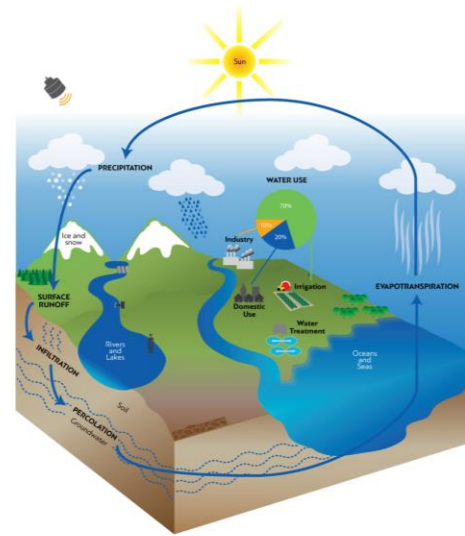


OPEN DATA & OPEN KNOWLEDGE Workshop

WHOS leveraging the GEO-DAB to share hydrological in-situ data

Washington Otieno,
Scientific Officer
Earth System Monitoring Division,
Infrastructure Department, WMO

WHOS: ESSENTIAL DATA FOR ADDRESSING NEEDS



Early Warnings for All



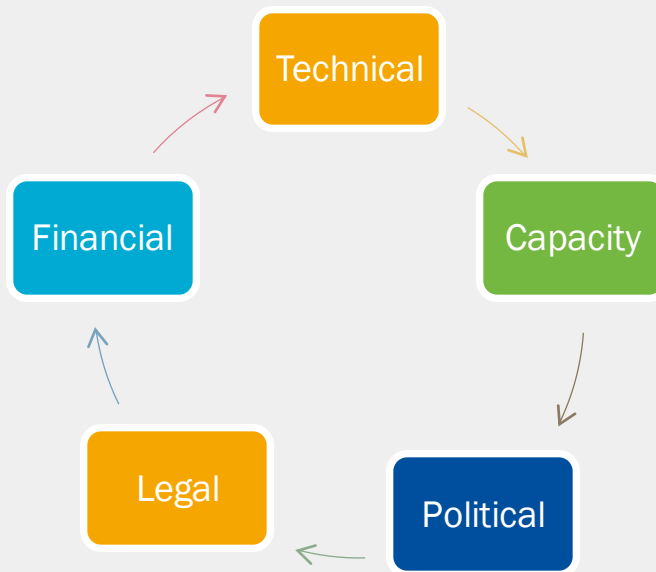
WHOS-DAB: Technical Solution for Hydrological Data interoperability

04/07/2023



Obstacles for Hydrological In-situ Data Sharing

- ❑ Demonstrating the benefits of investments in monitoring and open data
- ❑ Advocacy and outreach
- ❑ Culture, non-standard, control access, data rescue,
- ❑ New technologies e.g ML



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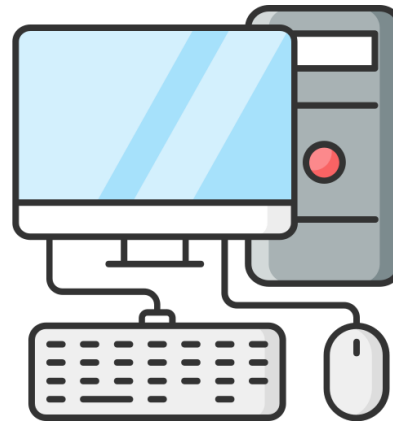
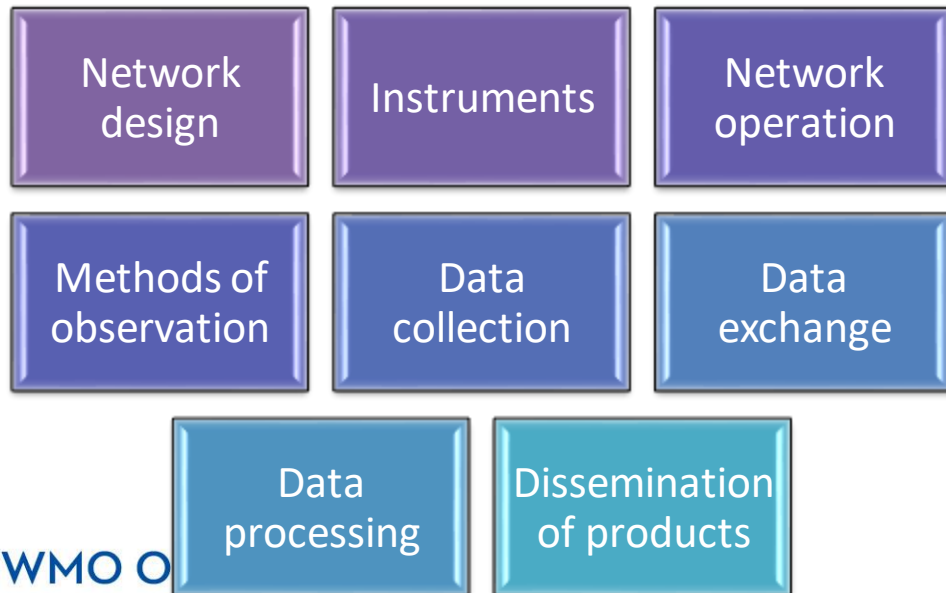
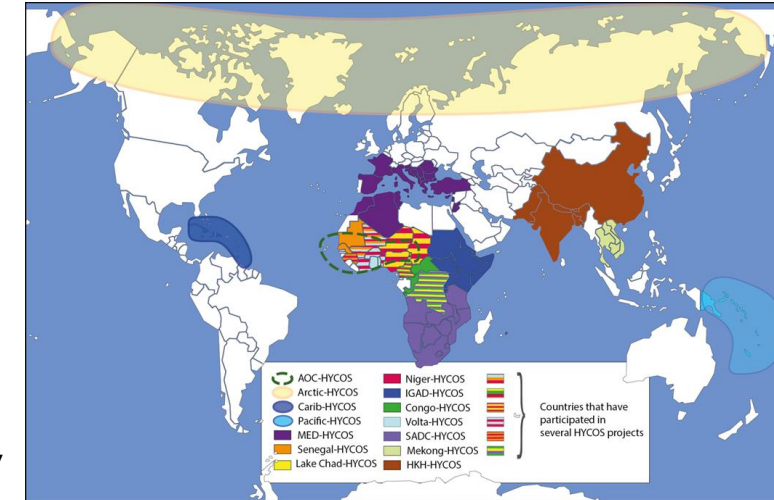
Many Players.....Hydrology data at the heart of economic development



Source: Asian Development Bank (2022) Development Outlook ([url](#))

WHYCOS – HYCOS World Hydrological Cycle Observing System

- WMO framework programme aimed at building and **reinforcing the technical and human capabilities** of NMHSs to perform their basic role in **hydrological monitoring** in:
 - data collection and management and information production and dissemination,
 - and to promote regional and basin wide cooperation in hydrology and data exchange



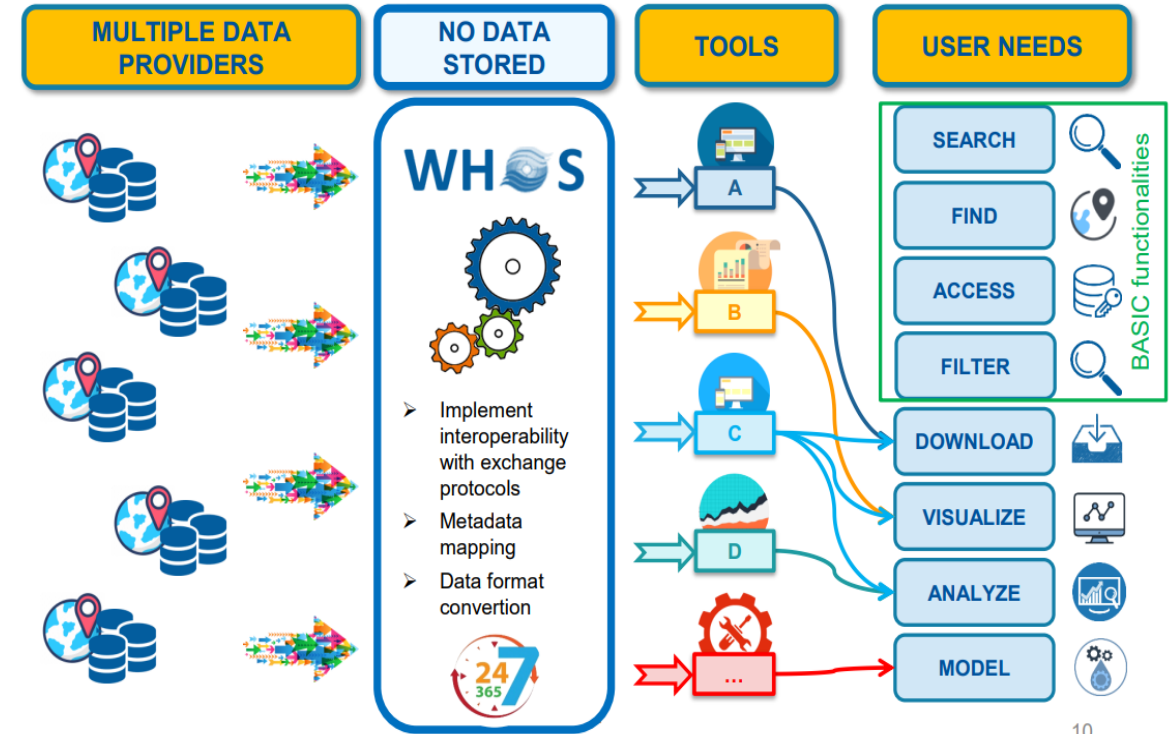
WMO O

WHOS

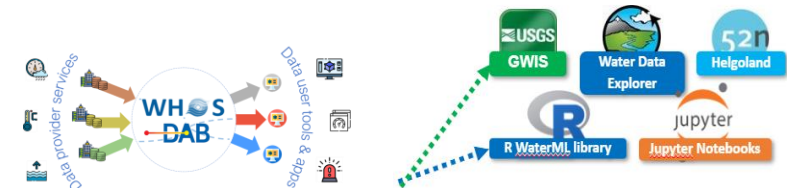
Hydrological Component of WIS2.0

- ❑ WMO Hydrological Observing System (WHOS): Solution for hydrological data access and interoperability using open standards and free tools, DAB. Supports:
- ❑ Earth Systems integration approach
- ❑ WMO Unified Data Policy (Res 1, (Cg-Ext(2021)), International Exchange of Earth System Data
- ❑ HydroSOS and other data systems
- ❑ Early Warnings For All; pillar 2 and key action area 4
- ❑ WMO Plan of Action for Hydrology 2022 – 2030

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10



WaterMI2.0

WHOS IMPLEMENTATIONS AND USAGE



WHOS-Arctic
 (Canada, Finland, Denmark (for Greenland), Iceland, Norway, Russia and the USA)

WHOS-SAVA
 (Slovenia, Croatia, Bosna and Herzegovina, Serbia, Montenegro and Albania)

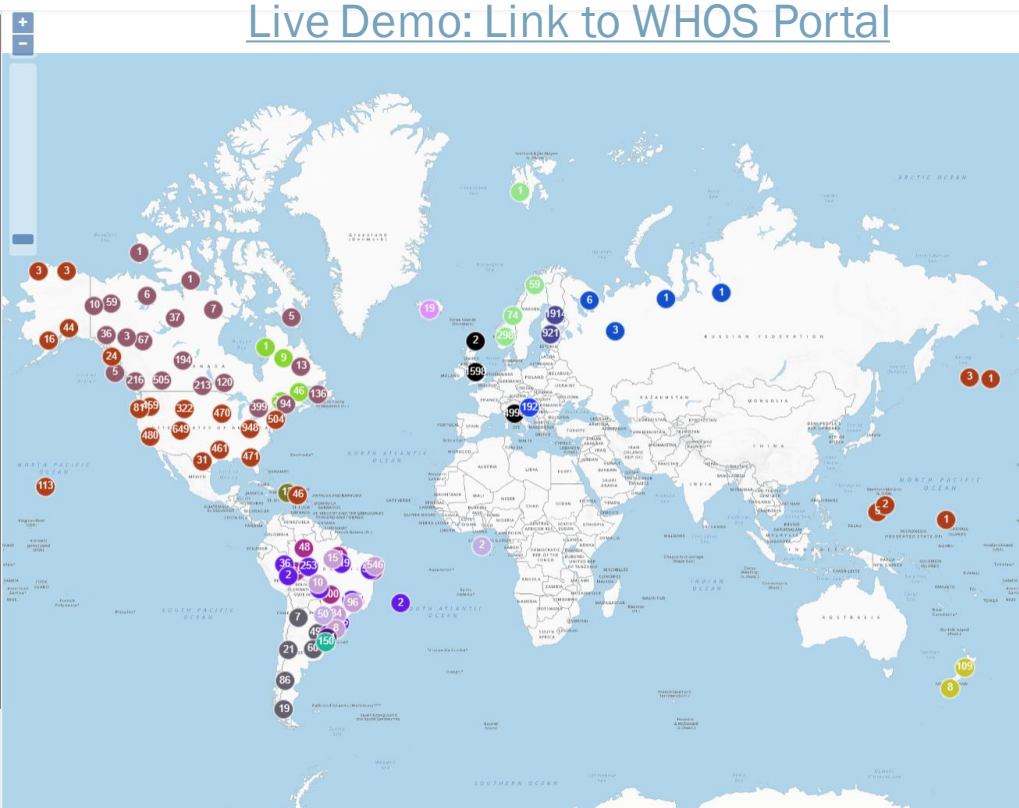
WHOS-La Plata
 (Argentina, Bolivia, Brazil, Paraguay and Uruguay)

Italy (ISPRA)

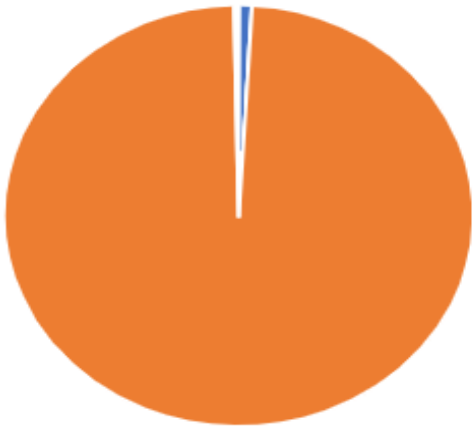
UK (NRFA)

New Zealand (NIWA)

Current Impl.
 (Cambodia and Lao, Togo, South Africa), IGRAC



WHOS Traffic (total requests)



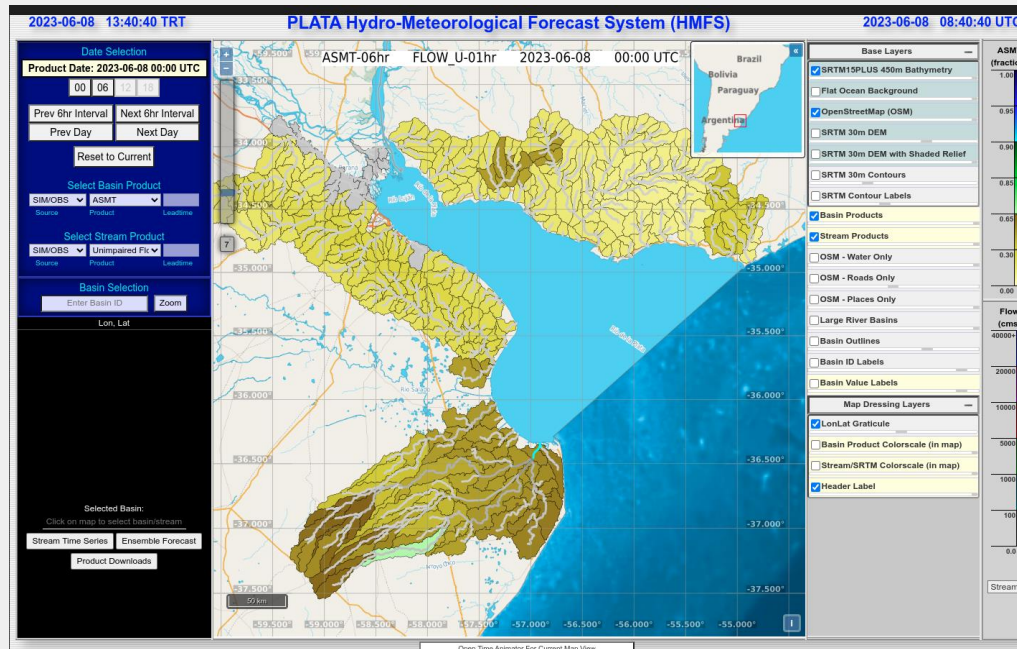
FEWS PROHMSAT-Plata Others

1100059 122211317 376602

Current Number of timeseries: 194,768

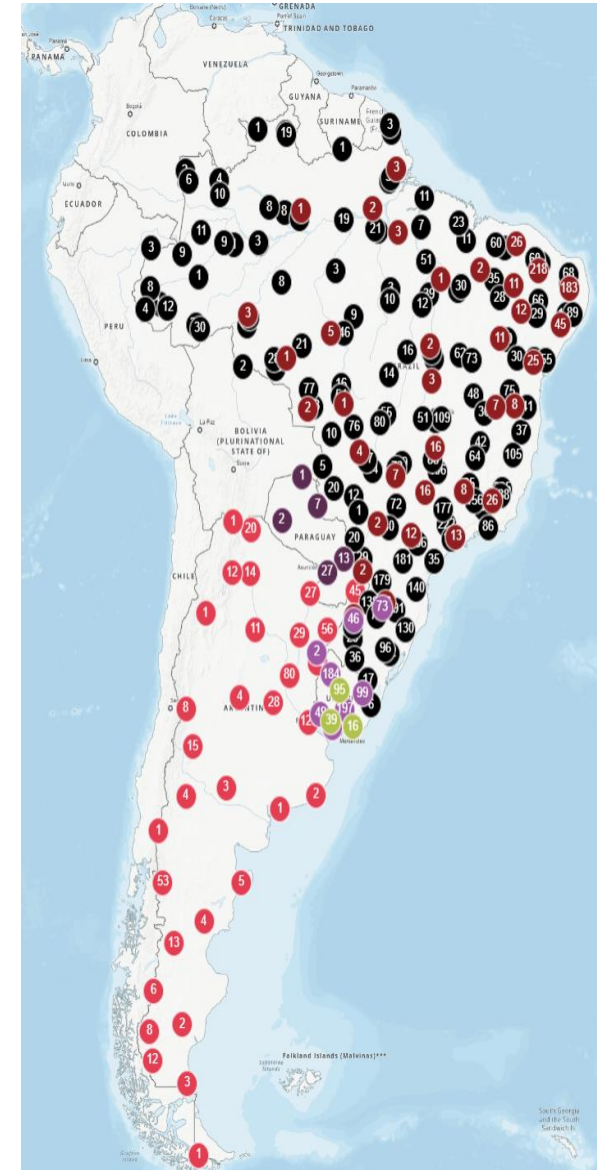
WDE serves as the technology for the WHOS global portal. WDE connects to the WHOS DAB. As a result, station's data can be discovered, visualized and downloaded by users.

WHOS La Plata case Study



Plata-Hydro-Meteorological Forecasting System (HMFS)

- ❑ WHOS is the main data provider to:
 - PROHMSAT Plata (hydrometeorological forecast and Early Warning System)
 - Decision Support System of la Plata (DSS) developed by the 5 countries in La Plata Basin and the CIC Plata
 - Uruguay importing hydrometeorological data from Argentina and Brazil.



WHOS Interoperability With WIS2.0

WIS 2 as a WHOS Data Consumer



Data Providers Publishing their data through WIS

WHOS Broker: Harmonizes and makes the data available to WIS Users

Hydrological data Accessible through WIS 2.0 in a box users

- Discovery metadata (resources e.g data sets), WCMP2.0
- Topic hierarchy: [arg.ina.data.hydrology.surface-water-observations.river.stream-level](#)
- KPIs for hydrology metadata and data

WIS 2 as a WHOS Data Provider



Data Provider Publishes their data

WIS 2 Client

WIS 2.0 Box makes the data available to WHOS

WHOS DAB makes other domain data available to WHOS Users

- Standards: WIGOS Metadata Standards, WaterIML2.0
- Hydrology vocabulary
- OSCAR and allocation of WSI

WHOS Evolution Within WIS2.0



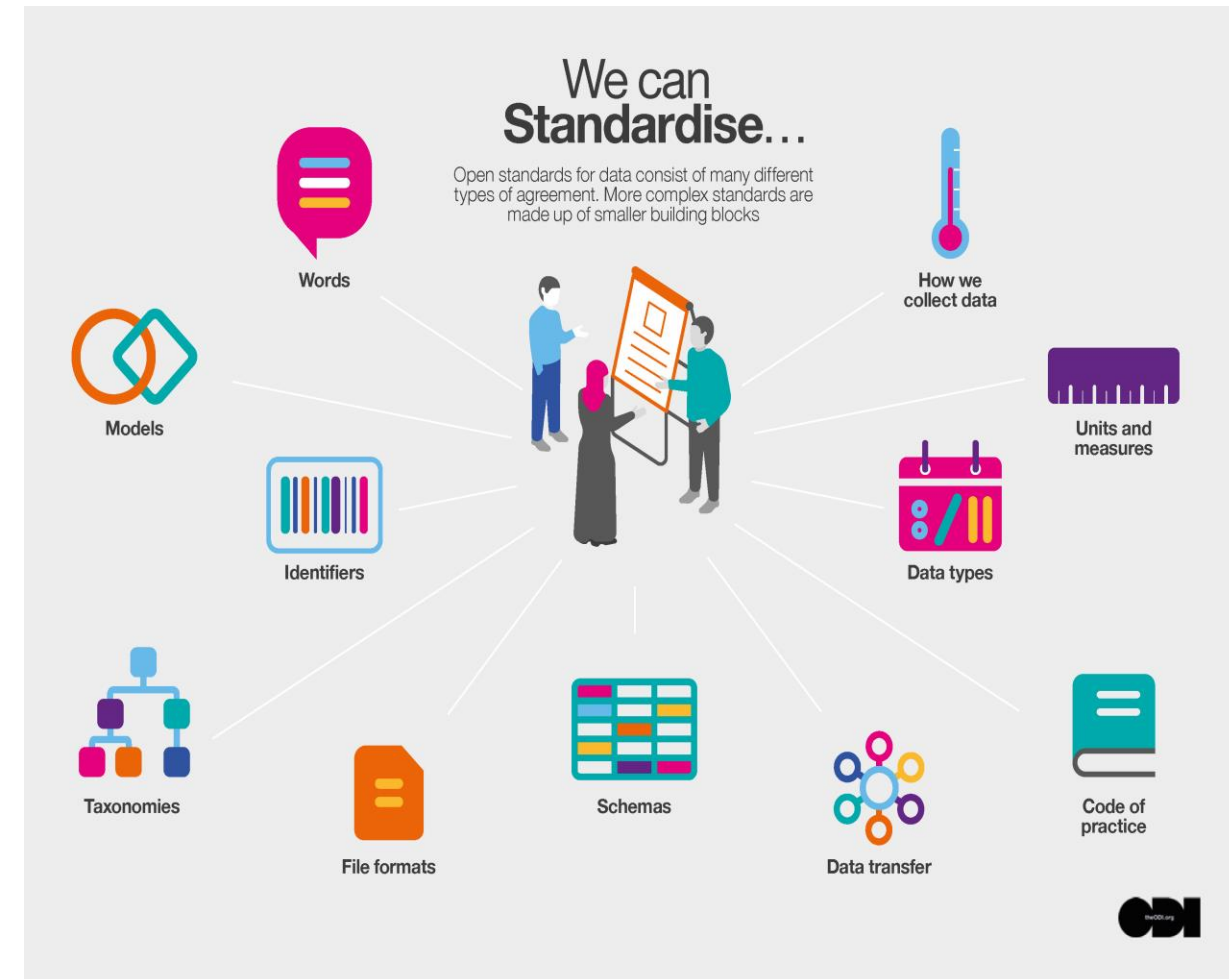
WORLD
METEOROLOGICAL
ORGANIZATION



Towards Consistent Approach

- Discovery metadata (resources e.g data sets), WCMP2.0
- Topic hierarchy: **arg.ina.data.hydrology.surface-water-observations.river.stream-level**
- KPIs for hydrology metadata and data
- Standards: WIGOS Metadata Standards, WaterIML2.0
- Additional Hydrological of variables
- OSCAR and allocation of WSI

Need to Standardize



The Open Data Institute

WHOS Technologies: Standardization

WMO/OGC Hydrology Domain Working Group

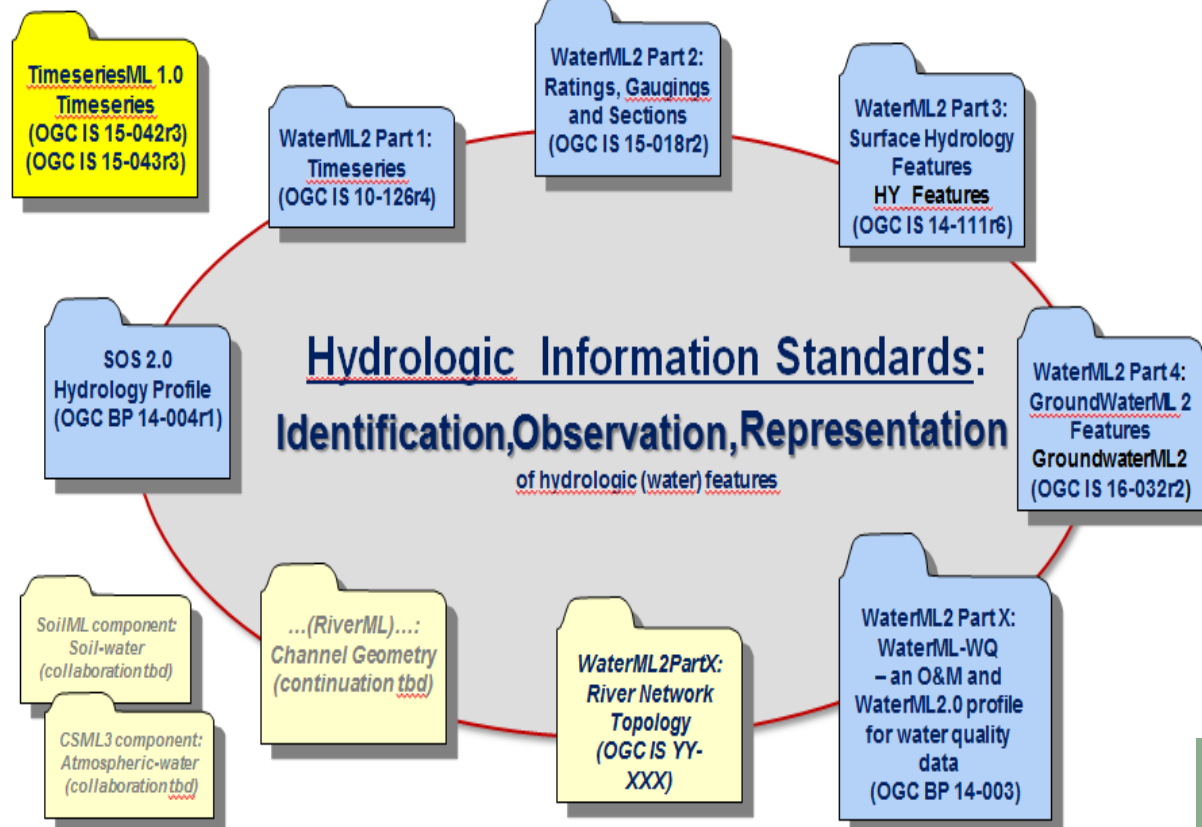
WaterML2 suite



International
Organization for
Standardization



Open
Geospatial
Consortium

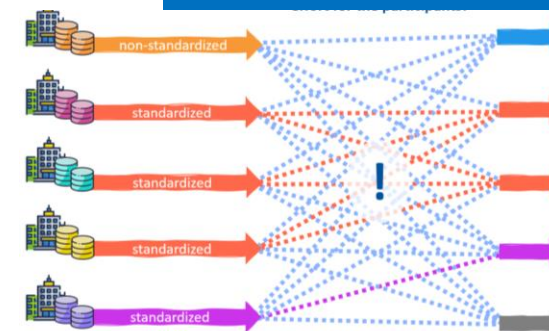


WHOS Standardization Approach

1. Data Providers implement standards
2. WHOS brokering approach builds on standardization

Talking about the same thing?

Interoperability burden

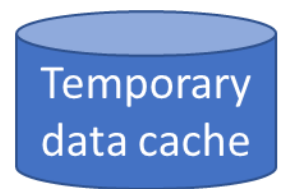
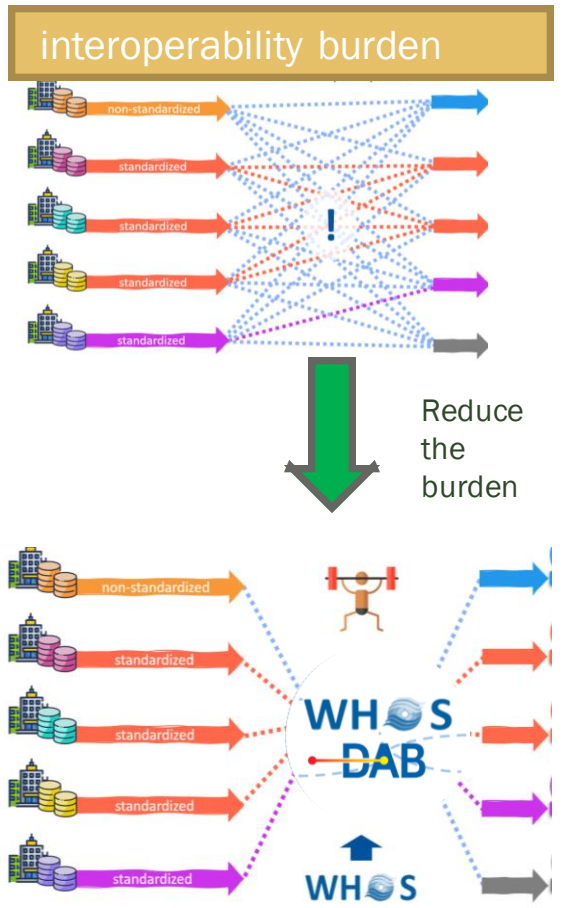


WHOS Technologies : DAB

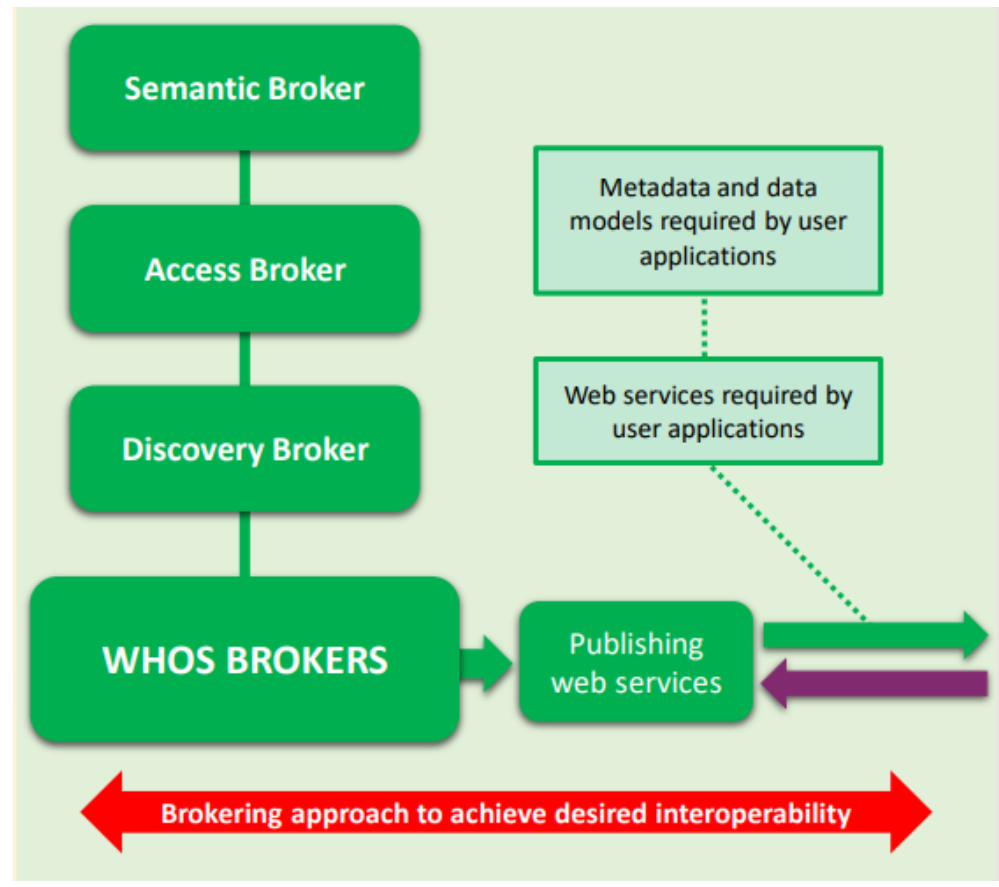


WORLD METEOROLOGICAL ORGANIZATION

GO GROUP ON EARTH OBSERVATIONS

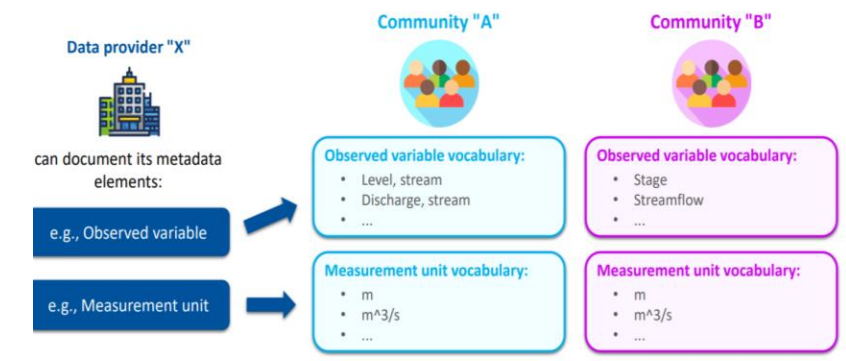
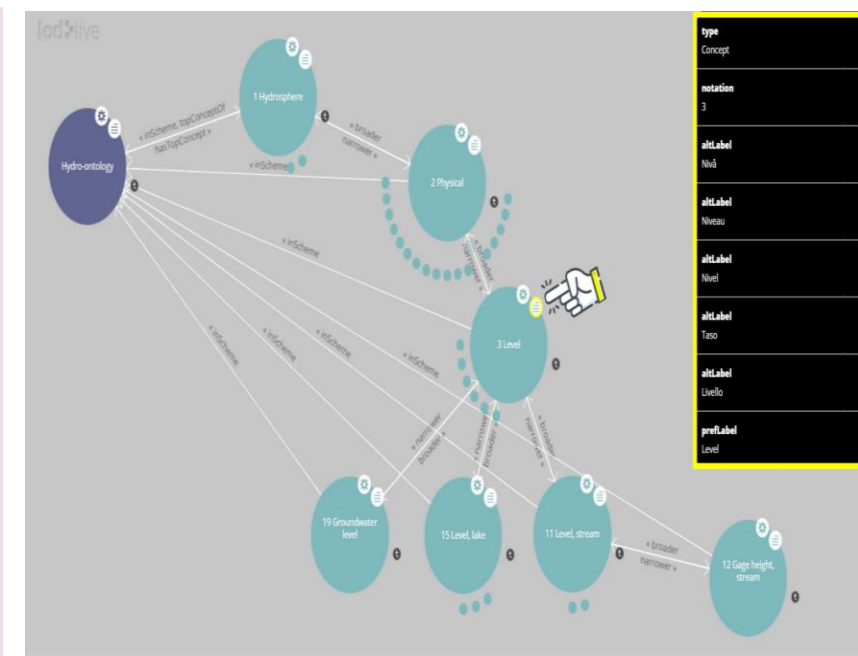
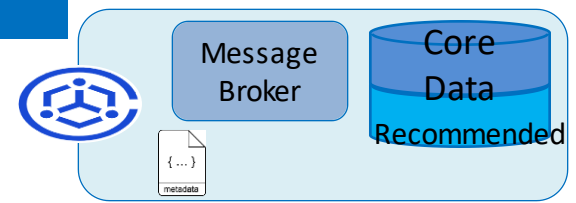


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DAB as WIS 2 Node

WIS2 Node



Institute of Atmospheric Pollution Research
National Research Council of Italy

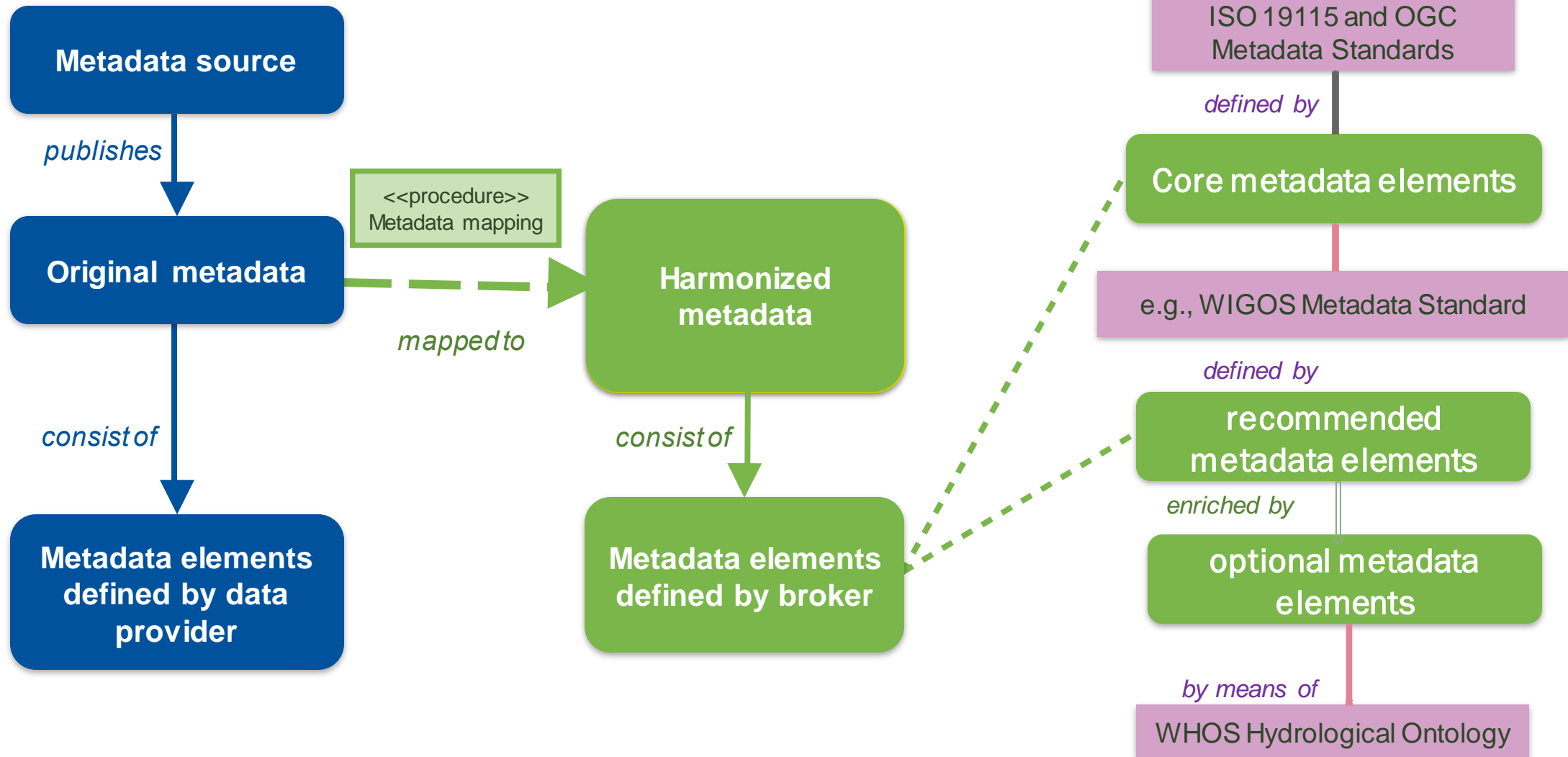
WHOS: Metadata Mapping



WORLD
METEOROLOGICAL
ORGANIZATION



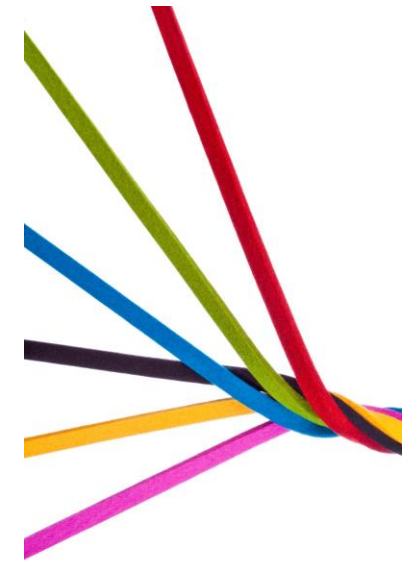
GROUP ON
EARTH OBSERVATIONS





Questions: How

- ❑ Visibility of data providers, creators, communities, consumers
- ❑ Improving on performance: data cache, distributed deployment of GEO-DAB,
- ❑ Common standard, vocabularies, protocols,
- ❑ Addressing user needs and quality-- one stop for data
- ❑ Essential data for addressing needs



CONTACT DETAILS



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Contact: whos@wmo.int



PHONE NUMBER

+41 766 546 328

For more information visit: <https://community.wmo.int/en/activity-areas/wmo-hydrological-observing-system-whos>