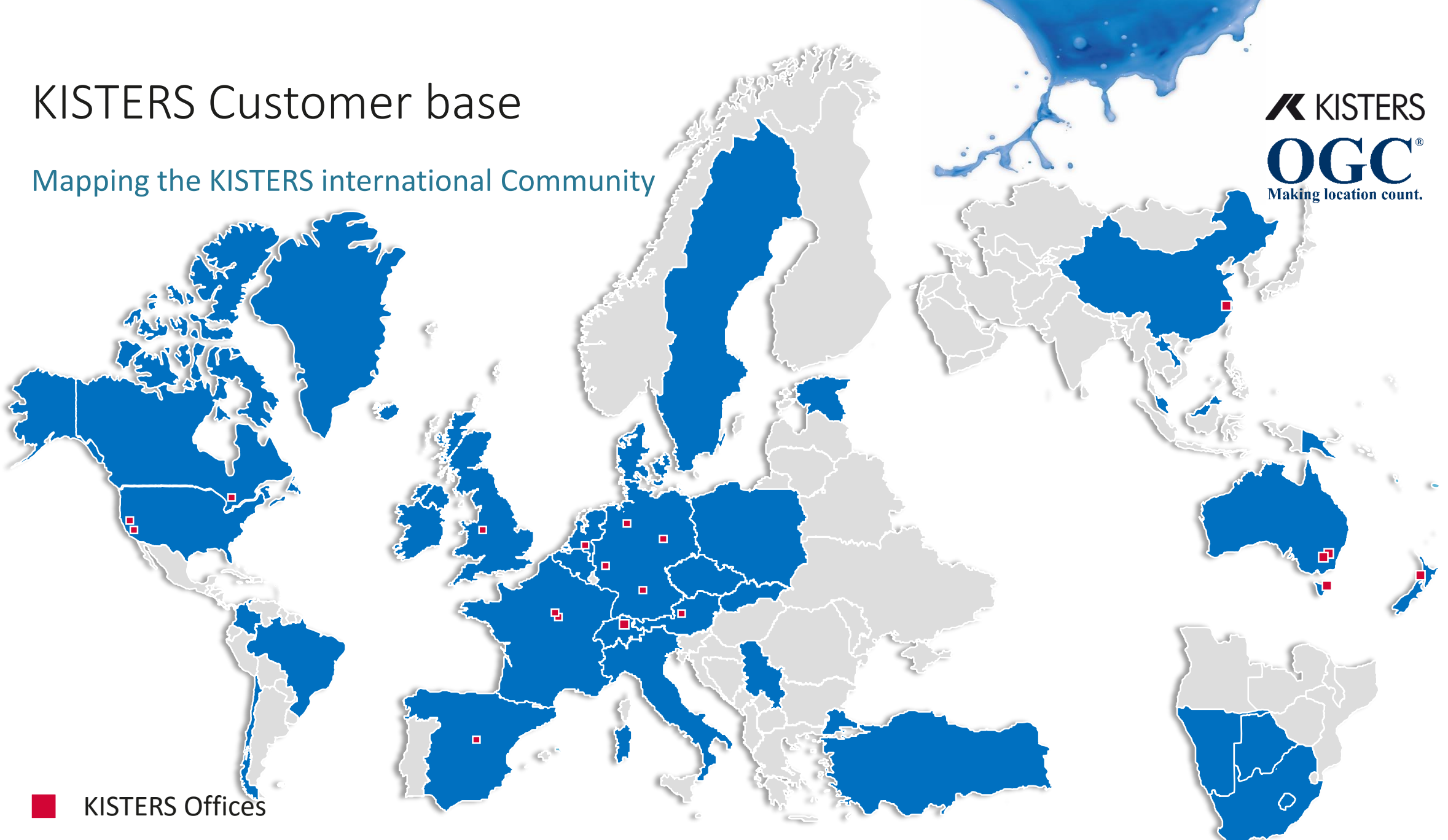


Experiences with open standards

OGC/WMO HYDRODWG 2016, Koblenz, Michael Natschke

KISTERS Customer base

Mapping the KISTERS international Community



■ KISTERS Offices

KISTERS Company Profile

Business Unit Water: Solution areas and Markets



KISTERS experiences with open standards

Standards, formats and protocols for time series transfer



Intra-process communication

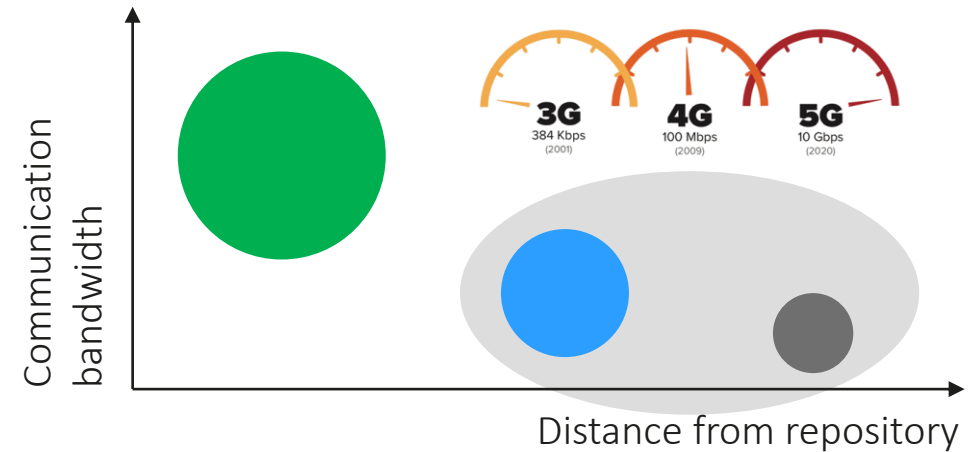
- communication between modules within a single server
- mass data streaming (industry standard)
- development standards (e.g. OSGi framework)

Inter-process communication

- communication between two server
- mass data transfer/streaming (industry standard)
- high performing API based client-server or server-server communication (e.g. REST)

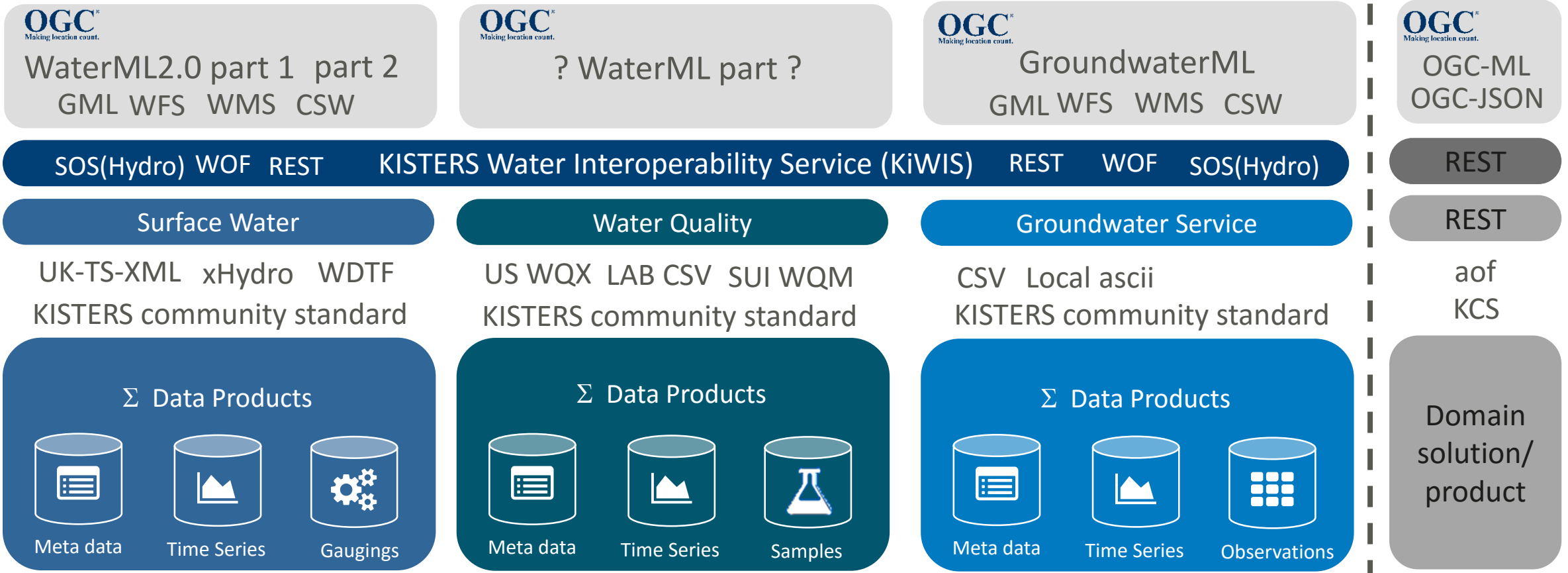
Inter-system communication

- communication between two systems (and business logics)
- data exchange (domain standard such as WaterML2.0 part1 for time series)
- open protocol (such as SOS)



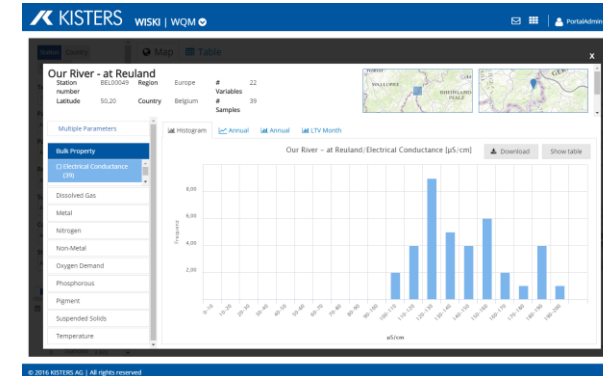
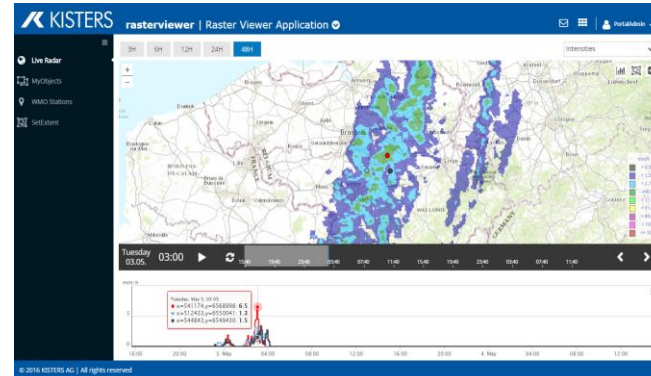
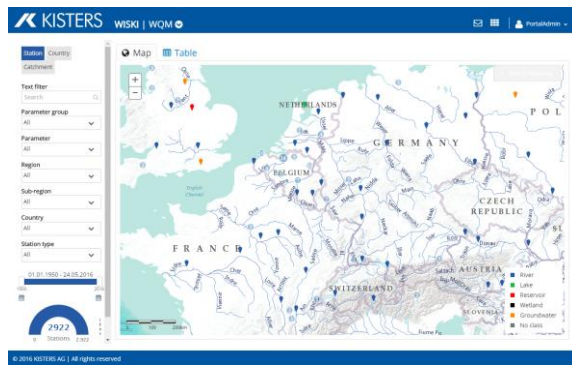
KISTERS experiences with open standards

Standards, formats and protocols for time series exchange



KISTERS experiences with open standards

Standards, formats and protocols for web app development



SOS(Hydro) WOF REST KISTERS Water Interoperability Service (KiWIS) REST WOF SOS(Hydro)

Surface Water

Water Quality

Groundwater Service

Σ Data Products

Meta data

Time Series

Gaugings

Σ Data Products

Meta data

Time Series

Samples

Σ Data Products

Meta data

Time Series

Observations

REST

REST

Domain solution/product

KISTERS Projects supporting open standards

Australian Water Resource Information System: Water Data Online for Australia



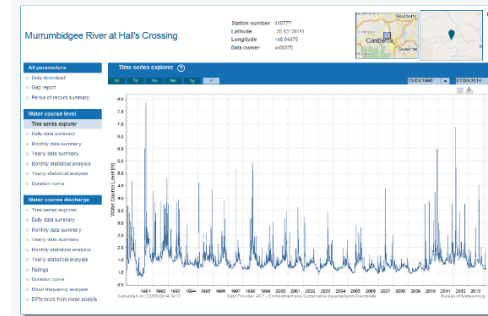
Water Data Online

Search: Enter name or number

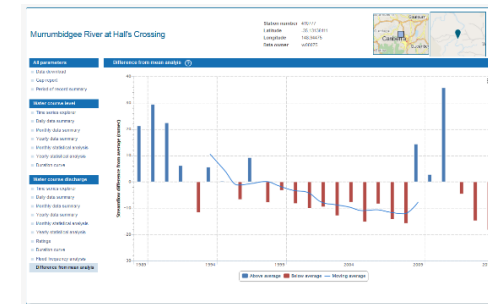
Filter: Parameter (All parameters), Station name (All stations), Station number (All stations)

Map, Table, Info, Copyright, FAQ

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Parameter Name	Unit	Data Type	Start Date	End Date	Quality Data
MurrumbidgeeDischarge	m ³ /s	Discharge	01/01/1961	31/12/2014	Quality A: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality A: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality B: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality C: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality D: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality E: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality F: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality G: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality H: 100%
MurrumbidgeeWaterLevel	m	Water Level	01/01/1961	31/12/2014	Quality I: 100%

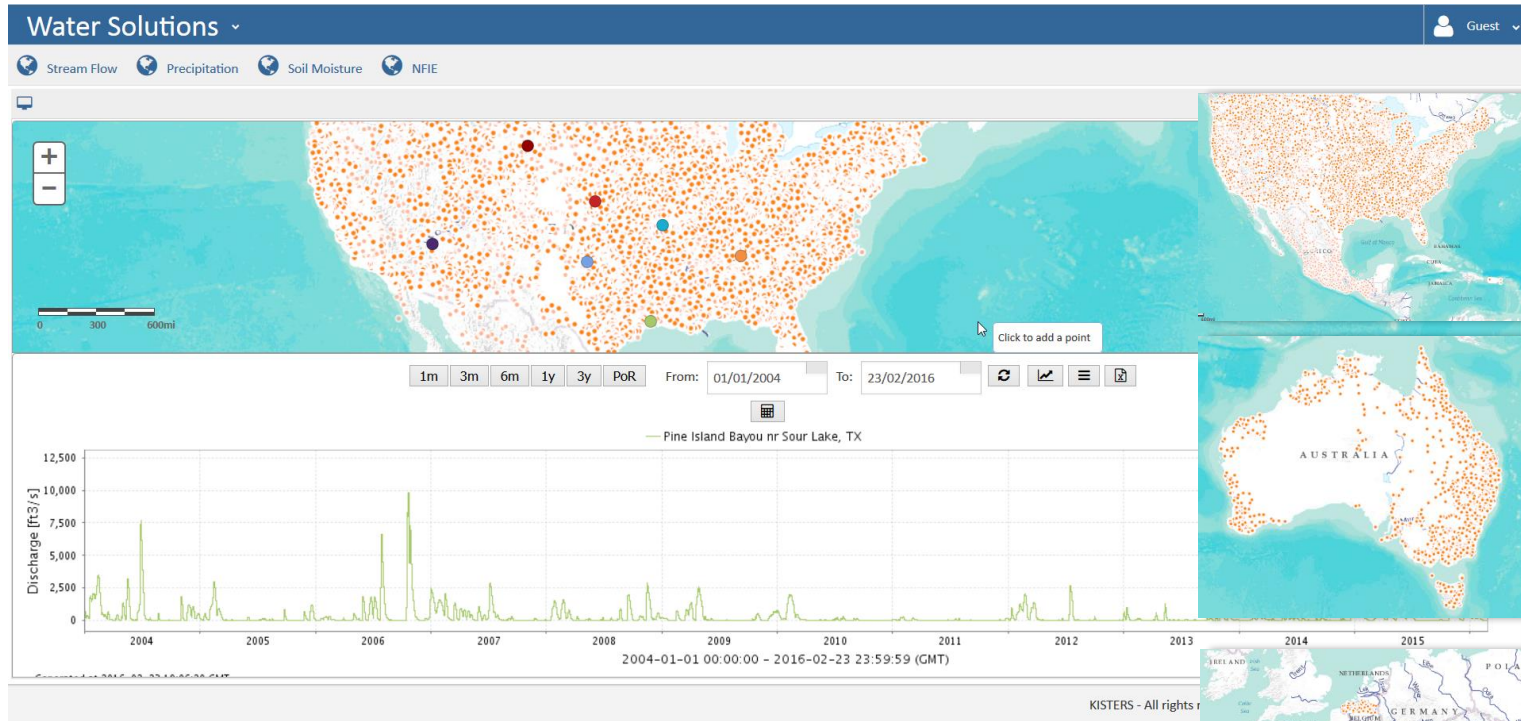


Fact Sheet

- Water Data Online is a lighthouse project in Australia (BoM) to centrally manage Australia's Water Resource Information
- Data from more than 260 data providers are integrated into a central access point at BOM
- Producing the core data products to inform Australia about the current water conditions
- Climbing Rob Vertessy's value ladder another step by making data publicly accessible
- Enabling the Geo-Fabric integration of in-situ data

KISTERS Projects supporting open standards

World Water Online: global in-situ network for Hydrology



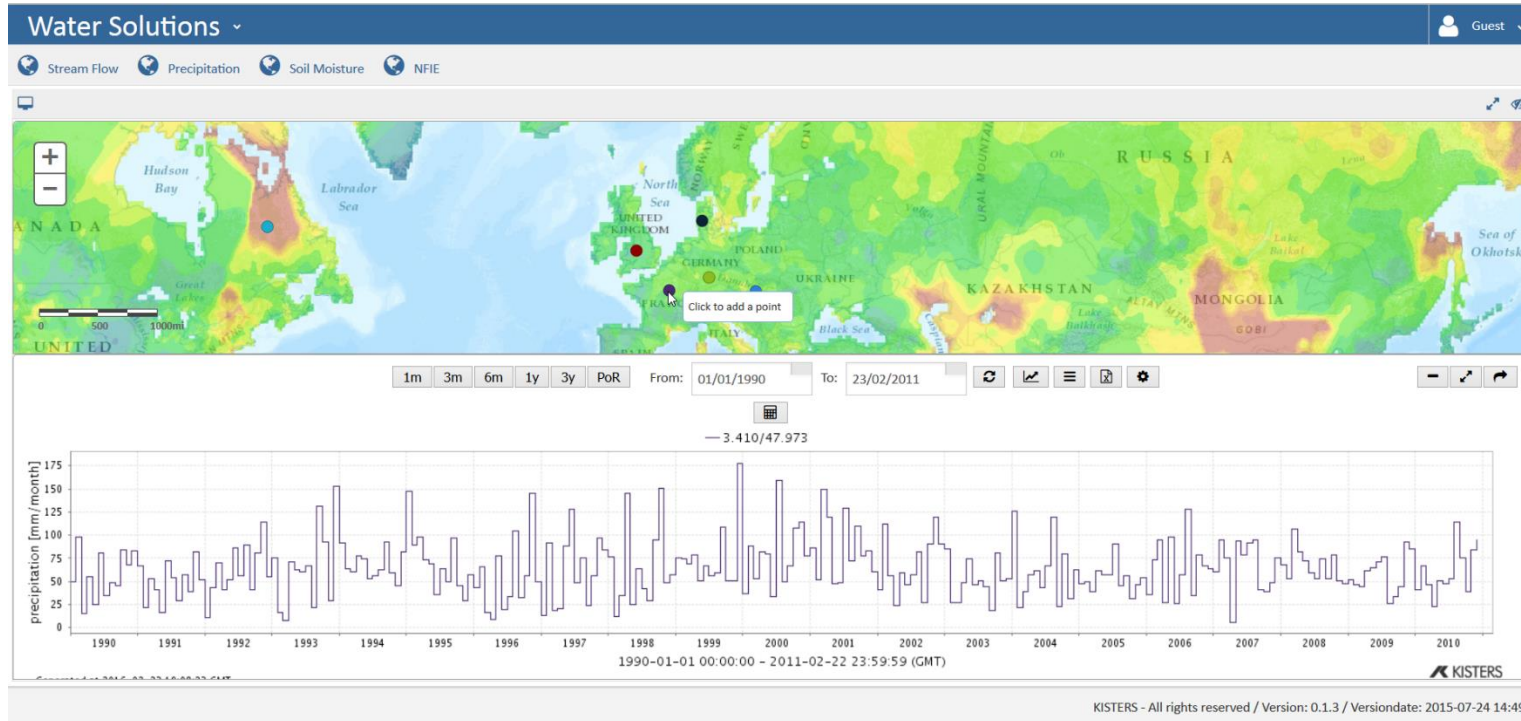
Fact Sheet

- **World Water Online** is an initiative from UT-Texas (Prof. David Maidment), esri and KISTERS
- Making core hydrological variables available on global level
- Stream discharges, precipitation and soil moisture
- Groundwater is pending
- Decentral solution based upon open standards and webservice technology
- Demonstrator at AIP 6/7 GEOSS Summit in Geneva



KISTERS Projects supporting open standards

World Water Online: global in-situ network for Hydrology



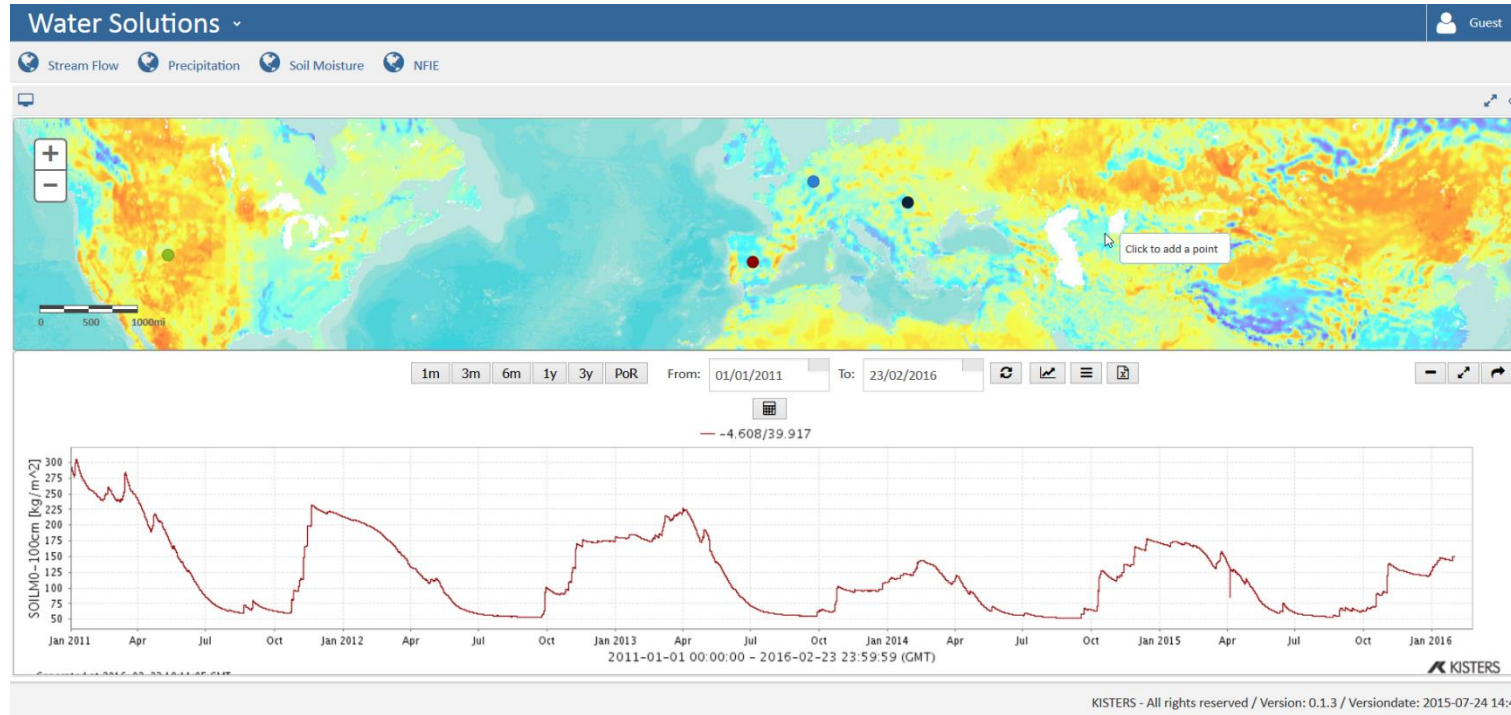
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KISTERS Projects supporting open standards

World Water Online: global in-situ network for Hydrology



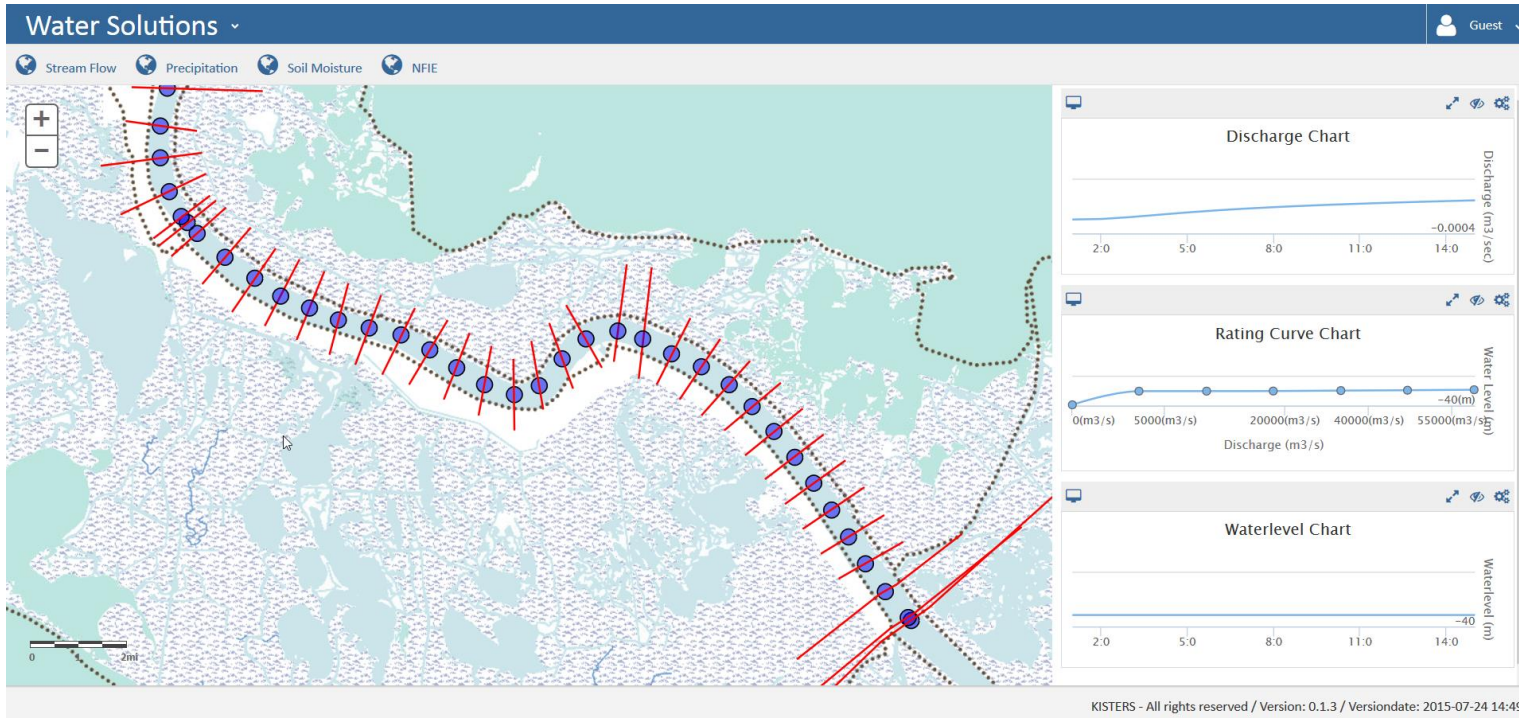
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KISTERS Projects supporting open standards

US: National Flood Forecast Interoperability Experiment



Fact Sheet

- **NFIE:** National Flood Forecast Interoperability Experiment
- Support of the architecture team
- NFIE Flow Modeling for the entire US, based upon NHDplus geospatial data set
- Demonstrator Summer School 2015
- 2.7 Million river reaches, 6,600 basins
- Models: WRF Hydro and RAPID
- Modern information services based upon web services (**incl. open standards**)



and many others

KISTERS Projects supporting open standards

WDI: Water Data Infrastructure for Flanders



Model type	Execution time	Task status	Start time	End time	Forecast time
POC- Maarkebeek	2/19/2016, 9:52:23 AM	FINISHED	2/16/2016	2/19/2016	2/19/2016
POC- Maarkebeek	2/19/2016, 9:28:01 AM	FINISHED	2/1/2015	2/12/2015	2/12/2015
POC-Bisagno	2/18/2016, 5:53:25 PM	FINISHED	2/1/2016	2/11/2016	2/11/2016
POC-Bisagno	2/19/2016, 10:37:22 AM	FINISHED	10/8/2011	11/1/2011	11/1/2011
POC- Maarkebeek	2/19/2016, 10:21:57 AM	FINISHED	2/8/2016	2/12/2016	2/19/2016

Fact Sheet

- The **Water Data Infrastructure (WDI)** project has been initiated by **Vlaamse Milieu Maatschappij (VMM)**
- **Avoid vendor login and silo processing** of relevant data in hydrological forecast processes
- **Open interfaces, open standards** (WML2.0, WPS, CSW, WMS) are used to build a decentral cloud based modeling infrastructure
- **Foster innovation** in modeling community by specifically engaging the scientific sector



KISTERS Projects supporting open standards

WDI: Water Data Infrastructure for Flanders

The screenshot displays the KISTERS Water data portal interface. The top navigation bar includes the KISTERS logo, a menu icon, 'Water data', and a user profile 'PortalAdmin'. The main content area is divided into several panels. A map on the left shows the geographical context. The central 'ModelRunner' panel is the focus, with four numbered callouts (1-4) highlighting key steps in the workflow:

- 1**: Selecting a model type from a dropdown menu. The menu shows options like 'POC-Bisagno' and 'POC-Maarkebeek'.
- 2**: Setting the 'From', 'To', and 'Forecast' dates in the 'Task status' section. The 'Forecast' date is currently set to '26-02-2016'.
- 3**: The 'Execute' button is highlighted, indicating the start of the model run. The 'Model type' is confirmed as 'POC-Maarkebeek'.
- 4**: The 'Task status' section shows the progress of the model run. A progress bar indicates '40%' completion. The 'Number of stations forecasted' is 8. Buttons for 'Show in map', 'Download', and 'New run' are visible.

Below the main panels, a table lists the status of previous model runs:

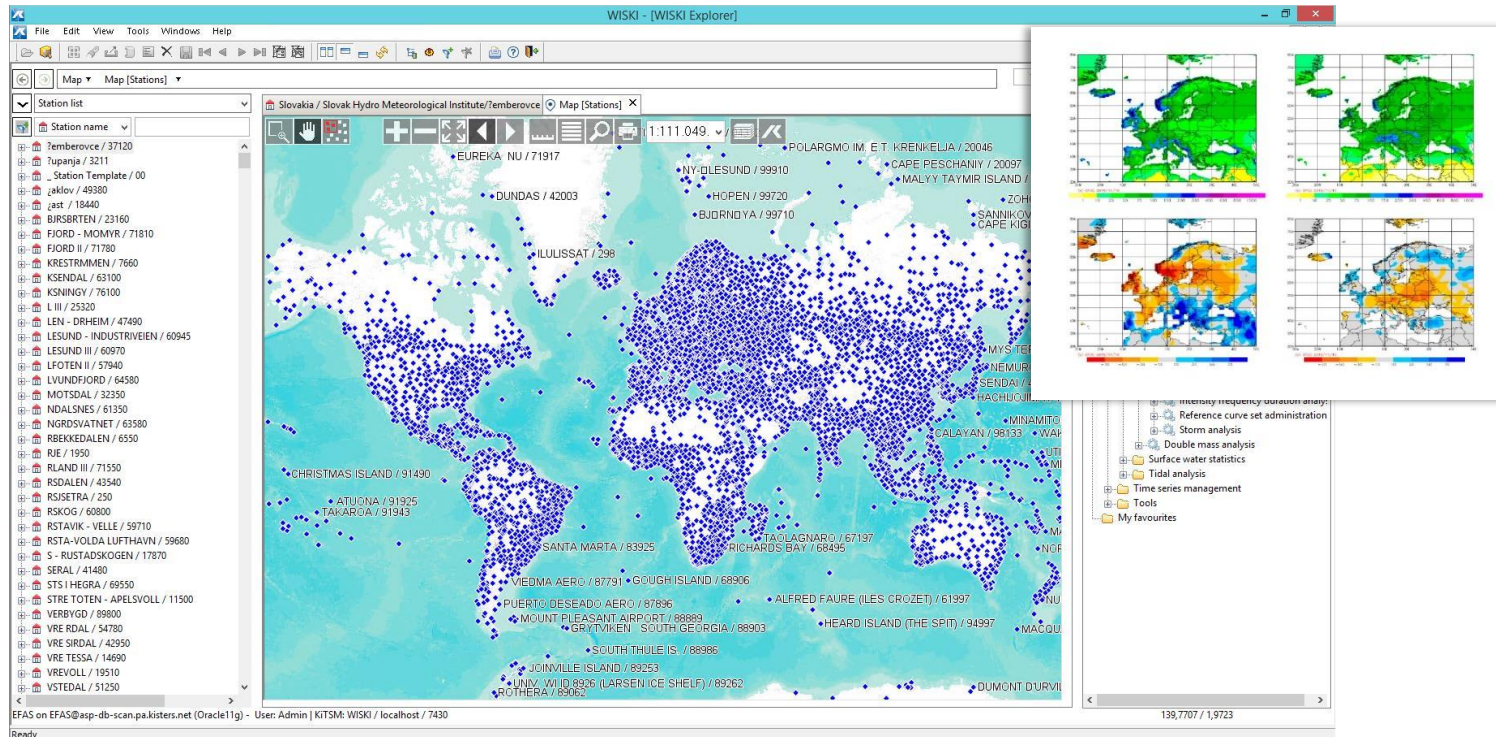
Model type	From	To	Forecast	Status	Start Date	End Date	Forecast Date	Actions
POC-Maarkebeek	2/19/2016	9:28:01 AM	FINISHED	2/1/2015	2/12/2015	2/12/2015		📍 🗑️
POC-Bisagno	2/18/2016	6:52:36 AM	FINISHED	2/1/2016	2/11/2016	2/11/2016		📍 🗑️

Fact Sheet

- The **Water Data Infrastructure (WDI)** project has been initiated by **Vlaamse Milieu Maatschappij (VMM)**
- **Avoid vendor login and silo processing** of relevant data in hydrological forecast processes
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KISTERS Projects supporting open standards

European Flood Awareness System: Meteo Data Collection Centre



Fact Sheet

- EFAS MDCC: meteorological data collection and validation for the European Flood Awareness System
- Collecting data for 20,000 meteorological stations (historic and real time) of the member states
- **Single meteo endpoint** for dissemination through open standards
- **Real time spatial/ temporal validation** and delivery of **gridded precipitation**, wind speed and air temperature data product to the computational center (every 6 hours)
- **Regular anomaly reporting**

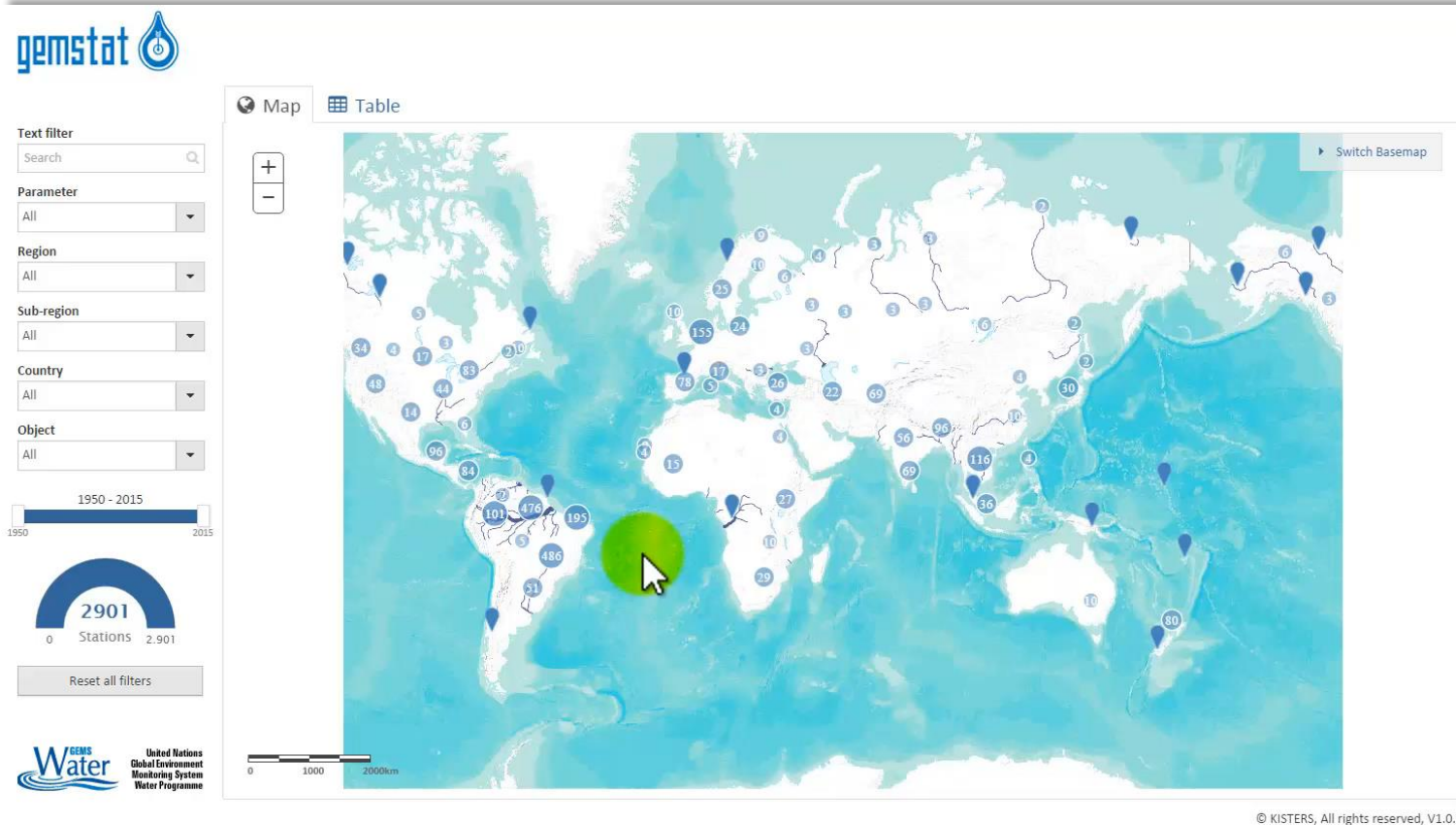


Rijkswaterstaat
Ministerie van Verkeer en Waterstaat



KISTERS Projects supporting open standards

Open Standard Candidate: GEMStat; UNEP Global Water Quality Portal



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Fact Sheet

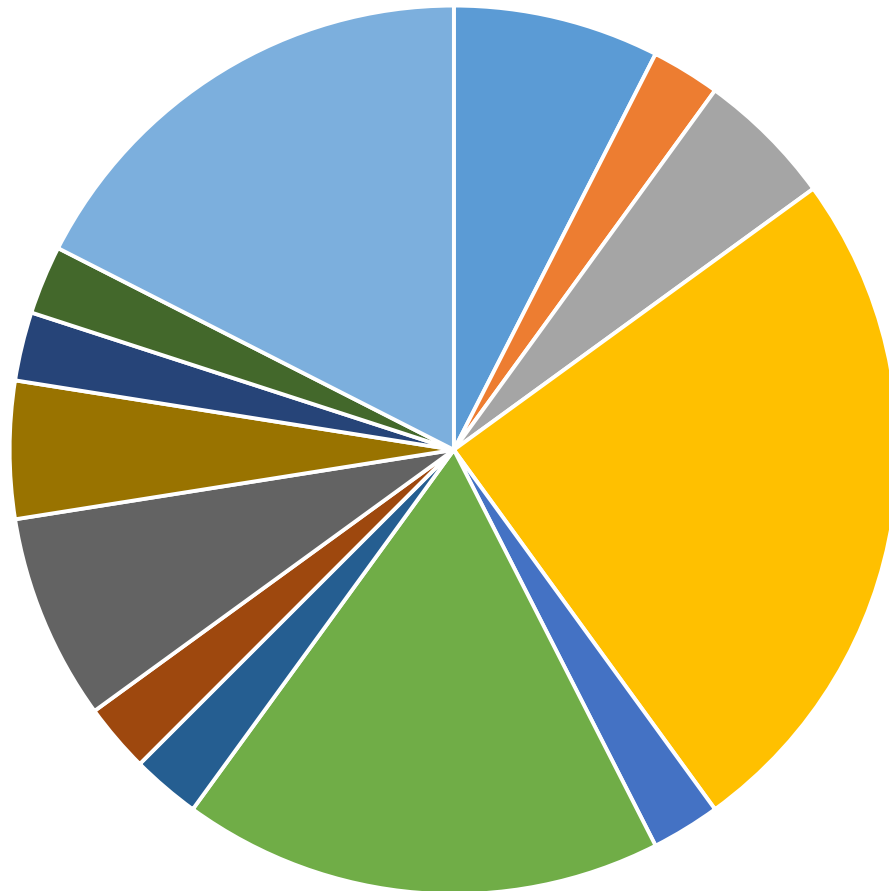
- **GEMStat** is component of the UNEP GEMS/Water
- 35 years operated by Environment Canada
- Now hosted by the German Federal Institute for Hydrology (BfG)
- designed to share surface and ground water quality data sets collected from the GEMS/Water Global Network of more than 3,700 stations world-wide.
- The GEMStat database comprises approx. 4.3 million records representing more than 100 quality parameter types.

KISTERS Projects supporting open standards

KISTERS Service enablement by countries



- Australia
- Austria
- Belgium
- Canada
- France
- Germany
- Ireland
- Italy
- Netherlands
- New Zealand
- Scotland
- Switzerland
- USA

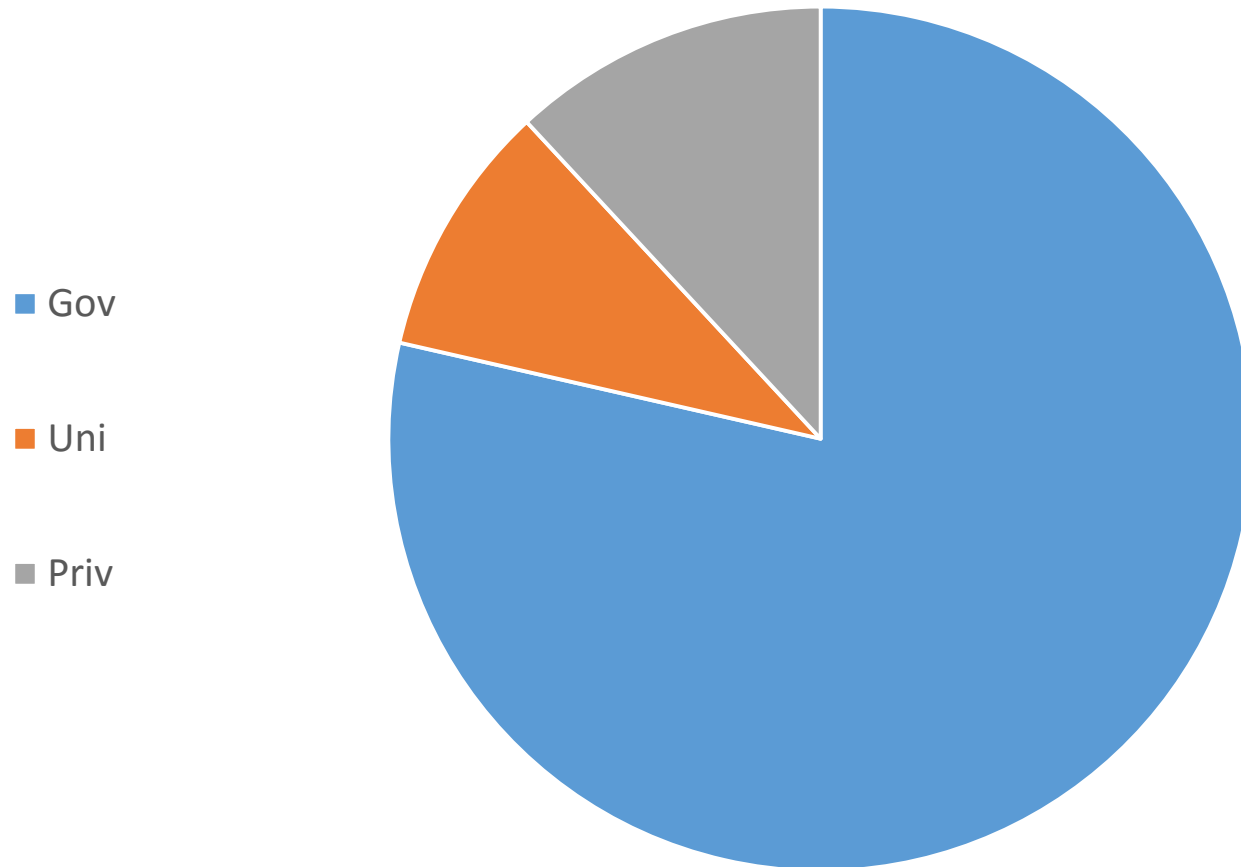


KISTERS Community

- **KISTERS Service enablement by countries**
- **KISTERS Water Interoperability Service installed and activated**
- **Open accessible data endpoints depend on the implementation of open data policy**
- **However open standards play an important role (common domain logic)**
- **HydroProfile must stay compliant to the community and must be managed by the HydroDWG**

KISTERS Projects supporting open standards

KISTERS Service enablement by sector

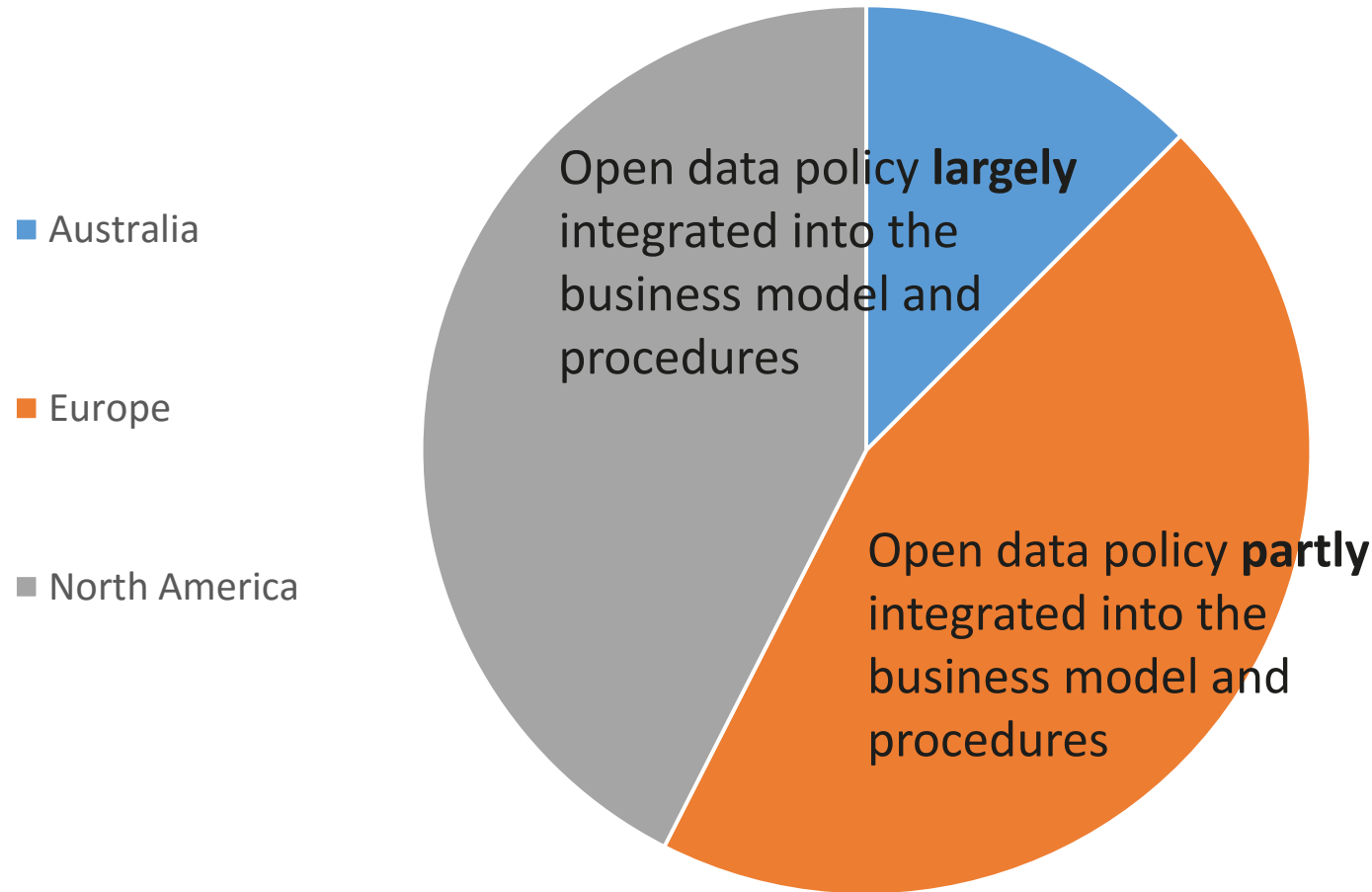


KISTERS Community

- **KISTERS Service enablement by sector**
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KISTERS Projects supporting open standards

KISTERS Service enablement by continent



KISTERS Community

- KISTERS Service enablement by continent
- KISTERS Water Interoperability Service installed and activated
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- HydroProfile must stay compliant to the community and must be managed by the HydroDWG

KISTERS experiences with open standards

Summary



OGC standards

- ✓ are established within the Hydro community
- ✓ are extended (e.g. by Ratings Gaugings & Cross Section)
- ✓ should revisit the forecast use case (IE2) and extend standard to ensemble and forecasts
- ✓ should be looking at standardization of Water Quality Sampling data
- ✓ provide service/data to fulfill publishing requirements (more JSON representation wanted)
- ✓ provide service/data as input or output in modelling processes

- ✗ should not be primarily used as server for a dynamic web page (format too verbose, functionality limited)
- ✗ should not be primarily used as data storage format (format too verbose and inefficient to read/write)

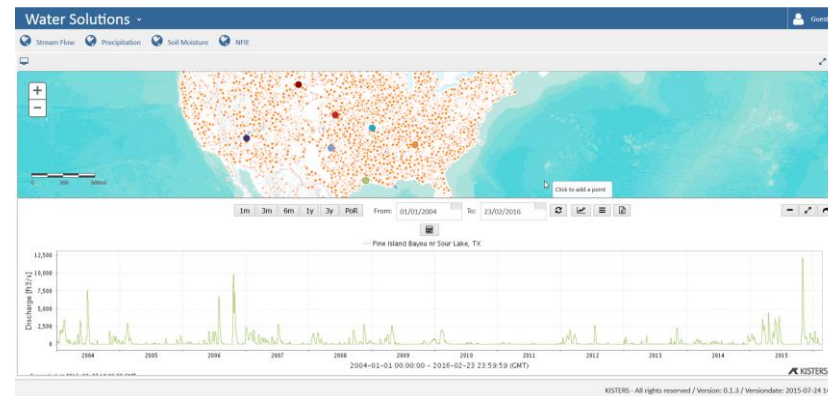
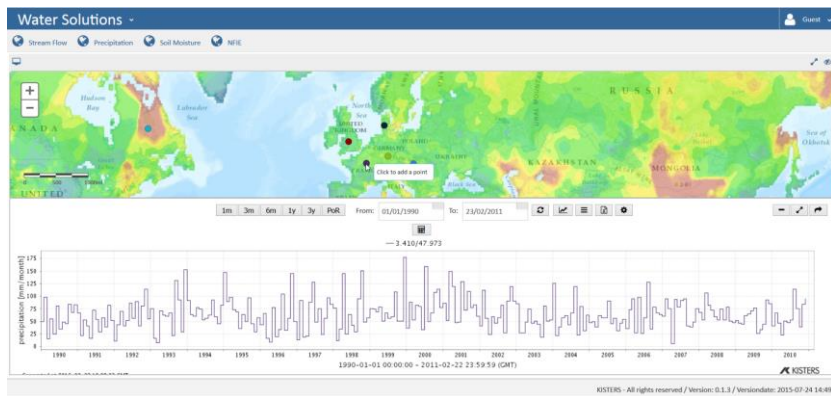
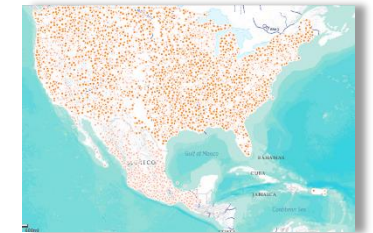
- ➡ are not fully utilised yet due to open data policy implementation process

KISTERS experiences with open standards

Summary

KISTERS contributions

- KISTERS technology stack is 100% compatible with open standards
- KISTERS projects do support open standards and combine them with the latest technology stack
- KISTERS continues working closely with the industry including the open source domain and scientific sector
- KISTERS World Water Online is the ideal technology stack for international/inter-institutional platforms (such as WMO Whycos, WIS, etc)



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Speaker: Michael Natschke

