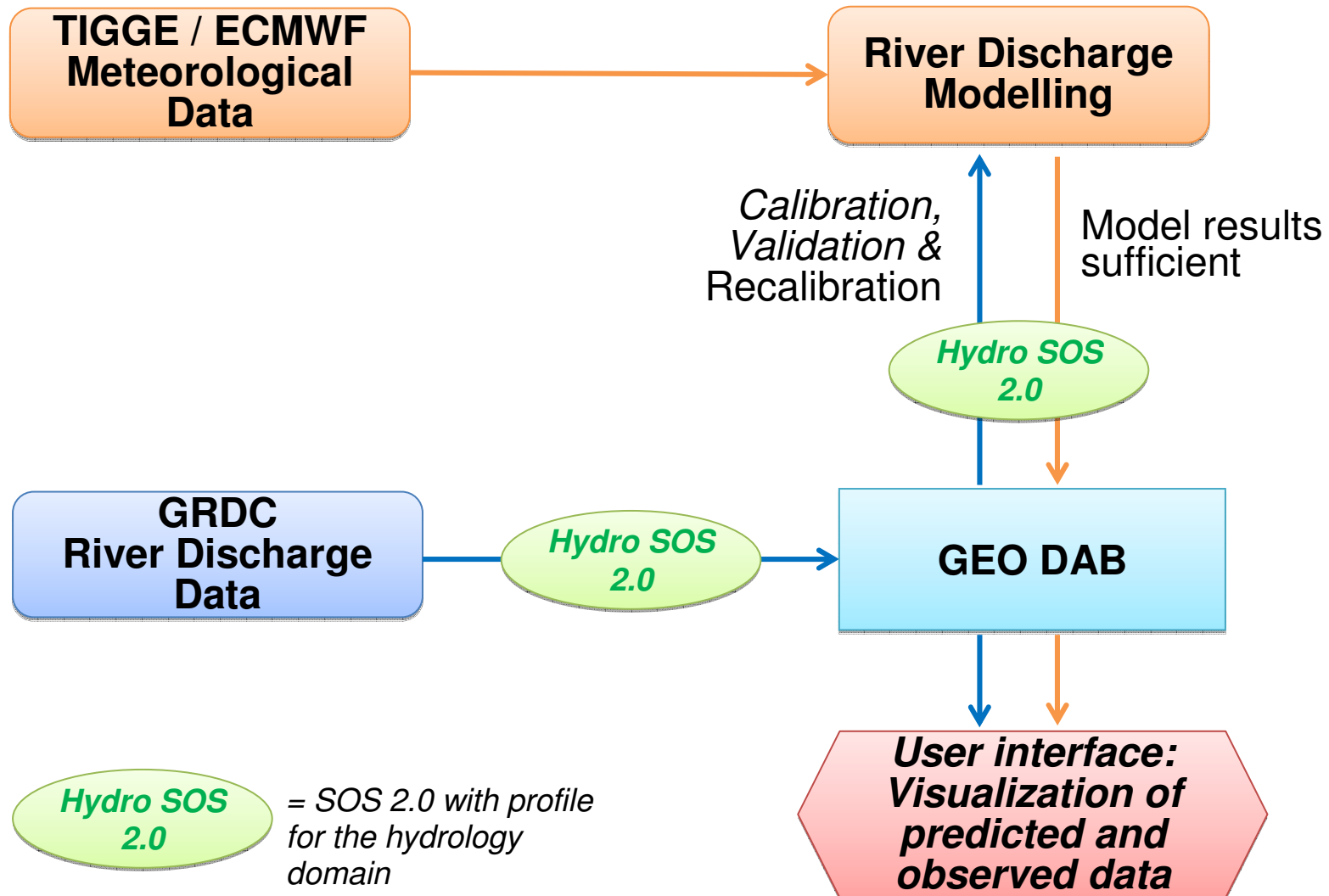


# Example: River Discharge Implementation Architecture

- Adaptation of GRDC's data infrastructure for long-term provision of river discharge data



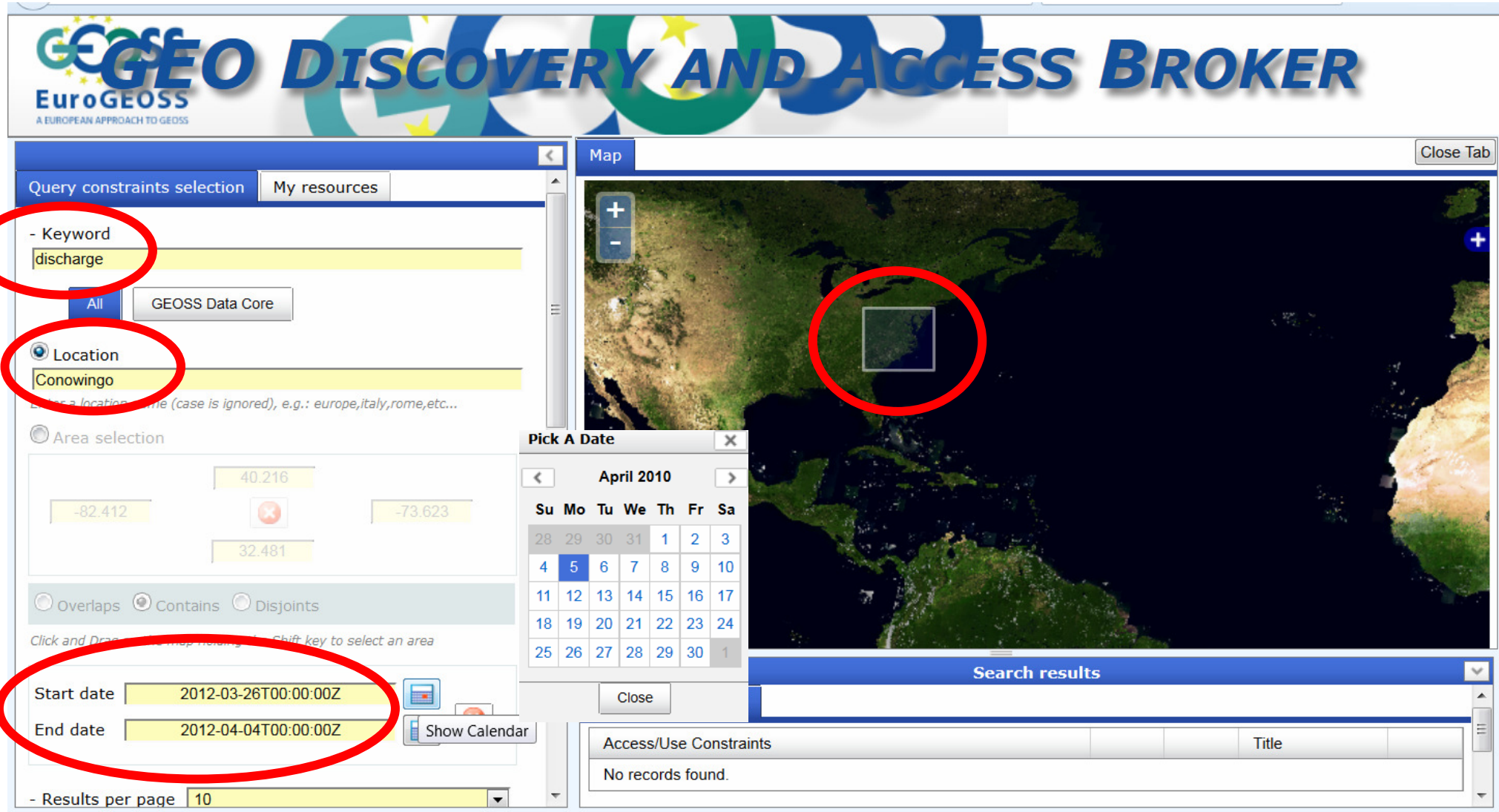
# Example: River Discharge Use Case Overview





# Example: River Discharge Multidisciplinary Use Case

## New GEO Discovery and Access Broker Functionalities



**GEOS GEO DISCOVERY AND ACCESS BROKER**  
EuroGEOSS A EUROPEAN APPROACH TO GEOS

Query constraints selection | My resources

**- Keyword**  
discharge

All | GEOSS Data Core

**Location**  
Conowingo

Area selection

40.216  
-82.412 | 32.481 | -73.623

Overlaps |  Contains | Disjoints

Start date: 2012-03-26T00:00:00Z  
End date: 2012-04-04T00:00:00Z

Results per page: 10

Map

Pick A Date

April 2010

Su	Mo	Tu	We	Th	Fr	Sa
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	1

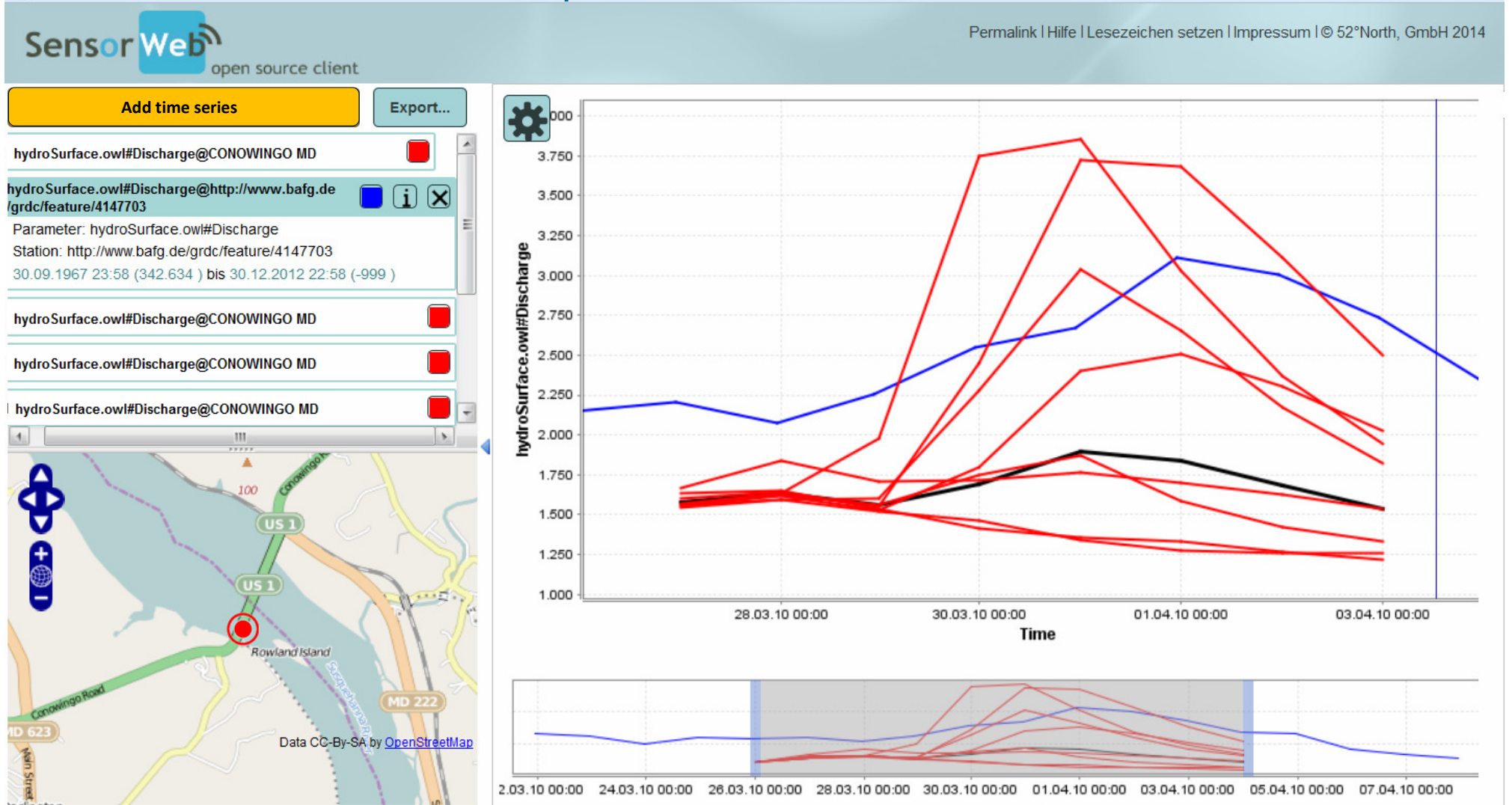
Search results

Access/Use Constraints	Title
No records found.	



# Example: River Discharge Multidisciplinary Use Case

## Visualization and Data Comparison Functionalities of the Sensor Web Client



- Global Flux of Freshwater to the Oceans
  - annual, automatically generated data product
  - based on WaterGAP 2.2 model results (University of Frankfurt)
  - will be made available in the GEOSS DataCORE
- Timeframe
  - workflow for the product generation will be developed within the next months by a subcontracting IT-company
  - end-results expected for end of July
  - Results will be registered to the GEOSS DataCORE until the project end of GEOWOW (August) and updated on an annual basis

## **GEOWOW provides a response to the needs of the Water SBA by...**

- **Developing** a fully interoperable **Hydrology Profile of the SOS 2.0**, that facilitates hydrological data sharing across organizational borders
- **Enhancing the GCI** architecture and ensuring interoperability for hydrological applications so that GEOSS becomes a valuable infrastructure for answering a broad range of water related problems and questions
- **Contributing** river discharge **data** of the GRDC and a Global Freshwater Flux data product **to the GEOSS Data-Core**, which can be discovered and accessed via the GEO Web Portal

### **Beyond its project lifetime GEOWOW provides...**

- **Open source data formats, services and clients** tailored to the needs of the hydrology domain that can be utilized by other projects (AIP-7) and various data users (University of Tokyo) and data providers (national agencies)
- Contribution to the OGC Sensor Web Enablement Framework and an **OGC Best Practice Paper** on the **SOS 2.0 Hydrology Profile**
- Improved access to **global hydrological data** and data products **via the GCI**
- Continuous contributions to the **GEOSS DataCORE**



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***Thank You!***