WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WIGOS WHOS PLATA

Silvano Pecora
Vice-President of CHy

Plata Basin Hydrometeorological Forecasting and Early Warning System
CONSULTATION MEETING
INMET, Brasilia, Brazil
21-25 May 2018

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale

WMO CHy-15 session

7 - 13 December 2016, Rome, Italy

WMO OMM

World Meteorological Organization
COMMISSION FOR HYDROLOGY
Fifteenth Session
Rome, Italy, 7 to 13 December 2016

CHy-15/Doc. 4.1(3)
Submitted by:
Chairperson
12.XII.2016
APPROVED

AGENDA ITEM 4: **SUPPORTING THE NATIONAL HYDROLOGICAL SERVICES VALUE CHAIN**

AGENDA ITEM 4.1: **MEASURING, MONITORING AND INFOSYSTEMS**

DATA OPERATIONS, MANAGEMENT AND EXCHANGE

SUMMARY

DECISIONS/ACTIONS REQUIRED:

(a) Adopt draft Resolution 4.1(3)/1 — *Data Operations and Management;*

(b) Adopt draft Recommendation 4.1(3)/1 — *Data Representations for Hydrological Information.*

CONTENT OF DOCUMENT:

The Table of Contents is available only electronically as a Document Map*.

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DRAFT RECOMMENDATION

Draft Recommendation 4.1(3)/1 (CHy-15)

DATA REPRESENTATIONS FOR HYDROLOGICAL INFORMATION

THE COMMISSION FOR HYDROLOGY,

Recalling Resolution 3 (CHy-14) which initiated a process, including testing, that could see the potential adoption of the WaterML 2.0 as a WMO standard for information exchange,

Recalling that the WMO Hydrological Observing System requires the exchange of hydrological information between Members,

Noting that, since CHy-14, Water ML 2.0 has evolved into a suite of components called "Parts",

Noting further:

(1) That standardizing on a limited number of data representations offered potential savings of time and money for Members,

(2) That the Commission for Hydrology had worked closely with the Open Geospatial Consortium in developing WaterML2 Part 1 "Time series observations" and WaterML2 Part 2 "Ratings, Gaugings, Sections",

(3) That the *Manual on WIS* (WMO-No. 1060) requires Members to create WIS Discovery Metadata records to describe the information they wish to make available to other Members,

(4) The successful testing of WaterML 2.0 Part 1 "Time series observations" in several regional projects around the world,

(5) The information provided on WaterML2 Part 2 "Ratings, Gaugings, Sections" during the pre-session discussion,

Concurs with Recommendation 3.3(2)/1 (CBS-16) to the Executive Council, to adopt the draft Resolution — *Data representations for hydrological information*, contained in Annex 1 to this Recommendation, with the addition of the « Requests OGC » indicated therein and Annex 2 to that draft resolution.

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Annex: 1

Annex to draft Recommendation 4.1(3)/1

Draft Resolution for consideration by EC-69 on WaterML 2.0

DATA REPRESENTATIONS FOR HYDROLOGICAL INFORMATION

THE EXECUTIVE COUNCIL,

Noting that the Commission for Hydrology had initiated the WMO Hydrological Observing System that would require the exchange of hydrological information between Members,

Noting further:

(1) That standardizing on a limited number of data representations offered potential savings of time and money for Members,

(2) That the Commission for Hydrology had worked closely with the Open Geospatial Consortium in developing a standard representation of time series of hydrological information known as WaterML2 Part 1 and a standard representation of streamflow information known as WaterML2 Part 2,

(3) That the *Manual on Codes* (WMO-No. 306) Volume I.3 records data representations derived from data models,

(4) That the *Manual on WIS* (WMO-No. 1060) requires Members to create WIS Discovery Metadata records to describe the information they wish to make available to other Members,

(5) That the published edition of the *Guide to Hydrological Practices*, Volume I (WMO-No. 168) pre-dates the WMO Information System and the work of the Open Geospatial Consortium on data representations for hydrology,

Decides:

[Note: Decides (1) and Annex 1 are provided to CHy-15 for information to show the complete context of the Resolution. CBS-16 will consider their contents and recommend any changes that are needed.]

(1) To amend the *Manual on Codes* (WMO-No. 306) Volume I.3 to introduce WaterML2 Part 1 and WaterML2 Part 2 as data representations that are suitable for the exchange of hydrological information as specified in Annex 1 - *Introduction of WaterML2 Part 1 and WaterML2 Part 2*;

(2) To amend the *Guide to Hydrological Practices* (WMO-No. 168) Volume I as specified in Annex 2;

Requests the Secretary-General to amend the text of the *Manual on Codes* (WMO No. 306) Volume I.3 and WMO-No. 168 as specified in Annexes 1 and 2 respectively and to make editorial changes as needed.

Requests OGC to revise the non-normative (informative) material on the basis of the comments to be provided by the CHy representatives in the Hydrology Domain Working Group (HDWG).

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Annexes: 2

DRAFT RESOLUTION

Draft Resolution 4.1(3)/1 (CHy-15)

DATA OPERATIONS AND MANAGEMENT

THE COMMISSION FOR HYDROLOGY,

Noting:

(1) The growing need of Members for appropriate hydrological data management and information systems,

(2) Resolution 23 (Cg-17),

(3) The final report of the Second Session of the Inter Programme Expert Team on Observing System Design and Evolution (IPET-OSDE),

Recognizing:

(1) The importance of including reliable hydrological observations and data in the WMO Integrated Global Observing System (WIGOS) and the WMO Information System (WIS),

(2) That the initiative of the president of CHy to launch a demonstration and testing portal for the first phase of WHOS had been successful and had met with widespread approval,

(3) That the quality and sustainability of free and/or open source software, such as of Meteorology, Climatology, and Hydrology Database Management System (MCH), depends mainly on the number of its users and developers,

(4) That new and increased demands are now being put on the global data centres, in particular in support of the global assessment and management of the world's water resources in the context of the SDGs and the Global Framework for Climate Services (GFCS),

Recalling the request of Cg-17 to monitor progress in the area of data operations and management (see paragraph 4.1.110 of Cg-17 Abridged Final Report),

Acknowledging the long-standing contribution to its activities made by the Global Data Centres, namely GRDC, GPCC, IGRAC and HYDROLARE,

Approves the further implementation WHOS Phase I as well as the initial concept of WHOS Phase II, as described in paragraphs 4.1(3).4 to 4.1.(3).8, and requests the AWG, with the support of the WMO Secretariat, to develop an initial implementation plan, covering issues such as governance, architecture, relationships with the WIGOS and WIS centres, provision of metadata into OSCAR and a clear definition of the roles of CHy, the Secretariat, the global data centres, and the NMHSs, to be presented to EC-70 in 2018 for its endorsement;

Requests the president of CHy:

(1) To form a small task team in charge of preparing a report to the Executive Council with regard to the evolving role of the GRDC, IGRAC and HYDROLARE, and their relationship with WMO, with respect to the monitoring and measurement of the achievement of the SDGs, their contributions to GFCS and support to WHOS, GHSF and other CHy initiatives;

(2) To liaise with the president of CCl to concur with CHy to include GPCC in the task team and in the review of its evolving role mentioned above, in a manner similar to the GRDC, IGRAC and HYDROLARE;

(3) To continue ensuring an appropriate representation of the Commission in the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) and in other relevant WIGOS and WIS;

Requests the AWG to prepare a new version of the observational requirements and the Statement of Guidance for the Application Area « Hydrology », taking into consideration the implementation plan of WHOS Phase II, to be presented to IPET-OSDE in the second half of 2017 and made available to NHSs through the WHOS web page;

Requests the AWG engage with the Commission for Basic Systems to ensure that Phase 2 of the WHOS is fully aligned with the WIS 2.0 Strategy."

Requests the Secretary-General to continue promoting the development of free and open source software for hydrology (such as MCH), according to user requirements and make them available to all users;

Invites Members to contribute to global data centres in accordance with the recommendation of the report to the Executive Council mentioned above, to ensure hydrological data and related information that is critical for WMO-supported programmes is available and accessible;

Invites Members hosting global data centres to continue to provide sufficient resources to ensure the long-term operation and service-delivery capacity of these centres;

Further invites Members to consider MCH as a possible data management tool for their data operations.

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WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS) and WMO HYDROLOGICAL OBSERVING SYSTEM (WHOS)

In June 2015 the President of CHy informed Cg-17 of CHy proposal to develop WHOS as the CHy contribution to WIGOS

- *Congress welcomed the effort and urged the president of CHy to continue guiding WHOS to full implementation*
- *Congress urged the promotion of WHOS among NHSs and the hydrological community*

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WMO Hydrological Observing System (WHOS)

Implementation:

Phase 1:

Map interface with links to those NHSs that make their real-time and historical stage and discharge data available online. implemented in August 2015.

Phase 2:

A fully WIS/WIGOS compliant services-oriented framework linking hydrologic data providers and users through a hydrologic information system enabling data registration, data discovery, and data access.

Beta version for CHy-15 review and endorsement (Dec 2016)
Initial implementation for EC approval (June 2018)

First Session of CHy Advisory Working Group

(a) Mr Harry Lins (United States of America) – president of CHy

(b) Mr Silvano Pecora (Italy) – vice-president of CHy

(c) Mr Jan Danhelka (Czech Republic)

(d) Mr Harry Dixon (United Kingdom of Great Britain and Northern Ireland))

(e) Ms Janice Fulford (United States of America)

(f) Mr Tom Kanyike (Uganda)

(g) Ms Hwirin Kim (Republic of Korea)

(h) Mr Yuri Simonov (Russian Federation)

(i) Mr Narendra Tuteja (Australia)

(j) Mr Marcelo Uriburu Quirno (Argentina)

(k) Mr Jianging Yang (China)

WMO OMM

27 February - 3 March 2017, Geneva, Switzerland

Annex 2 to draft Resolution 8/1 (CHy-15)

STRUCTURE OF THE COMMISSION FOR HYDROLOGY

Coordination and Implementation Support
President, vice-president, 1 AWG member
WIS/WIGOS, GFCS, GDPFS, RAs, ETR .....

Measurement, Monitoring, and Infosystems

Hydrological Applications, Products and Services

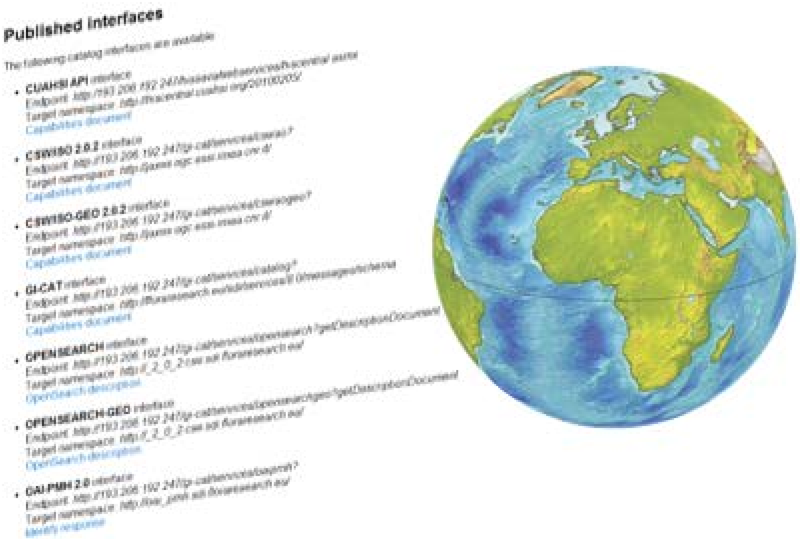
Activities Supported by Secretariat
Activities supported by Sec. with help from OPACHEs

CHy Member Activities
Activities requiring leadership by Members

EC-70 DOCUMENT on THE INITIAL IMPLEMENTATION

WHOS

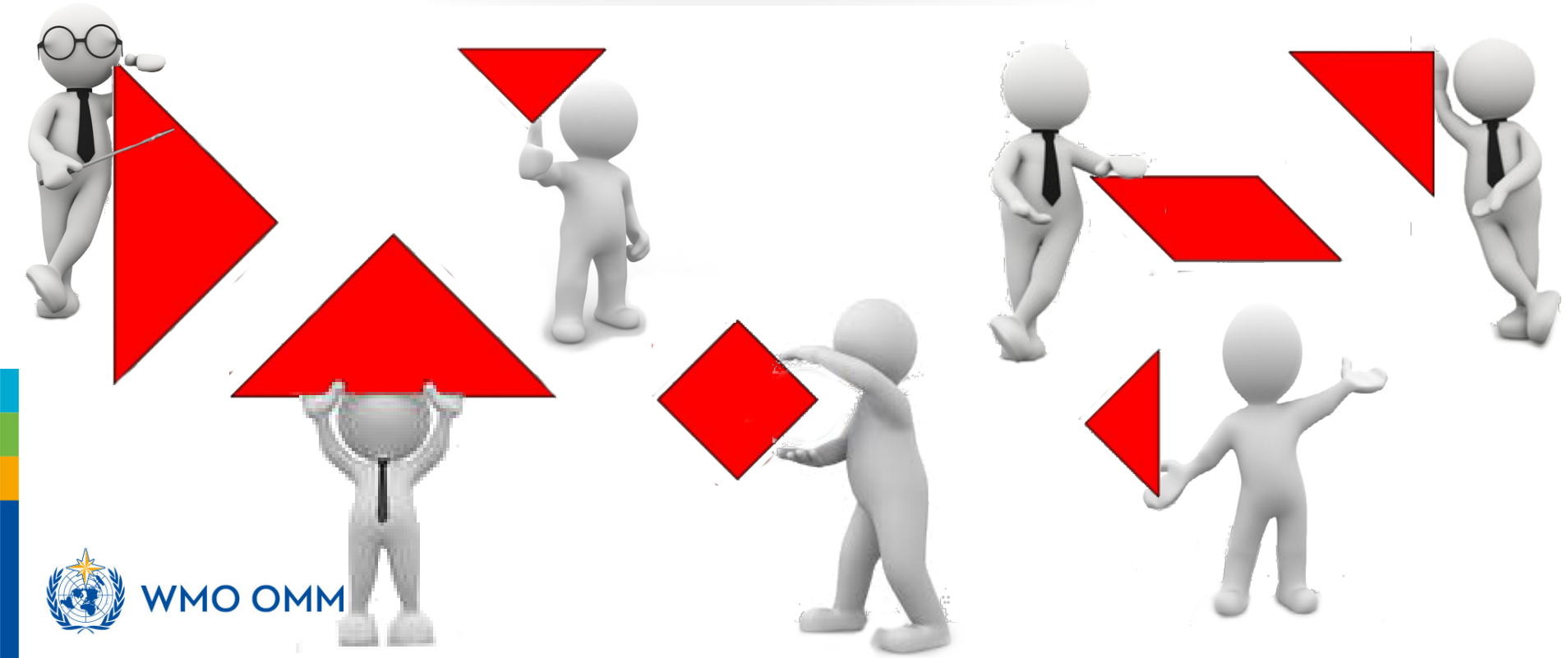
WMO Hydrological Observing System



Phase II – Initial Implementation

Silvano Pecora
Vice-President of WMO Commission for Hydrology

THE SEVEN COMPONENTS OF WHOS



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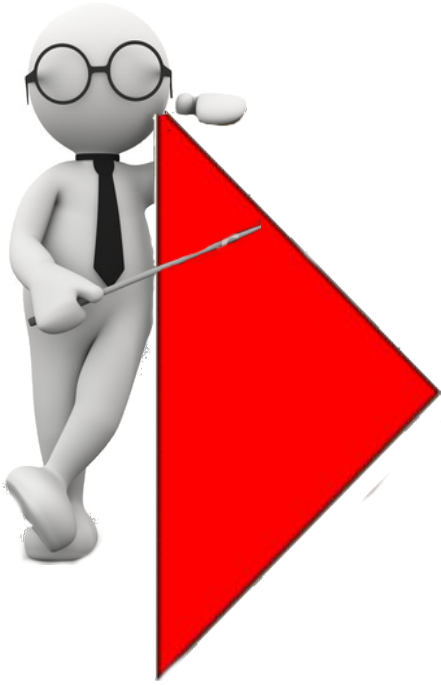
DATA

The ultimate goal of data collection in hydrology, be it precipitation measurements, water-level recordings, discharge gaugings, groundwater monitoring and water quality sampling, is to provide a set of sufficient good quality data that can be used in decision-making in all aspects of water resources management, in the wide range of operational applications as well as in research.

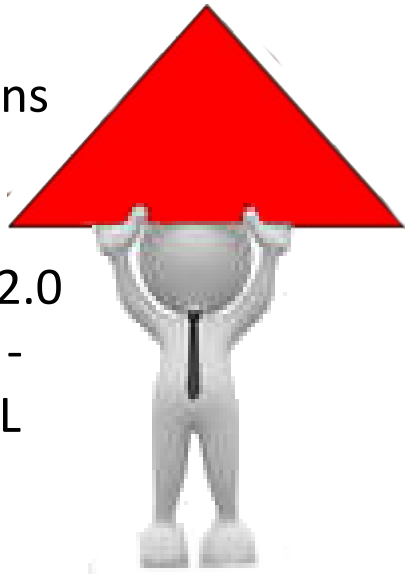
Decisions may be made directly from raw data measurements or based on derived statistics or on the results of many stages of modelling beyond the raw data stage, but it is the collected data that form the basis for these decisions. Data sets are of great intrinsic value as they are collected through a huge commitment of human and financial resources and often during a long period of time, and they acquire also a use value when are made available in an usable form to the final users to respond to their specific needs.



FORMAT

Resolution 25, adopted in May 1999 by the Thirteenth World Meteorological Congress, commits WMO Members to broaden and enhance, whenever possible, the free and unrestricted international exchange of hydrological data and products. In 2005, a Global Climate Observing System (GCOS) report identified standards as a key problem in data exchange in global hydrological and atmospheric networks. Thus, in 2009, WMO and the Open Geospatial Consortium (OGC) jointly formed a Hydrology Domain Working Group (HDWG) to address this issue.

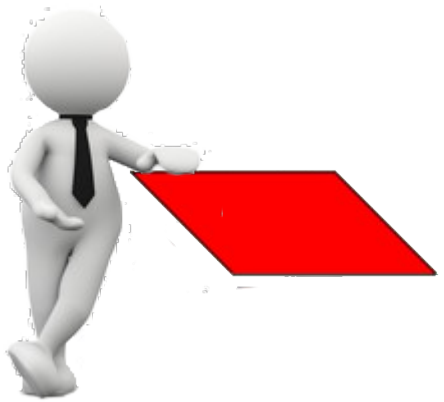
In particular, activities of the WMO/OGC Hydrology Domain Working Group are providing technical and institutional solutions to the challenge of exchanging data describing the state and location of water resources, both above and below the ground surface, with a number of standards associated with WaterML 2.0 such as WaterML 2.0:Part 1 – Time Series; WaterML 2.0:Part 2 - Ratings, Gaugings and Sections; WaterML-WQ; GroundwaterML 2.0; among others.



SERVICE

Utilizing a collection of WMO and OGC Web services, WHOS is designed as a "services stack framework" that shares catalog data, metadata and data with the user. The services stack framework identifies three types of services as essential to sharing water information across the web:

- catalog services
- metadata services
- data services.



These three services work together to completely index, describe and provide access to water information (e.g. time series). Catalog services provide users with an index of hydrologic metadata, metadata services identify collections of time series available over a domain of space and time, and data services provide the user with the raw data for a specified temporal period and spatial area. This framework is designed to publish and distribute time series, but it can be extended to include grids and coverages as well.

ONTOLOGY

The WMO Hydrological Ontology is a formal naming and definition of the types, properties, and interrelationships of entities that really or fundamentally exist in the domain of hydrology; in particular, it compartmentalizes the variables needed in hydrology and establishes the relationships between them. The ontology is encoded using OWL, and all its elements (classes, properties and individuals) are defined as RDF resources, and identified by URIs. The WMO Hydrological Ontology provides semantic access to linked data by incorporating OWL reasoning within the SPARQL syntax. The adopted development approach takes into account not only semantics, but a more general perspective in order to address possible future needs. The conceptual challenge concerns the enablement of new ways of searching and the adopted methodology is essentially supported by the approach of enriching the searchable information that is associated with hydrological data and information.

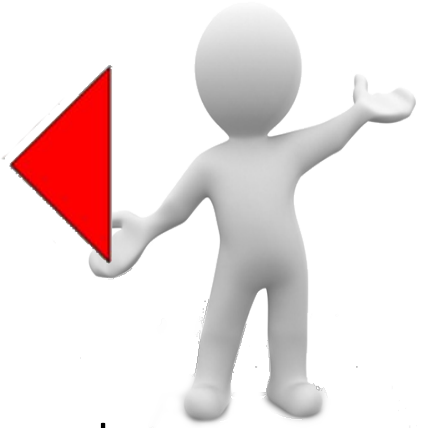
MEDIATOR

Data interoperability is the capacity to move data and information across heterogeneous sources and destinations, in such a way that the receiver is able to restore the original representation of information. This problem can be tackled through the mediated approach, that is identifying the existing heterogeneity boundaries and implementing suitable adaptation logic by means of specialized, lightweight components.

WHOS is supported by a mediation-based federated solution, which has proven suitable for implementing data interoperability in the Hydrology domain.

The adopted solution includes discovery services, relating and combining data from sources characterized by heterogeneous models and encodings, and presenting the users a uniform federal view of metadata and data. A mediator-wrapper component transforms the flowing XML resources from the local to the federal schema, by means of ad-hoc structural mappings. The federal model is based on the ISO TC 211 conceptual model, which is nowadays fairly consolidated and captured in well accepted standards.

BROKER



The Brokering approach is based on the following principles:

a) **Autonomy**: Keep the existing disciplinary infrastructures as autonomous as possible, not asking them to implement any "more general" service bus.

b) **Subsidiarity**: Supplement but not supplant disciplinary infrastructure mandates and governance arrangements by interconnecting and mediating their service buses.

c) **Interconnection**: Build incrementally on existing infrastructures and introduce distribution and mediation functionalities to interconnect the heterogeneous service buses characterizing any domain specific or other infrastructure.

d) **Low entry barrier**: Minimize the barrier for both users and resource providers of any disciplinary infrastructure.

e) **Flexibility**: Be flexible enough to accommodate existing and future information systems and information technologies that will augment the service bus implemented by any discipline.

f) **Effectiveness**: Address the full range of information exchange needs (discovery, access, semantics, workflow, etc.).

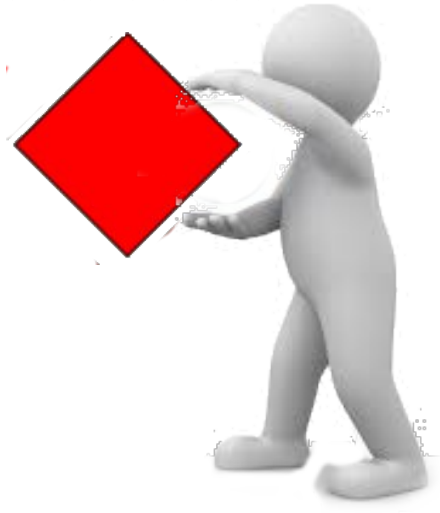
CLIENT

The final component of WHOS is the web or desktop client. The client is the component that allows for the harvesting of hydrologic information at the locality of one's own computer or analytical system as per Manual on WIS (WMO No.1060) section 3.6.7 "Provide access to information".

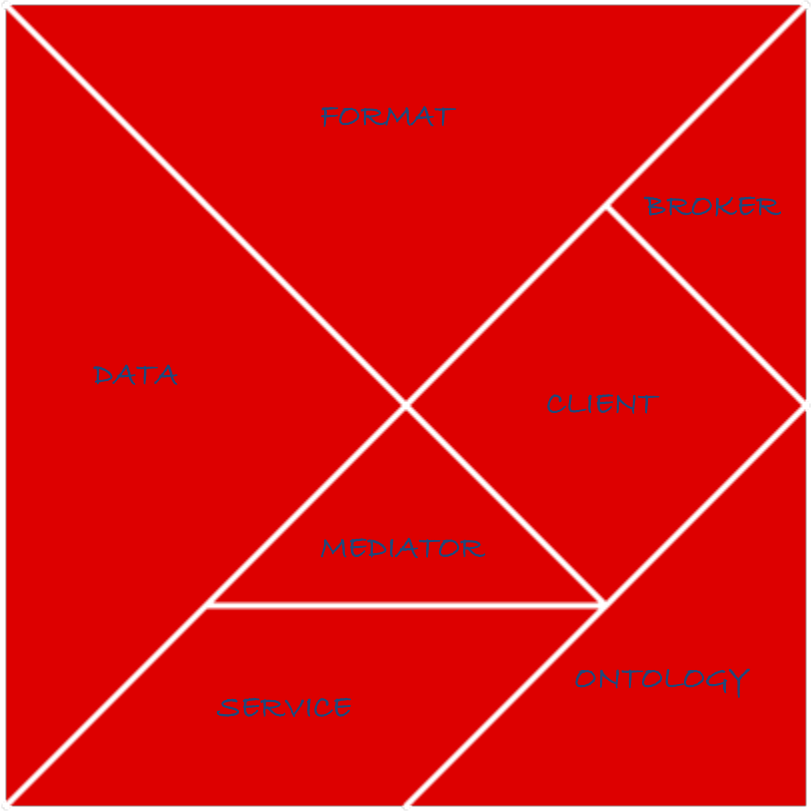
The client is a platform located on the user's machine and communicates with both data services and the registry.

Users can directly download hydrologic information from data providers if they already know of their existence or can search the registry for data that they might not know about.

Once the data of interest has been discovered, users can download the information onto their local databases.



WHOS



reshaping data in hydrology

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WHOS at LOCAL SCALE

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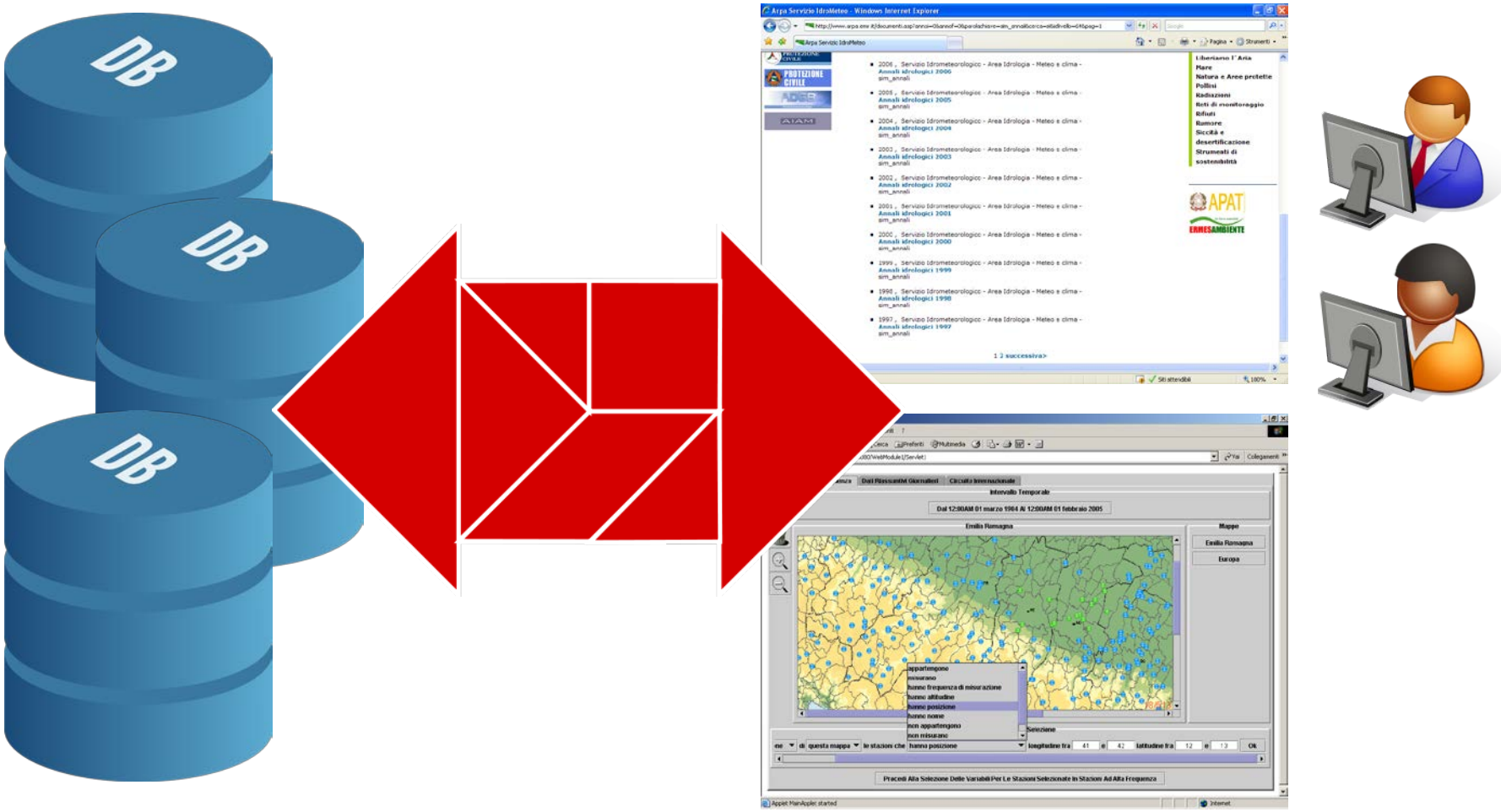
Hydrological Yearbooks



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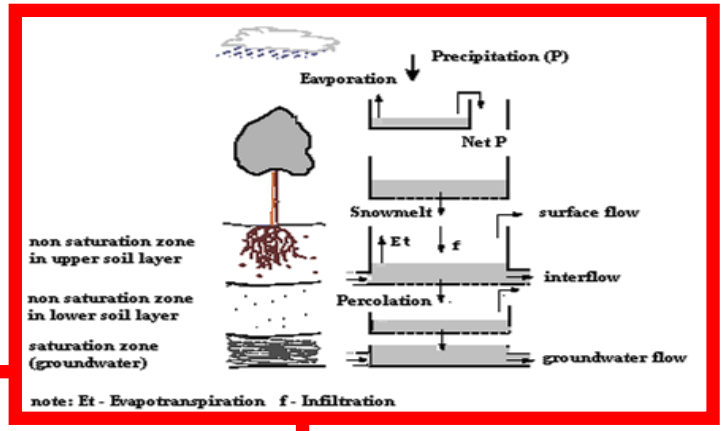
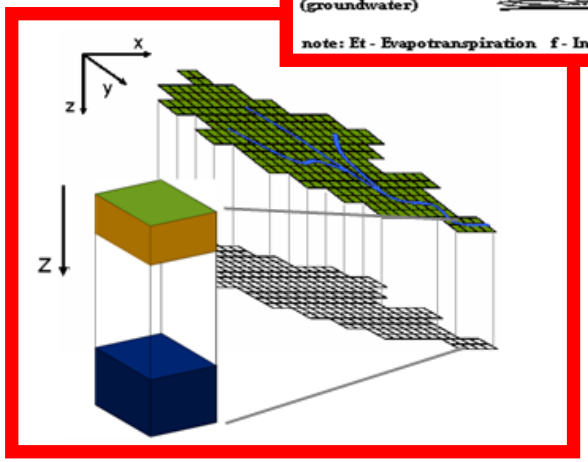
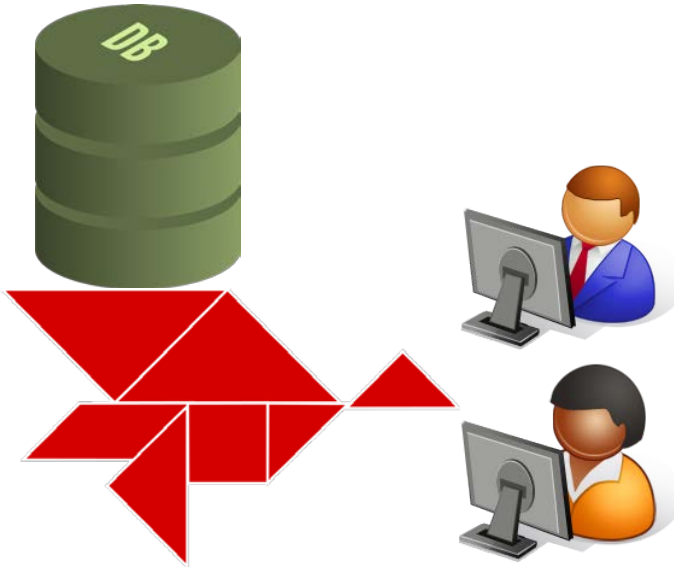
Hydrological Models







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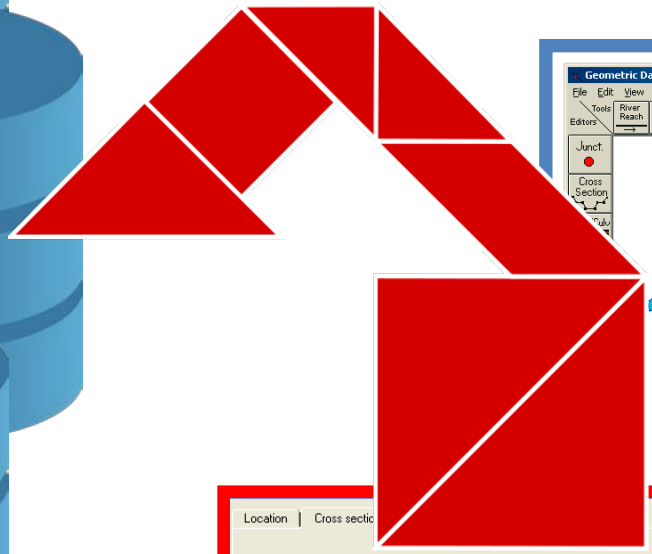
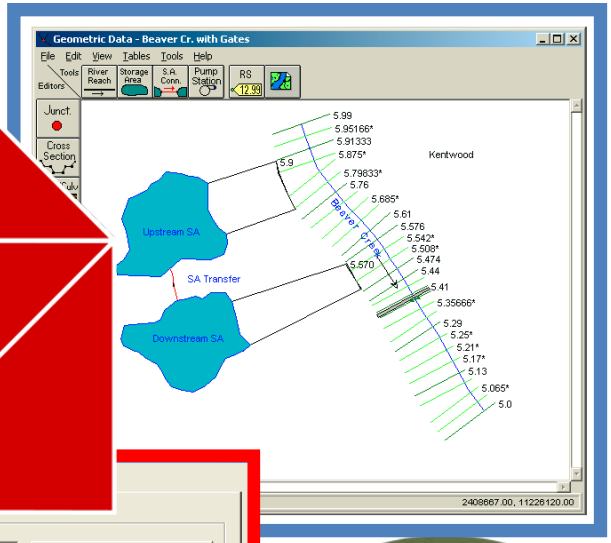
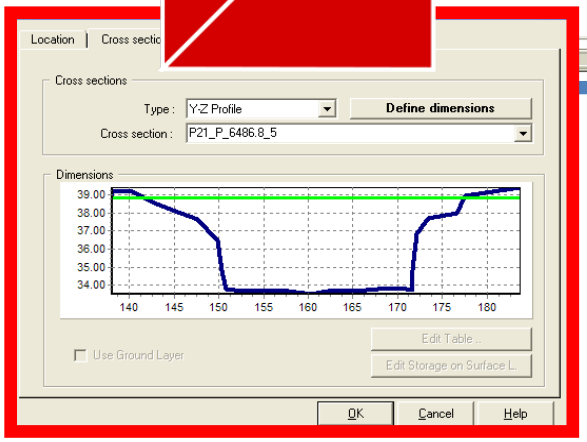
Hydraulic Models







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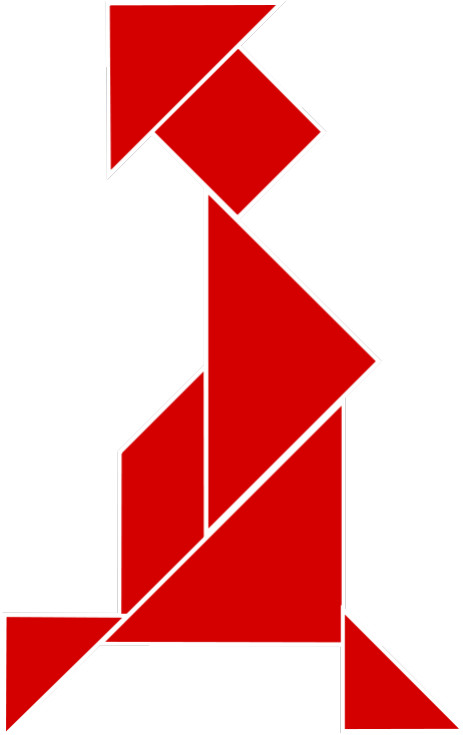

WHOS at NATIONAL SCALE

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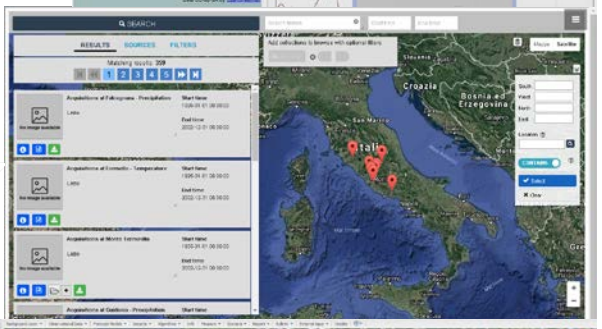
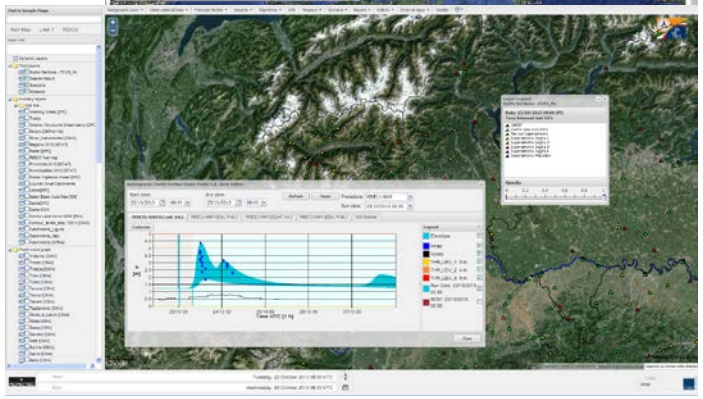
Federation of National Hydrological Data





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WHOS at TRANSBOUNDARY SCALE

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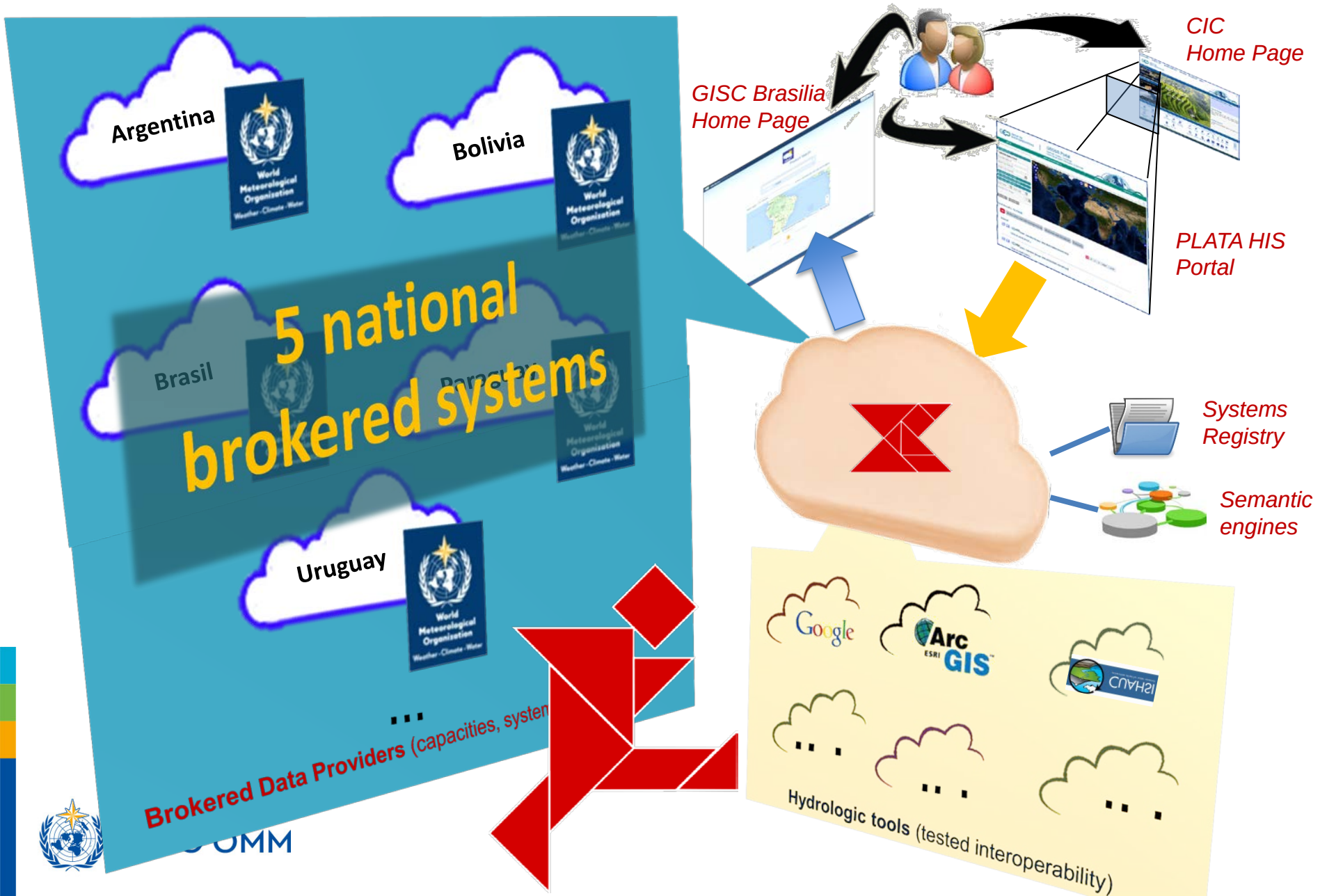
Federation of Basin Hydrological Data



WHOS at REGIONAL SCALE

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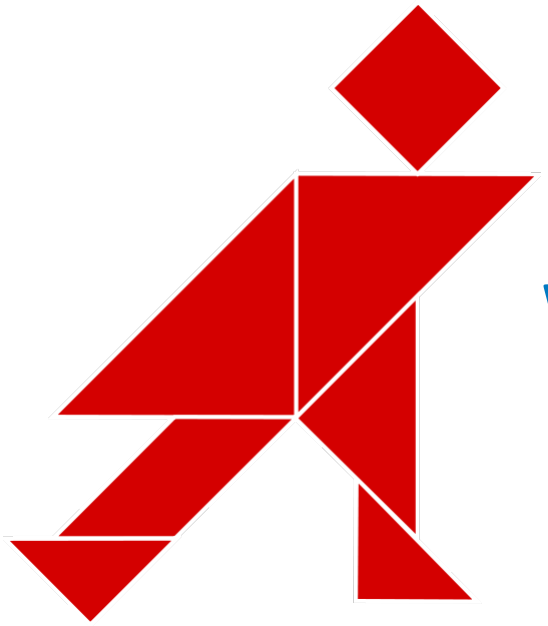
Federation of Regional Hydrological Data



WHOS at GLOBAL SCALE

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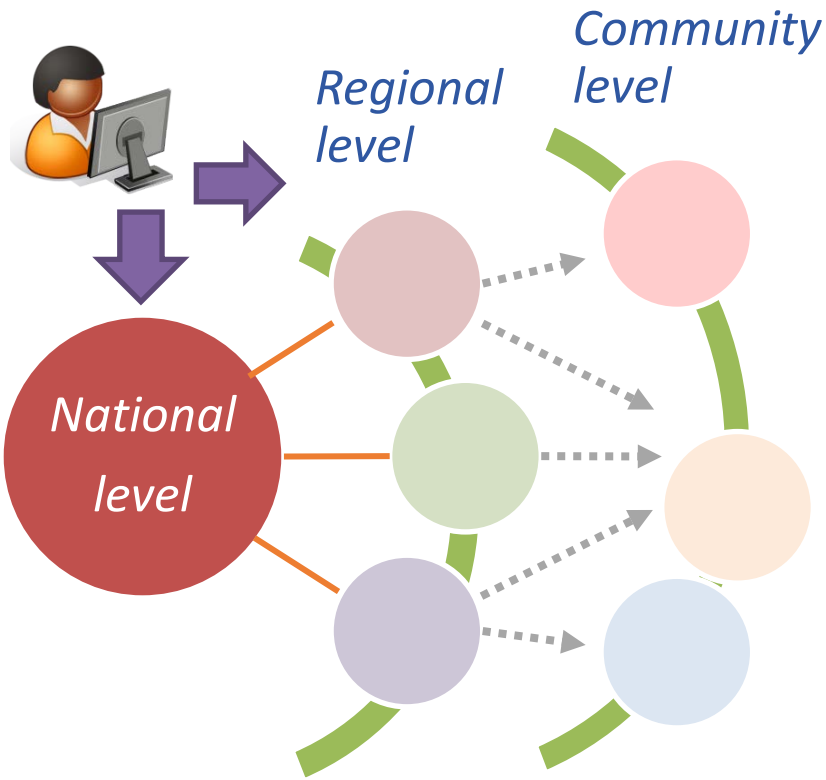
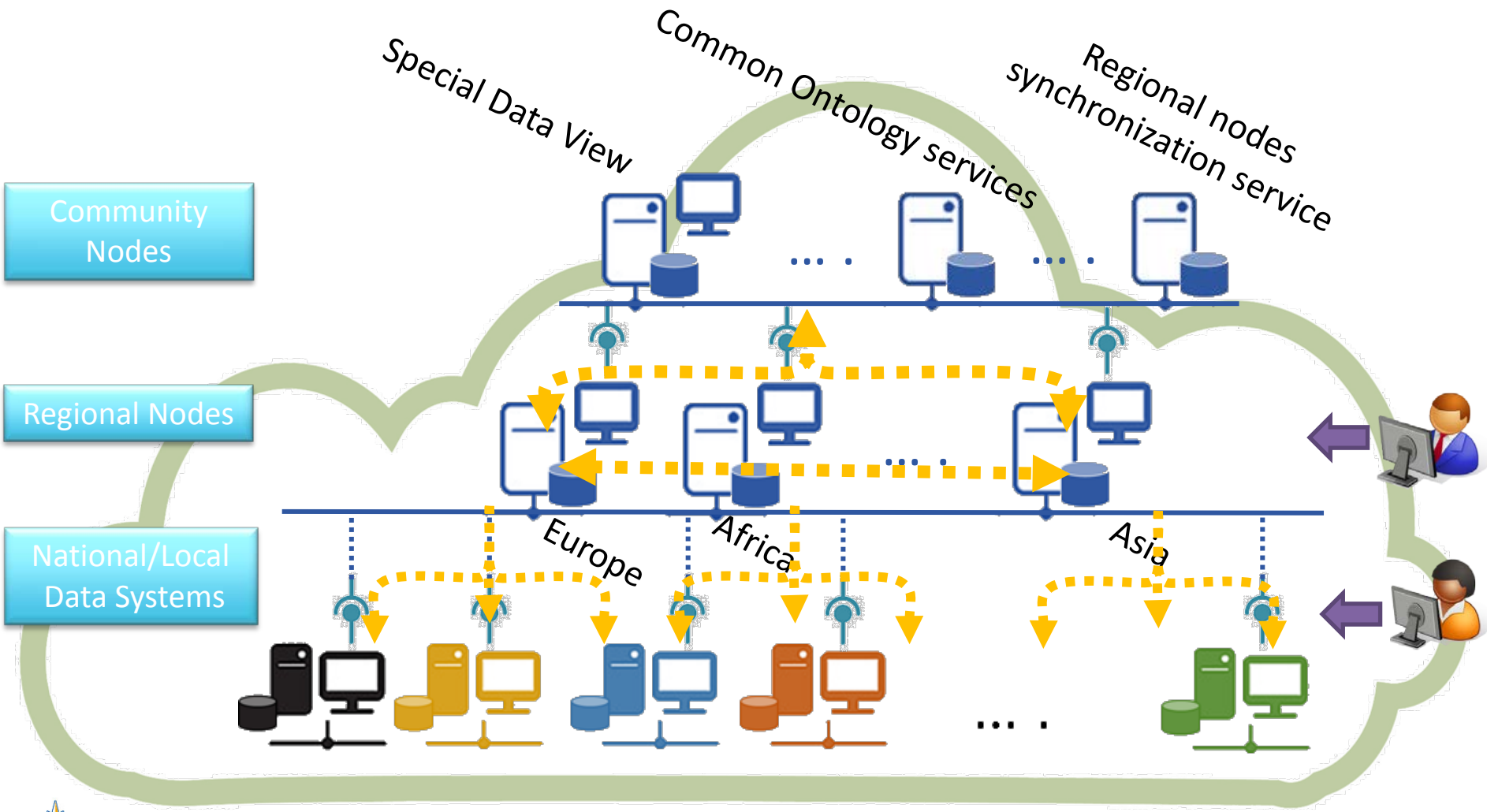
Software and Social Hydrosystem

- WHOS National level
  - National Data Systems
- WHOS Regional level
  - WHOS Regional Nodes
    - Africa
    - Asia
    - South America
    - North America, Central America and the Caribbean
    - South-West Pacific
    - Europe
- WHOS Community level
  - WHOS Special data systems (e.g. virtual views)
  - WHOS Services nodes



Interoperability and Information Flow



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AN OPERATIONAL PROTOTYPE

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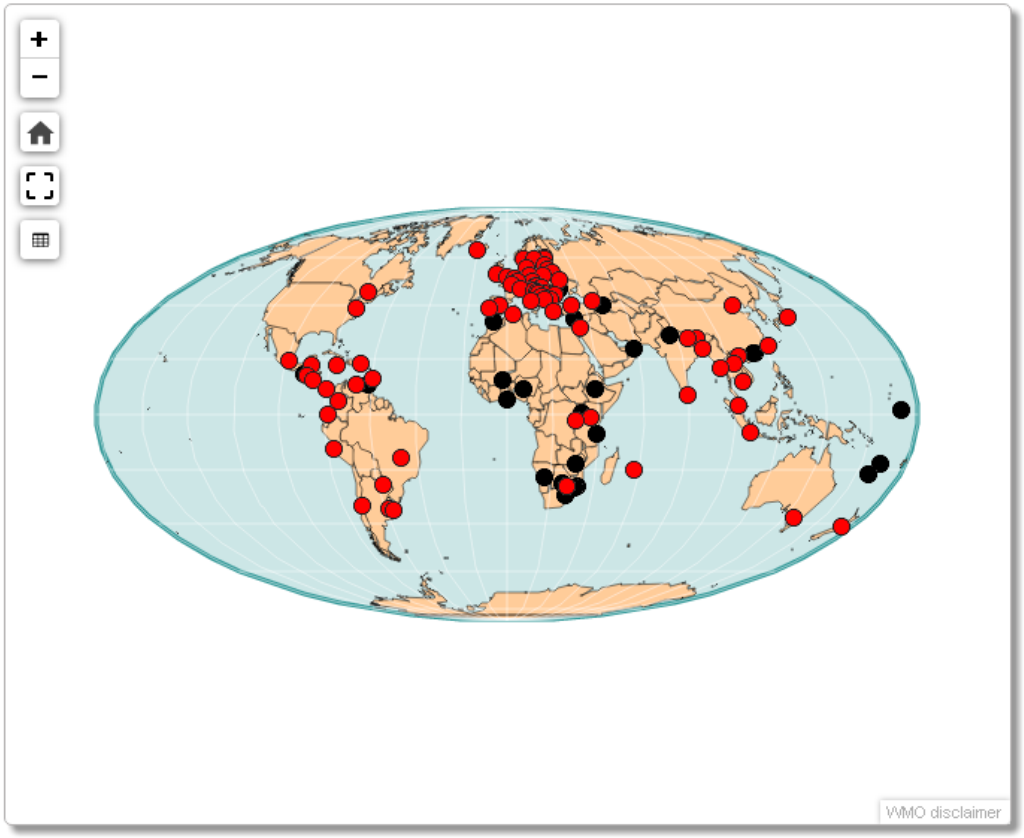
http://hydrolite.ddns.net/whos/

WHOS is being developed and implemented in phases. The map interface appearing below is a provisional product designed for demonstration and testing in preparation for a review of the WHOS concept at the 15th Session of the Commission for Hydrology (CHy-15) in December 2016. A full WHOS implementation is subject to approval by CHy-15.

This web portal features some advanced operations supported by the designed cyberinfrastructure.



National Hydrological Service, website only
National Hydrological Service, website and data

Access to the data comprising WHOS can be obtained via map-based links on the following map. Red dots appear in countries where the

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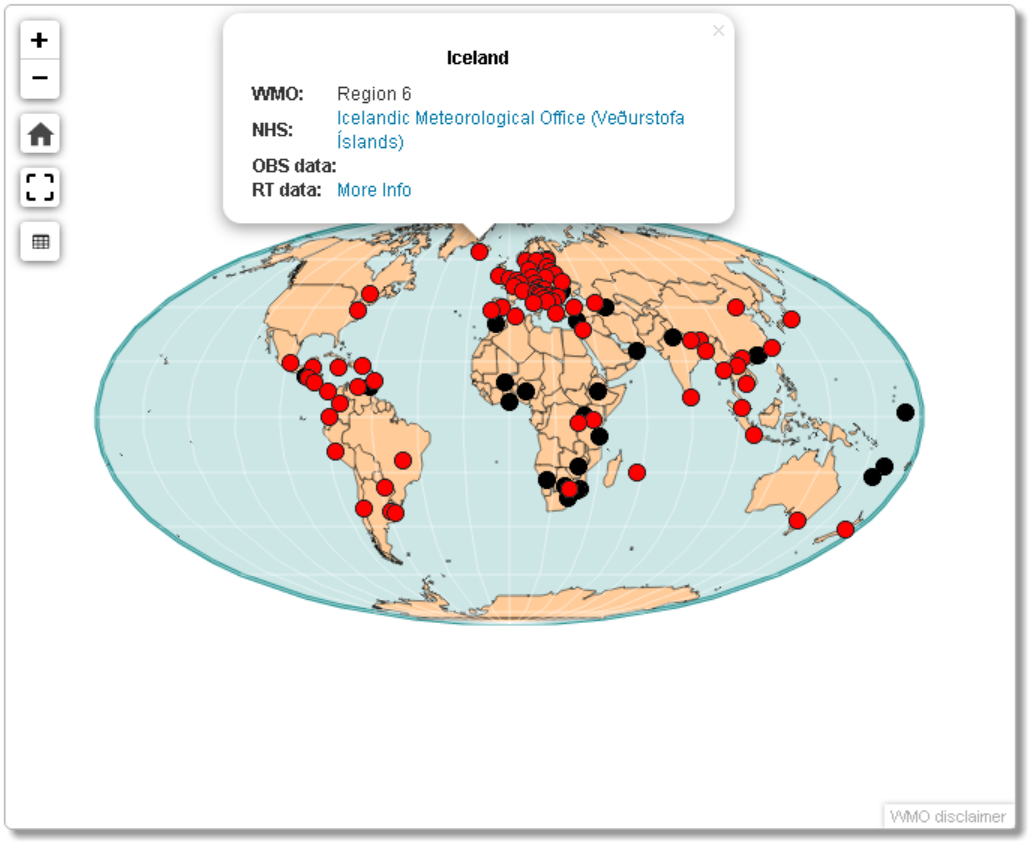


National Hydrological Service, website only
National Hydrological Service, website and data

Access to the data comprising WHOS can be obtained via map-based links on the following map. Red dots appear in countries where the

Veðurstofa Íslands

Aðal aðgerðir ▾ Upplýsingar ▾

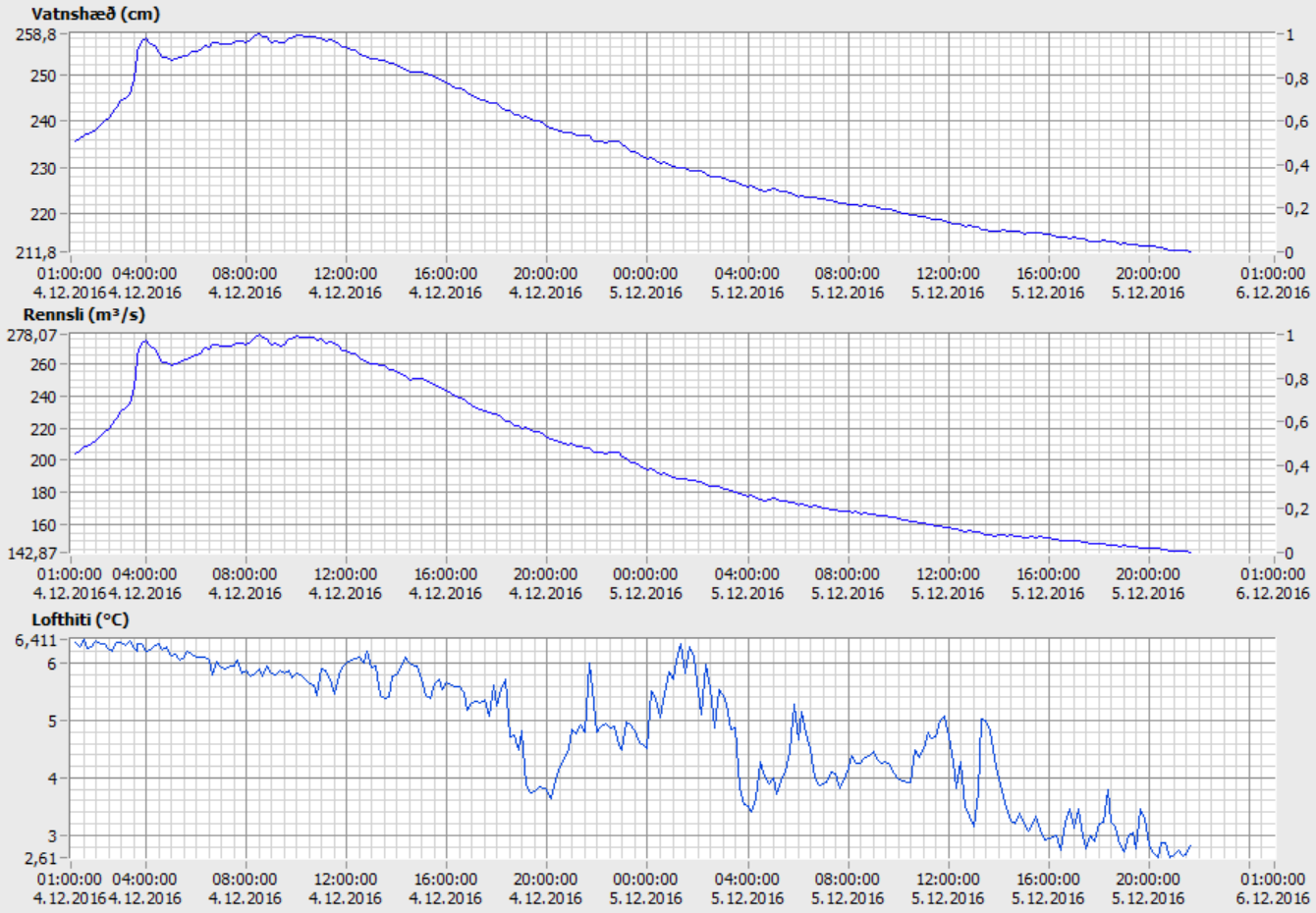
VDV2013

Sites

Austurland

- Hrafnkela; V288 - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Jökulsa á Dal, Brú - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Jökulsá á Dal, Hjarðarhagi; V110 - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Jökulsá á Fjöllum, Grímsstaðir; V102 - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Jökulsá á Fjöllum, Upptyppingar; V289 - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Jökulsá í Fljótsdal, Hóll; V109 - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Kelduá, Víðivellir - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Kreppa, Lónshnjúkur; V233 - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Lagarfljót, Lagarfell; V007 - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Upptyppingar, veðurstöð; S4020 - VARÚÐ ÞETTA ERU ÓYFIRFARIN FRUMGÖGN
- Upptyppingar_bru - VARÚÐ ÞETTA ERU ÓYFIRFARIN

Suðurland: Hvítá við Fremstaver



Ferill	Nýjast
W1_cm: Hvítá, Fremstaver; V335	0
W1_cm: Hvítá, Fremstaver_800; V335	211,8

Ferill	Nýjast
Q_m³/s: Hvítá, Fremstaver; V335	0
Q_m³/s: Hvítá, Fremstaver_800; V335	142,8

Ferill	Nýjast
TL1_C: Hvítá, Fremstaver_800; V335	2,811

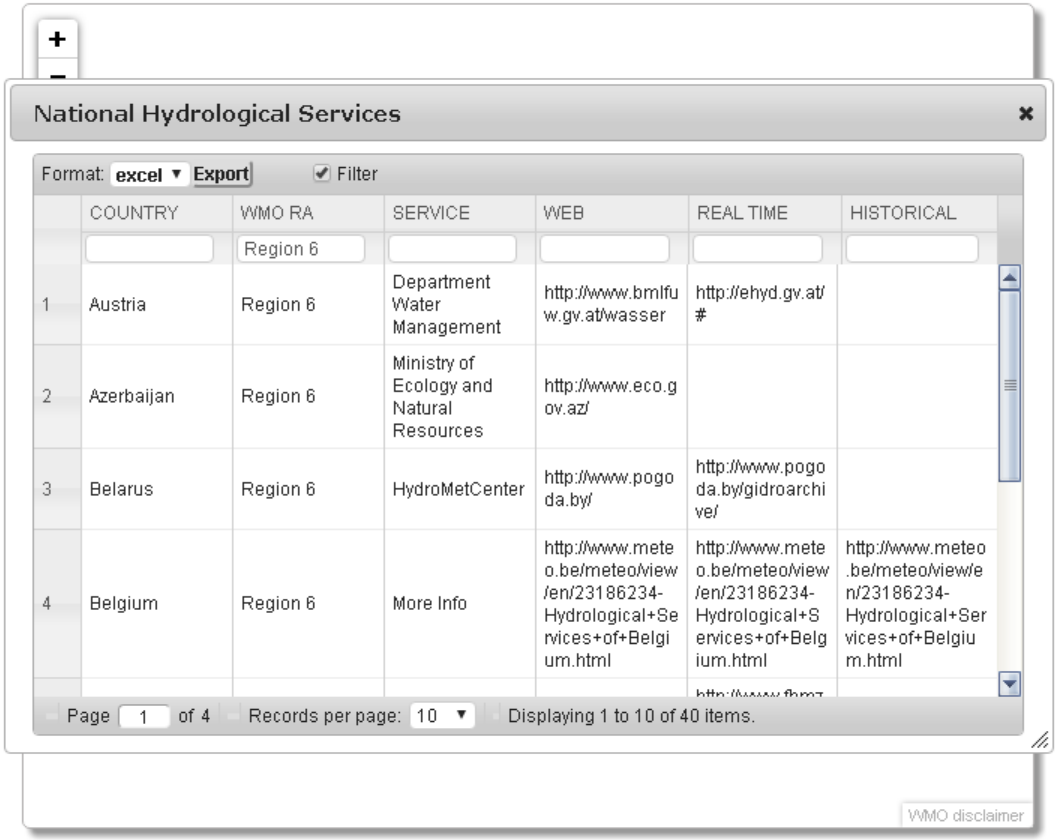
Powered by Vista Data Vision

Skali 2 dagar ▾ Tímaskref Skali ▾ ← → ⏭ 📅 +

WMO OMM

WHOS is being developed and implemented in phases. The map interface appearing below is a provisional product designed for demonstration and testing in preparation for a review of the WHOS concept at the 15th Session of the Commission for Hydrology (CHy-15) in December 2016. A full WHOS implementation is subject to approval by CHy-15.

This web portal features some advanced operations supported by the designed cyberinfrastructure.



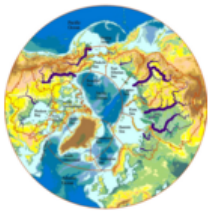
National Hydrological Service, website only
National Hydrological Service, website and data

Access to the data comprising WHOS can be obtained via map-based links on the following map. Red dots appear in countries where the

WHOS
WMO Hydrological Observing System
data discovery and access

← Go Back | Reset | 10 per page ▼ | Title A-Z ▼ | Filter by Title | Hycos

Filter by category ▼ | Discharge | Level | Precipitation | Temperature | Page 1 of 1



ARCTIC

ARCTIC Hydrologic Information System Central Web Service Registry

The Arctic-HYCOS program is being promoted through the World Hydrological Cycle Observing System (WHYCOS). The main goal of the Arctic-HYCOS program is to improve monitoring, data accuracy, availabili ...

Discharge Precipitation Level temperature

NIGER

NIGER Hydrologic Information System Central Web Service Registry

The Niger river basin hydrological observing system, designated Niger-HYCOS, is a federated network composed by 9 States (Benin, Burkina Faso, Cameroon, Cote d'Ivoire, Guinea, Mali, Niger, Nigeria and ...

Discharge Precipitation Level temperature

SADC

SADC Hydrologic Information System Central Web Service Registry

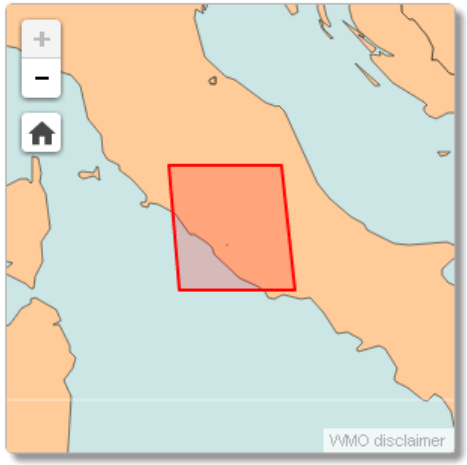
The SADC-HYCOS program is a regional component of the World Hydrological Cycle Observing System (WHYCOS). The main goal of the SADC-HYCOS program is to ensure that participating countries, individuall ...

Discharge Precipitation Level temperature

WMO Hydrological Observing System

ITA Lazio

The ultimate goal of data collection in hydrology, be it precipitation measurements, water-level recordings, discharge time series, groundwater monitoring and water quality sampling, is to provide a set of sufficient verified quality data that can be used in water resources management decision-making. Such needs span all aspects of water resources management, in a wide range of operational applications, as well as in research. Decisions may be made directly from raw data measurements, based on derived statistics, or from the results of many stages of modelling beyond the raw data stage. Regardless of any added value though, it is the collected data that form the basis for these decisions. Data sets are of great intrinsic value as they are collected through a huge commitment of human and financial resources and often during a long period of time. Further, they have additional value when they are made available in a usable form for the many users to respond to their specific needs. The portal provides access to the available hydrological observations. In particular, the portal provides additional operational capability, for in situ water observations, as an international registry of hydrological data services catalogued using the standards and procedures of the Open Geospatial Consortium and the World Meteorological Organization.



Brokered services: 1
Brokered sites: 114
Brokered variables: 4
Geographic extent: [11.5989, 42.8942, 13.4633, 41.3422]

WMO Hydrological Observing System

Published interfaces

The following catalog interfaces are available:

CUAHSI API interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/hiscentral/vae113e0745bc4894bd03be86cdae24fe*
Target namespace: *http://hiscentral.cuahsi.org/20100205/*
Capabilities document

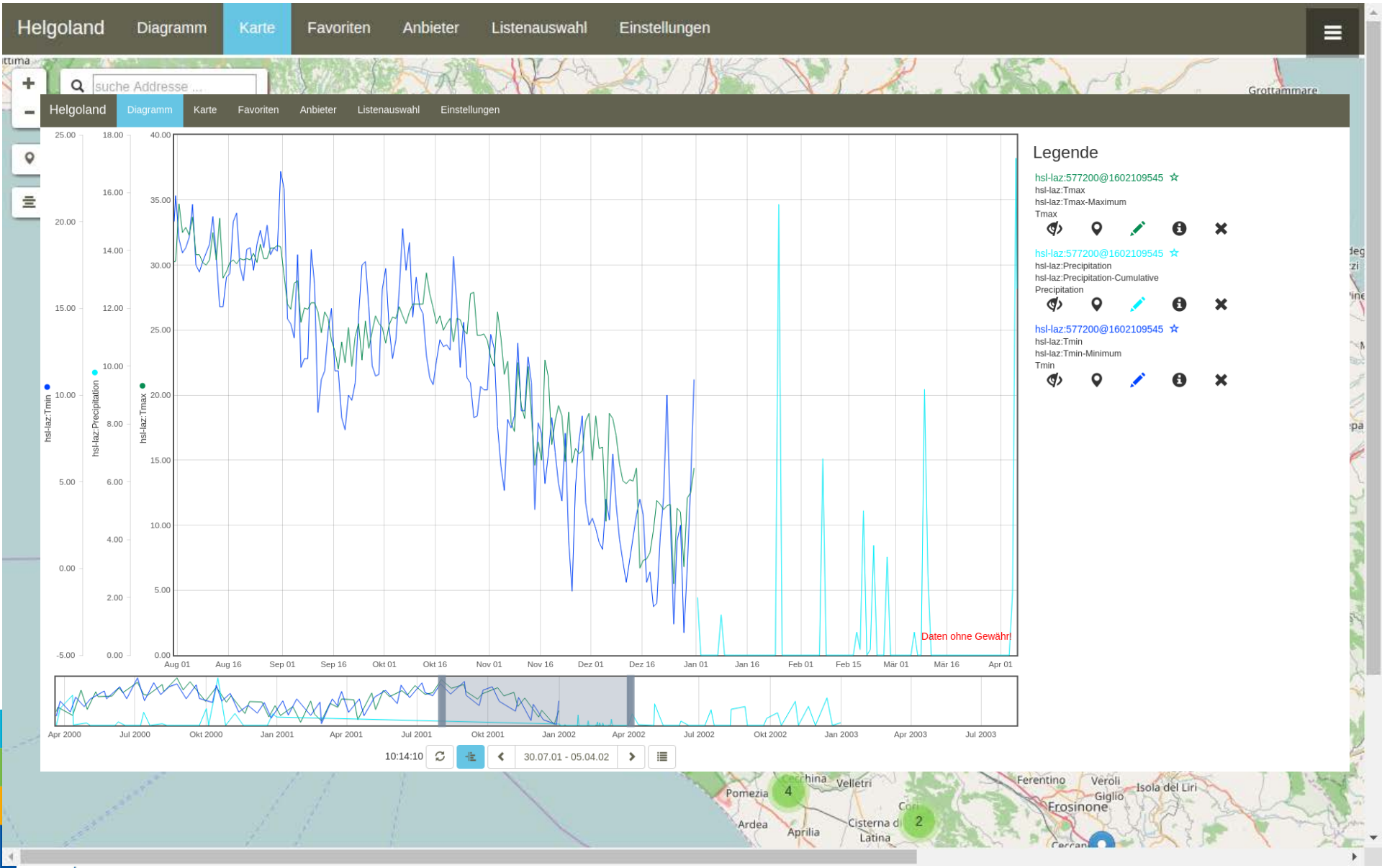
REST interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/api-rest/vae113e0745bc4894bd03be86cdae24fe/datasets/report*
Capabilities document

OAIPMH interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/oaipmh/vae113e0745bc4894bd03be86cdae24fe*
Target namespace: *http://oai_pmh.sdi.floraresearch.eu/*
Capabilities document

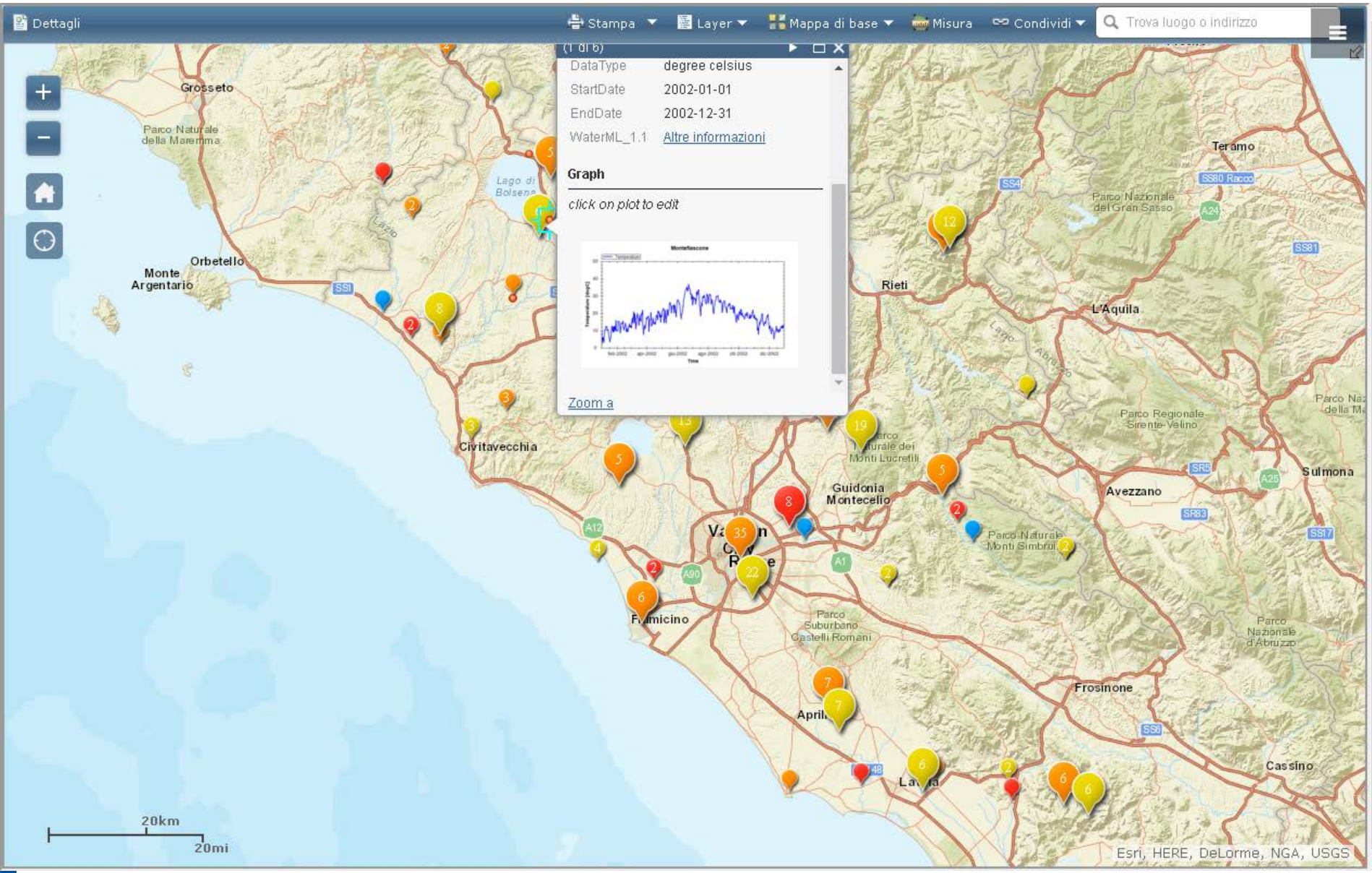
OAIPMH ISO 2007 interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/oaipmhiso2007/vae113e0745bc4894bd03be86cdae24fe*
Target namespace: *http://oai_pmh.sdi.floraresearch.eu/*
Capabilities document

Test Portal interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/search?viewId=vae113e0745bc4894bd03be86cdae24fe*
Capabilities document

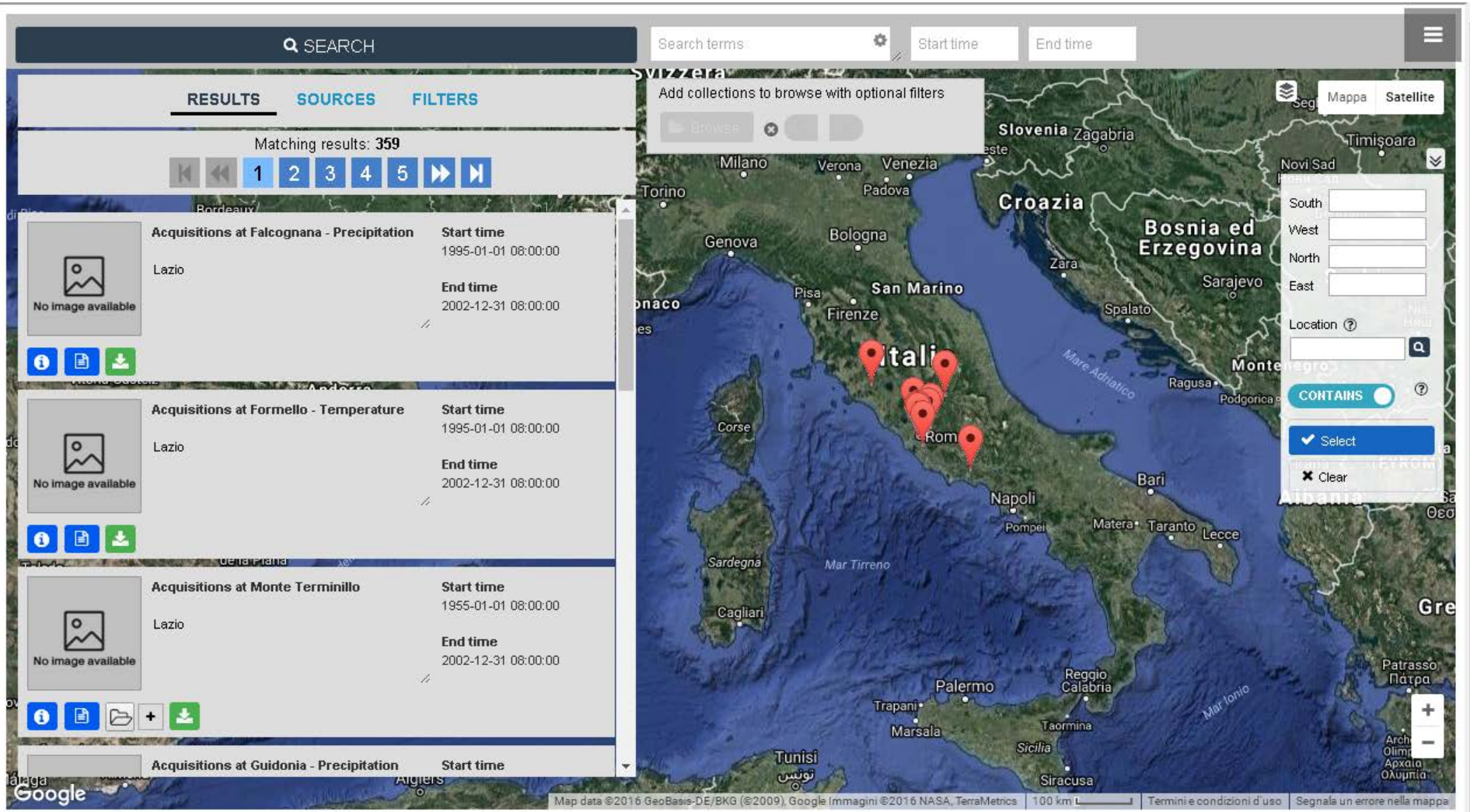
OPENSEARCH interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/opensearch/vae113e0745bc4894bd03be86cdae24fe*


Helgoland
Diagramm
Karte
Favoriten
Anbieter
Listenauswahl
Einstellungen
suche Addresse ...
Legende
hsl-laz:577200@1602109545
hsl-laz:Tmax
hsl-laz:Tmax-Maximum
Tmax
hsl-laz:577200@1602109545
hsl-laz:Precipitation
hsl-laz:Precipitation-Cumulative
Precipitation
hsl-laz:577200@1602109545
hsl-laz:Tmin
hsl-laz:Tmin-Minimum
Tmin
hsl-laz:Tmin
hsl-laz:Precipitation
hsl-laz:Tmax
Daten ohne Gewähr!
Aug 01
Aug 16
Sep 01
Sep 16
Okt 01
Okt 16
Nov 01
Nov 16
Dez 01
Dez 16
Jan 01
Jan 16
Feb 01
Feb 15
Mär 01
Mär 16
Apr 01
Apr 2000
Jul 2000
Okt 2000
Jan 2001
Apr 2001
Jul 2001
Okt 2001
Jan 2002
Apr 2002
Jul 2002
Okt 2002
Jan 2003
Apr 2003
Jul 2003
10:14:10
30.07.01 - 05.04.02
Grottammare
Pomezia
Velletri
Ardea
Aprilia
Cisterna di Latina
Ferentino
Veroli
Giglio
Isola del Liri
Frosinone

WMO OMM


Dettagli
Stampa
Layer
Mappa di base
Misura
Condividi
Trova luogo o indirizzo
(1 di 6)
DataType degree celsius
StartDate 2002-01-01
EndDate 2002-12-31
WaterML_1.1 Altre informazioni
Graph
click on plot to edit
Zoom a
Grosseto
Parco Naturale della Maremma
Orbetello
Monte Argentario
Civitavecchia
Lago di Bolsena
Lazio
Rieti
L'Aquila
Teramo
Parco Nazionale del Gran Sasso
Parco Regionale Sirente-Velino
Parco Naturale dei Monti Lucretili
Guidonia Montecelio
Avezzano
Sulmona
Parco Naturale Monti Simbruini
Parco Suburbano Castelli Romani
Fiumicino
Frosinone
Cassino
Parco Nazionale d'Abruzzo
20km
20mi
Esri, HERE, DeLorme, NGA, USGS

WMO OMM


SEARCH
Search terms
Start time
End time
RESULTS
SOURCES
FILTERS
Matching results: 359
1
2
3
4
5
Add collections to browse with optional filters
Browse
Mappa
Satellite
Acquisitions at Falcognana - Precipitation
Start time
1995-01-01 08:00:00
Lazio
End time
2002-12-31 08:00:00
No image available
Acquisitions at Formello - Temperature
Start time
1995-01-01 08:00:00
Lazio
End time
2002-12-31 08:00:00
No image available
Acquisitions at Monte Terminillo
Start time
1955-01-01 08:00:00
Lazio
End time
2002-12-31 08:00:00
No image available
Acquisitions at Guidonia - Precipitation
Start time
South
West
North
East
Location
CONTAINS
Select
Clear
Milano
Verona
Venezia
Padova
Torino
Genova
Bologna
Pisa
San Marino
Firenze
Roma
Corse
Sardegna
Mar Tirreno
Cagliari
Napoli
Pompei
Bari
Matera
Taranto
Lecce
Palermo
Trapani
Marsala
Reggio Calabria
Taormina
Sicilia
Siracusa
Tunisi
Croazia
Slovenia
Zagabria
Timişoara
Novi Sad
Bosnia ed Erzegovina
Zara
Sarajevo
Spalato
Ragusa
Podgorica
Mare Adriatico
Mar Ionio
Patrasso
Πάτρα
Google
Map data ©2016 GeoBasis-DE/BKG (©2009), Google Immagini ©2016 NASA, TerraMetrics
100 km
Termini e condizioni d'uso
Segnala un errore nella mappa

WHOS

WMO Hydrological Observing System

WMO Hydrological Ontology

The WMO Hydrological Ontology is a formal naming and definition of the types, properties, and interrelationships of entities that really or fundamentally exist in the domain of hydrology; in particular, it compartmentalizes the variables needed in hydrology and establishes the relationships between them.

i More about this visualisation

Legend:

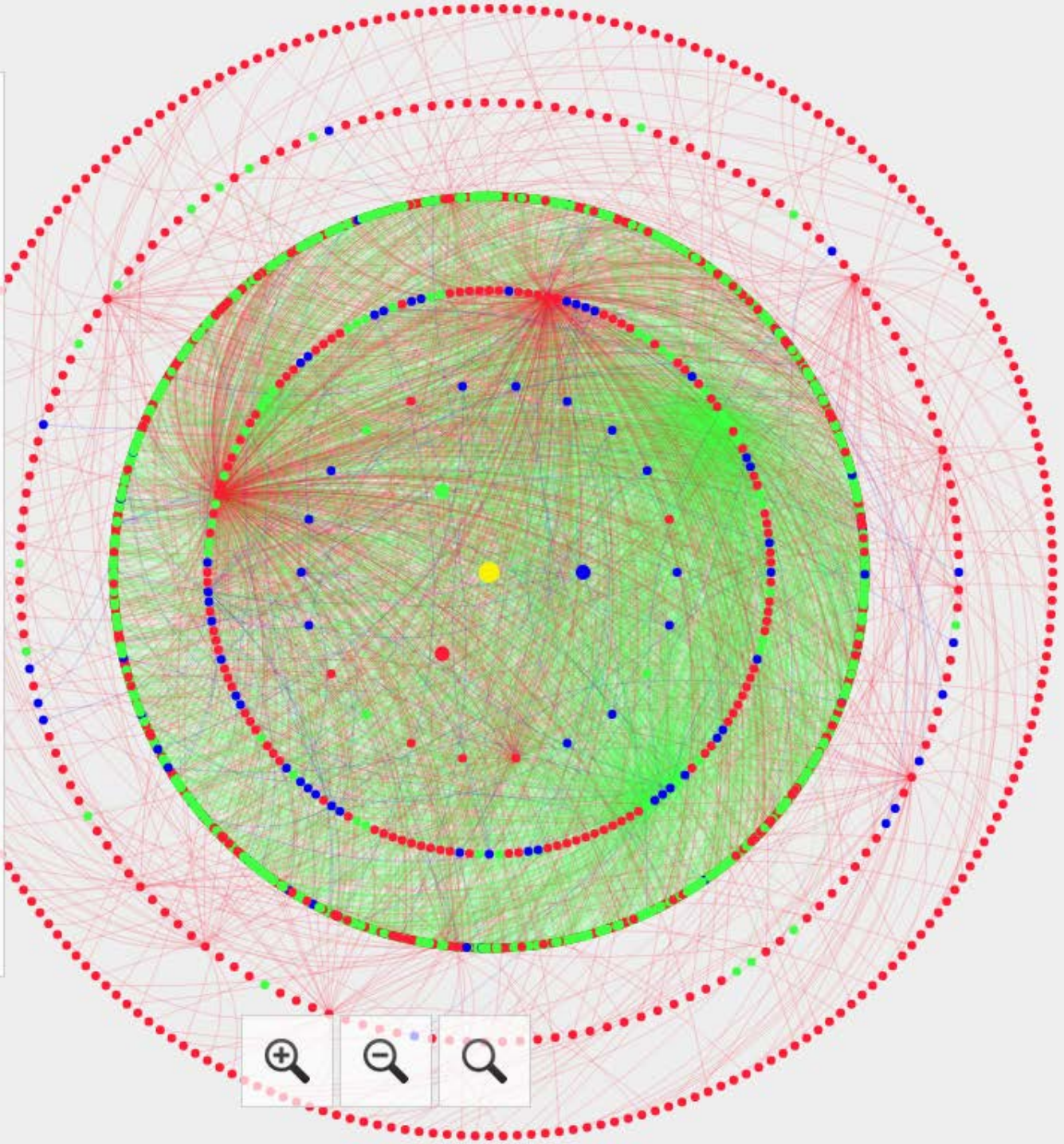
- A concept
- A relationship between two concepts
- Colour represents a grouping of concepts according to their properties

Ontology client

SPARQL

Search:

Search by name



WMO Hydrological Observing System

WMO Hydrological Ontology

The WMO Hydrological Ontology is a formal naming and definition of the types, properties, and interrelationships of entities that really or fundamentally exist in the domain of hydrology; in particular, it compartmentalizes the variables needed in hydrology and establishes the relationships between them.

i More about this visualisation

Legend:

- A concept
- A relationship between two concepts
- Colour represents a grouping of concepts according to their properties

Ontology client

SPARQL

Search:

Search by name

Return to the full network

Information Pane

Flux, discharge

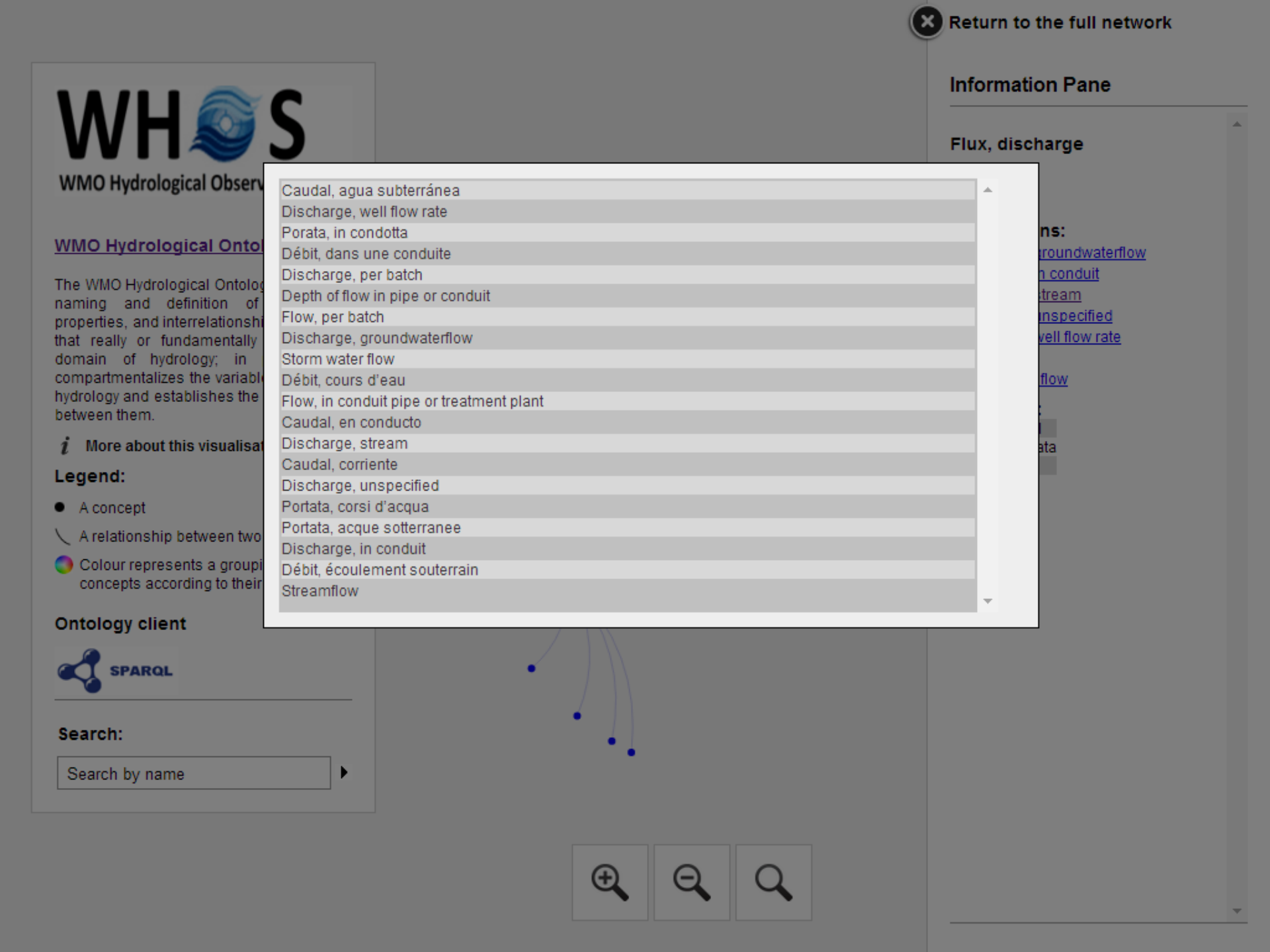
Variables

Connections:

Discharge, groundwaterflow
Discharge, in conduit
Discharge, stream
Discharge, unspecified
Discharge, well flow rate
Flux
Storm water flow

Synonyms:

Flujo, caudal
Flusso, portata
Flux, débit


Return to the full network
Information Pane
Flux, discharge
WHOS
WMO Hydrological Observ
WMO Hydrological Onto
The WMO Hydrological Ontolog
naming and definition of
properties, and interrelationshi
that really or fundamentally
domain of hydrology; in
compartmentalizes the variabl
hydrology and establishes the
between them.
More about this visualisat
Legend:
A concept
A relationship between two
Colour represents a groupi
concepts according to their
Ontology client
SPARQL
Search:
Search by name
Caudal, agua subterránea
Discharge, well flow rate
Porata, in condotta
Débit, dans une conduite
Discharge, per batch
Depth of flow in pipe or conduit
Flow, per batch
Discharge, groundwaterflow
Storm water flow
Débit, cours d'eau
Flow, in conduit pipe or treatment plant
Caudal, en conducto
Discharge, stream
Caudal, corriente
Discharge, unspecified
Portata, corsi d'acqua
Portata, acque sotterranee
Discharge, in conduit
Débit, écoulement souterrain
Streamflow
ns:
roundwaterflow
n conduit
tream
nspecified
vell flow rate
flow
ata

```
PREFIX : <http://www.semanticweb.org/ontologies/hydrology#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
select distinct ?name
where {?x rdf:type :Variable.
       ?x :variablename ?name.
       ?x :searchedBy ?y.
       ?y rdf:type :Concept.
       ?y :conceptname ?z.
       filter regex(?z, "level, stream", "i" )}
```

Table | Raw Response

Showing 1 to 18 of 18 entries

Search: Show 50 entries

	name
1	Water depth, stream
2	Profondeur de l'eau, cours d'eau
3	Profondità dell'acqua, corsi d'acqua
4	Nivel del agua, corriente
5	Stream gage height
6	Gage height stream
7	Profundidad del agua, sección transversal promedio
8	Hauteur d'eau, cours d'eau
9	Water depth, cross-sectional averaged
10	Profondeur de l'eau, coupe transversale moyenne

WMO Codes Registry | Browse | About | Advanced | Search | Submit

http://codes.wmo.int/

List all registers

Filters

Category

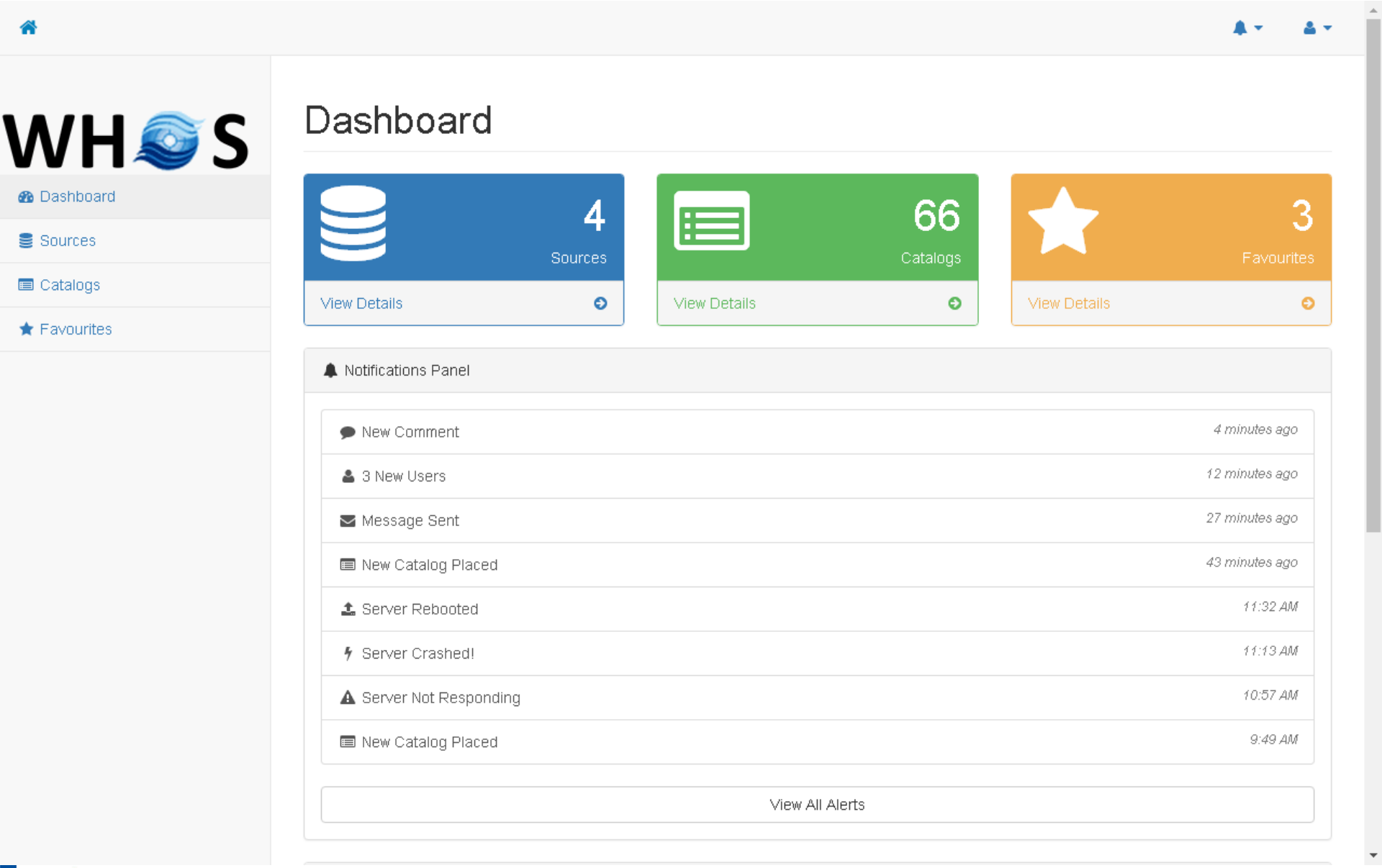
Owner

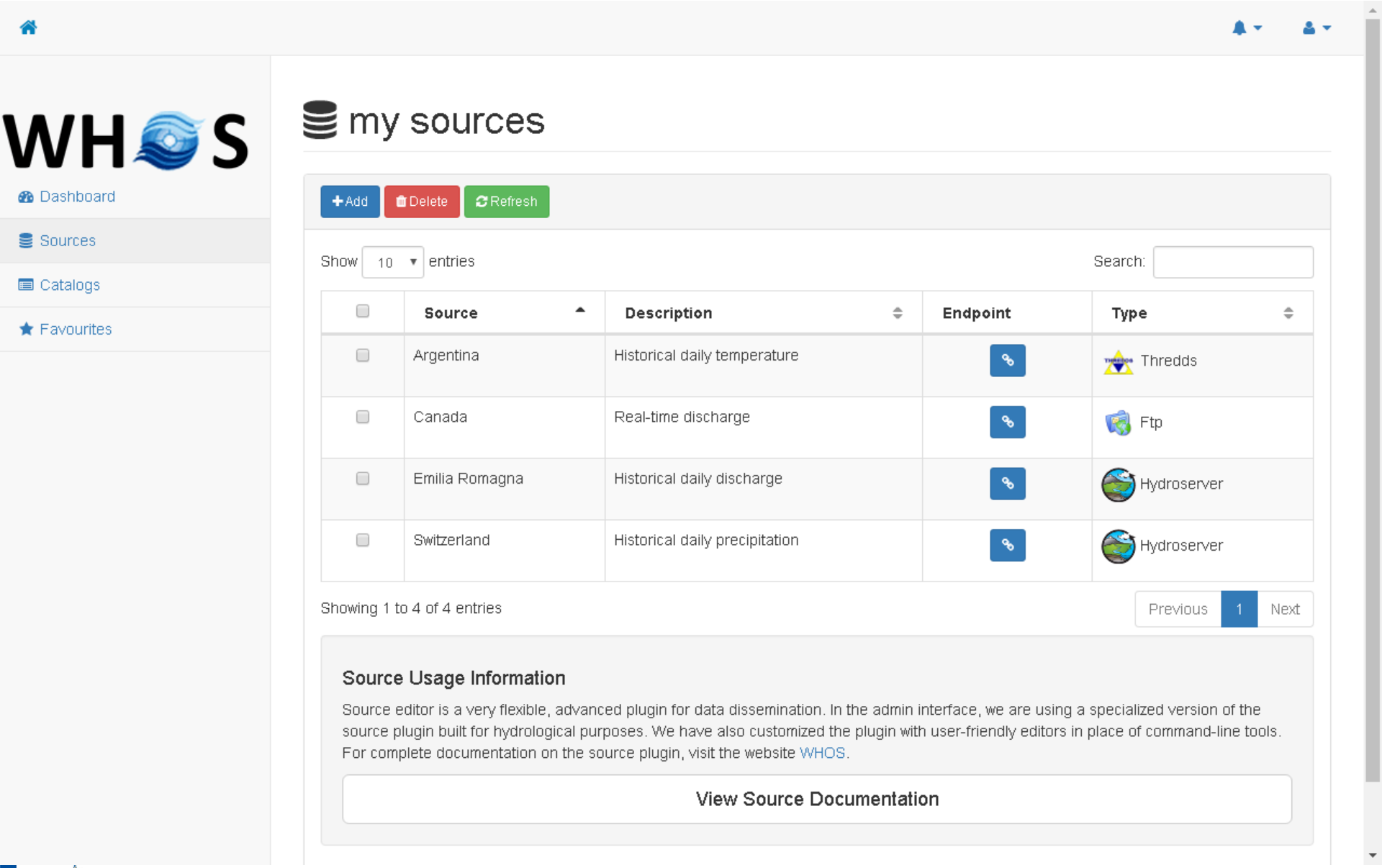
- World Meteorological Organization (WMO) [487]

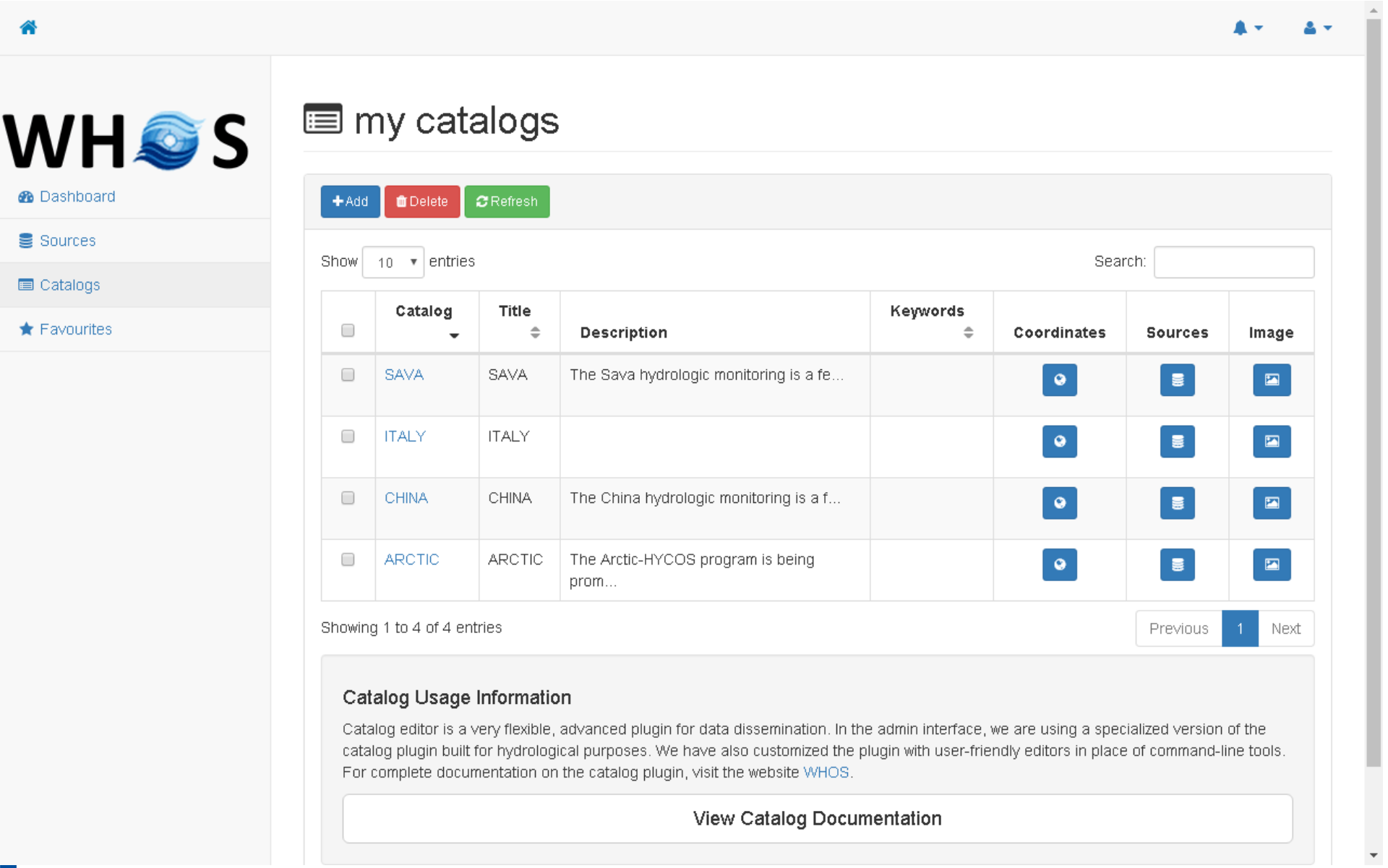
Entity

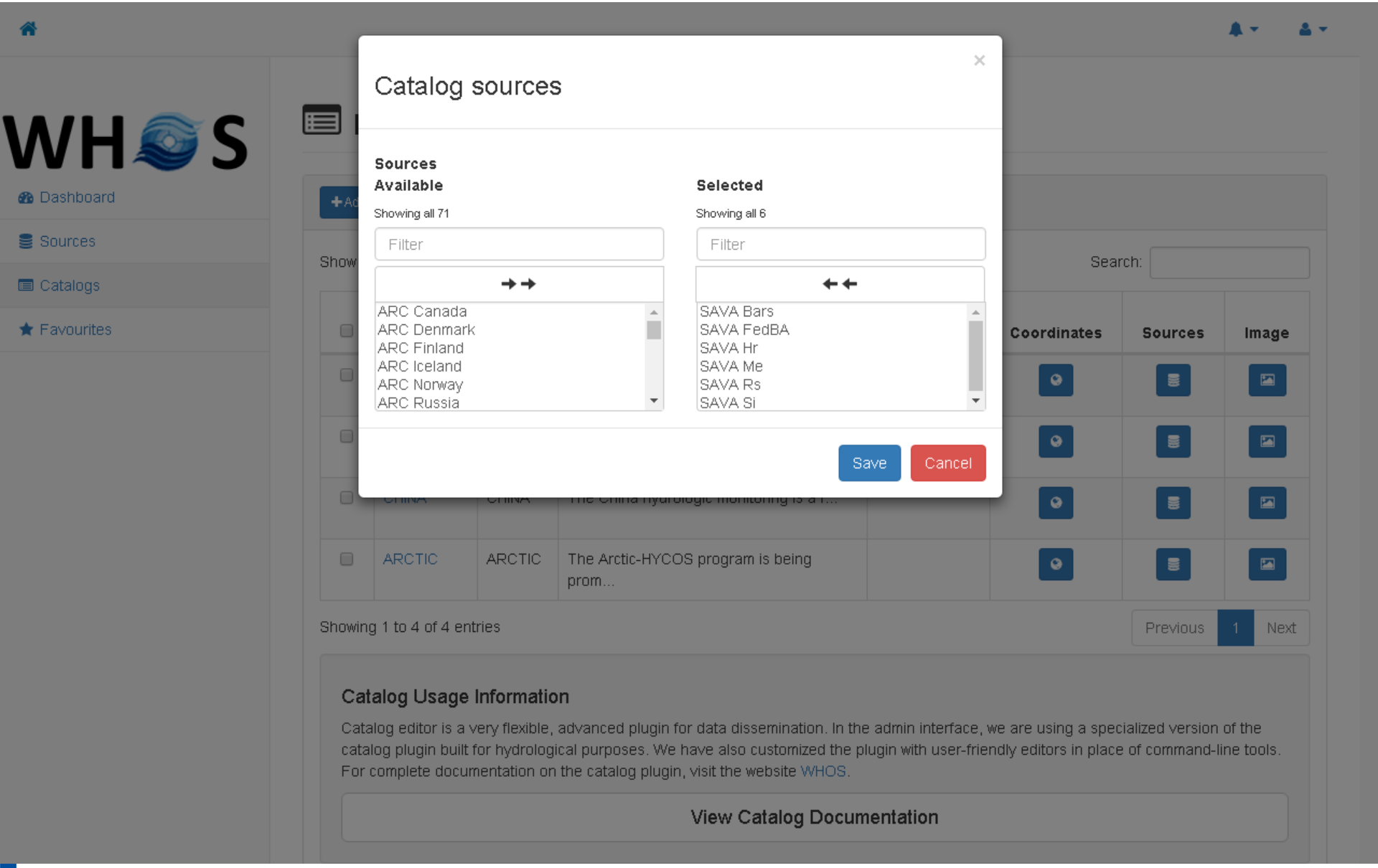
Name	Notation	Description	Status
root		The root register	stable
306: Significant Weather	306	WMO No. 306 Manual on Codes: Significant Weather.	stable
w'w'	4678	This register provides terms that may be used to describe significa...	stable
Common	common	WMO No. 306 Vol I.2 Common Features.	stable
Observation and measurement types	observation-type		stable
Code Table D-3: METCE observation types	METCE	The items within this code table are specialized	stable

DATA DISSEMINATION IN WHOS


WHOS
Dashboard
Sources
Catalogs
Favourites
Dashboard
4
Sources
View Details
66
Catalogs
View Details
3
Favourites
View Details
Notifications Panel
New Comment
4 minutes ago
3 New Users
12 minutes ago
Message Sent
27 minutes ago
New Catalog Placed
43 minutes ago
Server Rebooted
11:32 AM
Server Crashed!
11:13 AM
Server Not Responding
10:57 AM
New Catalog Placed
9:49 AM
View All Alerts


WHOS
Dashboard
Sources
Catalogs
Favourites
my sources
+Add
Delete
Refresh
Show 10 entries
Search:
Source
Description
Endpoint
Type
Argentina
Historical daily temperature
Thredds
Canada
Real-time discharge
Ftp
Emilia Romagna
Historical daily discharge
Hydroserver
Switzerland
Historical daily precipitation
Hydroserver
Showing 1 to 4 of 4 entries
Previous
1
Next
Source Usage Information
Source editor is a very flexible, advanced plugin for data dissemination. In the admin interface, we are using a specialized version of the source plugin built for hydrological purposes. We have also customized the plugin with user-friendly editors in place of command-line tools. For complete documentation on the source plugin, visit the website WHOS.
View Source Documentation


WHOS
Dashboard
Sources
Catalogs
Favourites
my catalogs
+Add
Delete
Refresh
Show 10 entries
Search:
Catalog
Title
Description
Keywords
Coordinates
Sources
Image
SAVA
SAVA
The Sava hydrologic monitoring is a fe...
ITALY
ITALY
CHINA
CHINA
The China hydrologic monitoring is a f...
ARCTIC
ARCTIC
The Arctic-HYCOS program is being prom...
Showing 1 to 4 of 4 entries
Previous
1
Next
Catalog Usage Information
Catalog editor is a very flexible, advanced plugin for data dissemination. In the admin interface, we are using a specialized version of the catalog plugin built for hydrological purposes. We have also customized the plugin with user-friendly editors in place of command-line tools. For complete documentation on the catalog plugin, visit the website WHOS.
View Catalog Documentation


WHOS
Dashboard
Sources
Catalogs
Favourites
Catalog sources
Sources
Available
Showing all 71
Filter
ARC Canada
ARC Denmark
ARC Finland
ARC Iceland
ARC Norway
ARC Russia
Selected
Showing all 6
Filter
SAVA Bars
SAVA FedBA
SAVA Hr
SAVA Me
SAVA Rs
SAVA Si
Save
Cancel
Search:
Coordinates
Sources
Image
ARCTIC
ARCTIC
The Arctic-HYCOS program is being prom...
Showing 1 to 4 of 4 entries
Previous
1
Next
Catalog Usage Information
Catalog editor is a very flexible, advanced plugin for data dissemination. In the admin interface, we are using a specialized version of the catalog plugin built for hydrological purposes. We have also customized the plugin with user-friendly editors in place of command-line tools. For complete documentation on the catalog plugin, visit the website WHOS.
View Catalog Documentation

WMO Hydrological Observing System

SAVA

The Sava hydrologic monitoring is a federated network composed by 5 States (Bosnia and Herzegovina, Croatia, Montenegro, Serbia and Slovenia), including 2 Entities (Federation of Bosnia and Herzegovina - Bosnia and Herzegovina, Republika Srpska), together with the International Sava River Basin Commission, an international organization established by the Framework Agreement on the Sava River Basin (FASRB), which is the unique international agreement integrating all aspects of the water resources management.

The portal provides access to the hydrological observations in the International Sava River Basin, commonly published as Hydrological Yearbooks. In particular, it provides additional operational capability, for in situ water observations, as a national registry of water data services catalogued using the standards and procedures of the Open Geospatial Consortium and the World Meteorological Organization.

The published interfaces of the portal retrieve data from distributed national water data providers, enabling plots and download.

Brokered services: 6
Brokered sites: 114
Brokered variables: 5
Geographic extent: [14.1653, 46.34, 20.4547, 42.8333]

WMO Hydrological Observing System

Published interfaces

The following catalog interfaces are available:

CUAHSI API interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/hiscentral/vcbff308ddc874631933e0f9defcd3aeb*
Target namespace: *http://hiscentral.cuahsi.org/20100205/*
Capabilities document

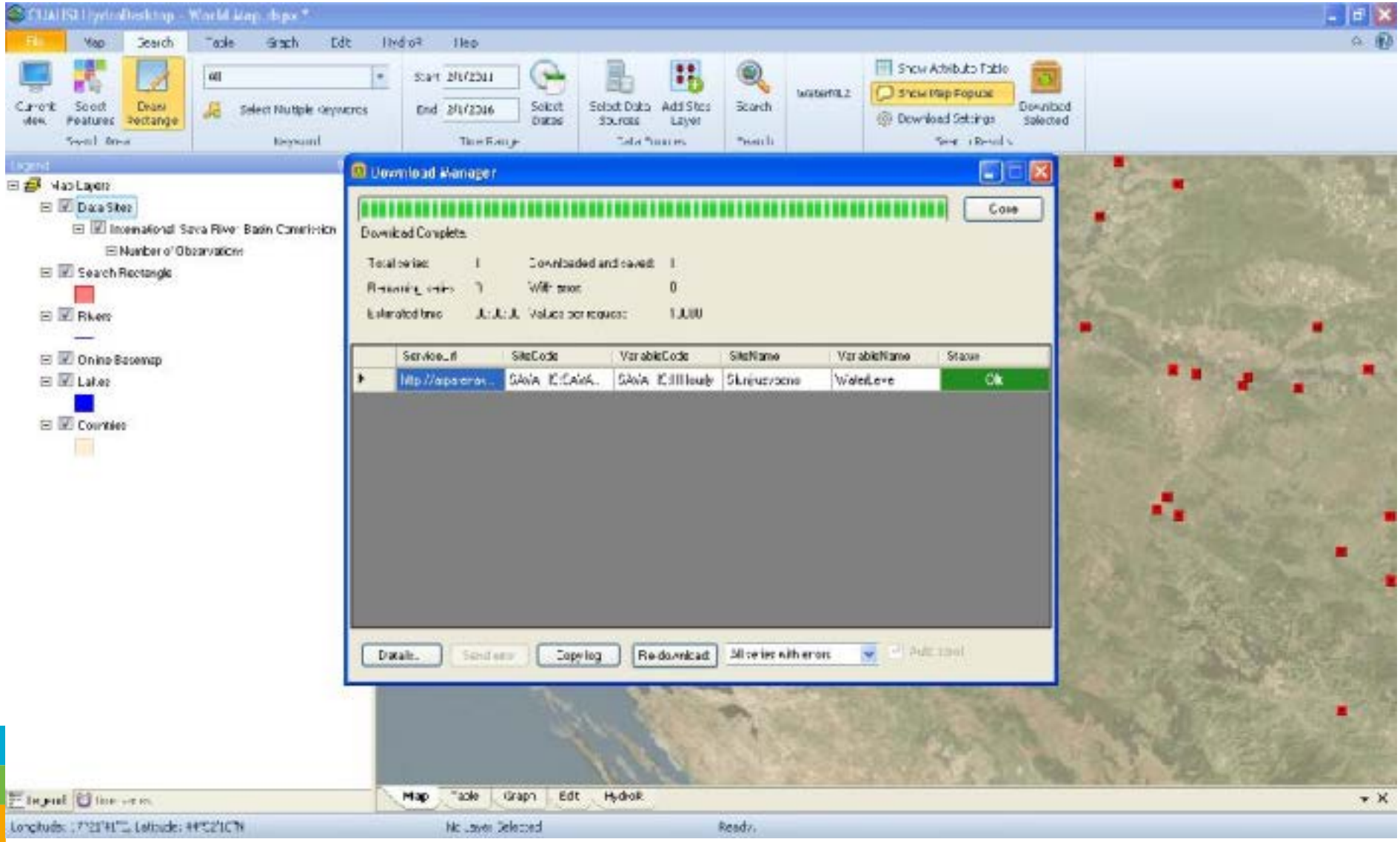
REST interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/api-rest/vcbff308ddc874631933e0f9defcd3aeb/datasets/report*
Capabilities document

OAIPMH interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/oaipmh/vcbff308ddc874631933e0f9defcd3aeb*
Target namespace: *http://oai_pmh.sdi.floraresearch.eu/*
Capabilities document

OAIPMH ISO 2007 interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/oaipmhiso2007/vcbff308ddc874631933e0f9defcd3aeb*
Target namespace: *http://oai_pmh.sdi.floraresearch.eu/*
Capabilities document

Test Portal interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/search?viewId=vcbff308ddc874631933e0f9defcd3aeb*
Capabilities document

OPENSEARCH interface
Endpoint: *http://arpa-er.geodab.eu/gi-cat-arpa/services/opensearch/vcbff308ddc874631933e0f9defcd3aeb*


Download Manager
Close
Download Complete
Total series:
Downloaded and saved:
With error:
Interpolated time:
Values per request:
Service_if
SiteCode
VariableCode
SiteName
VariableName
Status
Ok
Details...
Log
Re-download
All series with errors
Map
Table
Graph
Edit
Hydrok
Ready

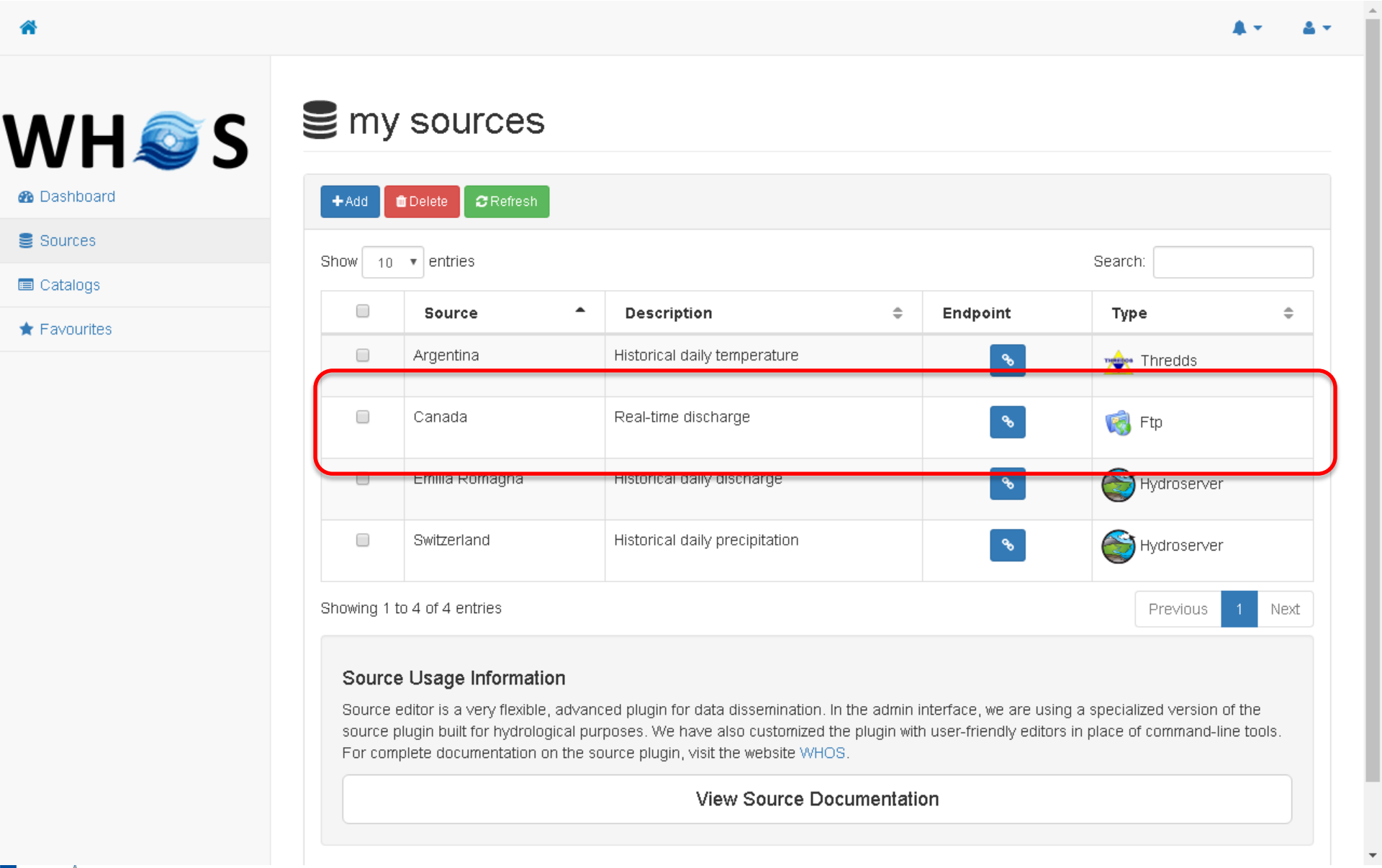
WMO OMM

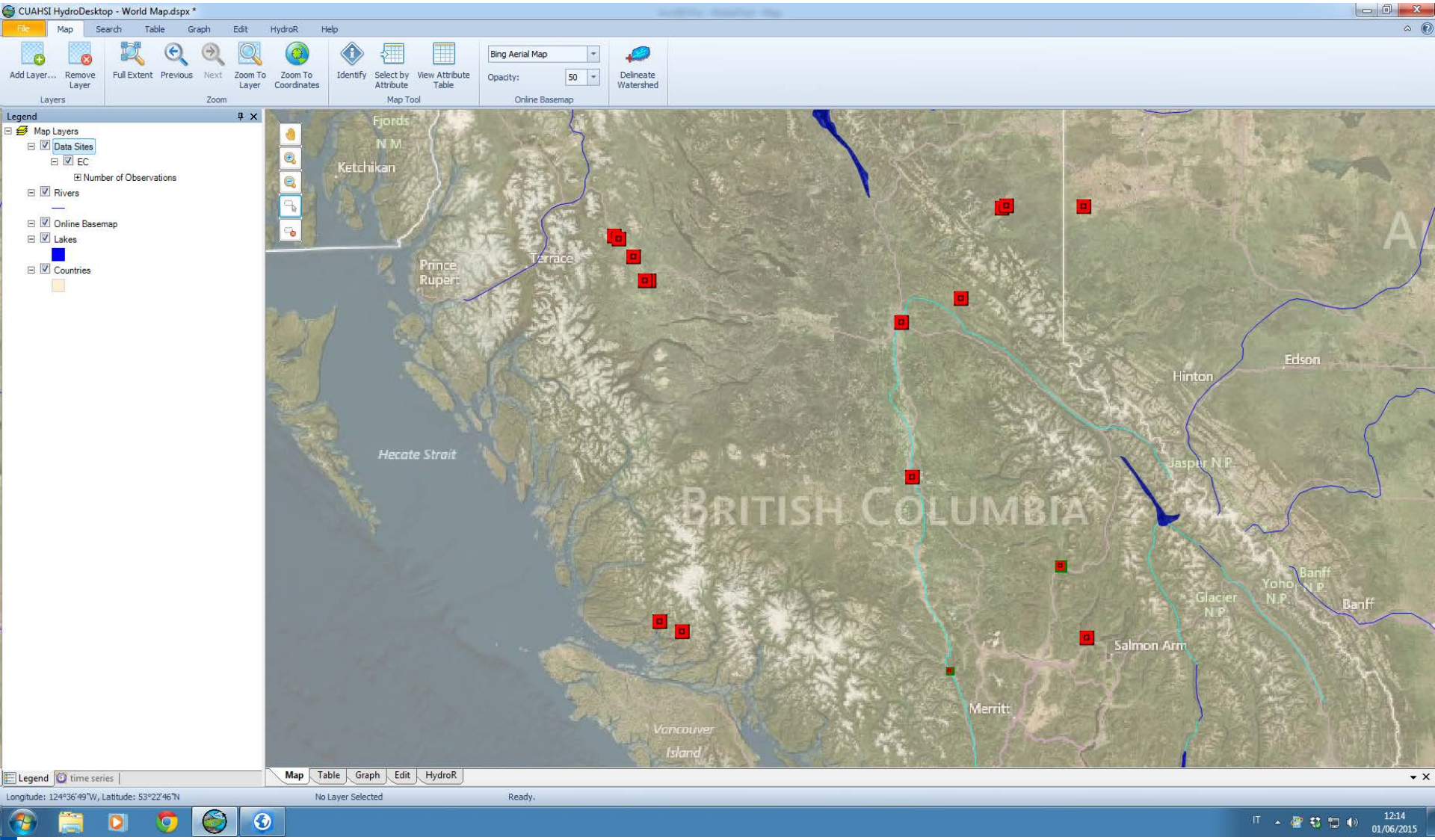
STANDARDS IN OPERATIONAL HYDROLOGY

WMO OMM


Wateroffice
Canada
Real-Time Data
Historical Data
Station and Network Data
Tools and Downloads
Partnerships
Resources
Welcome
This site provides public access to real-time hydrometric data collected at over 1800 locations and access to historical data collected at over 7600 stations (active and discontinued) in Canada. These data are collected under a national program jointly administered under federal-provincial and federal-territorial cost-sharing agreements. It is through partnerships that the Water Survey of Canada program has built a standardized and credible environmental information base for Canada.
Search for Real-Time Data by:
Station Name
Enter Full or Partial Station Name
OR
Station Number
Enter Full or Partial Station Number
OR
Province or Territory
All Provinces & Territories
OR
Drainage Basin
01 Maritime Provinces Drainage
Search
More Search Options
Map Search
Notice
Environment Canada (EC) is pleased to announce that the real time hydrometric data are now available on EC's data mart site: http://dd.weather.gc.ca/hydrometric/
Partners
Alberta
British Columbia
Manitoba
New Brunswick
Newfoundland and Labrador
Northwest Territories
Nova Scotia
Nunavut
Ontario
Prince Edward Island

WMO OMM


WHOS
Dashboard
Sources
Catalogs
Favourites
my sources
+Add
Delete
Refresh
Show 10 entries
Search:
Source
Description
Endpoint
Type
Argentina
Historical daily temperature
Thredds
Canada
Real-time discharge
Ftp
Emilia Romagna
Historical daily discharge
Hydroserver
Switzerland
Historical daily precipitation
Hydroserver
Showing 1 to 4 of 4 entries
Previous
1
Next
Source Usage Information
Source editor is a very flexible, advanced plugin for data dissemination. In the admin interface, we are using a specialized version of the source plugin built for hydrological purposes. We have also customized the plugin with user-friendly editors in place of command-line tools. For complete documentation on the source plugin, visit the website WHOS.
View Source Documentation


CUAHSI HydroDesktop - World Map.dspx *
File
Map
Search
Table
Graph
Edit
HydroR
Help
Add Layer...
Remove Layer
Layers
Full Extent
Previous
Next
Zoom To Layer
Zoom To Coordinates
Zoom
Identify
Select by Attribute
View Attribute Table
Map Tool
Bing Aerial Map
Opacity:
50
Online Basemap
Delineate Watershed
Legend
Map Layers
Data Sites
EC
Number of Observations
Rivers
Online Basemap
Lakes
Countries
Fjords
N.M.
Ketchikan
Prince Rupert
Terrace
Hecate Strait
BRITISH COLUMBIA
Hinton
Edson
Jasper N.P.
Yoho N.P.
Banff N.P.
Banff
Glacier N.P.
Salmon Arm
Merritt
Vancouver Island
Legend
time series
Map
Table
Graph
Edit
HydroR
Longitude: 124°36'49"W, Latitude: 53°22'46"N
No Layer Selected
Ready.
IT
12:14
01/06/2015

CUAHSI HydroDesktop - World Map.dspx *

File | Map | Search | Table | Graph | Edit | HydroR | Help

Current View | Select Features | Draw Rectangle — Search Area

Discharge, unspecified — Select Multiple Keywords — Keyword

Start 22/03/2015 — End 30/05/2015 — Select Dates — Time Range

Select Data Sources — Data Sources

Search — Search

Show Attribute Table | Show Map Popups | Download Settings — Download Selected — Search Results

Legend

CUAHSI HydroDesktop - World Map.dspx *

File | Map | Search | Table | Graph | Edit | HydroR | Help

Current View | Select Features | Draw Rectangle — Search Area

Discharge, unspecified — Select Multiple Keywords — Keyword

Start 22/03/2015 — End 30/05/2015 — Select Dates — Time Range

Select Data Sources — Data Sources

Search — Search

Show Attribute Table | Show Map Popups | Download Settings — Download Selected — Search Results

Legend

CUAHSI HydroDesktop - World Map.dspx *

File | Map | Search | Table | Graph | Edit | HydroR | Help

TimeSeries | Probability | Histogram | Box/Whisker | Summary — Plots

Plot Type | Color Setting | Show Legend — TSA Probability Plot Options

Start 28/04/2... — End 29/05/2... — Refresh | Full Date Range — Date Time

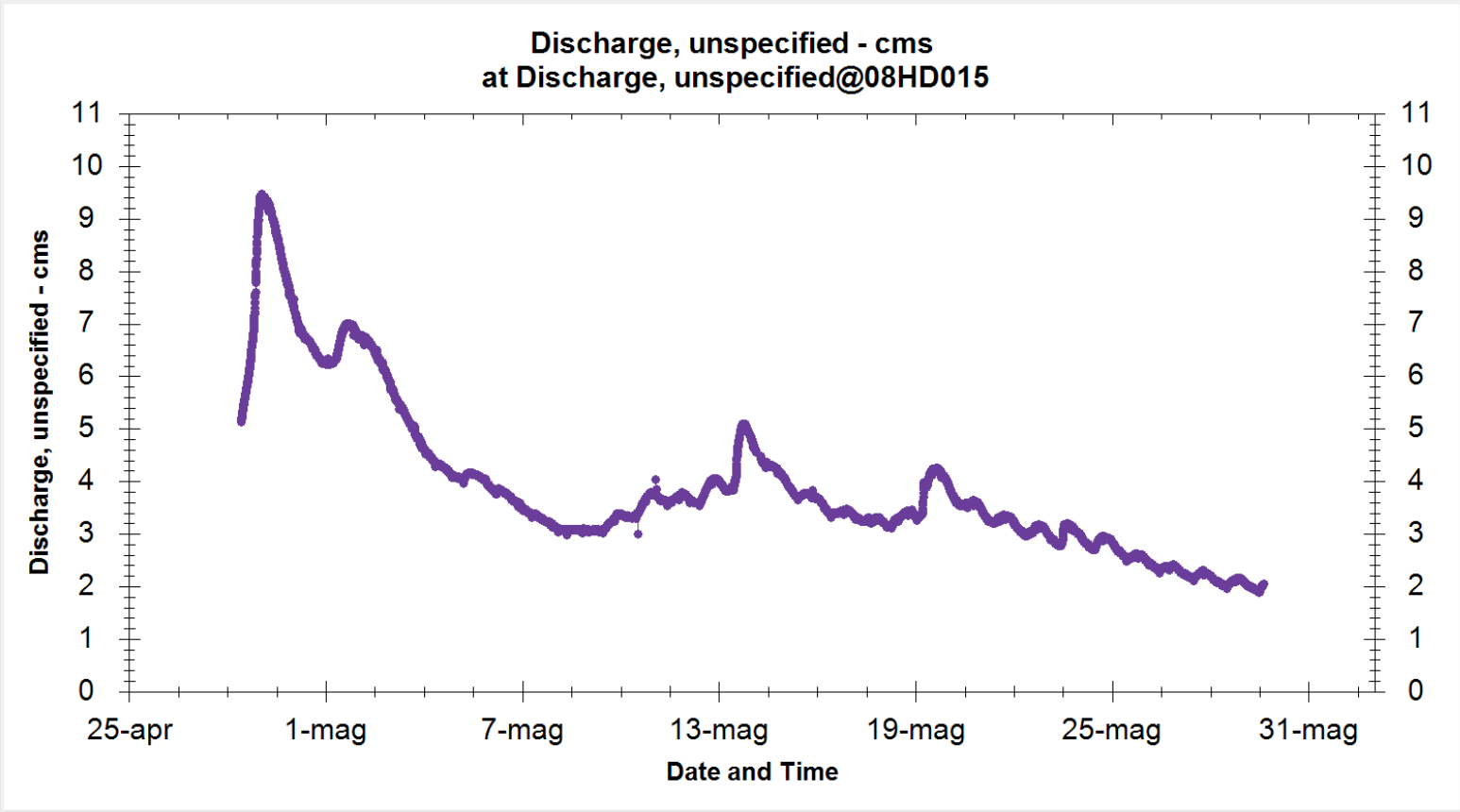
time series

Refresh | Check All | Uncheck All | Remove

Selection Tool

ALL | Simple Filter | Complex Filter

Check	VariableName	SiteName	Data Network
☑	Discharge, unsp...	Discharge, u...	EC (2)
☐	Precipitation	Precipitation...	GI-axe Data (8)

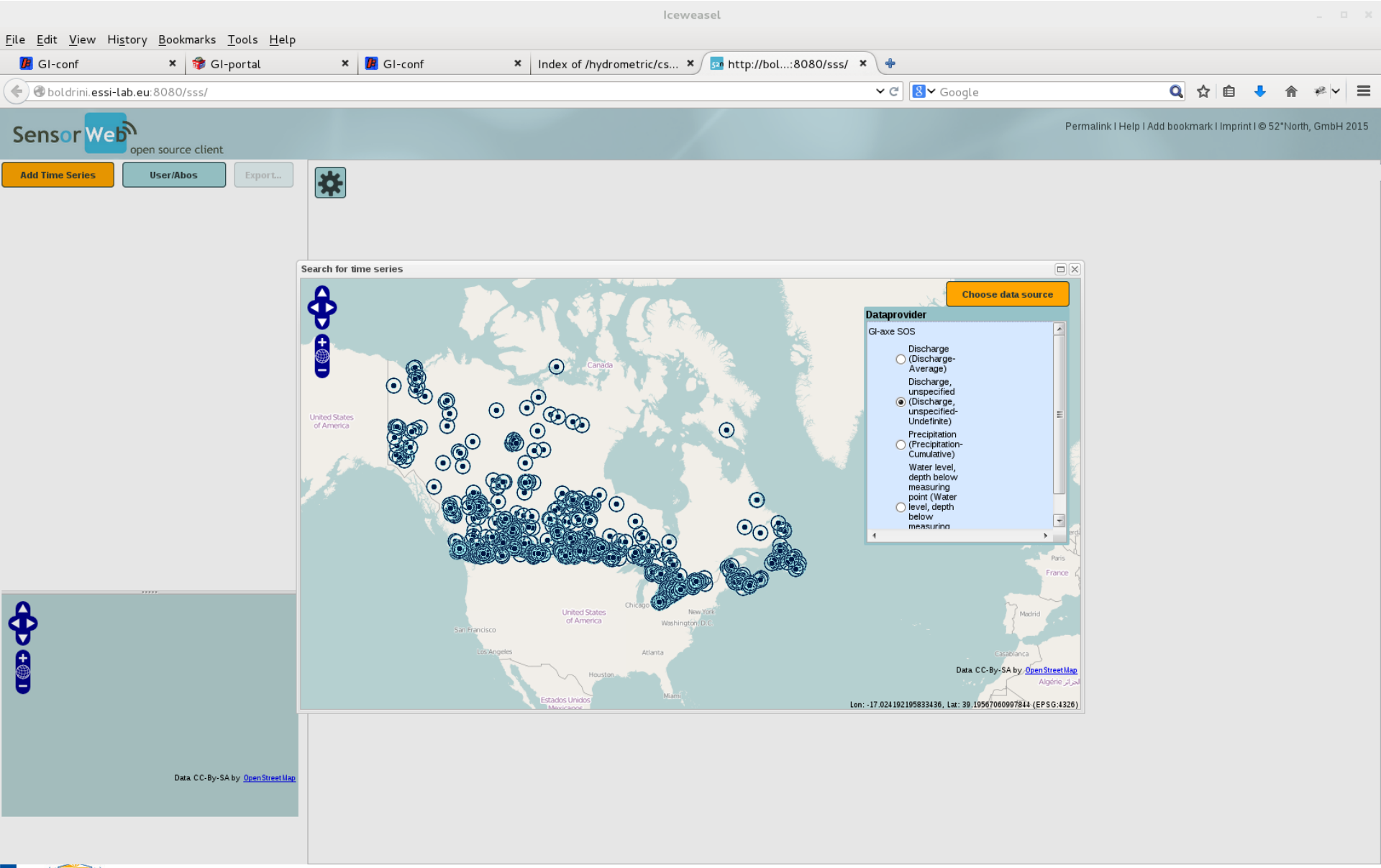


Legend | time series

Map | Table | Graph | Edit | HydroR

Layer: Search Rectangle, Selected: 0 — Ready.

IT — 16:12 — 29/05/2015


Iceweasel
File Edit View History Bookmarks Tools Help
GI-conf
GI-portal
GI-conf
Index of /hydrometric/cs...
http://bol...:8080/sss/
boldrini.essi-lab.eu:8080/sss/
Google
SensorWeb
open source client
Permalink | Help | Add bookmark | Imprint | © 52°North, GmbH 2015
Add Time Series
User/Abos
Export...
Search for time series
Choose data source
Dataprovider
GI-axe SOS
Discharge (Discharge-Average)
Discharge, unspecified (Discharge, unspecified-Undefinite)
Precipitation (Precipitation-Cumulative)
Water level, depth below measuring point (Water level, depth below measuring
Canada
United States of America
Chicago
New York
Washington D.C.
San Francisco
Los Angeles
Atlanta
Houston
Miami
Paris
France
Madrid
Casablanca
Data CC-By-SA by OpenStreetMap
Lon: -17.024192195833436, Lat: 39.19567060997844 (EPSG:4326)
Data CC-By-SA by OpenStreetMap

Add Time Series | User/Abos | Export...

Search for time series

Choose data source

Dataprovider

GI-axe SOS

Discharge (Discharge-Average)

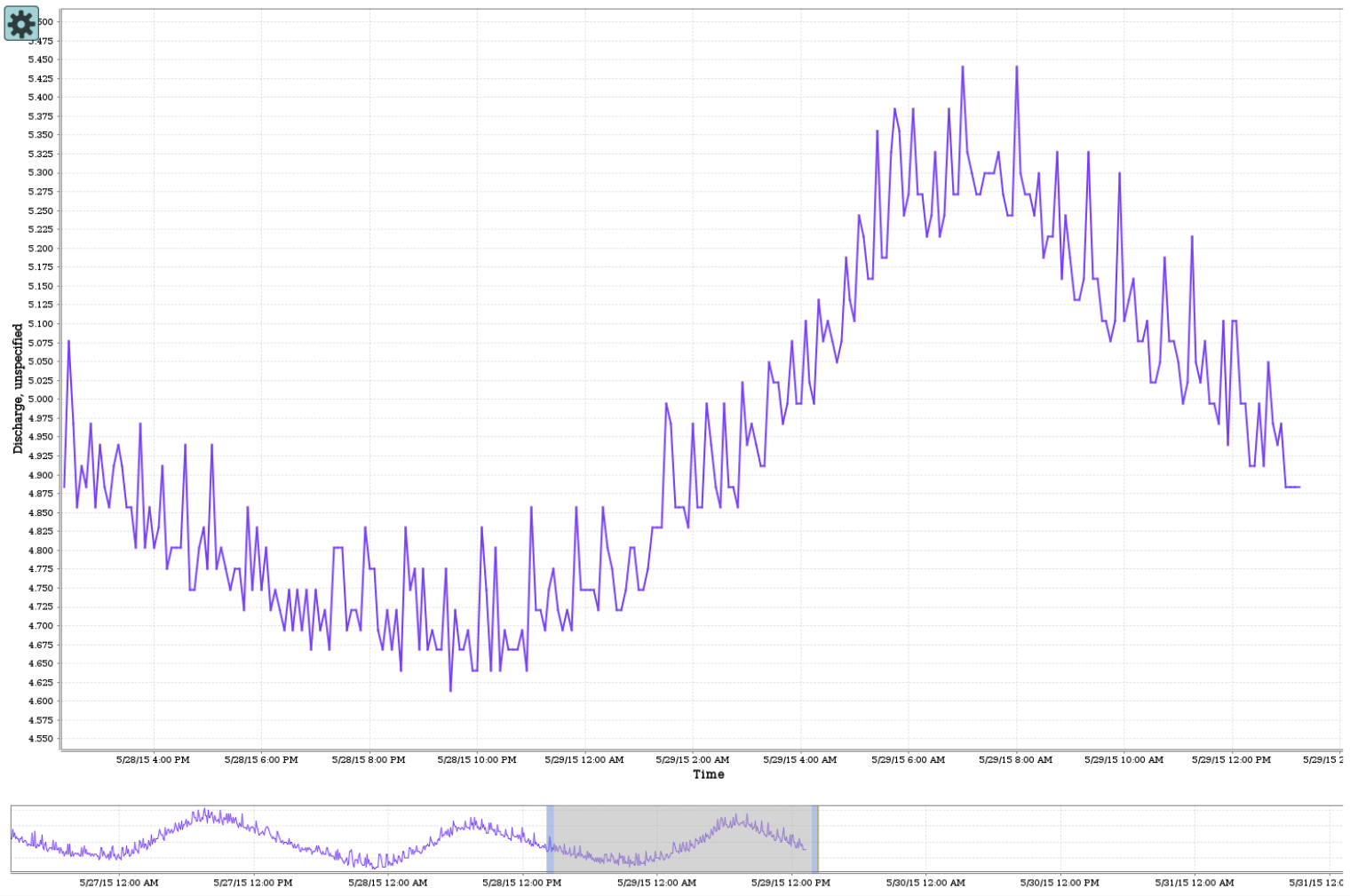
Discharge, unspecified

SensorWeb open source client
Permalink | Help | Add bookmark | Imprint | © 52°North, GmbH 2015

Add Time Series | User/Abos | Export...

Discharge, unspecified@EC:08HD018

Parameter: Discharge, unspecified
Station: EC:08HD018
28.04.2015 10:00 (7.432) to 29.05.2015 12:15 (5.077)



HYDROLOGICAL CENTERS

WMO OMM

GRDC

The Global Runoff Data Center operates under the auspices of the WMO and supports research on climate variability and global change. The German Federal Institute of Hydrology hosts the GRDC in Koblenz near the confluence of the Moselle and Rhine Rivers.

Info | Data

IGRAC

The International Groundwater Resources Assessment Centre is UNESCO Global Groundwater Centre, it also works under the auspices of WMO, it is a corporate IAH partner and it is financially supported by the Government of the Netherlands.

Info | Data

HYDROLARE

The Centre on Hydrology of Lakes and Reservoirs was established by Roshydromet at the State Hydrological Institute in support of the global monitoring system on lakes and reservoirs.

Info | Data

What People Says

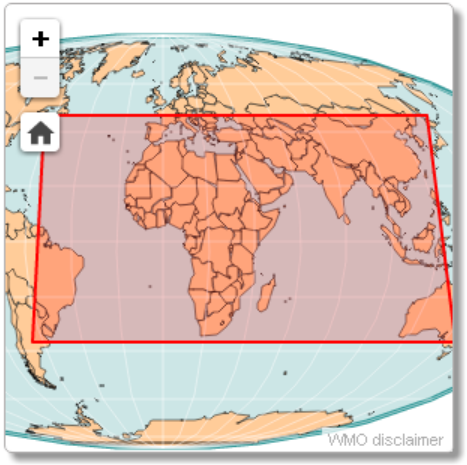
hydrologists describing their experience in operational activities

We were looking for a solution that allowed users in twenty or more countries to enter, store and report on lots of hydrological data. We found the perfect solution in WHOS. Once we started to understand the few principles upon WHOS is built, the drag and drop interface did the rest.

WMO Hydrological Observing System

GRDC

The Global Runoff Data Center operates under the auspices of the WMO and supports research on climate variability and global change. The German Federal Institute of Hydrology hosts the GRDC in Koblenz near the confluence of the Moselle and Rhine Rivers.



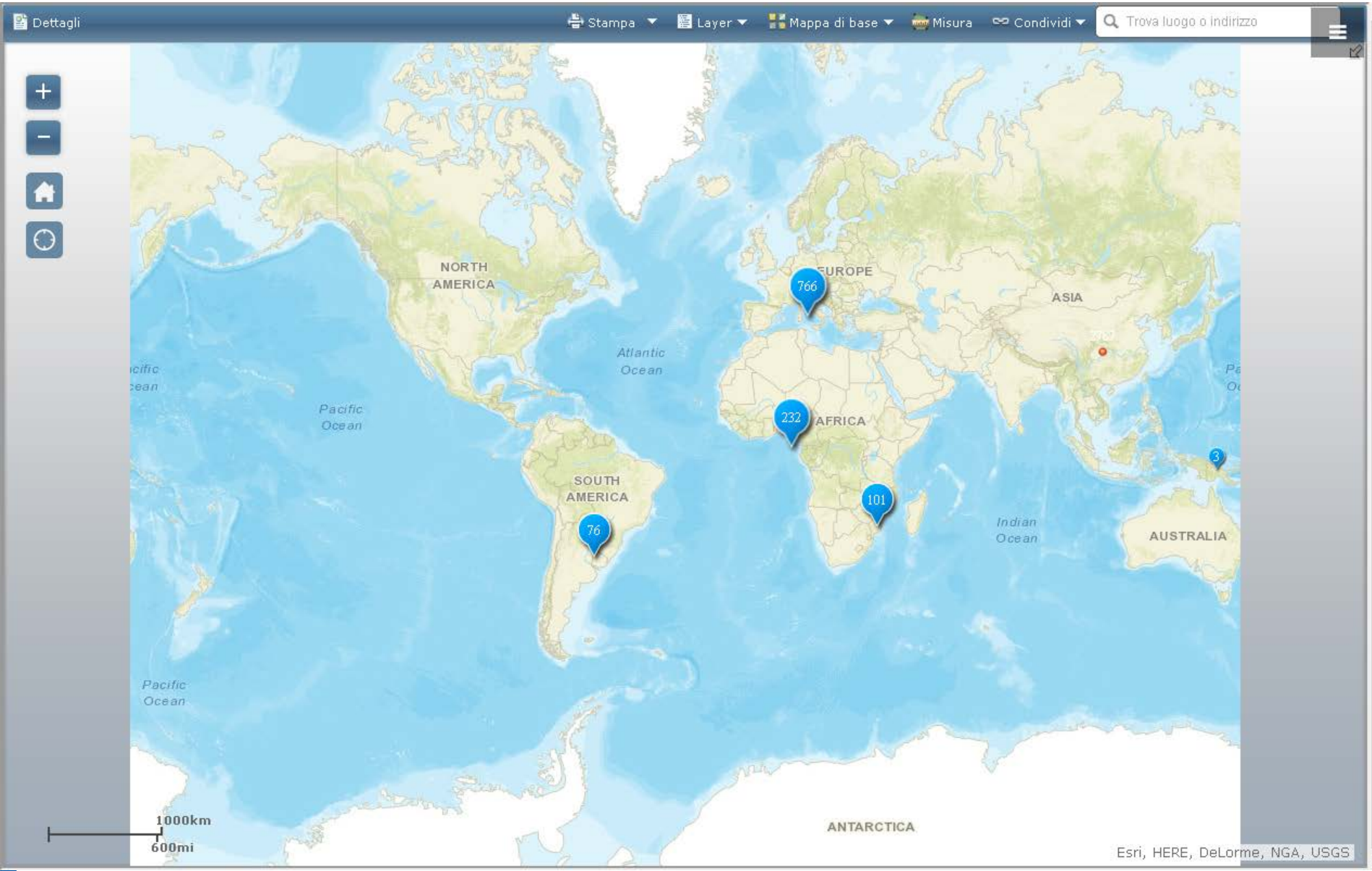
Brokered services: 45
Brokered sites: 8457
Brokered variables: 1
Geographic extent: [-65.6, 47.0366, 146.11, -36.833]

WMO OMM

WMO Hydrological Observing System

Brokered services

Service	Organization	Sites	Variables	Start date	End date
PLATA	My organization	470	3	01/01/1980	31/12/2015
SADC	My organization	149	1	01/01/1980	31/12/2015
CHINA	My organization	2623	1	01/01/1980	31/12/2015
SAVA	My organization	114	5	01/01/1980	31/12/2015
ITALY	My organization	4912	4	01/01/1980	31/12/2015
NIGER	My organization	189	1	01/01/1980	31/12/2015

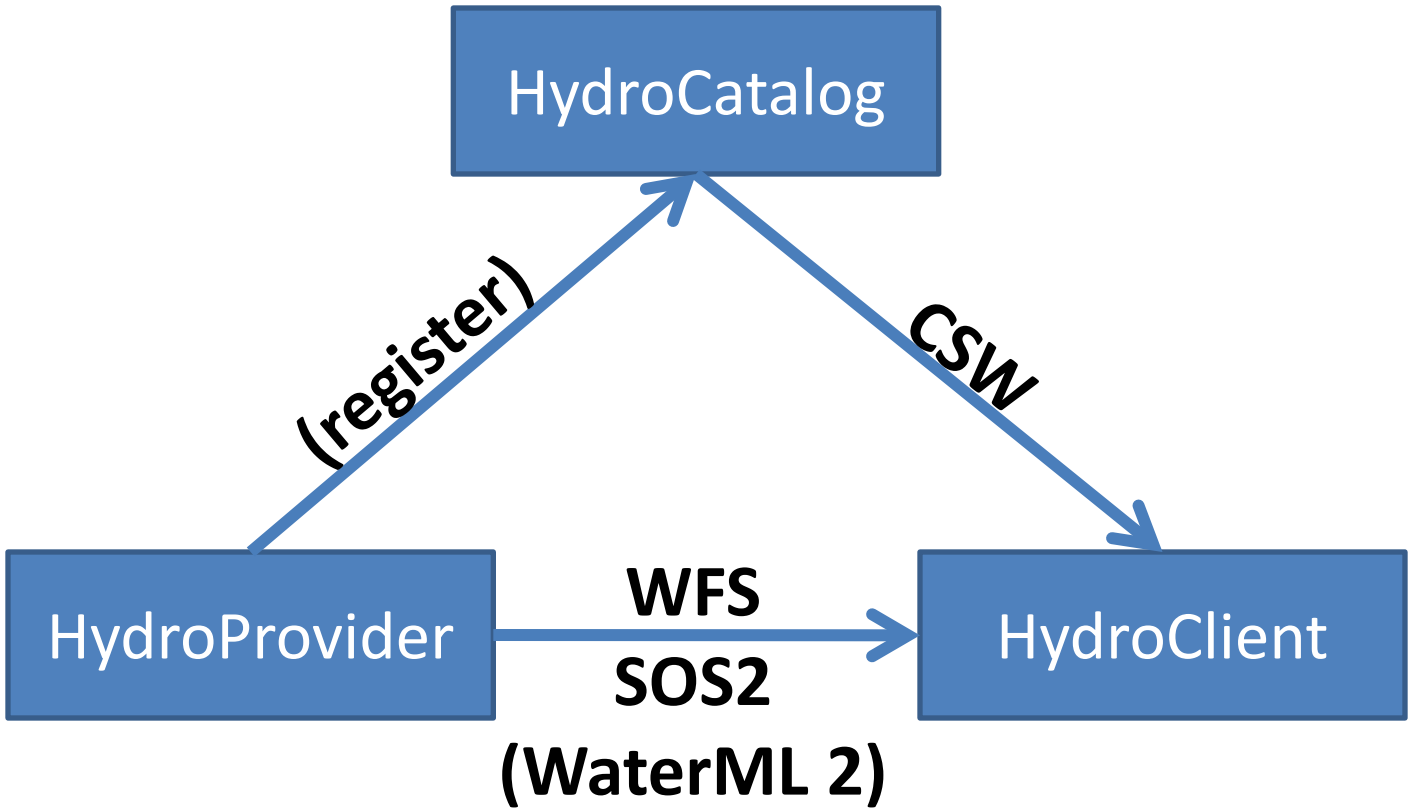

Dettagli
Stampa
Layer
Mappa di base
Misura
Condividi
Trova luogo o indirizzo
NORTH AMERICA
EUROPE
ASIA
Atlantic Ocean
Pacific Ocean
AFRICA
SOUTH AMERICA
Indian Ocean
AUSTRALIA
ANTARCTICA
766
232
101
76
3
1000km
600mi
Esri, HERE, DeLorme, NGA, USGS

WMO OMM

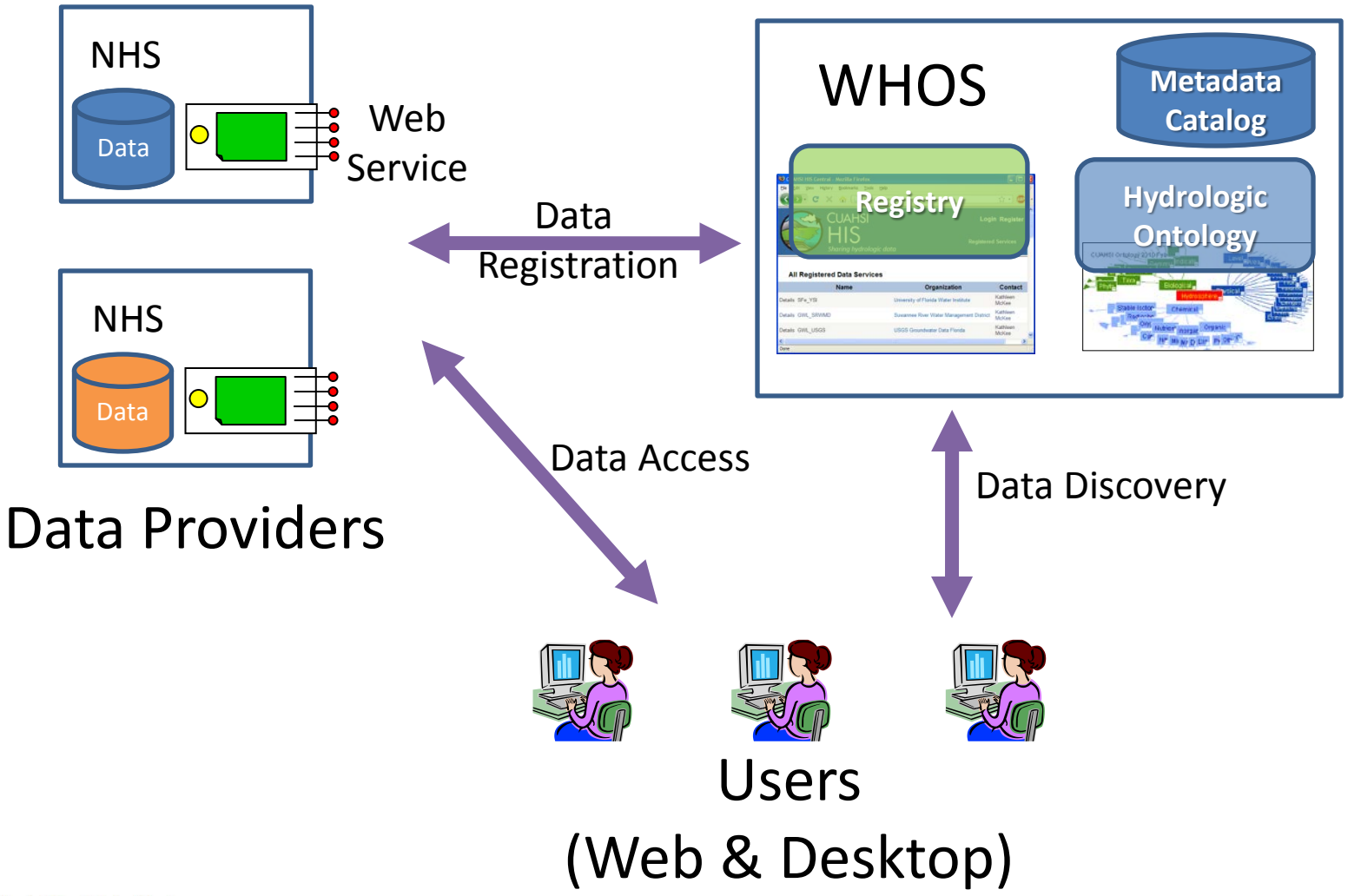
THE ARCHITECTURE

The Road Further Ahead in Hydrology

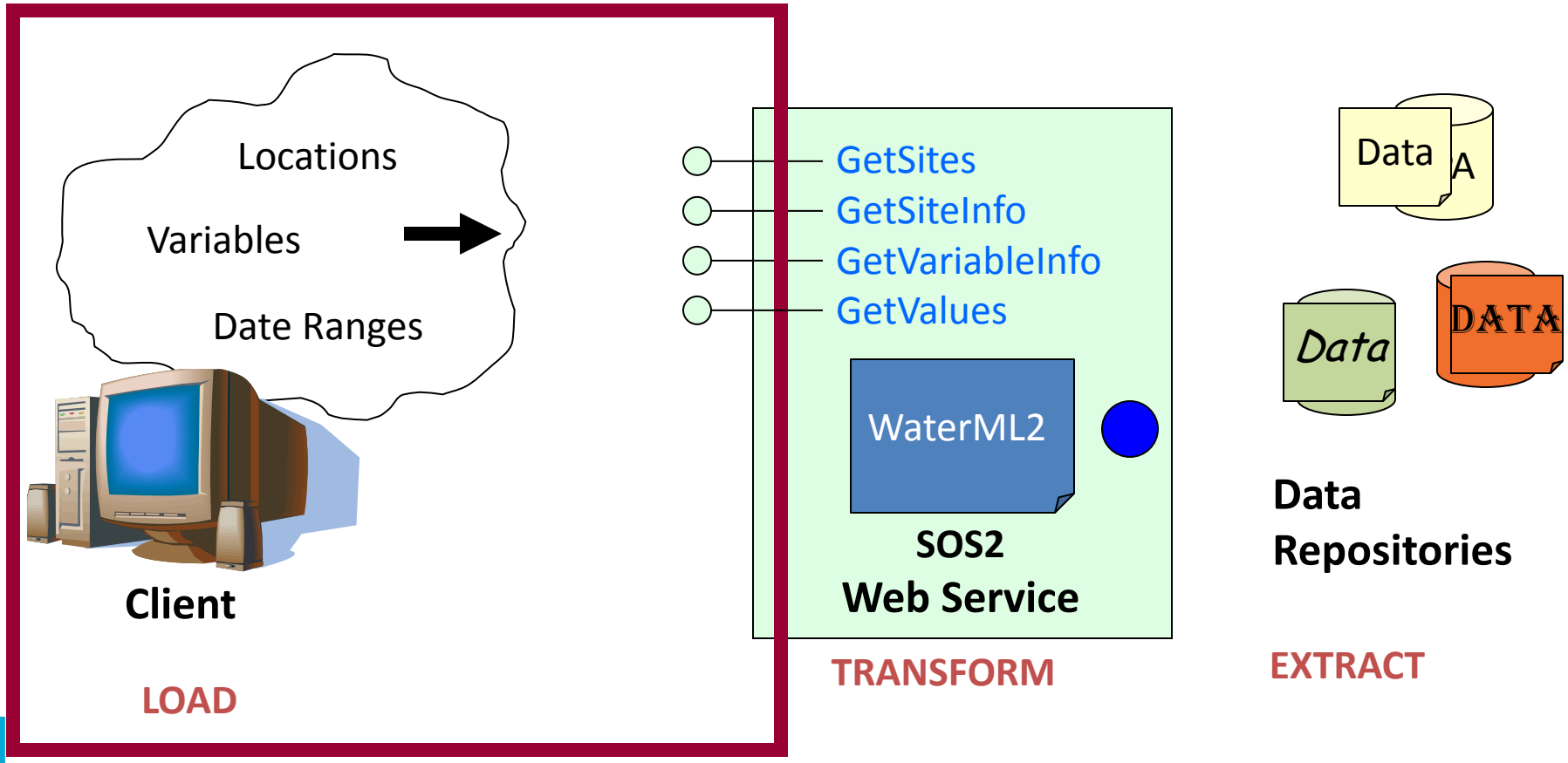
Using WMO and OGC Standards



WHOS Architecture Overview



WaterML2 and SOS2



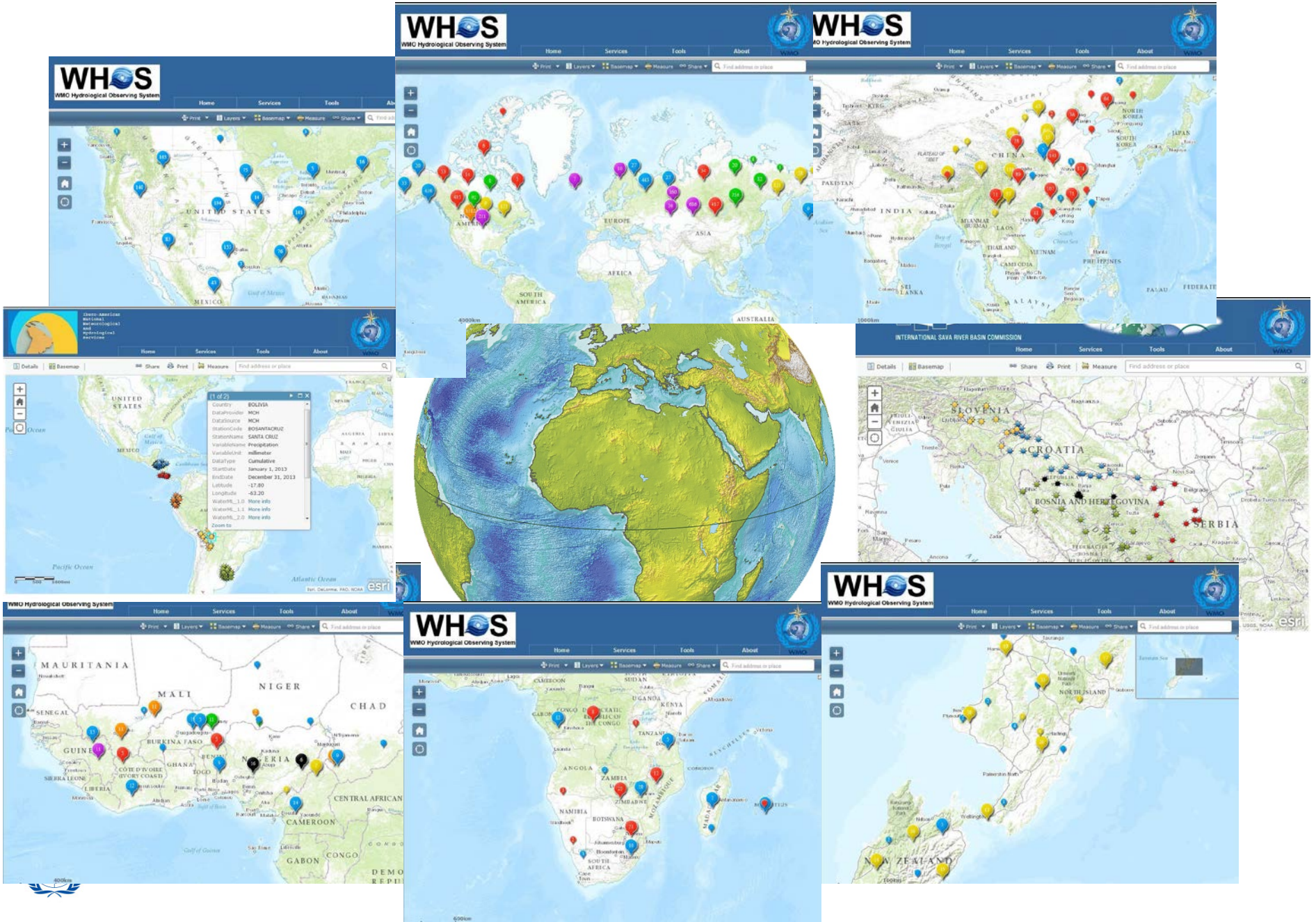
SOS2 is how you ask for data

WaterML2 is the format of what comes back

WMO OMM

Broker Approach

STANDARDIZED DATA EXCHANGE IN HYDROLOGY

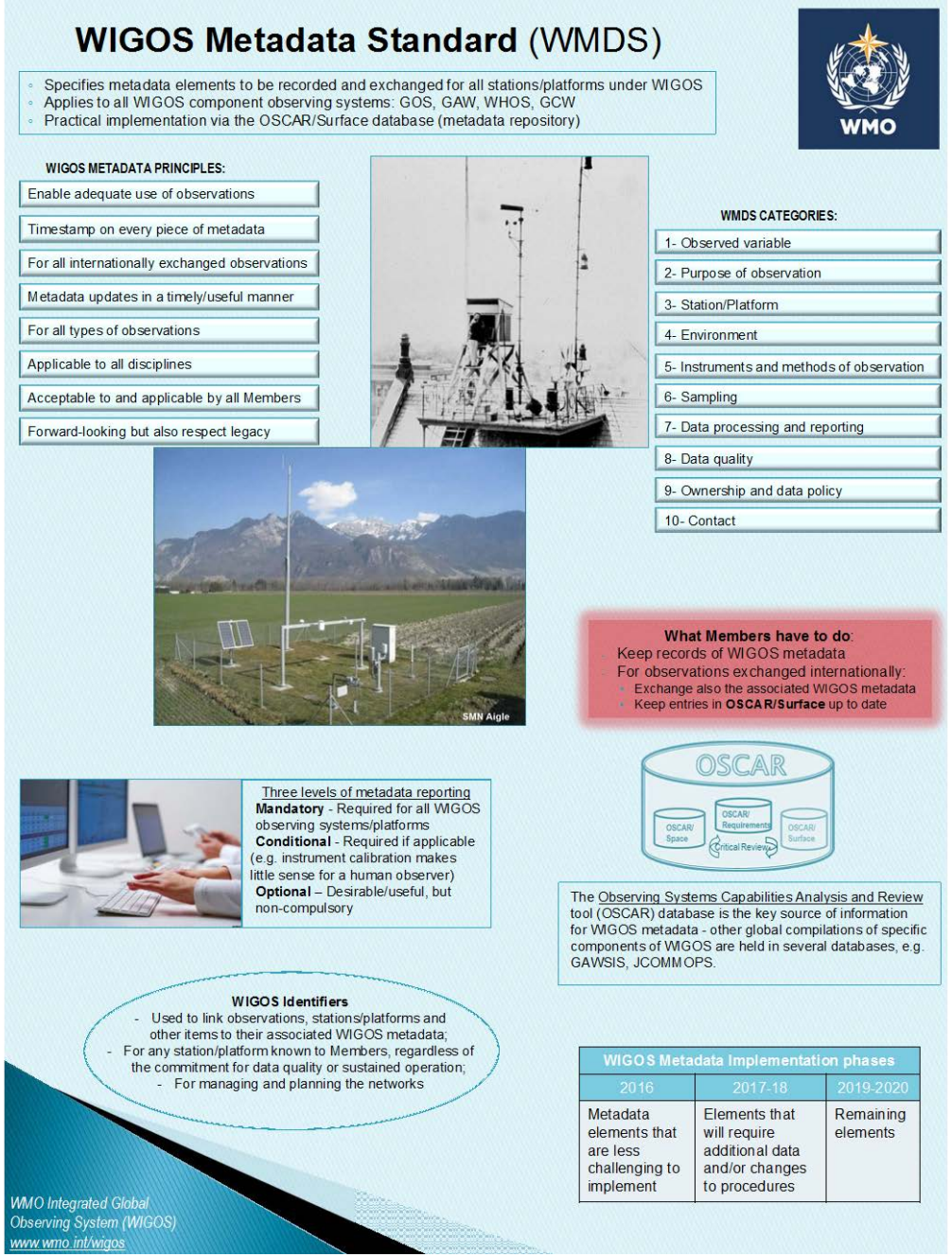


CURRENT DEVELOPMENTS IN WHOS

WIGOS Metadata Standard

- Approved at Cg-17 June 2015

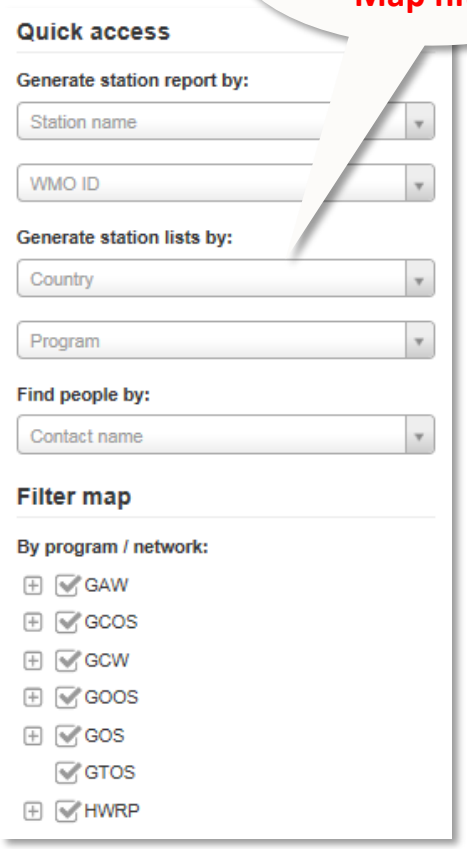
Source:
https://www.wmo.int/pages/prog/www/wigos/documents/Cg-17/WIGOS_Metadata.pdf

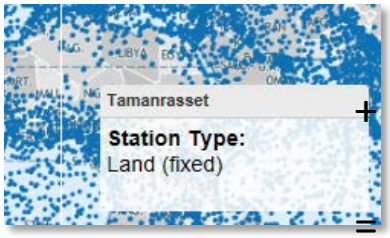


WMO OMM

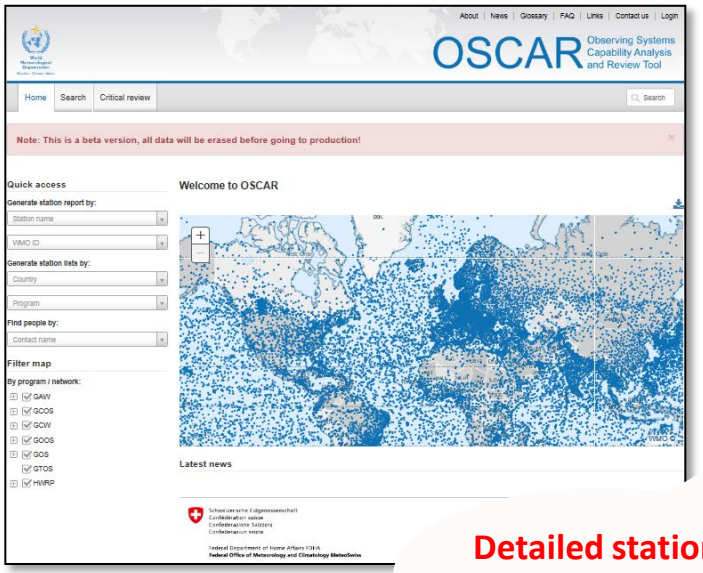
OSCAR quick access & reports

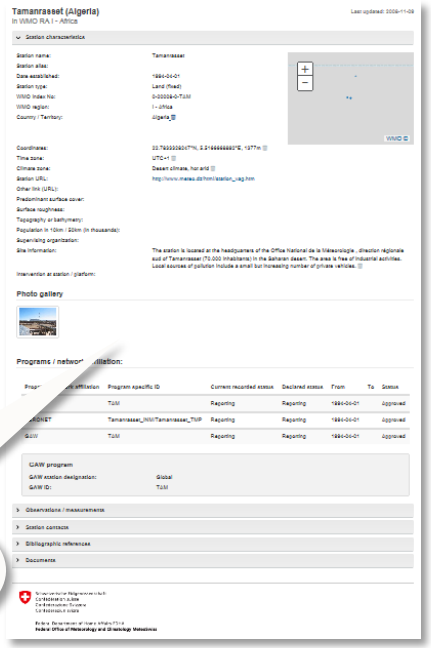
Quick access
&
Map filter





+ click





Detailed station report

WMO OMM

WaterML2.0 part 2 API validator

This service is provided for the operation of the WaterML2.0 part 2 Interoperability Experiment. WaterML2.0 part 2 is a format for exchanging hydrological rating tables and gaugings (observations). See here for details. An example URL and monitoring point ID are provided below.

Base API URL

http://waterml2.csiro.au/rgs-api/v1

Enter test monitoring point ID

420014

☐ Verbose

Submit

Results

Monitoring point tests

Testing retrieval of monitoring point (420014 at http://waterml2.csiro.au/rgs-api/v1)

Received 200 response from http://waterml2.csiro.au/rgs-api/v1/monitoring-point/?monitoring-point=42

Received monitoring point encoding, checking structure...

Successfully passed MP test!

Checking conversion group link ([u'http://waterml2.csiro.au/rgs-api/v1/conversion-group/94/'])

Conversion group link OK

Gaugings tests

Testing gaugings end point at http://waterml2.csiro.au/rgs-api/v1/gauging for MP:420014

Received 200 response from http://waterml2.csiro.au/rgs-api/v1/gauging/?monitoring-point=420014&format=json (

Received gaugings, checking structure...

Successfully passed GAUGING test!

Conversion group tests

Testing conversion group end point at http://waterml2.csiro.au/rgs-api/v1/gauging for MP:420014

Received 200 response from http://waterml2.csiro.au/rgs-api/v1/conversion-group/?monitoring-point=420014&form

Received conversion group, checking structure...

Successfully passed CONV_GROUP test!

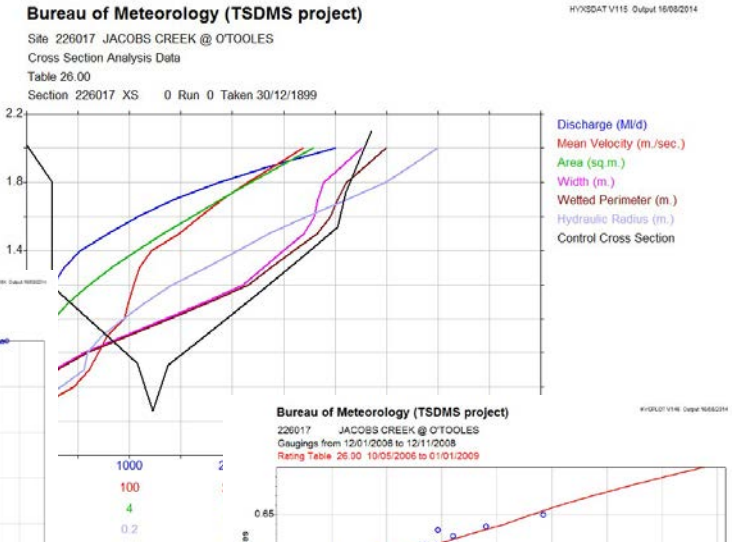
Checking nested conversion period object structure...

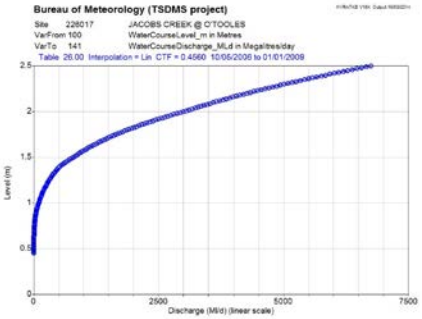
Successfully passed CONV_PERIOD test!

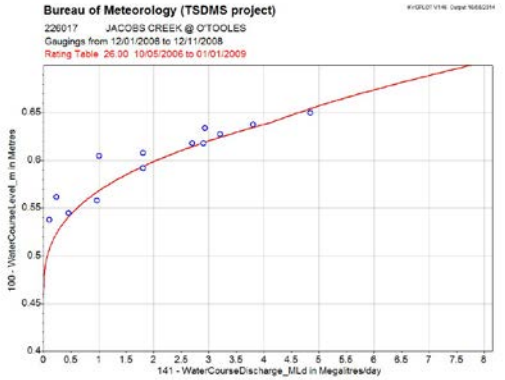
Valid period object. Checking conversion at http://waterml2.csiro.au/rgs-api/v1/conversion/420014-100.00-141-102

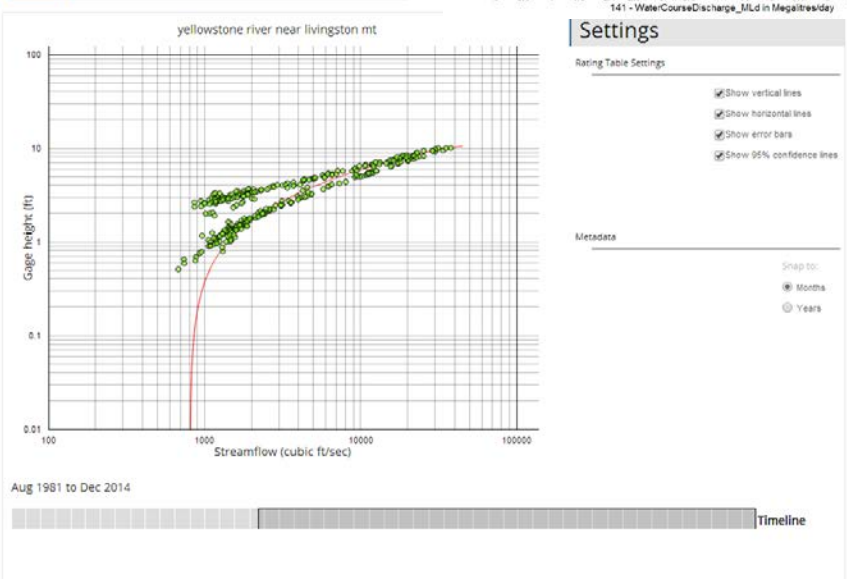
Retrieved conversion.

No results could be found in header!



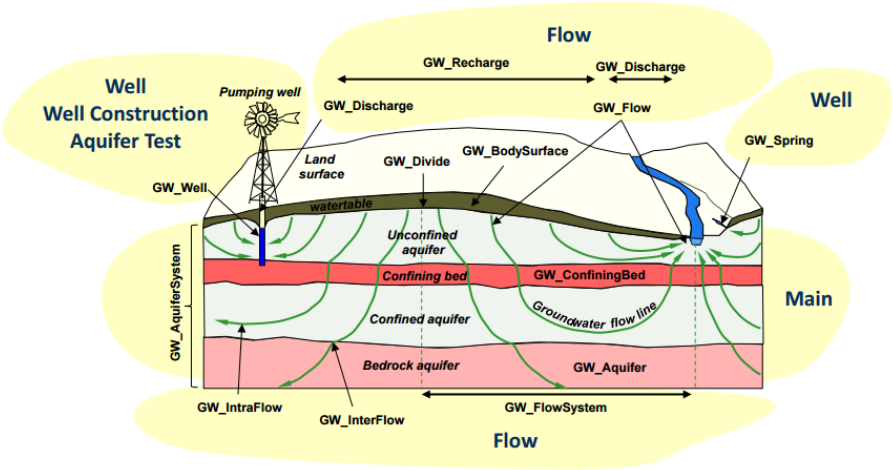


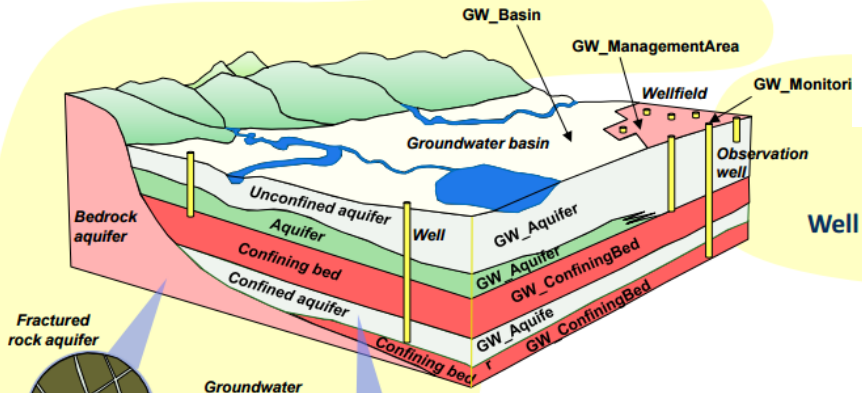


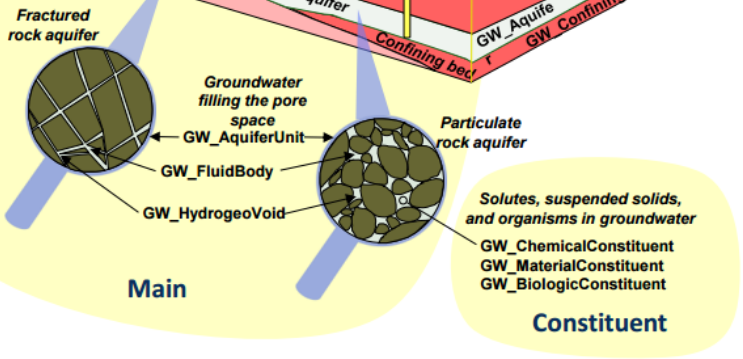


WMO OMM

```
▼<gsml:gbUnitDescription>
  ▼<gsmle:GeologicUnitDescription>
      <gsmle:bodyMorphology xlink:href="http://resource.geosciml.org/classifier/cgi/geologicunitmorphology/layer
    </gsmle:GeologicUnitDescription>
  </gsml:gbUnitDescription>
  <!--  add more compositions  -->
  <gwml2:gwUnitMedia xlink:href="http://gw-info.net/media/granular" xlink:title="granular"/>
  <gwml2:gwUnitWaterBudget xsi:nil="true"/>
▼<gwml2:gwUnitRecharge>
  ▼<gwml2f:GW_Recharge gml:id="gin.richelieu.recharge.1">
    ▼<gml:location>
        <gml:LocationString>Regional precipitation</gml:Locatio
      </gml:location>
      <gwml2f:gwFlowPersistence nilReason="missing"/>
      <gwml2f:gwFlowProcess xlink:href="urn:Precipitation" xlir
    ▼<gwml2f:gwFlowTime>
      ▼<gml:TimePeriod gml:id="gin.richelieu.recharge.1.ft">
          <gml:beginPosition>2012-04-01</gml:beginPosition>
          <gml:endPosition>2013-03-31</gml:endPosition>
        </gml:TimePeriod>
      </gwml2f:gwFlowTime>
      <gwml2f:gwFlowVelocity xsi:nil="true" nilReason="unknown"
    ▼<gwml2f:gwFlowVolumeRate>
```

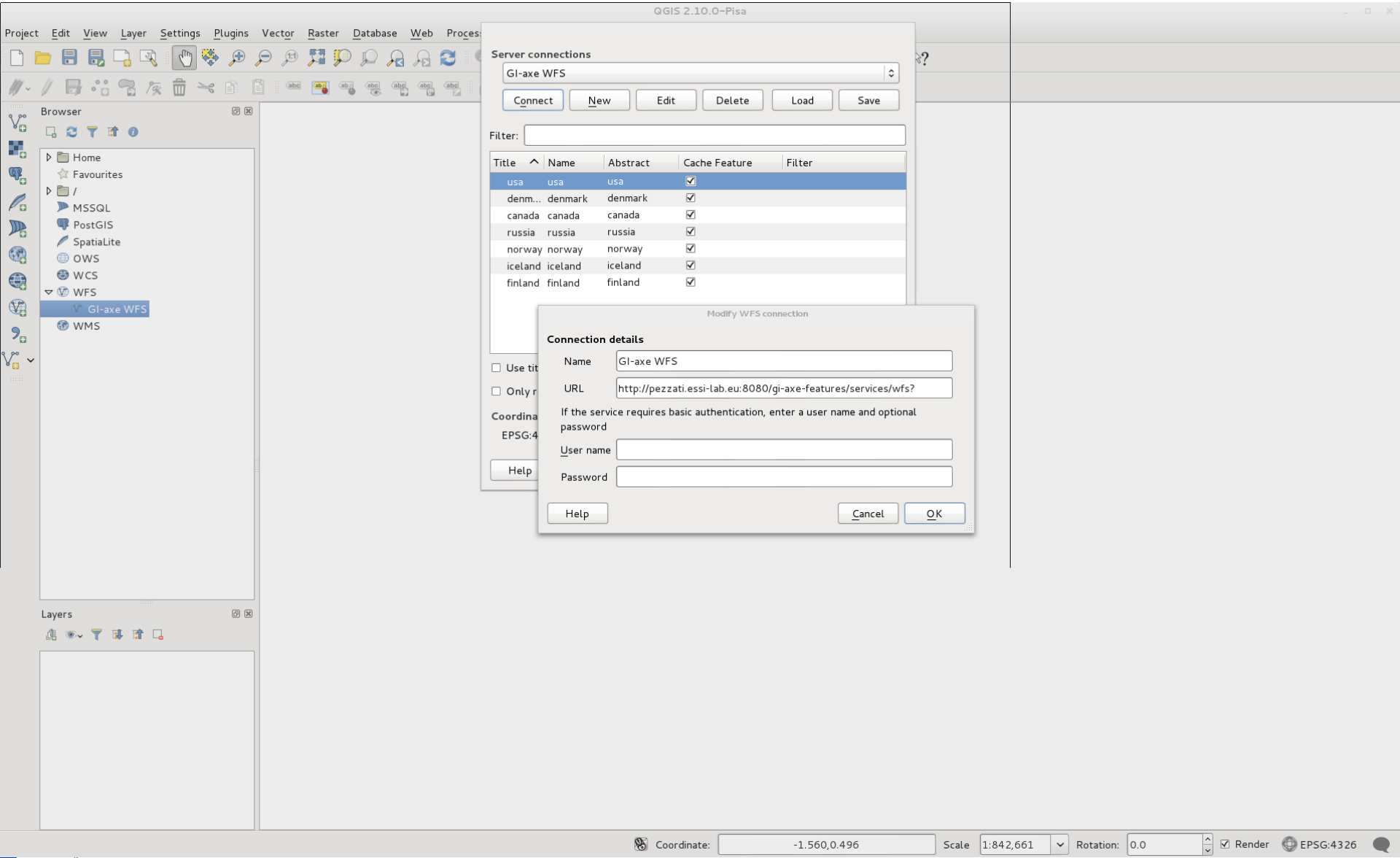






GroundWaterML2 (GWML2)

QGIS and WEBSERVICES



DAB RESTful API - Version: 1.0.0-BETA

DAB RESTful API

This RESTful APIs (Application Program Interface) provides simple search capabilities and resources encoded in JSON, which simplify the development of applications and clients making use of the DAB

API key

The key is required for API configuration, such as views management, and it is also required to enable the test functionalities of this page.
Fill the form below and click the "GET A KEY" button; you'll receive in the mail box you provided the API key along with the registration details

Email *

Name *

Last name *

Insititue/organization *

GET A KEY

Enter your API key in the field below and click the "VERIFY KEY" button; if the key is verified, the test functionalities will be enabled

Enter your API key here

VERIFY KEY

See also the Javascript API

WMO OMM

TRAINING on HYDROLOGIC DATA SHARING

WORLD
METEOROLOGICAL
ORGANIZATION

COMMISSION FOR HYDROLOGY

1st Training Course on Hydrologic Data Sharing

Date: days month 2016

Local organiser: National Hydrological Service in Country

Organized and funded by (in alphabetical order):

- Organisation1 …. (ORG1)
- Organisation2 …. (ORG2)
- World Meteorological Organisation (WMO)

with the collaboration of (in alphabetical order):

- Agency1 …. (AG1)
- Agency2 …. (AG2)
- Hydrology Domain Working Group (OGC\WMO HDWG)

and the coordination of: WMO CHy – WHOS programme

Venue: City, Country

Background

Water observation data is fundamental to our understanding of water resources and their spatial and temporal variability. Water resource management within countries, regions and continents around the world is highly distributed with many organisations typically involved in the collection and management of water data, even within single countries. In addition geographic features such as river basins and aquifers generally do not align with the boundaries of nation states and 90% of people live in countries that share transboundary hydrological features with their neighbours. As a result, to understand water resources within basins or aquifers, hydrological data sharing both within and between countries is usually required.

Content and format standards for water data exchange are a fundamental requirement to deal with the complexity which arises when disparate data from different organisations are brought together. Adherance to standards such as WaterML 2.0 allows data to be aggregated more easily without the complex task of understanding and translating multiple data formats. The need for exchange of water observations data operates at many different levels, from sharing across international borders to inter- and intra-agency sharing within individual countries.

Development of community-agreed consistent models and exchange formats for spatial and temporal data and metadata increases interoperability between information systems. It has many practical benefits including: improved efficiency and quality of information modals and systems; wider use and re-use of information; vendor and open source support at low or no cost to users; and new value to existing information through serendipitous uses.

The WaterML 2.0 standard for hydrological data exchange provides a solid foundation for improved interoperability between water information systems and increased data sharing between WMO Members.

Scope

The event is targeted to operational hydrologists, hydrological data managers, and early career scientists (advanced students, PhD candidates and postdoctoral researchers) with interest on data standardization and interoperability in hydrology. They are expected to be proficient in English as a working language.

Participants will attend a series of lectures and practical exercises. Attendance of international experts on hydrologic information systems will ensure an advanced and stimulating learning environment for participants. Attendees will receive a proper certificate of attendance upon completion.

Schedule:

<table>
<tr><th></th><th>MONDAY
day month</th><th>TUESDAY
day month</th><th>WEDNESDAY
day month</th><th>THURSDAY
day month</th></tr>
<tr><td>08:30–09:00</td><td>Welcome and objectives</td><td>Review previous day and introduction to next topics</td><td>Review previous day and introduction to next topics</td><td>Review previous day and introduction to next topics</td></tr>
<tr><td>09:00–09:30</td><td>Introduction to hydrologic data sharing</td><td>Data formats in hydrology</td><td rowspan="2">Ontology in hydrology</td><td>WIGOS</td></tr>
<tr><td>09:30–10:00</td><td rowspan="2">Presentations of hydrologic data management in each participant country</td><td>WaterML2</td><td>WHOS</td></tr>
<tr><td>10:00–10:30</td><td>Encoding of sample data</td><td>Making your variable searchable</td><td>The WMO data model METCE</td></tr>
<tr><td>10:30–11:00</td><td>Break</td><td>Break</td><td>Break</td><td>Break</td></tr>
<tr><td>11:00–11:30</td><td rowspan="2">Live demonstration What they will be doing</td><td rowspan="2">Web services in hydrology
SOS2</td><td>Catalogs of data providers</td><td rowspan="2">WIS</td></tr>
<tr><td>11:30–12:00</td><td>Broker and mediator</td></tr>
<tr><td>13:00–15:00</td><td>Lunch</td><td>Lunch</td><td>Lunch</td><td>Lunch</td></tr>
<tr><td>15:00–15:30</td><td rowspan="2">XML Basics and Tutorials</td><td rowspan="3">Workshop on Hydroserver</td><td rowspan="3">Workshop on Hydrocatalog</td><td rowspan="2">WIS Tutorial</td></tr>
<tr><td>15:30–16:00</td></tr>
<tr><td>16:00–16:30</td><td>Data Formats and Web Services</td><td>WIS and HIS</td></tr>
<tr><td>16:30–17:00</td><td>Questions and Answers</td><td>Questions and Answers</td><td>Questions and Answers</td><td>Questions and Answers</td></tr>
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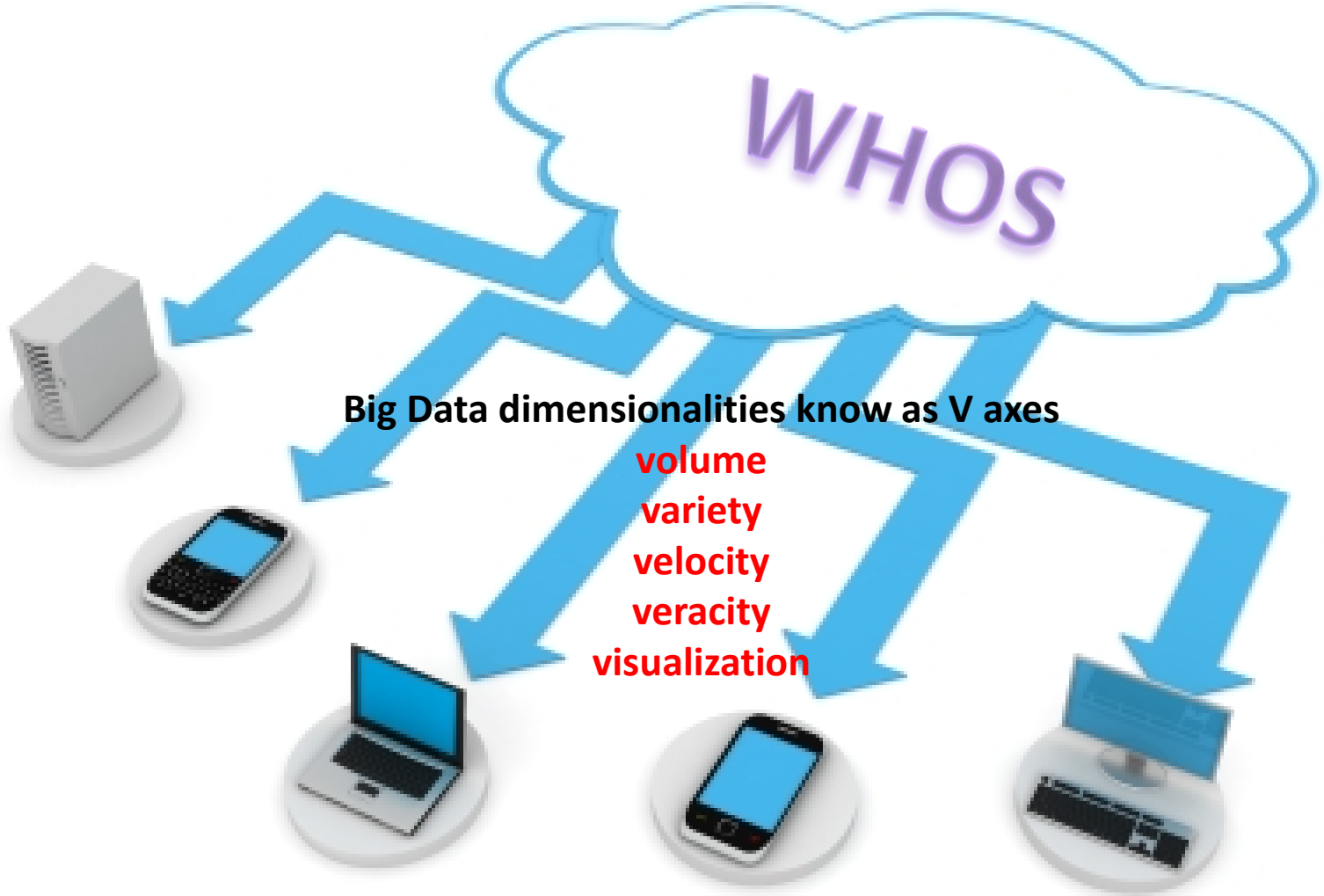
WMO OMM

WHOS IN THE CLOUD



Big Data dimensionalities know as V axes

volume

variety

velocity

veracity

visualization

These are the fine people that make WHOS architecture what it is today

David Maidment

David Valentine

Simon Jirka

David Arctur

Weiqing Qu

Michael Natschke

Dan Ames

Enrico Boldrini

Jose Mauro de Rezende

James Nelson

Silvano Pecora

Alva Couch

Tony Boston

Thomas Whitenack

Harry Lins

Richard Hooper

Stefano Nativi

Ilya Zaslavsky

Carsten Hollmann

Jose Arimatea de Sousa Brito

Jiri Kadlec

Stefan Fuest

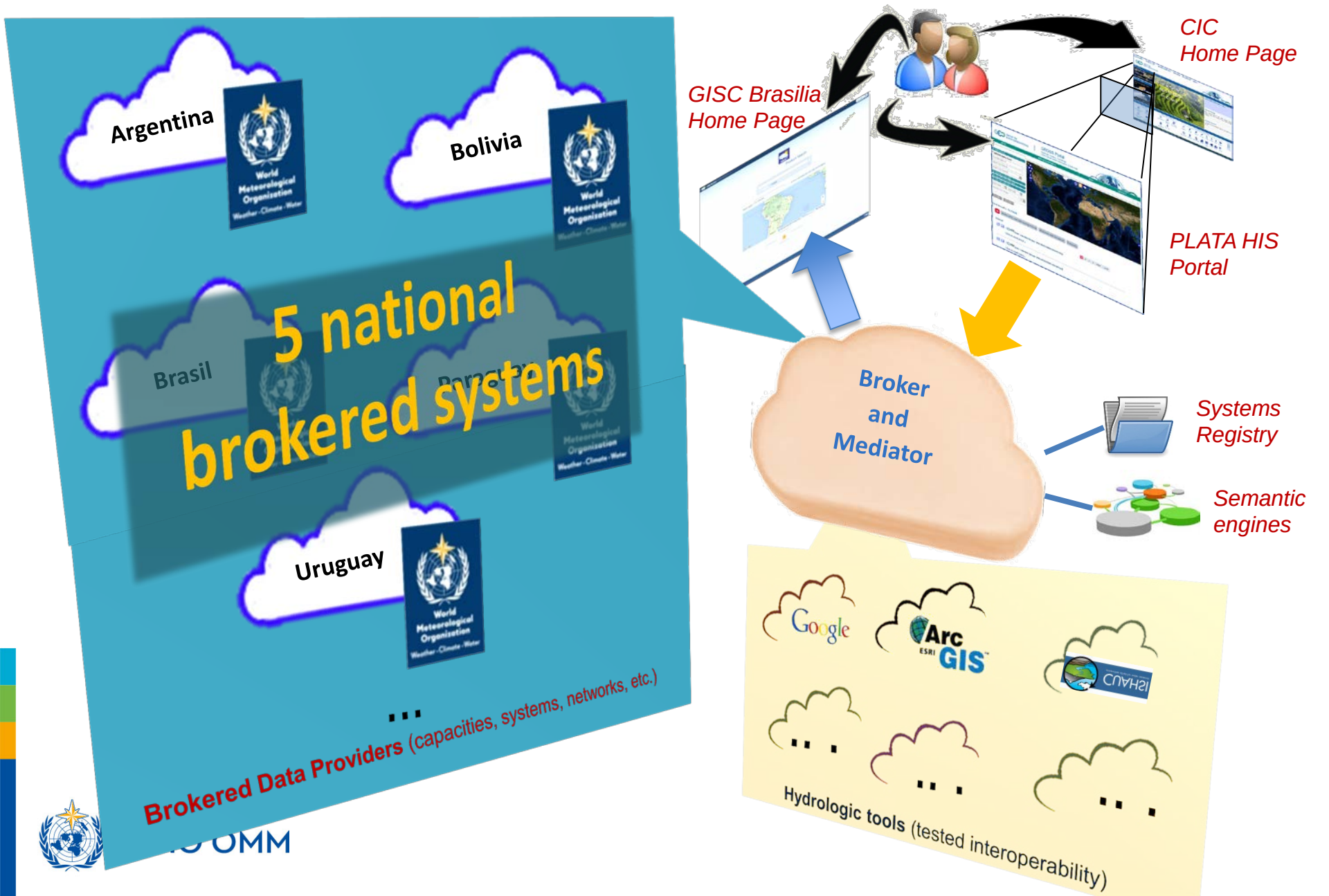
Steve Kopp

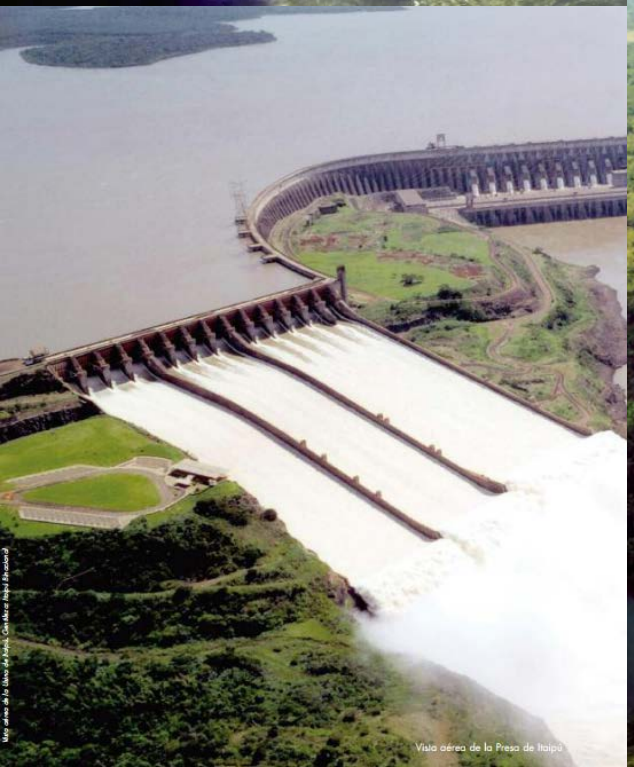
Fabio Bordini

WHOS PLATA

WMO OMM

Hydrologic Information System in the Plata basin





Vista aérea de la Presa de Itaipu

Vista aérea del Sitio Ramsar "Humedales Chaco"

Puerto de Montevideo

HIS in La Plata Basin

Ibero-American National Meteorological and Hydrological Services

WHOS
WMO Hydrological Observing System

Home | Services | Tools | About

WMO

HIS PLATA Sistema de información hidrológico del Río de la Plata

La Cuenca del río de la Plata, con una superficie de 3.200.000 km² es la segunda cuenca hidrográfica más grande del mundo. Abarca importantes territorios pertenecientes a Argentina, Bolivia, Brasil, Uruguay y la totalidad de Paraguay. Las precipitaciones registradas confluyen en dos grandes cursos, los ríos Paraná y Uruguay, que posteriormente vierten sus aguas en el Río de la Plata el cual finalmente desemboca en el océano Atlántico.

El conjunto fluvial de la Cuenca del río de la Plata forma el principal sistema de recarga del acuífero Guaraní, una de las mayores reservas continentales de agua dulce del mundo; los gobiernos de los países implicados estudian su aprovechamiento de forma sostenible, asegurando así la provisión de agua potable para sus habitantes. La cuenca sirve de asiento a una población de más de 100 millones de habitantes, por lo que la interacción humana con la misma a lo largo del tiempo de forma incontrolada produce cambios significativos tanto para la cuenca como para la calidad de vida de sus habitantes.

Los dos grandes ríos de la cuenca, el Paraná y el Uruguay, tienen una densa red de afluentes, subafluentes y tributarios menores, como los ríos Paraguay, Pilcomayo, Bermejo, Salado, Carcarañá, río Tercero, río Cuarto, Iguazú, Salado, Gualeguay, arroyo Nogoyá, Mocoretá, Gualeguaychú, Miriñay, Aguapey, Río Negro, Guaycurú, Pilagá, San Javier, Queguay, Arapey, Guayquiraró y Samborombón, entre otros.

Ibero-American National Meteorological and Hydrological Services

WHOS
WMO Hydrological Observing System

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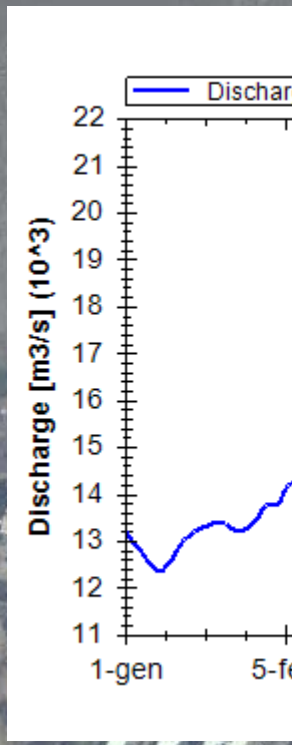
Print | Layers | Basemap | Measure | Share | Find address or place

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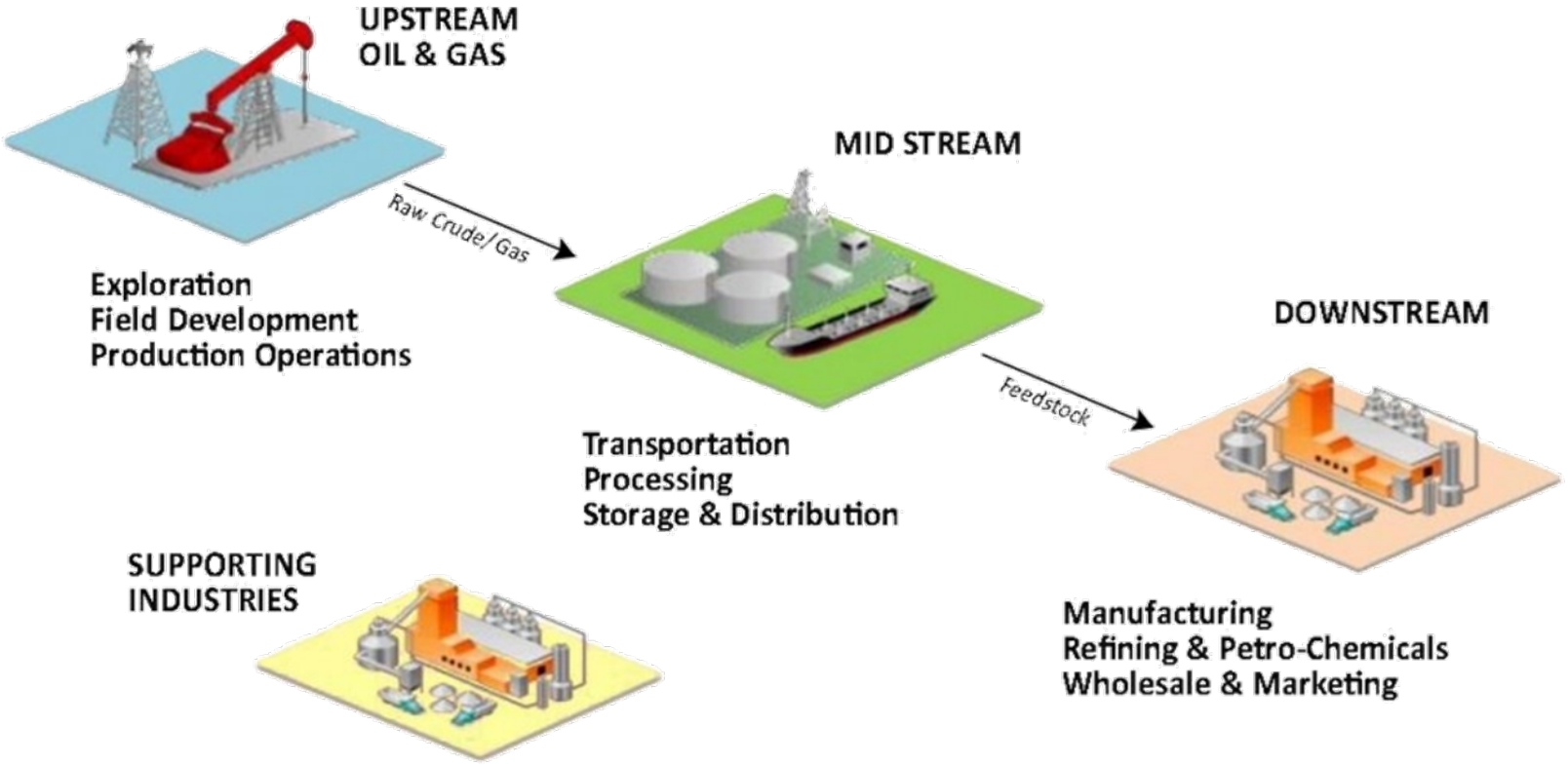
DEVELOPMENT OF WHOS PLATA

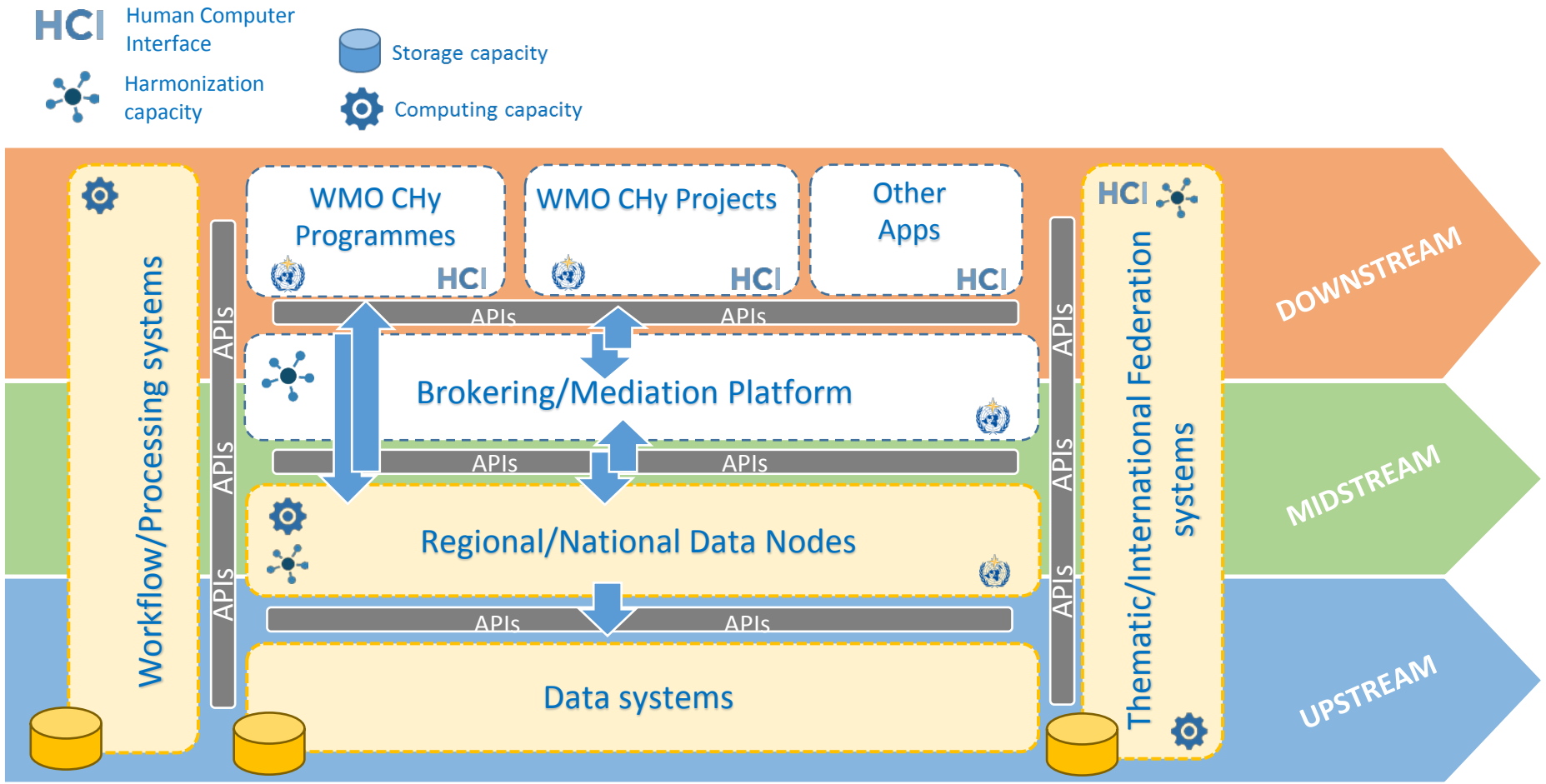
WMO OMM

System of Systems: Supply-chain model

Data/information is the new “oil”

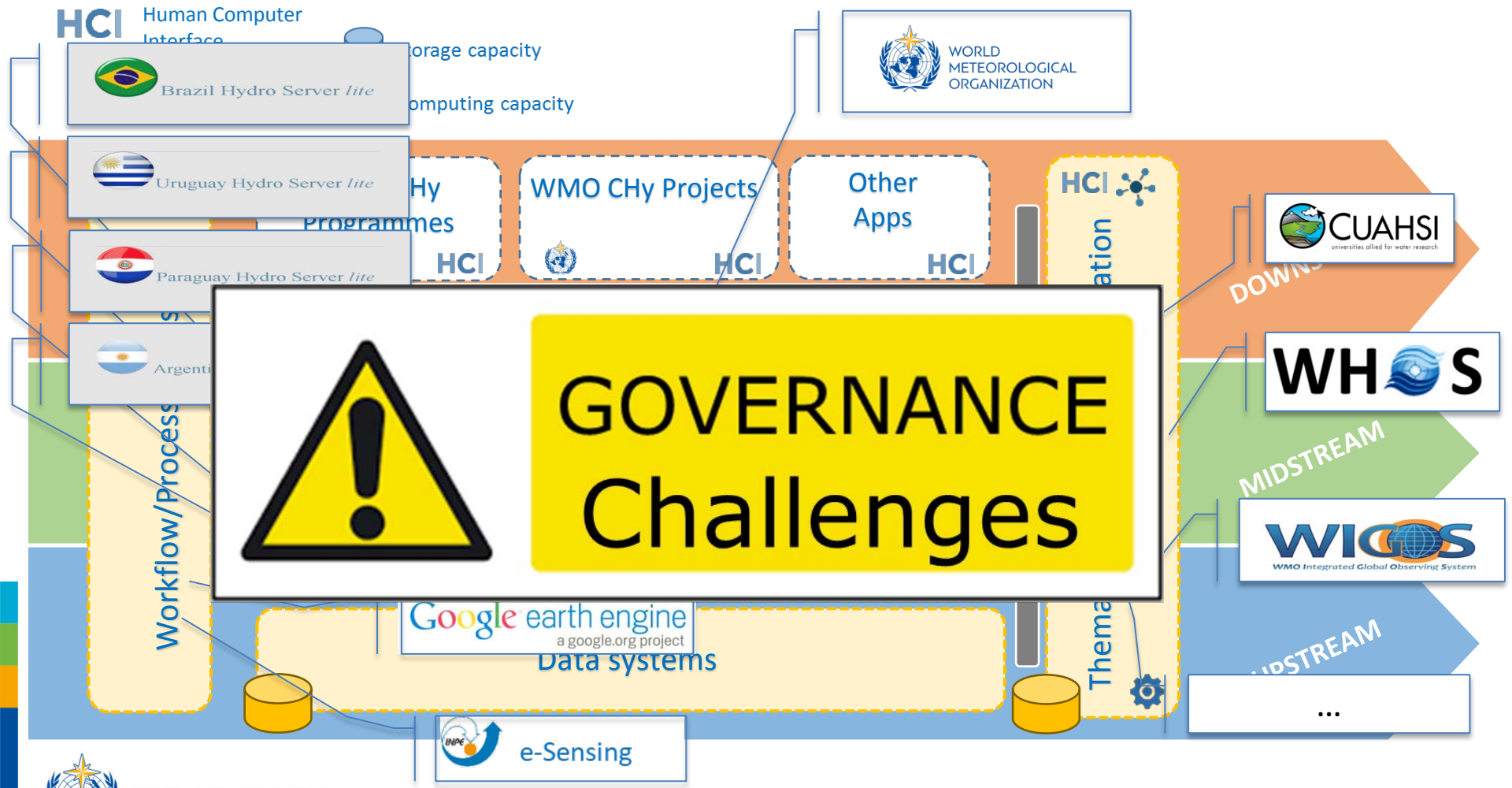


Supply-chain SECO



WMO OMM

Multi-Organization Effort



WMO OMM

Ecosystem: Supply-chain model

Governance

WORLD METEOROLOGICAL ORGANIZATION

Sourcing

Quality Check

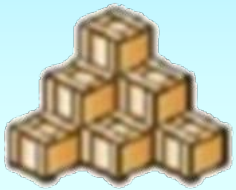
Harmonization, Quality Assessment, Ranking, Enrichment

Warehousing

Transformation

Distribution

Retailing, Corporate selling



Users uptake

Feedbacks

UPSTREAM

MIDSTREAM

DOWNSTREAM

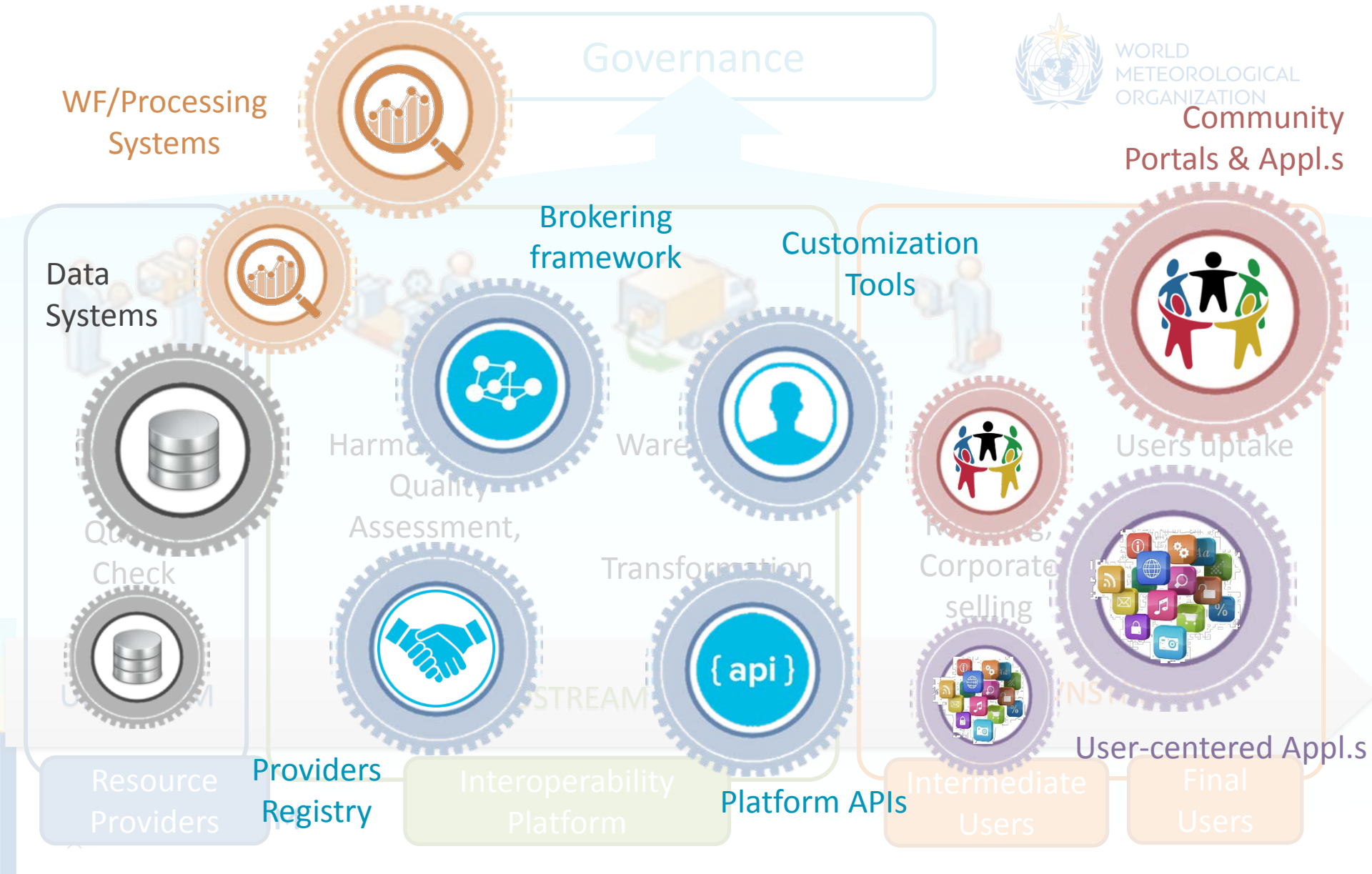
Resource Providers

Interoperability Platform

Intermediate Users

Final Users

System of Systems



WHOS Plata System

- A ***System of Systems*** to provide a unique entry point for Client Applications to discover and access Hydrological data published by the contributing Data Nodes.
- Client Applications access the system utlizing the preferred service protocol/APIs.
- Data Nodes publish their data utilizing the preferred service protocol/APIs.
- Contribute to WMO Hydrological Observing System (WHOS)

WMO OMM

WHOS Plata – Main Functional Requirements

- Implement interoperability with service protocols/APIs utilized by the Data Nodes
- Publish service protocols/APIs required by Client Applcations
- Metadata mapping
- Data transformation

WHOS Plata – Main Non-Functional Requirements

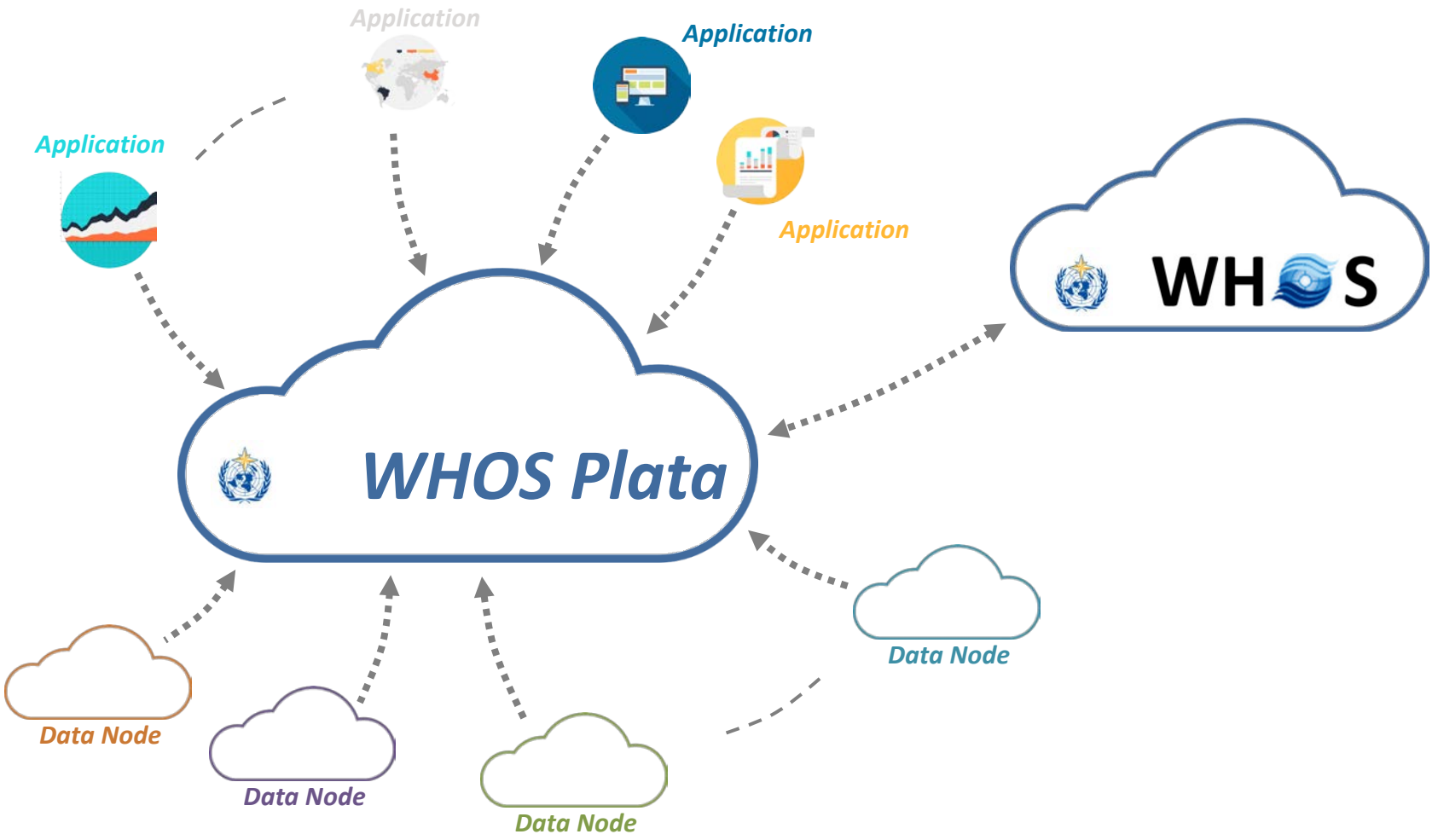
Quality of Service

- Availability
- Scalability
- Response Time
- Throughput

Extensibility, in particular to support new service protocols/APIs, metadata schemas/encodings and data models/formats

WMO OMM

WHOS Plata System Overview



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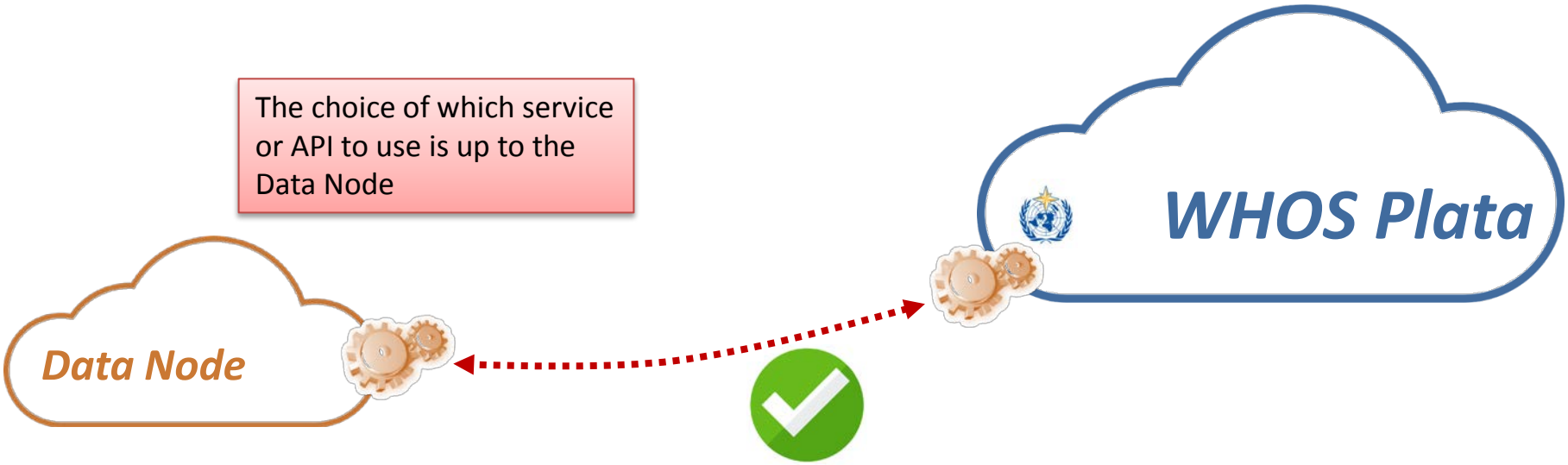
Brokering a Data Node

The choice of which service or API to use is up to the Data Node



Connectivity	The Data Node is reachable on the Web
Data Discoverability	It is possible to discover data
Data Accessibility	It is possible to download discovered data

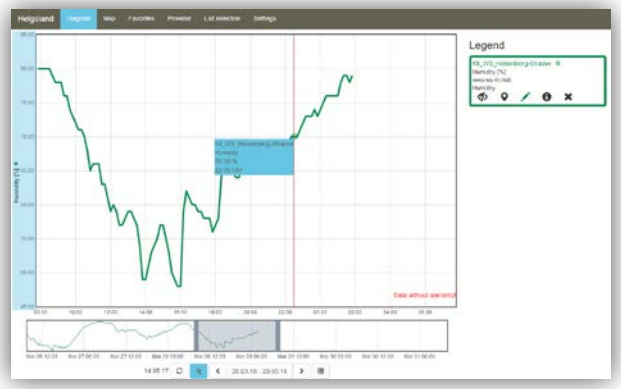
If needed, one or more cycles of tuning/tests can take place

Publishes data → Interoperability Tests → Data Node becomes part of the System of Systems

Connecting an Application

The System must support required services/APIs utilized by the different Applications

Applications will interact with the System as if it were a single server



Publishes a set of web services/APIs

Can use any service/API to connect to the System

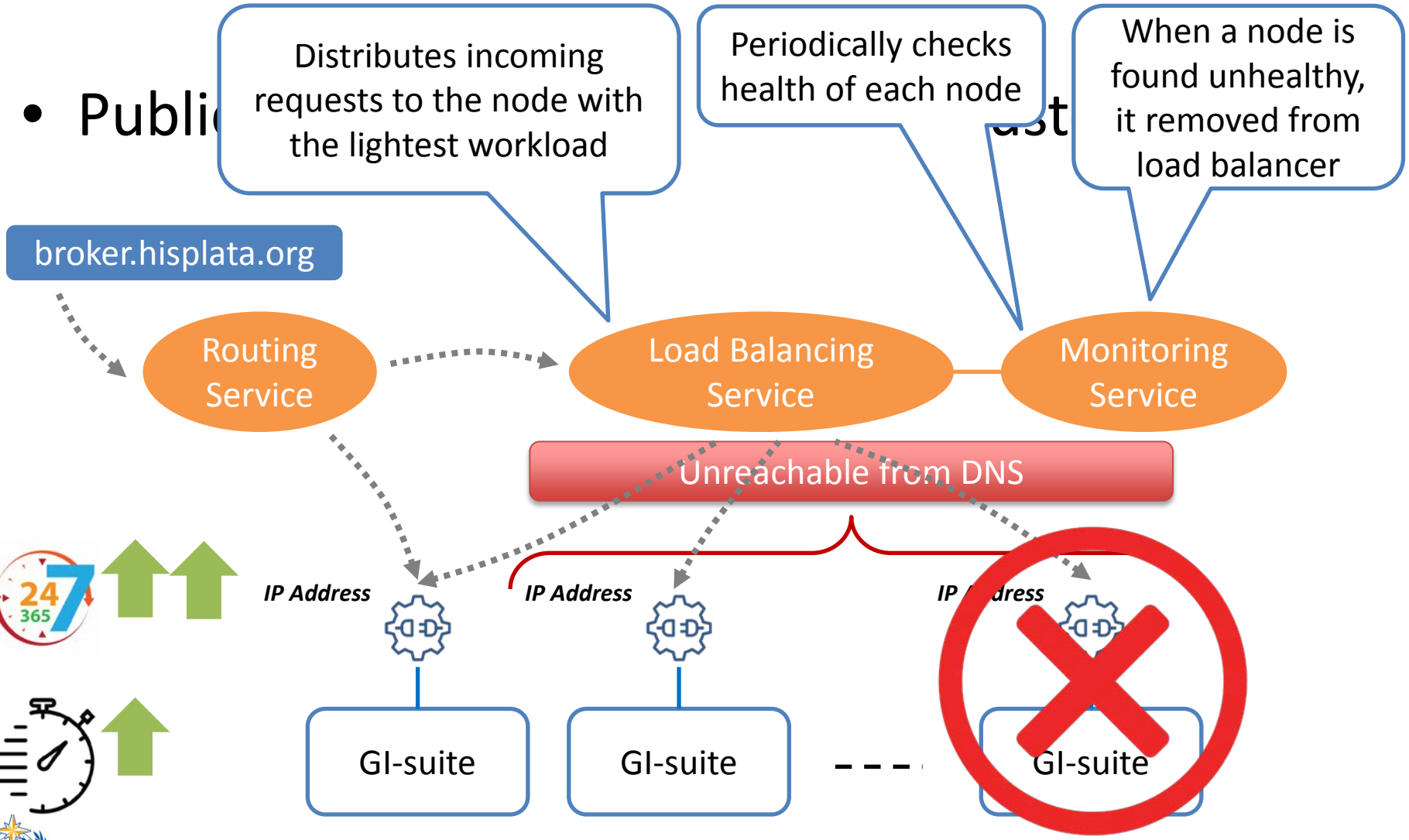
Accesses the entire content of the System and displays it to user

BROKER OF WHOS PLATA

WMO OMM

Plata Broker Configuration at INMET

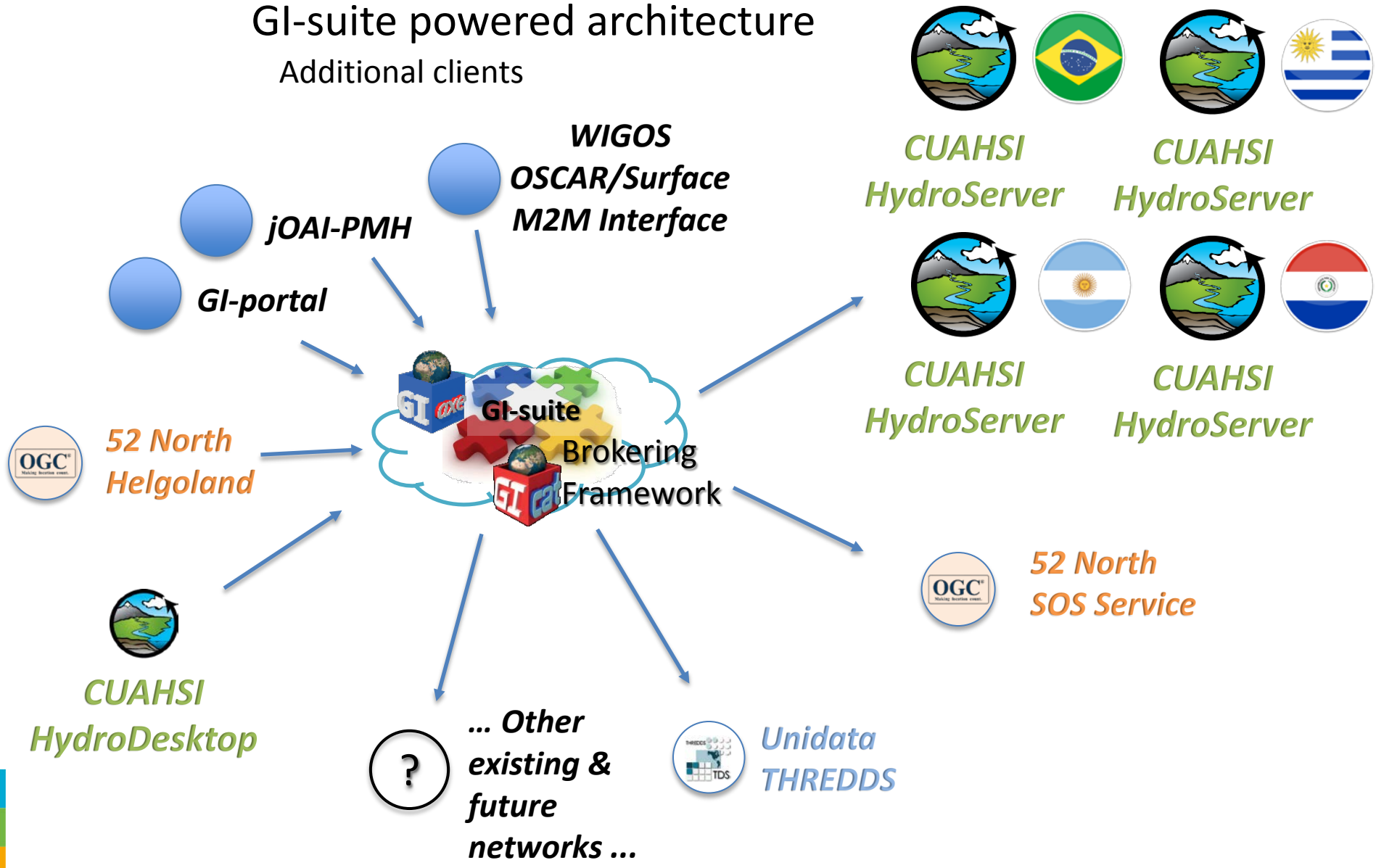
- Publi



WMO OMM

GI-suite powered architecture

Additional clients



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Brokered architecture

HYDROLOGICAL DATA OF WHOS PLATA

WMO OMM

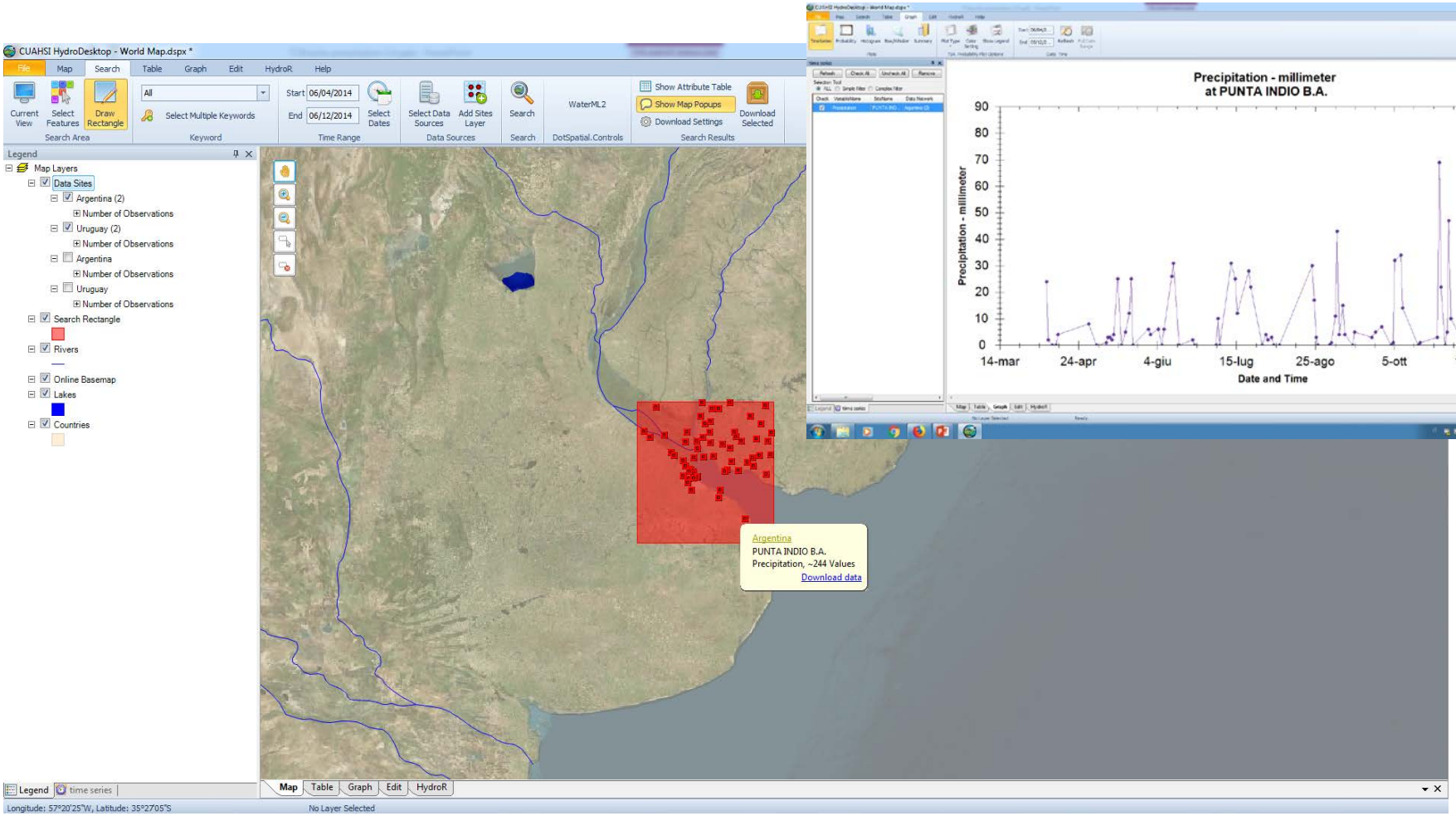
Questionnaire on Hydrological Data Availability

- CHy arranges a questionnaire for NHSs about their current data publication status
- INMET translates and circulates it
- To be circulated by the beginning of June

CLIENTS OF WHOS PLATA

WMO OMM

HYDRODESKTOP



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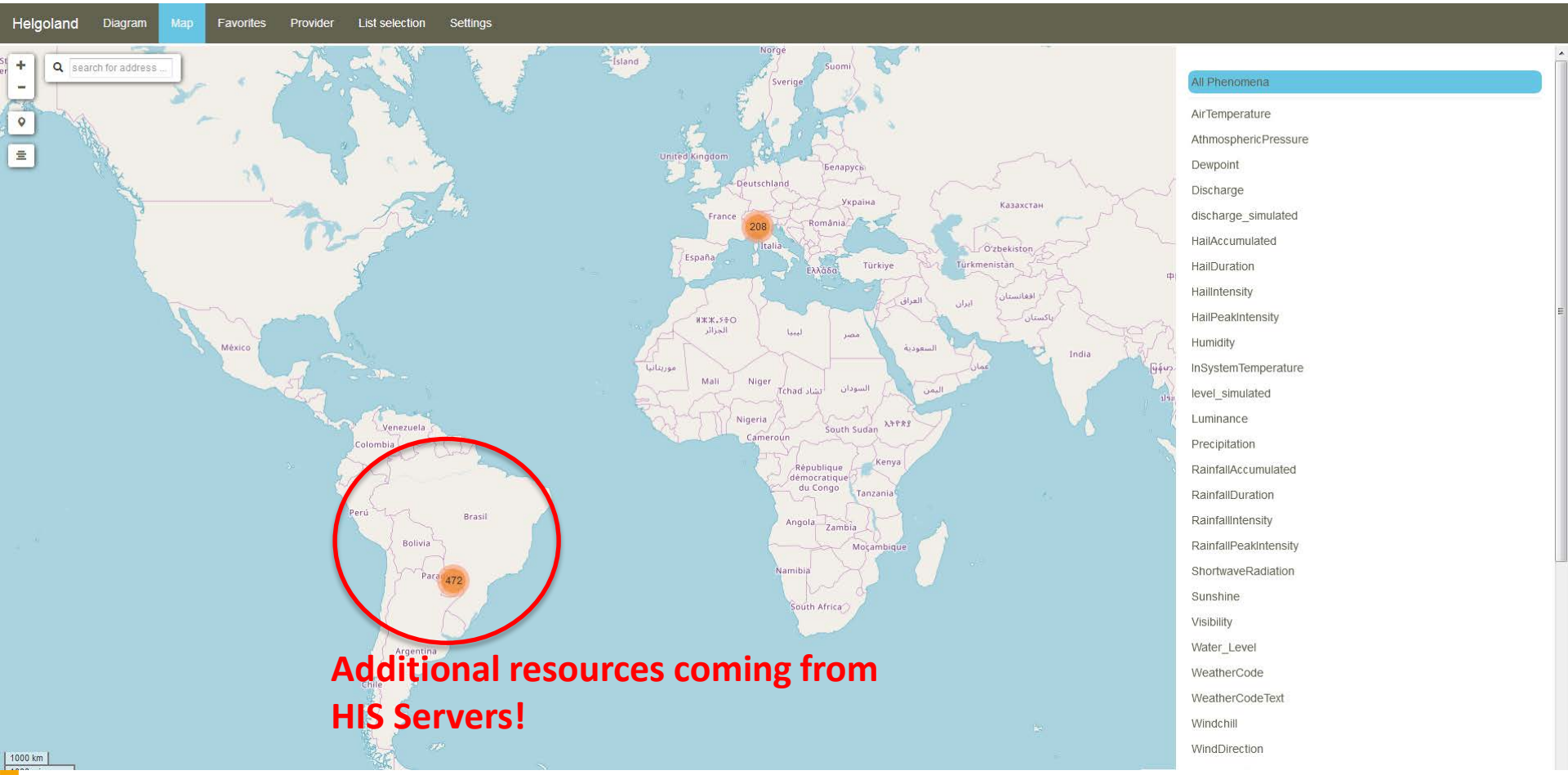
HydroExplorer

Brokered OGC network client



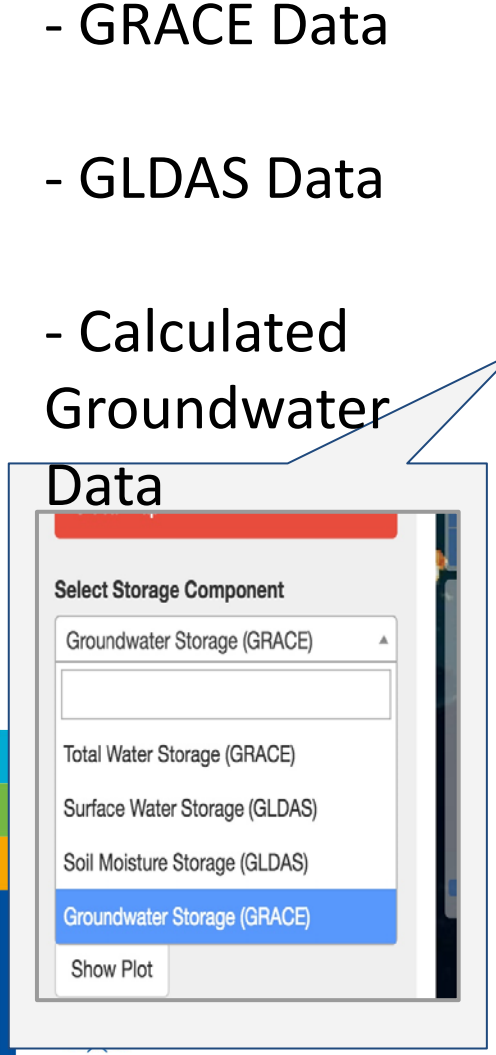
WMO OMM

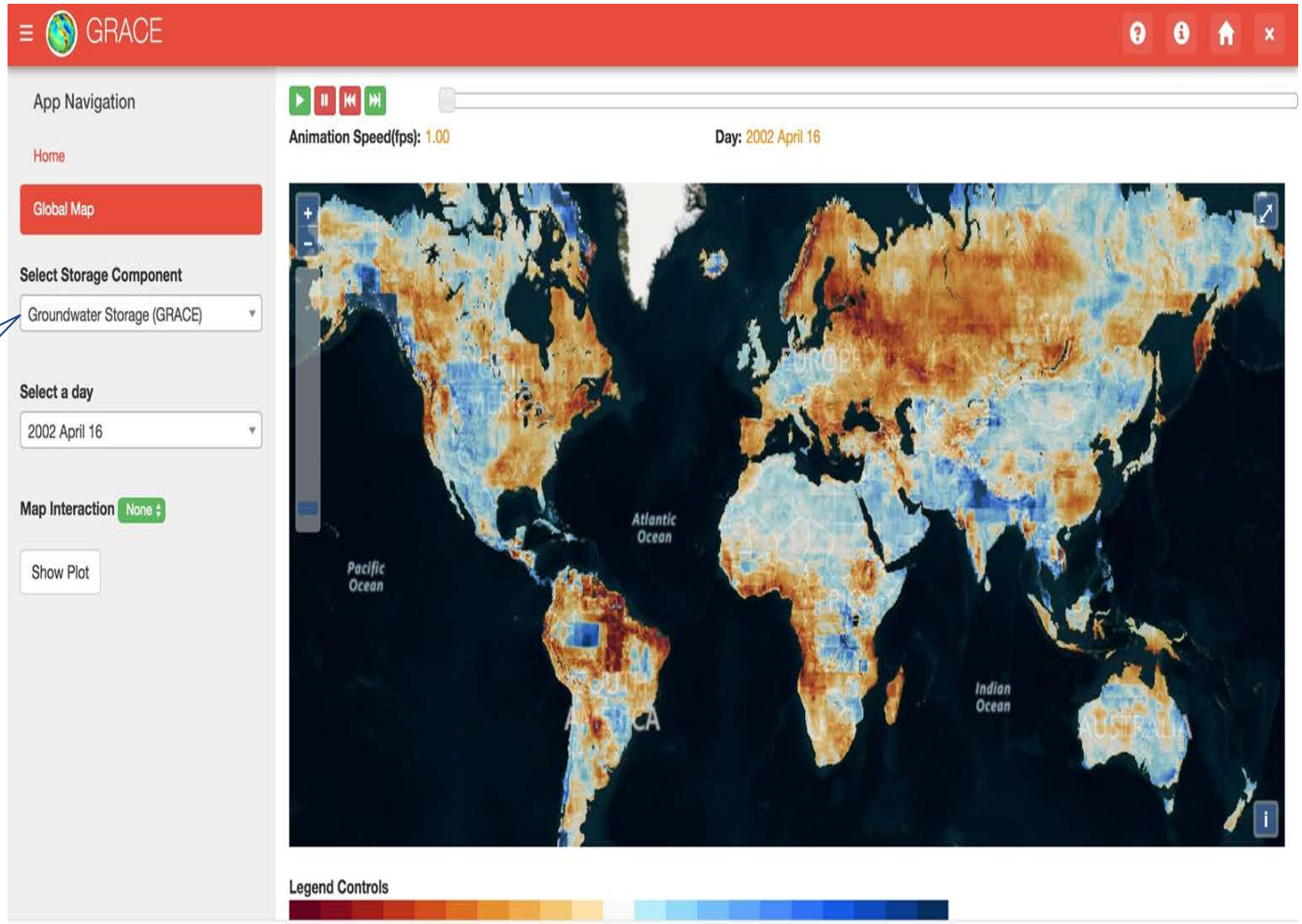
Tethys GRACE App

- GRACE Data

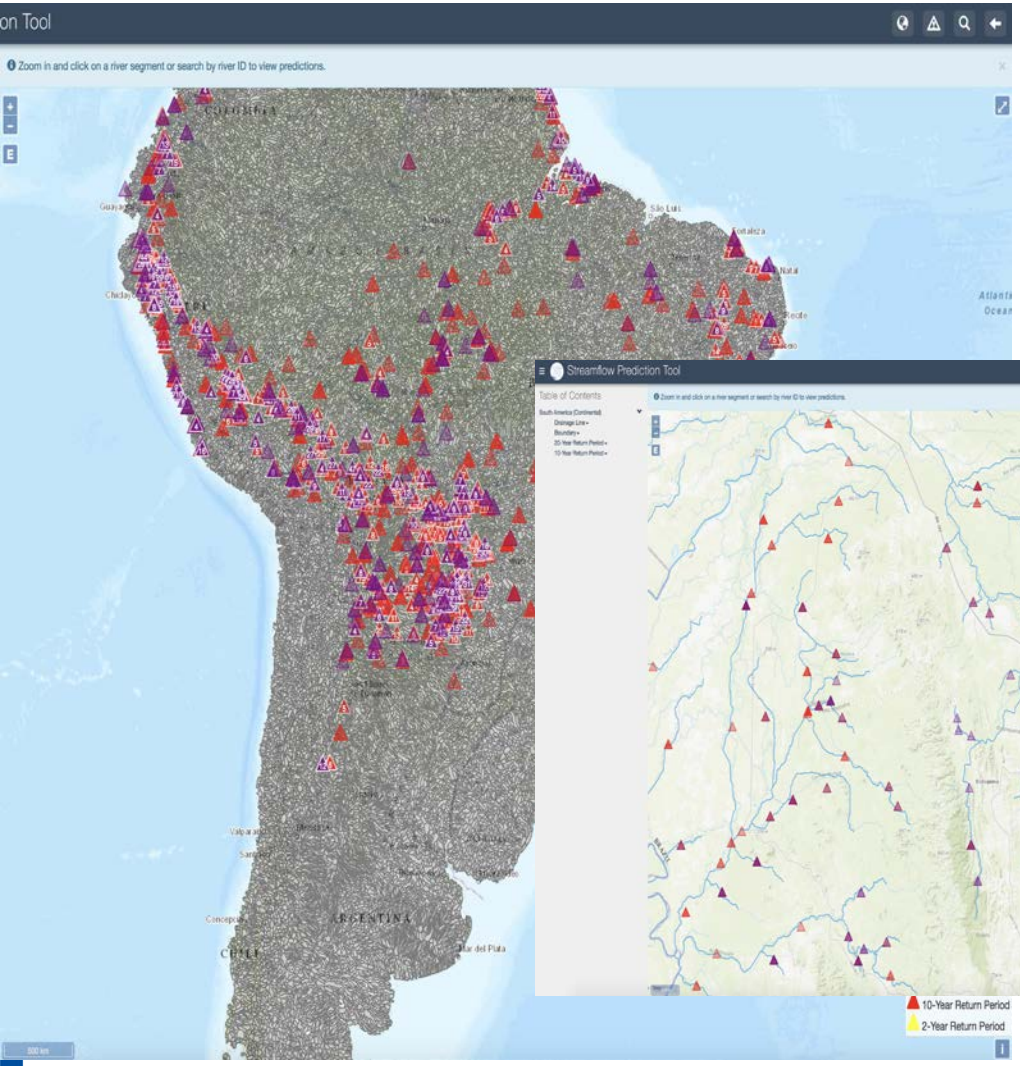
- GLDAS Data

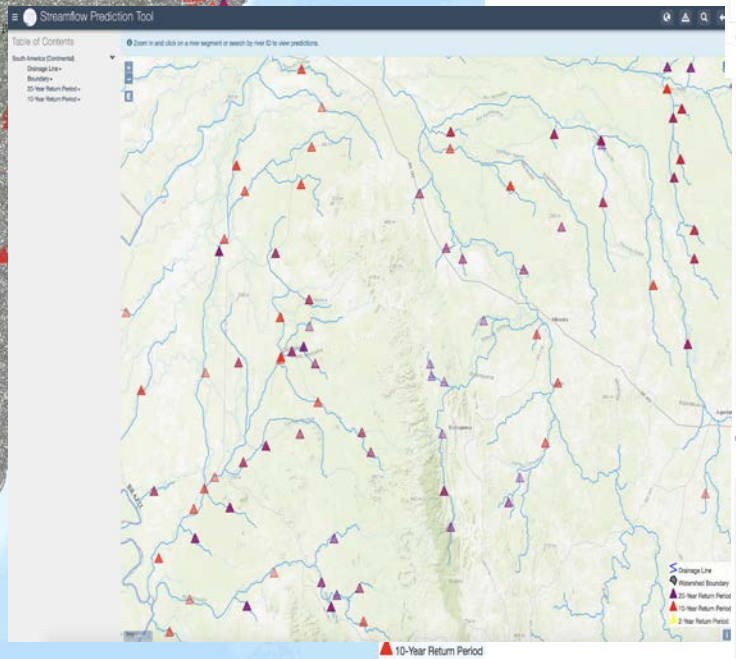
- Calculated Groundwater Data

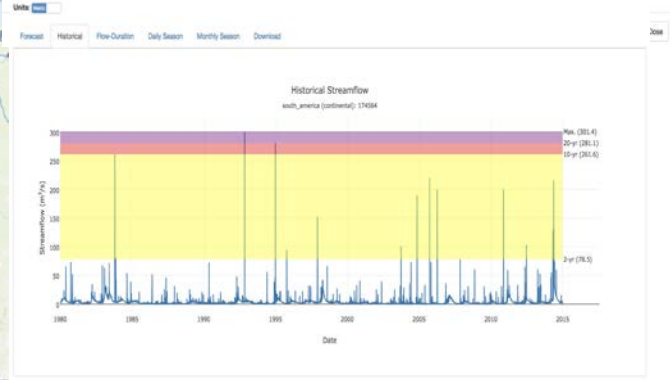


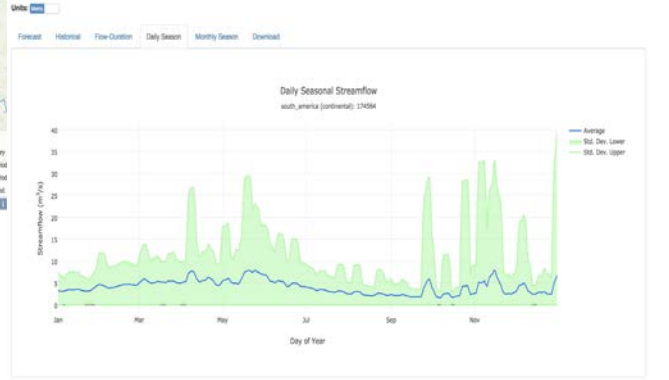


Streamflow Prediction App









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PORTAL OF WHOS PLATA

WMO OMM

NASA SERVIR PORTAL

ICIMOD NEPAL PORTAL

WMO LA PLATA PORTAL

APP WAREHOUSE

Stakeholders – They Make the Decisions


Aqua
Terra
GPM
SMAP
Model
Files
ECWMF/Glofas Forecasts
Streamflow
Forecast
Services
Custom
Python
Scripts
Time Series
Bangladesh
Transboundary
Web App
Tool
ICIMOD, DHM,
FFWD, BWD,
Pakistan, Mercy
Corps, Practical
Action, Others
Engineers,
Decision
Makers,
Advocacy
Groups, Public
Inside a Hydropower Plant
Reservoir
Dam
Transformer
Powerhouse
Generator
Power Lines
Intake
Control Gate
Penstock
Turbine
Outflow
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WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Thank you for your attention

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World Meteorological Organization
Organisation météorologique mondiale