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HDWG Groundwater IE Update

HDWG Workshop

Ispra, Italy

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Overview

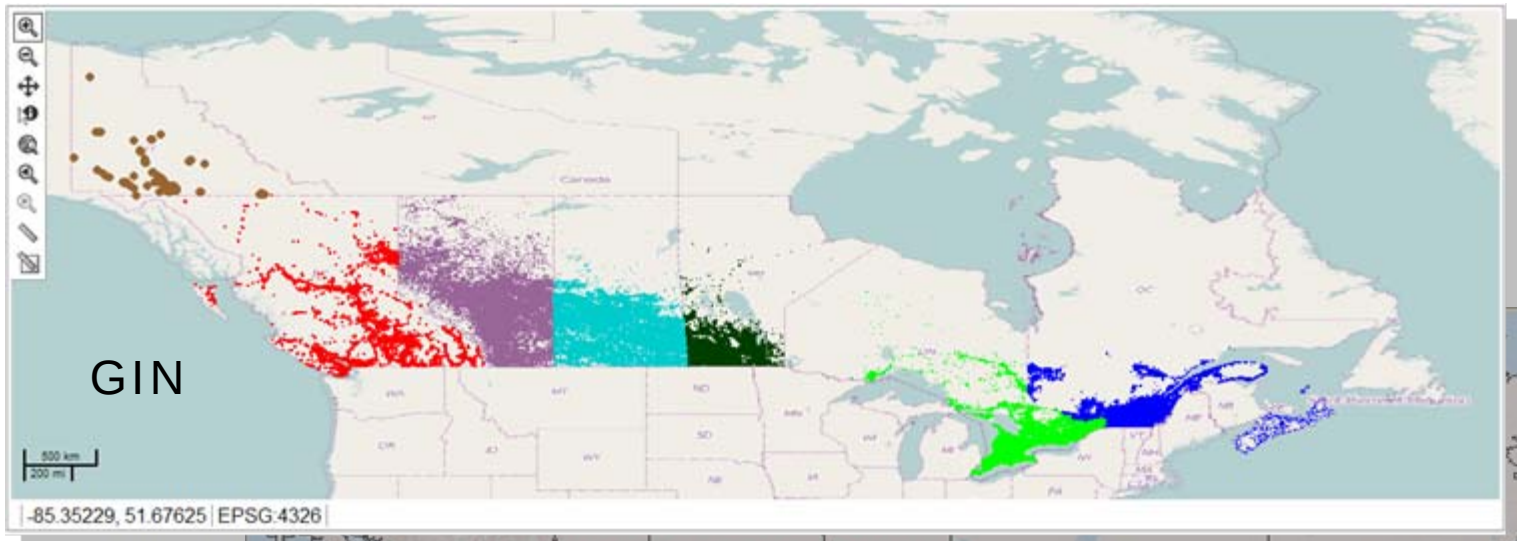
OGC-WMO Hydrology Domain Working Group GroundWater Interoperability Experiment (GW IE)

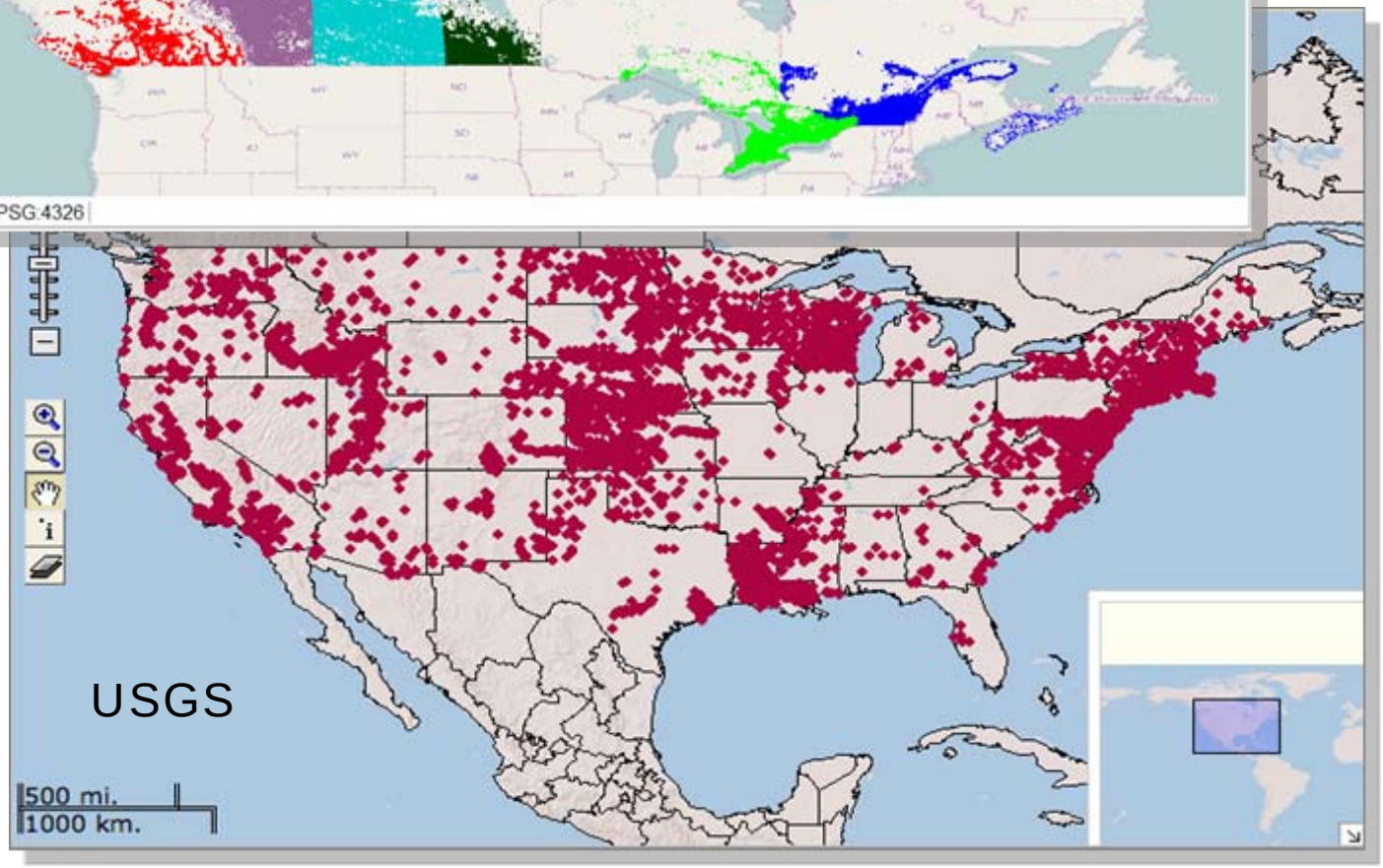
- GW IE Description
- Interim Results: Dec 2009
- Interim Results: Mar 2010
- Interim Lessons Learned
- Demo

GW IE Context

- **GW is a significant source of water for humans**
- **Ground / water feature and observation data**
  - **distributed:** many data providers (~1000 in Canada alone)
  - **heterogeneous:** structure and content (e.g. level, flow, quality)
  - **massive instances:** millions of wells (features/sensors) & time series (observ.)
  - **massive schema:** thousands of properties (e.g. for quality)
  - **few standard services:** very few OGC gr/water services
- **Existing schema standards for water**
  - WaterML (USA), GroundwaterML (CAN), WTDF (AU), WQX (USA), O&M,…
  - consolidation in WaterML 2 via OGC HDWG
- **Relevant OGC Web service standards**
  - SOS, WFS, WMS, CSW

Sensor & well locations





HDWG GW IE

- **Objectives**
  - Advance design of WaterML2 re: GW data
  - Advance fit of OGC services with WaterML2 and GW data
  - Advance US-CAN cross-border GW data exchange
- **Timeline**
  - Dec 2009 to Dec 2010
- **Participants**
  - US (USGS, SDSC/CUAHSI, NCSA/ISWA, 34North)
  - CAN (GSC, UCalgary)
  - AU (CSIRO)
  - EU (Kisters)
- **Use-case**
  - View, query, download: water wells & levels at US-CAN border

Interim Results: Dec 2009

- **WaterML2**
  - WaterML2 alpha schema tested & coordinated with GWML
- **OGC Services**
  - GSC: static water levels and wells (SOS, WFS, WMS)
  - USGS: dynamic water levels and well locations (SOS, WMS)
- **Clients**
  - GSC client implemented
- **Demo**
  - presented at OGC TC Dec 2009, AGU Annual meeting 2009
- **Remaining Issues**
  - WaterML2 schema: feature-of-interest and geometry
  - Services: SOS for massive networks, CSW for sensor discovery
  - Implementation: more clients, more data

Interim Results: Dec 2009

view wells

query levels

download levels

Interim Results: Mar 2010

- **WaterML2**
  - more analysis resulting in design recommendations
- **OGC Services**
  - USGS: water wells (WFS)
  - NCSA/ISWA: dynamic water levels—in progress
- **Clients**
  - 34North client implemented
- **Demo**
  - to be presented at HDWG workshop 16 Mar 2010, Ispra
- **Next Steps**
  - implement WaterML2 beta by June 2010
  - refine/add services and clients by June 2010
  - wrap-up Dec 2010 at OGC TC Sydney, AU

Interim Results: Mar 2010

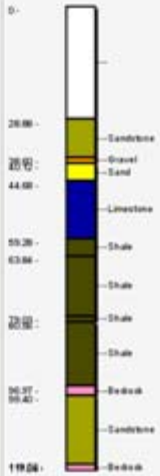
USGS WFS well service

GIN Water Well Log

Water Well - USGS.440050094102801

Identity : USGS.440050094102801
Length : 118.56m
Elevation : 305.52m
Latitude : -94.17468
Longitude : 44.013851944

Well log :



Depth from (m)	Depth to (m)	GIN Lithology	Original Lithology
0	28.88	(Show Info)	Gravel and clay
28.88	38.608	Sandstone (Show Info)	Sandstone
38.608	40.128	Gravel (Show Info)	Gravel
40.128	44.688	Sand (Show Info)	Sand
44.688	59.28	Limestone (Show Info)	Limestone
59.28	63.84	Shale (Show Info)	Shale
63.84	79.03999999999999	Shale (Show Info)	Shale
79.03999999999999	80.56	Shale (Show Info)	Shale
80.56	96.976	Shale (Show Info)	Shale
96.976	99.408	Bedrock (Show Info)	Rock
99.408	117.04	Sandstone (Show Info)	Sandstone
117.04	118.56	Bedrock (Show Info)	Rock

34North client

Lessons Learned

- The model – (1) Data Providers, (2) Schema & Services Design and (3) Client Development is good.
- Coordinating North America, Europe and Australia telecon leaves few good time options
- Knowledge of the IE process and rules critical for assembly phase
- Cross-border test case is interesting and politically useful but not mandatory for evolving requirements, prototyping, testing and validation
- Need proper coverage of integration use cases implemented in test clients to validate IE
- In GW IE, using an existing and well specified client makes for very effective IE feedback

Lessons Learned

- Quarterly milestones appropriate and necessary
- Monthly scoping calls work but need to be carefully managed
- Informal & direct technical exchange between monthly scoping calls mandatory
- Still need efficient process to communicate out to SWGs
- Testing of other areas of OGC stack equally important to IE and HydroWG (besides WaterML2 and SOS) (i.e. GWML via WFS, WMS getFeatureInfo)
- Custom SOS servers mandatory for testing the evolving standard(s)

More info

- **HDWG / WaterML 2**
  - http://external.opengis.org/twiki_public/bin/view/HydrologyDWG
- **HDWG GW IE wiki**
  - http://external.opengis.org/twiki_public/bin/view/HydrologyDWG/GroundwaterInteroperabilityExperiment
- **GWML**
  - http://ngwd-bdnes.cits.rncan.gc.ca/gwml/

Demo