SOSPilot - Prototype

Just van den Broecke
Geonovum
Amersfoort - Oct 27, 2014
just@justobjects.nl

ABOUT

Independent Open Source Geospatial Professional

justobjects.nl

JustObjects

Member of the OpenGeoGroep (NL)

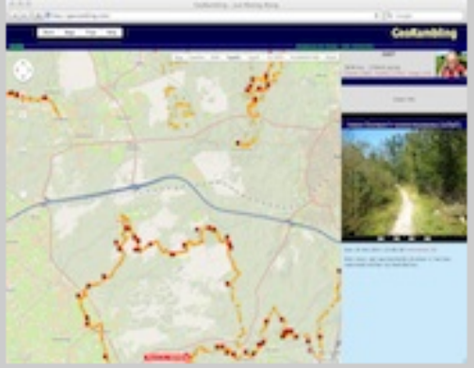
www.opengeogroep.nl

OPEN GEO GROEP

Secretary OSGeo.nl

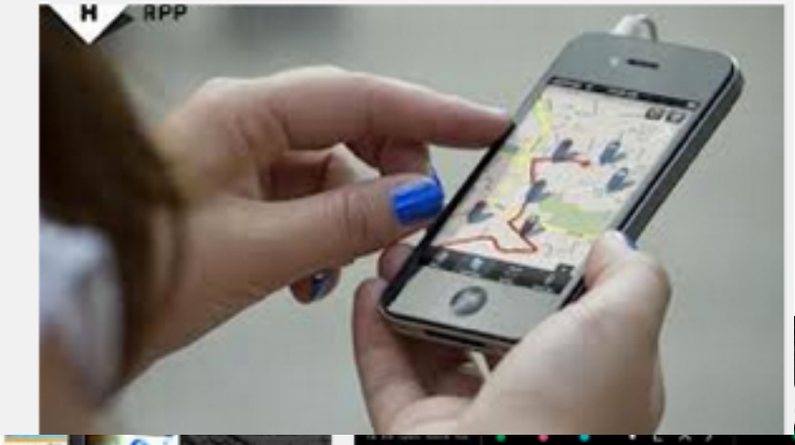
OSGeo.nl
Nederlandstalige afdeling

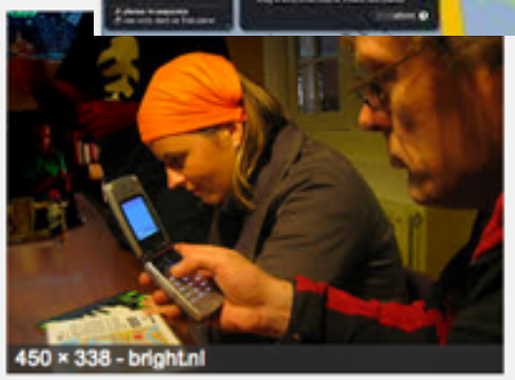
Traceland



GeoRambling - Just's GPS Hikes

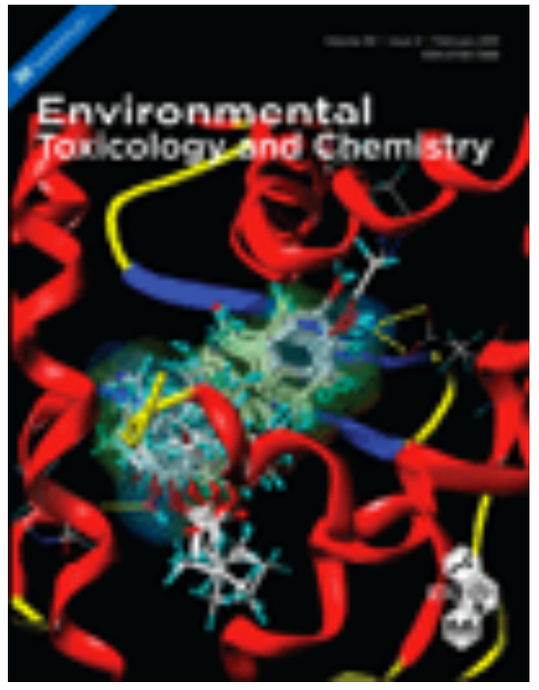
OtterTracing





1. Intro

Back into Environmental Chemistry



G.G. Choudhry, J.A. van den Broecke, G.R.B. Webster, and O. Hutzinger; ***"Environmental Photoincorporations of Polychlorobenzenes into Several Humic Model Monomers"***; Chemosphere 16: 495-505 1987

G.G. Choudhry, J.A. van den Broecke, G.R.B. Webster, and O. Hutzinger; ***"Photochemistry of Halogenated Benzene Derivatives. Part VII. Photochemical Interactions of Polychlorobenzenes with some Humic Model Compounds"***; 1986 Environm. Toxicol. Chem. 5: 625-635

G.G. Choudhry, J.A. van den Broecke, G.R.B. Webster, and O. Hutzinger; ***"Environmental Photoincorporations of polychlorobenzenes into several humic model monomers"***; 1987 Proceedings of the Third International Symposium on "Environmental Pollution and its Impact on Life in the Mediterranean Region"; Istanbul, Turkey, September 1-4, 1985; Guest eds. H. Parlar et al., Pergamon Press, New York;

Agenda

1. Intro
2. Data Transformation (ETL)
3. Services
4. Clients
5. Demo
6. Discussion

Project Links

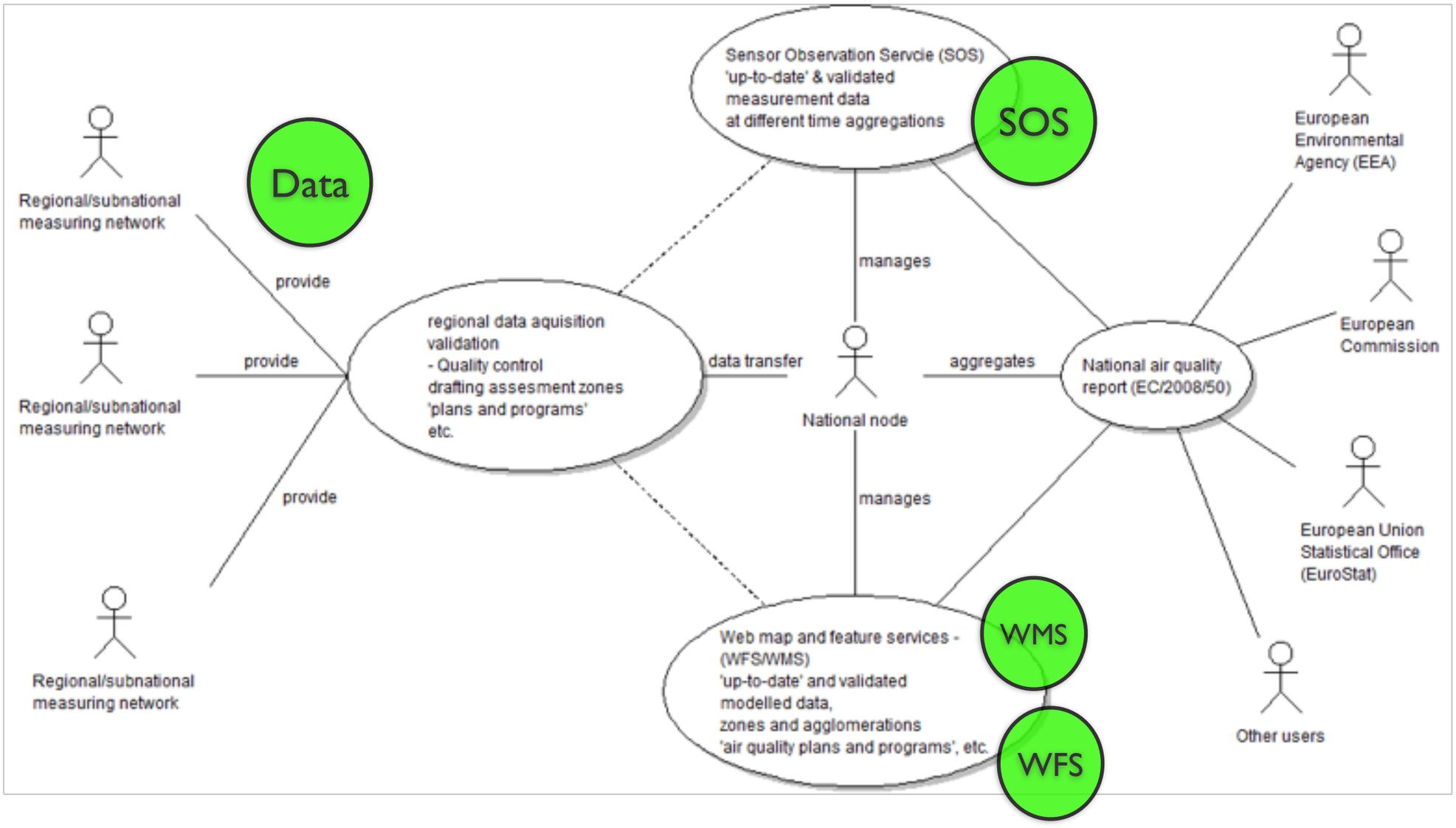
Home: sensors.geonovum.nl

Doc: sospilot.rtfd.org

Code: github.com/Geonovum/sospilot

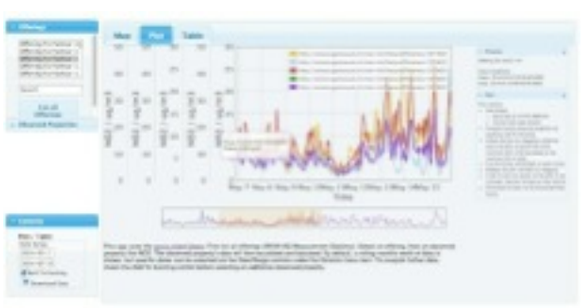
TODO: GitHub issue tracker

Scope

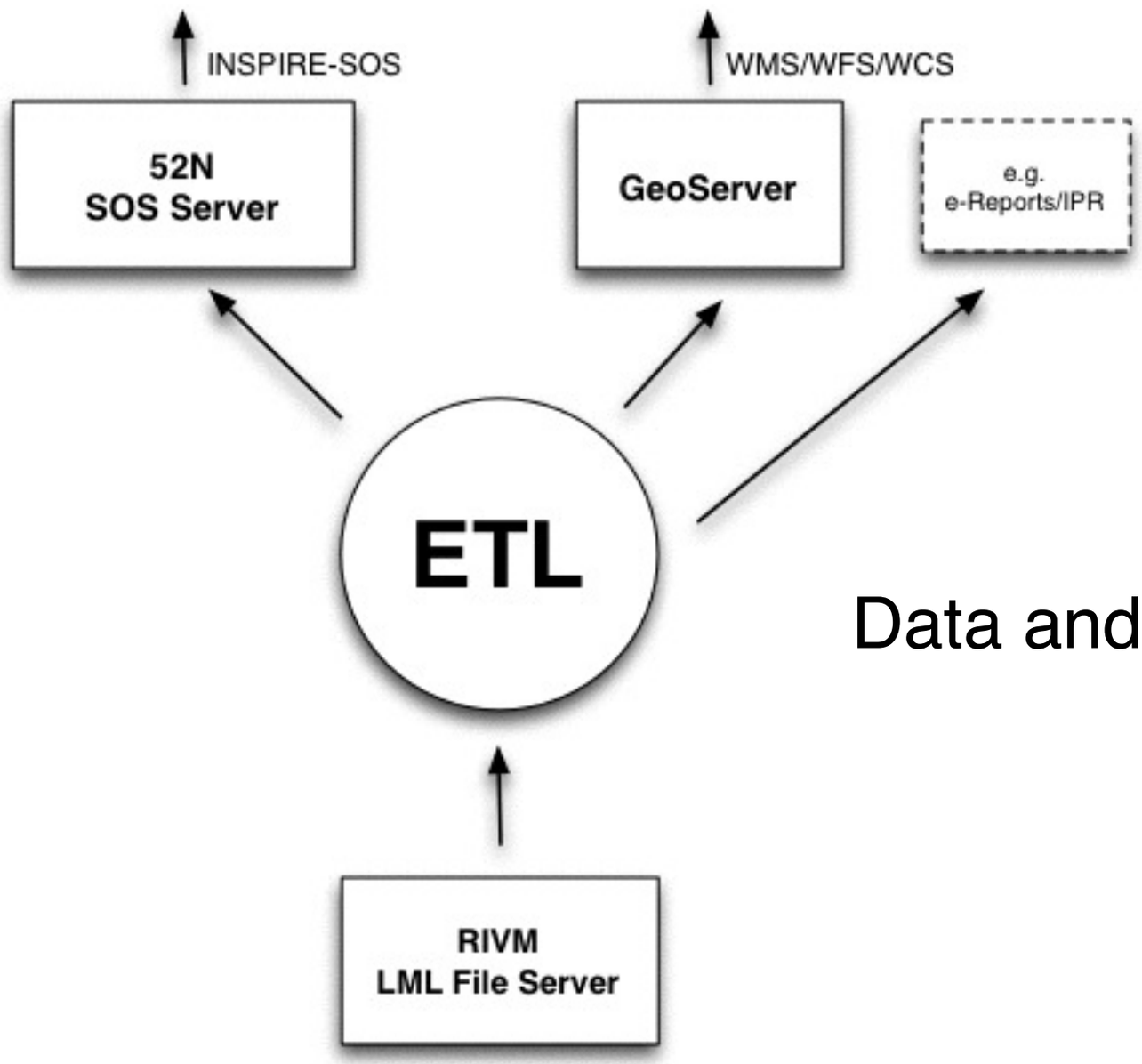


From: *"Building bridges: experiences and lessons learned from the implementation of INSPIRE and e-reporting of air quality data in Europe"*
by: Alexander Kotsev, Olav Peeters, Paul Smits and Michel Grothe. - Earth Sci Inform DOI 10.1007/s12145-014-0160-8

Prototype Scope



Clients



Services

Data and Transformations

Data and Transformations (ETL)

Source: Hourly Measurements


```
▼<message>
  ▼<body>
    ▼<meting>
       <datum>01/07/2014</datum>
       <tijd>11</tijd>
       <station>NL01483</station>
       <component>PM10</component>
       <eenheid>ug/m3</eenheid>
       <waarde>31</waarde>
       <gevalideerd>0</gevalideerd>
     </meting>
    ▼<meting>
       <datum>01/07/2014</datum>
       <tijd>11</tijd>
       <station>NL01486</station>
       <component>PM10</component>
       <eenheid>ug/m3</eenheid>
       <waarde>11</waarde>
       <gevalideerd>0</gevalideerd>
     </meting>
    ▼<meting>
       <datum>01/07/2014</datum>
       <tijd>11</tijd>
       <station>NL01487</station>
       <component>PM10</component>
       <eenheid>ug/m3</eenheid>
       <waarde>13</waarde>
       <gevalideerd>0</gevalideerd>
     </meting>
    ▼<meting>
       <datum>01/07/2014</datum>
       <tijd>11</tijd>
       <station>NL01488</station>
       <component>PM10</component>
       <eenheid>ug/m3</eenheid>
       <waarde>10</waarde>
       <gevalideerd>0</gevalideerd>
     </meting>
    ▼<meting>
       <datum>01/07/2014</datum>
```

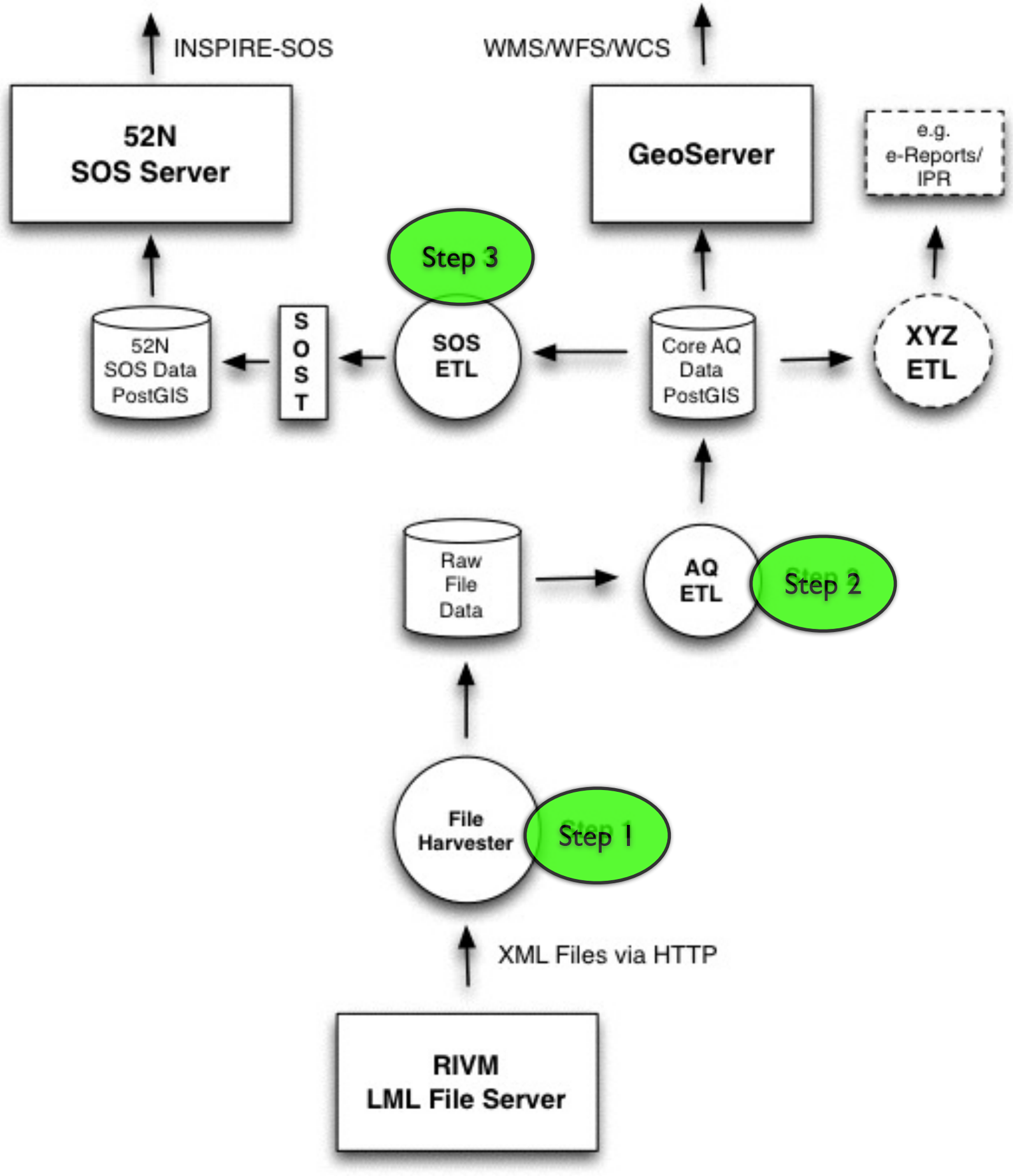
Source: AQ Station Info (EIONET)

stations.csv

```
GMLID,LocalId,Namespace,Version,NatlStationCode,Name,Municipality,EUStationCode,ActivityBegin,ActivityEnd,Lat,Lon,SRSName,Altitude,AltitudeUnit,A
STA-NL00807,STA-NL00807,NL.RIVM.AQ,,807,Hellendoorn-Luttenbergerweg,Hellendoorn,NL00807,1976-04-02 00:00:00+01:00,,52.38916779,6.40361404,urn:ogc
STA-NL00818,STA-NL00818,NL.RIVM.AQ,,818,Barsbeek-De Veenen,Steenwijkerland,NL00818,1986-11-24 00:00:00+01:00,,52.65500259,6.01806974,urn:ogc:def:
STA-NL00913,STA-NL00913,NL.RIVM.AQ,,913,Sappemeer-Borgercompagnie,,NL00913,1976-04-02 00:00:00+01:00,2002-04-02 00:00:00+01:00,53.144722,6.799458
STA-NL00918,STA-NL00918,NL.RIVM.AQ,,918,Balk-Trophornsterweg,,NL00918,1976-04-02 00:00:00+01:00,,52.91691589,5.57349157,urn:ogc:def:crs:EPSG:4258
STA-NL00928,STA-NL00928,NL.RIVM.AQ,,928,Witteveen-Talmaweg,,NL00928,1978-01-01 00:00:00+01:00,2000-02-08 00:00:00+01:00,52.813611,6.669725,urn:og
STA-NL00934,STA-NL00934,NL.RIVM.AQ,,934,Kollumerwaard-Hooge Zuidwal,Kollumerland en Nieuwkruisland,NL00934,1989-12-21 00:00:00+01:00,,53.33166504
STA-NL00131,STA-NL00131,NL.RIVM.AQ,,131,Vredepeel-Vredeweg,Venray,NL00131,1984-04-01 00:00:00+01:00,,51.54111099,5.85361385,urn:ogc:def:crs:EPSG:
STA-NL00133,STA-NL00133,NL.RIVM.AQ,,133,Wijnandsrade-Opfergeltstraat,Nuth,NL00133,1986-04-01 00:00:00+01:00,,50.9030571,5.882236,urn:ogc:def:crs:
STA-NL00134,STA-NL00134,NL.RIVM.AQ,,134,Beek-Vliegveldweg,,NL00134,1978-01-01 00:00:00+01:00,2013-01-01 00:00:00+01:00,50.90545,5.761917,urn:ogc:
STA-NL00227,STA-NL00227,NL.RIVM.AQ,,227,Budel-Toom,,NL00227,1976-01-02 00:00:00+01:00,2013-01-01 00:00:00+01:00,51.2675,5.561678,urn:ogc:def:crs:
STA-NL00230,STA-NL00230,NL.RIVM.AQ,,230,Biest Houtakker-Biestsestraat,Hilvarenbeek,NL00230,1984-04-01 00:00:00+01:00,,51.51944351,5.14890242,urn:
STA-NL00231,STA-NL00231,NL.RIVM.AQ,,231,Gilze-Rijen-Rijksweg,,NL00231,1978-01-01 00:00:00+01:00,2013-01-01 00:00:00+01:00,51.566389,4.932792,urn:
STA-NL00232,STA-NL00232,NL.RIVM.AQ,,232,Volkel-Heikantsepad,,NL00232,1986-11-18 00:00:00+01:00,2002-04-02 00:00:00+01:00,51.641667,5.662233,urn:o
STA-NL00234,STA-NL00234,NL.RIVM.AQ,,234,Putte-Larikslaan,,NL00234,1976-01-02 00:00:00+01:00,1999-01-01 00:00:00+01:00,51.366389,4.388336,urn:ogc:
STA-NL00235,STA-NL00235,NL.RIVM.AQ,,235,Huijbergen-Vennekenstraat,Woensdrecht,NL00235,1987-01-01 00:00:00+01:00,,51.43500137,4.36028624,urn:ogc:d
STA-NL00236,STA-NL00236,NL.RIVM.AQ,,236,Eindhoven-Genovevalaan,Eindhoven,NL00236,1989-01-26 00:00:00+01:00,,51.46972275,5.47278357,urn:ogc:def:cr
STA-NL00237,STA-NL00237,NL.RIVM.AQ,,237,Eindhoven-Noordbrabantlaan,,NL00237,1989-01-19 00:00:00+01:00,,51.44528,5.4289,urn:ogc:def:crs:EPSG:4258,
STA-NL00238,STA-NL00238,NL.RIVM.AQ,,238,Eindhoven-Piuslaan,,NL00238,1989-01-19 00:00:00+01:00,2002-09-02 00:00:00+01:00,51.430556,5.502781,urn:og
STA-NL00301,STA-NL00301,NL.RIVM.AQ,,301,Zierikzee-Lange Slikweg,Schouwen-Duiveland,NL00301,1976-01-02 00:00:00+01:00,,51.63555908,3.91694736,urn:
STA-NL00315,STA-NL00315,NL.RIVM.AQ,,315,Sas van Gent-Westkade,,NL00315,1976-02-01 00:00:00+01:00,1999-01-01 00:00:00+01:00,51.213056,3.800842,urn
STA-NL00318,STA-NL00318,NL.RIVM.AQ,,318,Philippine-Stelleweg,Terneuzen,NL00318,1982-12-31 00:00:00+01:00,,51.29527664,3.74945831,urn:ogc:def:crs:
STA-NL00404,STA-NL00404,NL.RIVM.AQ,,404,Den Haag-Rebecquestraat,'s-Gravenhage,NL00404,1976-01-02 00:00:00+01:00,,52.07805634,4.28917217,urn:ogc:d
STA-NL00411,STA-NL00411,NL.RIVM.AQ,,411,Schipluiden-Groeneveld,,NL00411,1976-01-02 00:00:00+01:00,2013-01-01 00:00:00+01:00,51.994722,4.280569,ur
STA-NL00415,STA-NL00415,NL.RIVM.AQ,,415,Maassluis-Vlaardingsedijk,,NL00415,1976-04-03 00:00:00+01:00,2010-01-06 00:00:00+01:00,51.914722,4.259175
STA-NL00416,STA-NL00416,NL.RIVM.AQ,,416,Vlaardingen-Lyceumlaan,,NL00416,1976-04-10 00:00:00+01:00,2013-01-01 00:00:00+01:00,51.9175,4.357228,urn:
STA-NL00418,STA-NL00418,NL.RIVM.AQ,,418,Rotterdam-Schiedamsevest,Rotterdam,NL00418,1976-01-02 00:00:00+01:00,,51.91500092,4.48028898,urn:ogc:def:
STA-NL00433,STA-NL00433,NL.RIVM.AQ,,433,Vlaardingen-Floreslaan,Vlaardingen,NL00433,1984-04-01 00:00:00+01:00,,51.91139221,4.32695293,urn:ogc:def:
STA-NL00434,STA-NL00434,NL.RIVM.AQ,,434,Rotterdam-vliegveldweg,,NL00434,1978-01-01 00:00:00+01:00,2013-01-01 00:00:00+01:00,51.953889,4.443342,ur
STA-NL00437,STA-NL00437,NL.RIVM.AQ,,437,Westmaas-Groeneweg,,NL00437,1986-04-01 00:00:00+01:00,,51.78749847,4.45084143,urn:ogc:def:crs:EPSG:4258,-
STA-NL00441,STA-NL00441,NL.RIVM.AQ,,441,Dordrecht-Frisostraat,,NL00441,1989-09-27 00:00:00+01:00,2010-11-16 00:00:00+01:00,51.805278,4.668911,urn
STA-NL00518,STA-NL00518,NL.RIVM.AQ,,518,Amsterdam-Cabeliaustraat,Amsterdam,NL00518,1976-04-02 00:00:00+01:00,,52.38472366,4.80361414,urn:ogc:def:
STA-NL00520,STA-NL00520,NL.RIVM.AQ,,520,Amsterdam-Florapark,,NL00520,1976-02-02 00:00:00+01:00,2013-01-01 00:00:00+01:00,52.390931,4.917294,urn:o
STA-NL00107,STA-NL00107,NL.RIVM.AQ,,107,Posterholt-Vlodropperweg,Roerdalen,NL00107,1976-01-02 00:00:00+01:00,,51.1202774,6.04306364,urn:ogc:def:o
STA-NL00537,STA-NL00537,NL.RIVM.AQ,,537,Haarlem-Amsterdamsevaart,Haarlem,NL00537,1989-11-21 00:00:00+01:00,,52.38166428,4.64806938,urn:ogc:def:cr
STA-NL00538,STA-NL00538,NL.RIVM.AQ,,538,Wieringerwerf-Medemblikkerweg,Wieringermeer,NL00538,1986-04-01 00:00:00+01:00,,52.80472183,5.05084181,urn
STA-NL00620,STA-NL00620,NL.RIVM.AQ,,620,Cabauw-Zijdeweg,,NL00620,1976-04-02 00:00:00+01:00,2011-12-31 00:00:00+01:00,51.971389,4.926397,urn:ogc:d
STA-NL00627,STA-NL00627,NL.RIVM.AQ,,627,Bilthoven-Van Leeuwenhoeklaan,De Bilt,NL00627,1978-01-01 00:00:00+01:00,,52.12083,5.195567,urn:ogc:def:c
STA-NL00628,STA-NL00628,NL.RIVM.AQ,,628,De Bilt-Wilhelminalaan,De Bilt,NL00628,1978-01-01 00:00:00+01:00,,52.100833,5.177789,urn:ogc:def:crs:EPSG
STA-NL00631,STA-NL00631,NL.RIVM.AQ,,631,Biddinghuizen-Hoekwantweg,,NL00631,1986-04-01 00:00:00+01:00,,52.44850159,5.61915016,urn:ogc:def:crs:EPSG
STA-NL00633,STA-NL00633,NL.RIVM.AQ,,633,Zegveld-Oude Meije,Woerden,NL00633,1986-04-01 00:00:00+01:00,,52.138889,4.838336,urn:ogc:def:crs:EPSG:425
STA-NL00636,STA-NL00636,NL.RIVM.AQ,,636,Utrecht-de Jongweg,Utrecht,NL00636,1987-10-29 00:00:00+01:00,,52.106111,5.125286,urn:ogc:def:crs:EPSG:425
STA-NL00637,STA-NL00637,NL.RIVM.AQ,,637,Utrecht-Wittevrouwenstraat,,NL00637,1987-11-05 00:00:00+01:00,2004-10-01 00:00:00+01:00,52.095833,5.12528
STA-NL00638,STA-NL00638,NL.RIVM.AQ,,638,Utrecht-Vleutenseweg,,NL00638,1987-10-01 00:00:00+01:00,2013-01-01 00:00:00+01:00,52.093889,5.103058,urn:
STA-NL00639,STA-NL00639,NL.RIVM.AQ,,639,Utrecht-Erzeijstraat,Utrecht,NL00639,1987-10-01 00:00:00+01:00,,52.068889,5.121114,urn:ogc:def:crs:EPSG:4
STA-NL00640,STA-NL00640,NL.RIVM.AQ,,640,Utrecht-Universiteitsbibliotheek,,NL00640,1987-12-02 00:00:00+01:00,2005-01-01 00:00:00+01:00,52.095556,5
STA-NL00722,STA-NL00722,NL.RIVM.AQ,,722,Eibergen-Lintveldseweg,Berkelland,NL00722,1983-01-01 00:00:00+01:00,,52.0925,6.605839,urn:ogc:def:crs:EPS
STA-NL00724,STA-NL00724,NL.RIVM.AQ,,724,Wageningen-Binnenhaven,,NL00724,1978-01-01 00:00:00+01:00,2003-01-01 00:00:00+01:00,51.973056,5.647514,ur
STA-NL00727,STA-NL00727,NL.RIVM.AQ,,727,Apeldoorn-Loolaan,,NL00727,1988-04-22 00:00:00+01:00,2002-04-03 00:00:00+01:00,52.223056,5.953614,urn:ogc
STA-NL00728,STA-NL00728,NL.RIVM.AQ,,728,Apeldoorn-Stationsstraat,,NL00728,1988-04-19 00:00:00+01:00,2013-07-16 00:00:00+01:00,52.213964,5.966719,
STA-NL00729,STA-NL00729,NL.RIVM.AQ,,729,Apeldoorn-Arnhemseweg,,NL00729,1988-04-22 00:00:00+01:00,2002-04-03 00:00:00+01:00,52.191944,5.962789,urn
```

Multistep ETL

2. Data Transformation (ETL)

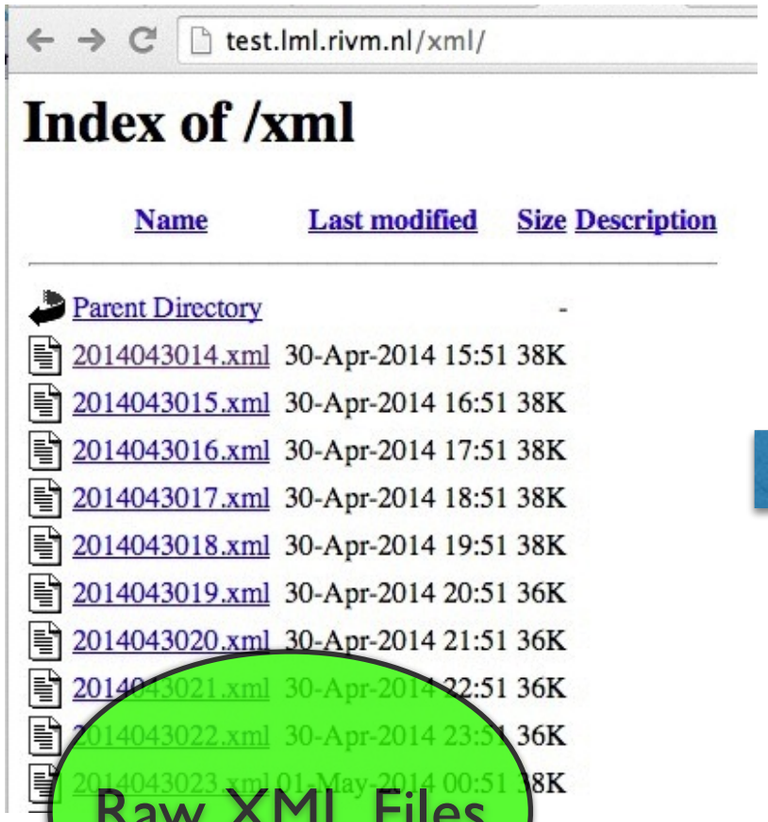


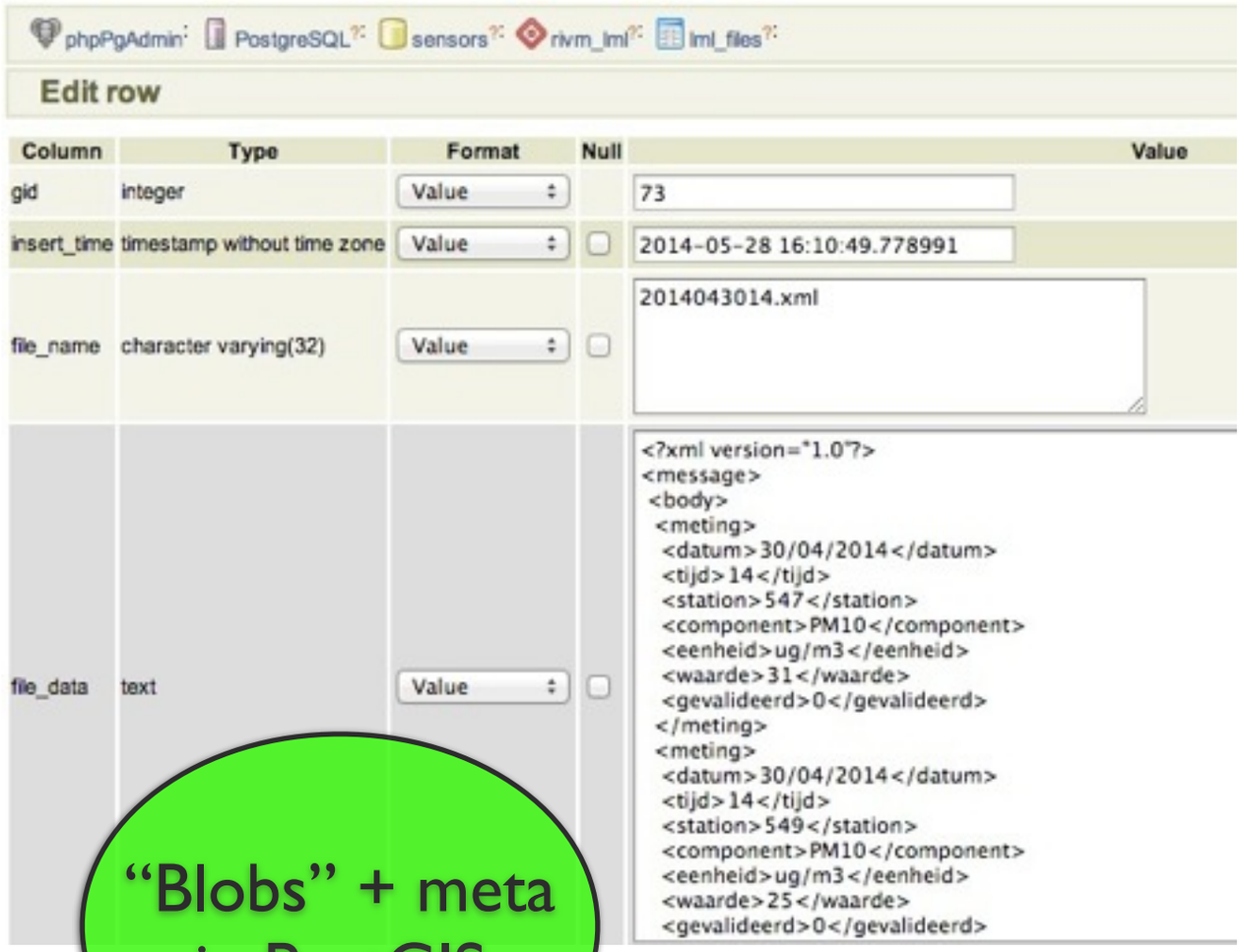
2. Data Transformation (ETL)

Multistep ETL - Advantages

- backup of source XML data files
- incrementally build up of history past the last month
- in case of (design) errors we can always restart anew
- simpler ETL scripts than “all-in-one” (divide & conquer)
- migration with changed in 52N SOS DB schema simpler
- prepared for IPR/INSPIRE ETL
- OWS server (WMS/WFS evt WCS) can directly use Core AQ DB
- many possibilities with VIEWs on Core AQ DB
  - aggregations
  - last measured values
  - peak values
  - Voronoi polygons

ETL Step 1
File Harvester





2. Data Transformation (ETL)

ETL Step 2
Raw AQ Measurements

phpPgAdmin: PostgreSQL: sensors: rivm_lml: lml_files:

Edit row

Column	Type	Format	Null	Value
gid	integer	Value		73
insert_time	timestamp without time zone	Value		2014-05-28 16:10:49.778991
file_name	character varying(32)	Value		2014043014.xml
file_data	text	Value		<?xml version="1.0"?> <message> <body> <meting> <datum>30/04/2014</datum> <tijd>14</tijd> <station>547</station> <component>PM10</component> <eenheid>ug/m3</eenheid> <waarde>31</waarde> <gevalideerd>0</gevalideerd> </meting> <meting> <datum>30/04/2014</datum> <tijd>14</tijd> <station>549</station> <component>PM10</component> <eenheid>ug/m3</eenheid> <waarde>25</waarde> <gevalideerd>0</gevalideerd>

"Blobs" + meta in PostGIS

phpPgAdmin: PostgreSQL: sensors: rivm_lml: measurements:

Browse

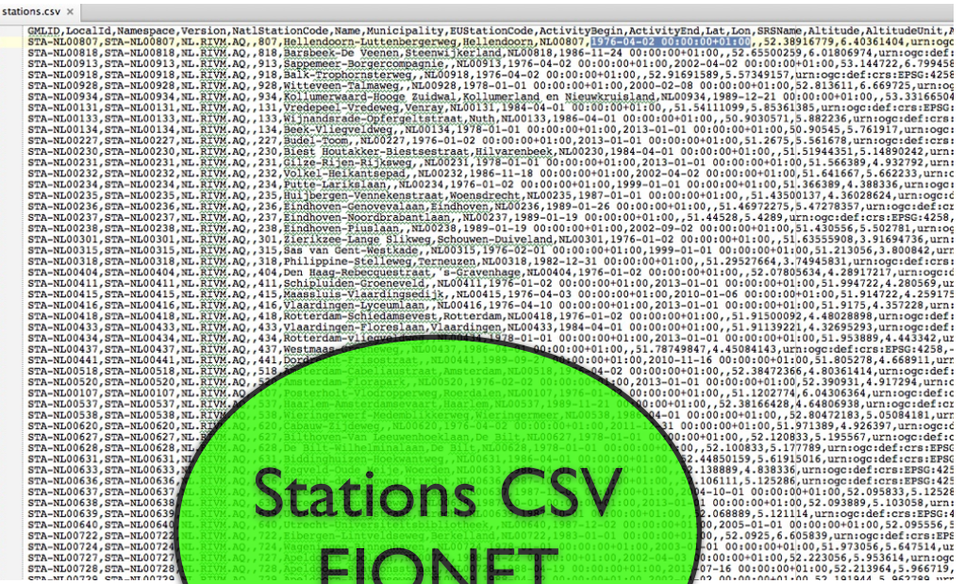
<< First < Prev 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 Ne

Actions	gid	file_name	insert_time	component	station_id	sample_id	sample_time	sample_value	validated
Edit Delete	1376	2014052714.xml	2014-05-29 20:10:39.728278	PM10	918	918-PM10-27/05/2014-14	2014-05-27 14:00:00	10	0
Edit Delete	1377	2014052714.xml	2014-05-29 20:10:39.729051	PM10	929	929-PM10-27/05/2014-14	2014-05-27 14:00:00	14	0
Edit Delete	1378	2014052714.xml	2014-05-29 20:10:39.729783	PM10	934	934-PM10-27/05/2014-14	2014-05-27 14:00:00	13	0
Edit Delete	1379	2014052714.xml	2014-05-29 20:10:39.73055	PM10	937	937-PM10-27/05/2014-14	2014-05-27 14:00:00	15	0
Edit Delete	1380	2014052714.xml	2014-05-29 20:10:39.731285	NO2	483	483-NO2-27/05/2014-14	2014-05-27 14:00:00	62	0
Edit Delete	1381	2014052714.xml	2014-05-29 20:10:39.732025	NO2	485	485-NO2-27/05/2014-14	2014-05-27 14:00:00	67	0
Edit Delete	1382	2014052714.xml	2014-05-29 20:10:39.732723	NO2	486	486-NO2-27/05/2014-14	2014-05-27 14:00:00	54	0
Edit Delete	1383	2014052714.xml	2014-05-29 20:10:39.73344	NO2	487	487-NO2-27/05/2014-14	2014-05-27 14:00:00	112	0
Edit Delete	1384	2014052714.xml	2014-05-29 20:10:39.734159	NO2	488	488-NO2-27/05/2014-14	2014-05-27 14:00:00	48	0
Edit Delete	1385	2014052714.xml	2014-05-29 20:10:39.734911	NO2	489	489-NO2-27/05/2014-14	2014-05-27 14:00:00	95	0
Edit Delete	1386	2014052714.xml	2014-05-29 20:10:39.735857	NO2	491	491-NO2-27/05/2014-14	2014-05-27 14:00:00	78	0
Edit Delete	1387	2014052714.xml	2014-05-29 20:10:39.736693	NO2	493	493-NO2-27/05/2014-14	2014-05-27 14:00:00	89	0
Edit Delete	1388	2014052714.xml	2014-05-29 20:10:39.737539	NO2	494	494-NO2-27/05/2014-14	2014-05-27 14:00:00	47	0
Edit Delete	1389	2014052714.xml	2014-05-29 20:10:39.738278	NO2	495	495-NO2-27/05/2014-14	2014-05-27 14:00:00	22	0
Edit Delete	1390	2014052714.xml	2014-05-29 20:10:39.738976	NO2	496	496-NO2-27/05/2014-14	2014-05-27 14:00:00	14	0
Edit Delete	1391	2014052714.xml	2014-05-29 20:10:39.739739	NO2	002	002-NO2-27/05/2014-14	2014-05-27 14:00:00	53	0
Edit Delete	1392	2014052714.xml	2014-05-29 20:10:39.740453	NO2	003	003-NO2-27/05/2014-14	2014-05-27 14:00:00	9	0

Records in PostGIS

ETL Step 2

Stations



Stations CSV EIONET

gid	station_id	municipality	component	sample_time	sample_value	point	validated	file_name
1	547	Hilversum	PM10	2014-05-01 20:00:00	37	0101000020E6100000F4177AC4E8B91440CBF8F719171E4A40	0	20140501203
2	549	Laren	PM10	2014-05-01 20:00:00	35	0101000020E6100000F81C588E90F1144037A8272CF1204A40	0	20140501203
3	247	Veldhoven	PM10	2014-05-01 20:00:00	34	0101000020E610000089E45400C6921540747DFEFF28B44940	0	20140501203
5	244	Gemert-Bakel	PM10	2014-05-01 20:00:00	47	0101000020E61000001E19A8CDFF3B174094F6065F98C44940	0	20140501203
6	246	Moerdijk	PM10	2014-05-01 20:00:00	42	0101000020E6100000485146E0360E124058B009408ED34940	0	20140501203
7	319	Vlissingen	PM10	2014-05-01 20:00:00	53	0101000020E610000023111AC1C6F50D40C0E8F2E670B84940	0	20140501203
8	131	Venray	PM10	2014-05-01 20:00:00	43	0101000020E61000008EA6C4BF196A174031C7FA1F43C54940	0	20140501203
9	133	Nuth	PM10	2014-05-01 20:00:00	38	0101000020E6100000596A8DDF68871740D675036097734940	0	20140501203
10	136	Heerlen	PM10	2014-05-01 20:00:00	39	0101000020E6100000818717C06BE2174090B402E0AB714940	0	20140501203
11	138		PM10	2014-05-01 20:00:00	19	0101000020E610000084D6C39789F21740348463963D734940	0	20140501203
12	230	Hilvarenbeek	PM10	2014-05-01 20:00:00	48	0101000020E6100000F1C740E079981440E4C8FB1F7DC24940	0	20140501203
13	235	Woensdrecht	PM10	2014-05-01 20:00:00	39	0101000020E6100000C7FE47E0EE701140BFEEF81FAEB74940	0	20140501203
14	236	Eindhoven	PM10	2014-05-01 20:00:00	31	0101000020E6100000CBF14C6021E41540F6B704E01FBC4940	0	20140501203
15	237		PM10	2014-05-01 20:00:00	37	0101000020E610000008104C58F31B715400CC85EEFFEB84940	0	20140501203
16	240		PM10	2014-05-01 20:00:00	49	0101000020E610000007E7D7FFCE4C13406E280660FBCB4940	0	20140501203
17	241	Breda	PM10	2014-05-01 20:00:00	41	0101000020E6100000484FD35F961F1340B30101003ACD4940	0	20140501203
18	318	Terneuzen	PM10	2014-05-01 20:00:00		0101000020E6100000CD5299FFE3FE0D405009FC9FCBA54940	0	20140501203
19	418	Rotterdam	PM10	2014-05-01		0B3EAD6DFD0EB1140DE9A09C01EF54940	0	20140501203
20	433	Vlaardingen	PM10	2014-05		9968FCC4E1140BCE3FB7FA8F44940	0	20140501203
21	437		PM10	201		660A9CD11406826F7BFCCE44940	0	20140501203
22	442	Dordrecht	PM10	2		036D51240CCAB00007CE64940	0	20140501203
23	444	Noordwijk	PM10	2		880A124010E0FC9F26264A40	0	20140501203
24	445		PM10	2		64311409A9999999994A40	0	20140501203
25	446	's-Gravenhage	PM10	2		711140D15BFA9F15054A40	0	20140501203

Records in PostGIS

Edits + GDAL ogr2ogr

ETL Step 3
SOS Publication

Via SOS-Transaction Protocol

ETL Step 3

SOS-T Templates - InsertSensor

```
{{
  "request": "InsertSensor",
  "service": "SOS",
  "version": "2.0.0",
  "procedureDescriptionFormat": "http://www.opengis.net/sensorML/1.0.1",
  "procedureDescription": "{procedure-desc.xml}",
   "observableProperty": [
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/benzeen",
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/CO",
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/NH3",
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/NO",
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/NO2",
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/O3",
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/PM10",
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/PM25",
     "http://sensors.geonovum.nl/rivm-lml/observableProperty/SO2"
  ],
  "observationType": [
    "http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement"
  ],
  "featureOfInterestType": "http://www.opengis.net/def/samplingFeatureType/OGC-OM/2.0/
SF_SamplingPoint"
}}
```

```
{{
   "request": "InsertObservation",
   "service": "SOS",
   "version": "2.0.0",
   "offering": "http://sensors.geonovum.nl/rivm-lml/offering/{station_id}",
   "observation": {{
     "identifier": {{
.
     "procedure": "http://sensors.geonovum.nl/rivm-lml/procedure/{station_id}",
     "observedProperty": "http://sensors.geonovum.nl/rivm-lml/observableProperty/{component}",
     "featureOfInterest": {{
       "identifier": {{
         "value": "http://sensors.geonovum.nl/rivm-lml/featureOfInterest/{station_id}",
         "codespace": "http://www.opengis.net/def/nil/OGC/0/unknown"
       }},
       "name": [
         {{
           "value": "{municipality}",
           "codespace": "http://www.opengis.net/def/nil/OGC/0/unknown"
         }}
       ],
       "geometry": {{
         "type": "Point",
         "coordinates": [
           {station_lat},
           {station_lon}
         ],
.
.
       }}
     }},
     "phenomenonTime": "{sample_time}",
     "resultTime": "{sample_time}",
     "result": {{
       "uom": "ug/m3",
       "value": {sample_value}
     }}
   }}
```

ETL Step 3

SOS-T Templates - InsertObservation

ETL Tech
Progress Tracking

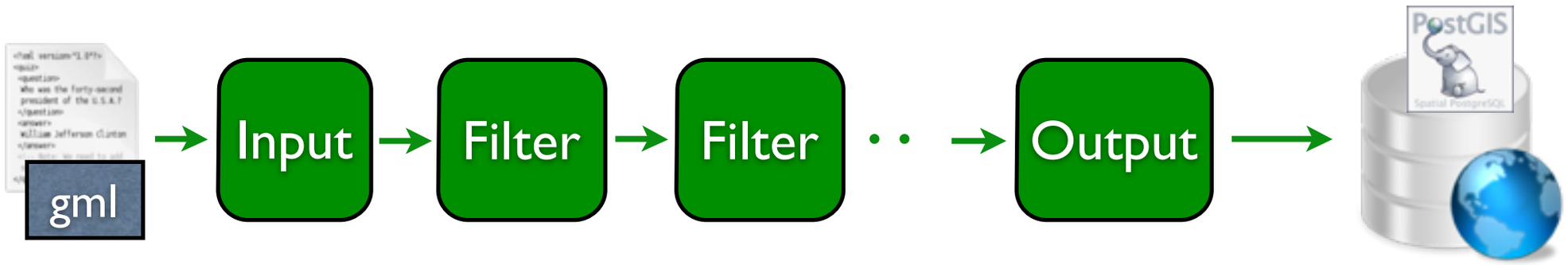
ETL Tech
Tool: Stetl

- Framework for Streaming ETL
- Proven for Dutch datasets (Top10NL and BGT)
- Proven for INSPIRE ETL (BAG to AD, Top10 to TN)
- Integration with native libs: libXML, libXSLT, GDAL/OGR
- Declarative programming using config files
- Call-back programming model
- Extensibility via own custom modules
- Free and Open Source (GPL) in Python

More on stetl.org and presentation

ETL Tech

Tool: Stetl



measurements2sos.cfg

```
[etl]
chains = input_measurements_dbquery|output_sos_observation_insert

# for reading files from Apache dir listing
[input_measurements_dbquery]
class = measurementsdbinput.MeasurementsDbInput
host = {host}
database = {database}
user = {user}
password = {password}
schema = {schema}
table = measurements_stations
query = SELECT * from measurements_stations WHERE gid > %d ORDER BY gid LIMIT 500
progress_query = SELECT * from etl_progress WHERE worker = 'measurements2sos'
progress_update = UPDATE etl_progress SET last_id = %d, last_update = current_timestamp WHERE
worker = 'measurements2sos'
```

```
[output_std]
class = outputs.standardoutput.StandardOutput

# For inserting sensors
[output_sos_observation_insert]
class = sosoutput.SOSTOutput
host = {http_host}
port = {http_port}
path = {http_path}
user = {http_user}
password = {http_password}
method = POST
content_type = application/json;charset=UTF-8
sos_request = insert-observation
template_file_ext = json
template_file_root = sostemplates
```

ETL Tech

Stetl Config - Step 3

SOS-T Publication

ETL Tech

Stetl Command - Step 3

SOS-T Publication

```
options="database=sensors schema=rivm_lml host=localhost port=80
user=** password=** http_host=sensors.geonovum.nl
http_port=80 http_user=** http_password=**
http_path=/sos/service"

stetl -c measurements2sos.cfg -a "$options"
```

Services
WMS/WFS

- On RAW AQ Data tables
- Prepare data via Postgres VIEWs
- Using GeoServer
- Using WMS-Time

Service URL
sensors.geonovum.nl/gs/ows

Viewer
sensors.geonovum.nl/heronviewer

Services
WMS/WFS via VIEWs

Measurements with Station info, a.o. GeoLocation

```
CREATE VIEW rivm_lml.measurements_stations AS
  SELECT m.gid, m.station_id, s.municipality, m.component, m.sample_time,
m.sample_value, s.point, m.validated,
         m.file_name, m.insert_time, m.sample_id,
         s.local_id, s.eu_station_code, s.altitude, s.area_classification,
         s.activity_begin, s.activity_end
         FROM rivm_lml.measurements as m
           INNER JOIN rivm_lml.stations as s ON m.station_id =
s.natl_station_code;
```

Services

WMS/WFS via VIEWs

Measurements with Station info, a.o. GeoLocation

phpPgAdmin | PostgreSQL | sensors | rivm_lml | measurements_stations

Browse

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 1

gid	station_id	municipality	component	sample_time	sample_value	point	validated	file_name
1	547	Hilversum	PM10	2014-05-01 20:00:00	37	0101000020E6100000F4177AC4E8B91440CBF8F719171E4A40	0	2014050120.xml
2	549	Laren	PM10	2014-05-01 20:00:00	35	0101000020E6100000F81C588E90F1144037A6272CF1204A40	0	2014050120.xml
3	247	Veldhoven	PM10	2014-05-01 20:00:00	34	0101000020E610000089E45400C6921540747DFEFF26B44940	0	2014050120.xml
5	244	Gemert-Bakel	PM10	2014-05-01 20:00:00	47	0101000020E61000001E19ABCDFF3B174094F6065F98C44940	0	2014050120.xml
6	246	Moerdijk	PM10	2014-05-01 20:00:00	42	0101000020E6100000485146E0380E12405B009406ED34940	0	2014050120.xml
7	319	Vlissingen	PM10	2014-05-01 20:00:00	53	0101000020E610000023111AC1C6F50D40C0E8F2E670BB4940	0	2014050120.xml
8	131	Venray	PM10	2014-05-01 20:00:00	43	0101000020E61000006EA6C4BF196A174031C7FA1F43C54940	0	2014050120.xml
9	133	Nuth	PM10	2014-05-01 20:00:00	38	0101000020E6100000596ABDDF68871740D675036097734940	0	2014050120.xml
10	136	Heerlen	PM10	2014-05-01 20:00:00	39	0101000020E6100000B18717C06BE21740908402E0AB714940	0	2014050120.xml
11	138		PM10	2014-05-01 20:00:00	19	0101000020E610000084D6C39789F21740348463963D734940	0	2014050120.xml
12	230	Hilvarenbeek	PM10	2014-05-01 20:00:00	48	0101000020E6100000F1C740E079981440E4C8FB1F7DC24940	0	2014050120.xml
13	235	Woensdrecht	PM10	2014-05-01 20:00:00	39	0101000020E6100000C7FE47E0EE701140BFEEF81FAEB74940	0	2014050120.xml
14	236	Eindhoven	PM10	2014-05-01 20:00:00	31	0101000020E6100000CBF14C6021E41540F6B704E01FBC4940	0	2014050120.xml
15	237		PM10	2014-05-01 20:00:00	37	0101000020E61000008104C58F31B715400CC85EEFFEB84940	0	2014050120.xml
16	240		PM10	2014-05-01 20:00:00	49	0101000020E610000007E7D7FFCE4C13406E280860FBCB4940	0	2014050120.xml
17	241	Breda	PM10	2014-05-01 20:00:00	41	0101000020E6100000484FD35F961F1340B30101003ACD4940	0	2014050120.xml
18	318	Terneuzen	PM10	2014-05-01 20:00:00	32	0101000020E6100000CD5299FFE3FE0D405009FC9FCBA54940	0	2014050120.xml
19	418	Rotterdam	PM10	2014-05-01 20:00:00	32	0101000020E6100000B3EAD6DFD0EB1140DE9A09C01EF54940	0	2014050120.xml
20	433	Vlaardingen	PM10	2014-05-01 20:00:00	32	0101000020E6100000BB89B6BFCC4E1140BCE3FB7FA8F44940	0	2014050120.xml
21	437		PM10	2014-05-01 20:00:00	36	0101000020E6100000A3203660A9CD11406826F7BFCCE44940	0	2014050120.xml
22	442	Dordrecht	PM10	2014-05-01 20:00:00	29	0101000020E61000002C1A420036D51240CCAB00007CE64940	0	2014050120.xml
23	444	Noordwijk	PM10	2014-05-01 20:00:00	25	0101000020E610000090C8EB7F880A124010E0FC9F26264A40	0	2014050120.xml
24	445		PM10	2014-05-01 20:00:00	33	0101000020E6100000C1CAA145B64311409A9999999094A40	0	2014050120.xml
25	446	's-Gravenhage	PM10	2014-05-01 20:00:00	27	0101000020E61000008A4A55A037711140D15BFA9F15054A40	0	2014050120.xml

Services
WMS/WFS via VIEWs

```
-- per component last-captured measurements
CREATE VIEW rivm_lml.v_last_measurements_NO2 AS
  SELECT DISTINCT ON (station_id) station_id,
    municipality, sample_time, sample_value, point, validated, gid, sample_id
  FROM rivm_lml.measurements_stations WHERE component = 'NO2' ORDER BY
station_id, gid DESC;

CREATE VIEW rivm_lml.v_last_measurements_O3 AS
  SELECT DISTINCT ON (station_id) station_id,
    municipality, sample_time, sample_value, point, validated, gid, sample_id
  FROM rivm_lml.measurements_stations WHERE component = 'O3' ORDER BY
station_id, gid DESC;

  .
  .

-- per component time-series measurements
CREATE VIEW rivm_lml.v_measurements_NO2 AS
  SELECT  station_id,
    municipality, sample_time, sample_value, point, validated, gid, sample_id
  FROM rivm_lml.measurements_stations WHERE component = 'NO2';
```

Services
WMS/WFS via VIEWs

Last Measurements for Ozone

phpPgAdmin | PostgreSQL | sensors | rivm_lml | v_last_measurements_o3

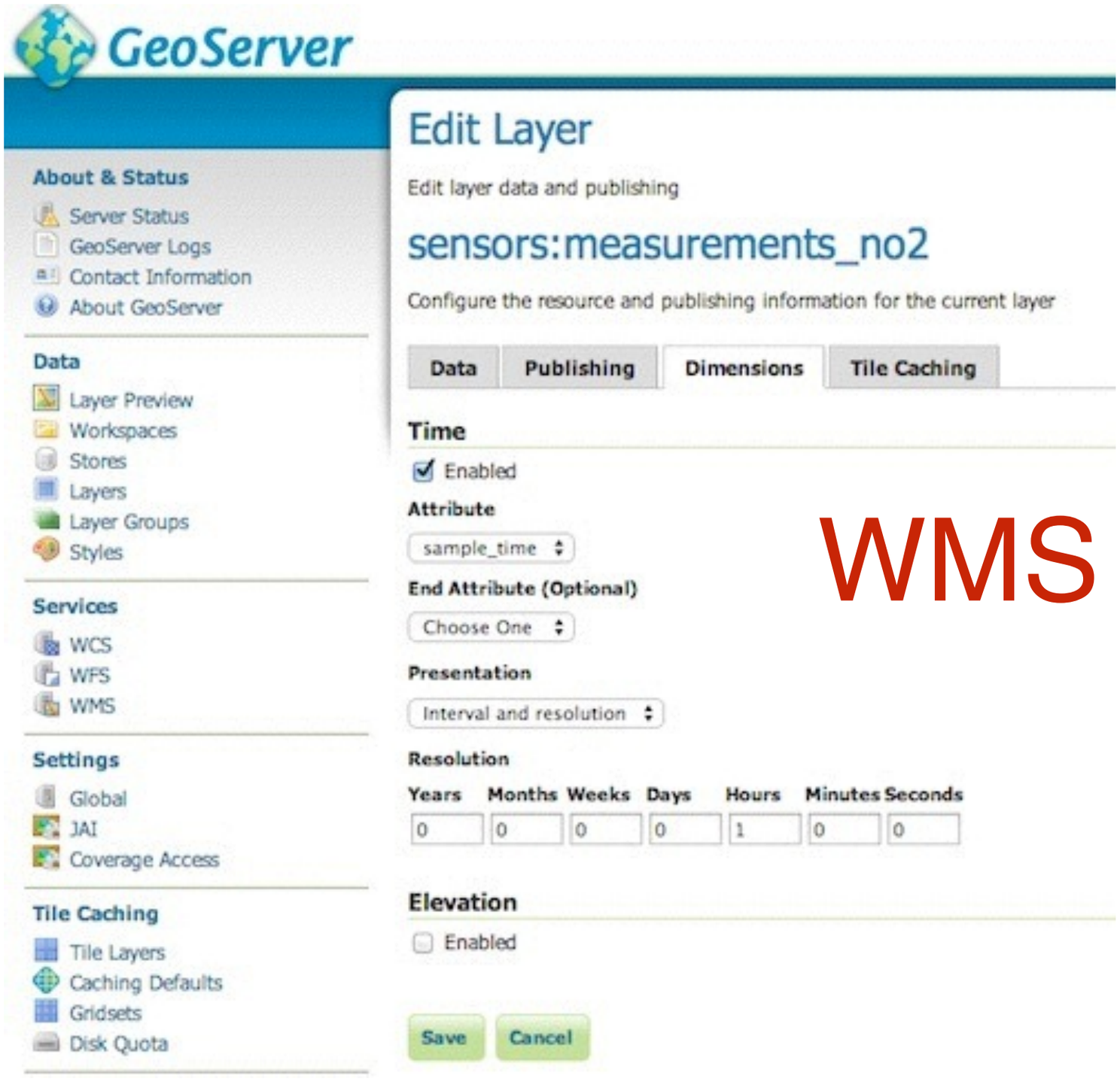
Browse

1 2 Next > Last >>

station_id	municipality	gid	sample_time	sample_value	point	validated	sample_id
107	Roerdalen	185728	2014-06-03 10:00:00	83	0101000020E610000070C9F5DF182C184055B9F53F658F4940	0	107-O3-03/06/2014-10
131	Venray	183455	2014-06-03 01:00:00	40	0101000020E61000008EA6C4BF196A174031C7FA1F43C54940	0	131-O3-03/06/2014-01
133	Nuth	185729	2014-06-03 10:00:00	98	0101000020E6100000596ABDDF68871740D675036097734940	0	133-O3-03/06/2014-10
138		185730	2014-06-03 10:00:00	94	0101000020E610000084D6C39789F2174034846396 3D734940	0	138-O3-03/06/2014-10
230	Hilvarenbeek	185731	2014-06-03 10:00:00	74	0101000020E6100000F1C740E079981440E4C8FB1F7DC24940	0	230-O3-03/06/2014-10
235	Woensdrecht	185732	2014-06-03 10:00:00	25	0101000020E6100000C7FE47E0EE701140BFEEF81FAEB74940	0	235-O3-03/06/2014-10
236	Eindhoven	185733	2014-06-03 10:00:00	59	0101000020E6100000CBF14C6021E41540F6B704E01FBC4940	0	236-O3-03/06/2014-10
241	Breda	185734	2014-06-03 10:00:00	58	0101000020E6100000484FD35F961F1340B30101003ACD4940	0	241-O3-03/06/2014-10
247	Veldhoven	185735	2014-06-03 10:00:00	96	0101000020E610000089E45400C6921540747DFEFF28B44940	0	247-O3-03/06/2014-10
301	Schouwen-Duiveland	185736	2014-06-03 10:00:00	64	0101000020E61000000CD45A7FE8550F404FA3FBFF59D14940	0	301-O3-03/06/2014-10
318	Terneuzen	185737	2014-06-03 10:00:00	50	0101000020E6100000CD5299FFE3FE0D405009FC9FCBA54940	0	318-O3-03/06/2014-10
404	's-Gravenhage	185738	2014-06-03 10:00:00	53	0101000020E6100000DF40D4BF1C281140D2C509C0FD094A40	0	404-O3-03/06/2014-10
418	Rotterdam	185739	2014-06-03 10:00:00	44	0101000020E6100000B3EAD6DFD0EB1140DE9A09C01EF54940	0	418-O3-03/06/2014-10
433	Vlaardingen	185740	2014-06-03 10:00:00	24	0101000020E6100000BBB986BFCC4E1140BCE3FB7FA8F44940	0	433-O3-03/06/2014-10
437		185741	2014-06-03 10:00:00	38	0101000020E6100000A3203660A9CD11406826F7BFCCE44940	0	437-O3-03/06/2014-10
442	Dordrecht	183722	2014-06-03 02:00:00	6	0101000020E61000002C1A420036D51240CCAB00007CE64940	0	442-O3-03/06/2014-02
444	Noordwijk	185742	2014-06-03 10:00:00	55	0101000020E610000090C8EB7F880A124010E0FC9F26264A40	0	444-O3-03/06/2014-10
446	's-Gravenhage	185743	2014-06-03 10:00:00	46	0101000020E61000008A4A55A037711140D15BFA9F15054A40	0	446-O3-03/06/2014-10
537	Haarlem	185744	2014-06-03 10:00:00	38	0101000020E6100000558EE27F9F9712406153086 0DA304A40	0	537-O3-03/06/2014-10
538	Wieringermeer	185745	2014-06-03 10:00:00	65	0101000020E6100000B6E01CE00F341440171DFB1F01674A40	0	538-O3-03/06/2014-10
564	Haarlemmermeer	185727	2014-06-03 10:00:00	56	0101000020E6100000B41EBE4C14111340D4F19681CA244A40	0	564-O3-03/06/2014-10
631		185746	2014-06-03 10:00:00	86	0101000020E61000007C0DE27F027A164083A0068068394A40	0	631-O3-03/06/2014-10
633	Woerden	185747	2014-06-03 10:00:00	61	0101000020E6100000E23C9CC0745A13401763601DC7114A40	0	633-O3-03/06/2014-10
639	Utrecht	185748	2014-06-03 10:00:00	54	0101000020E6100000DA59F44E057C1440EE06D15AD1084A40	0	639-O3-03/06/2014-10

Services

WMS/WFS



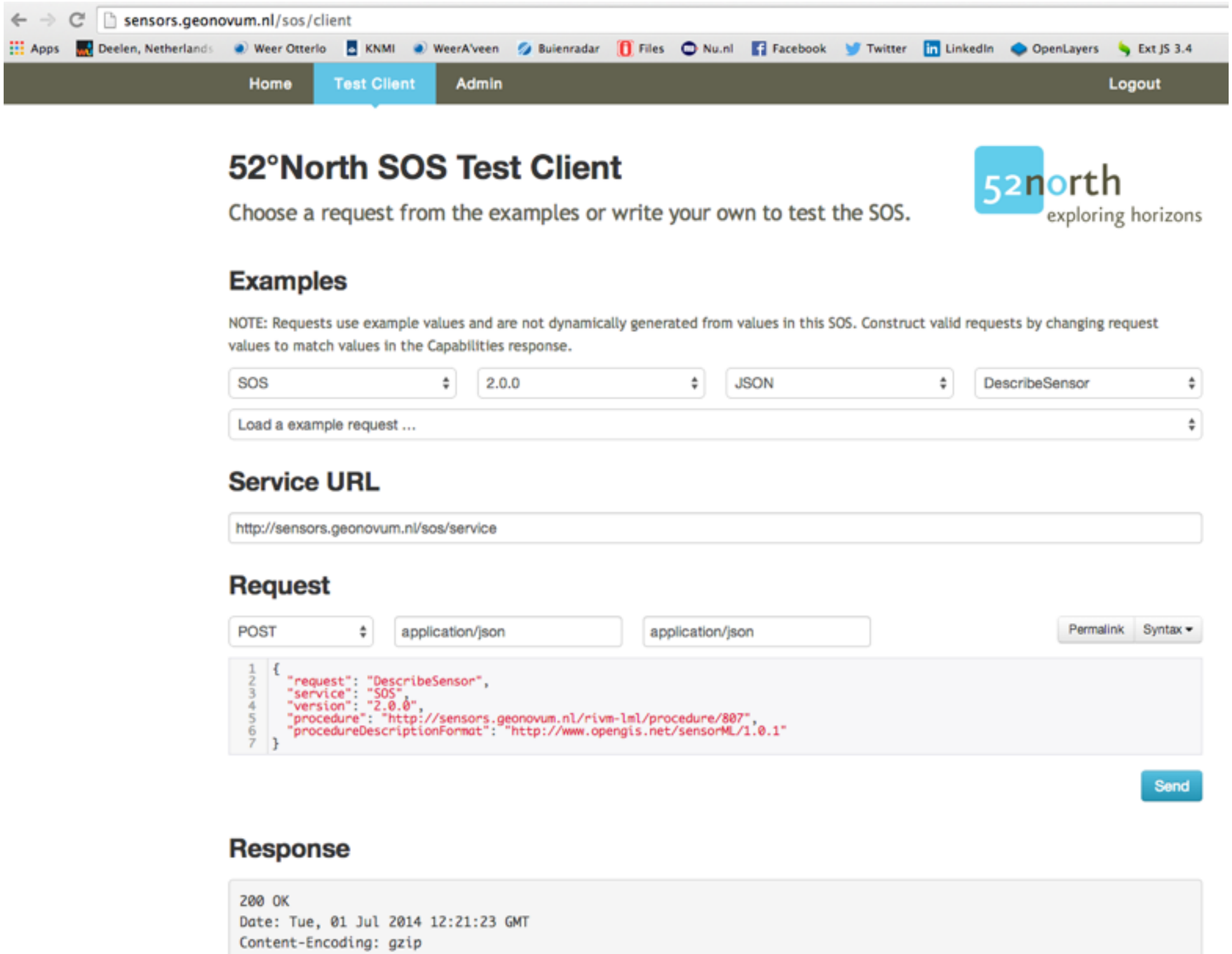
WMS Time

Services
SOS

- Using 52North SOS
- Easy setup via Tomcat deploy + Admin GUI
- Data population via SOS-T

Service URL
http://sensors.geonovum.nl/sos/service?

Services -SOS

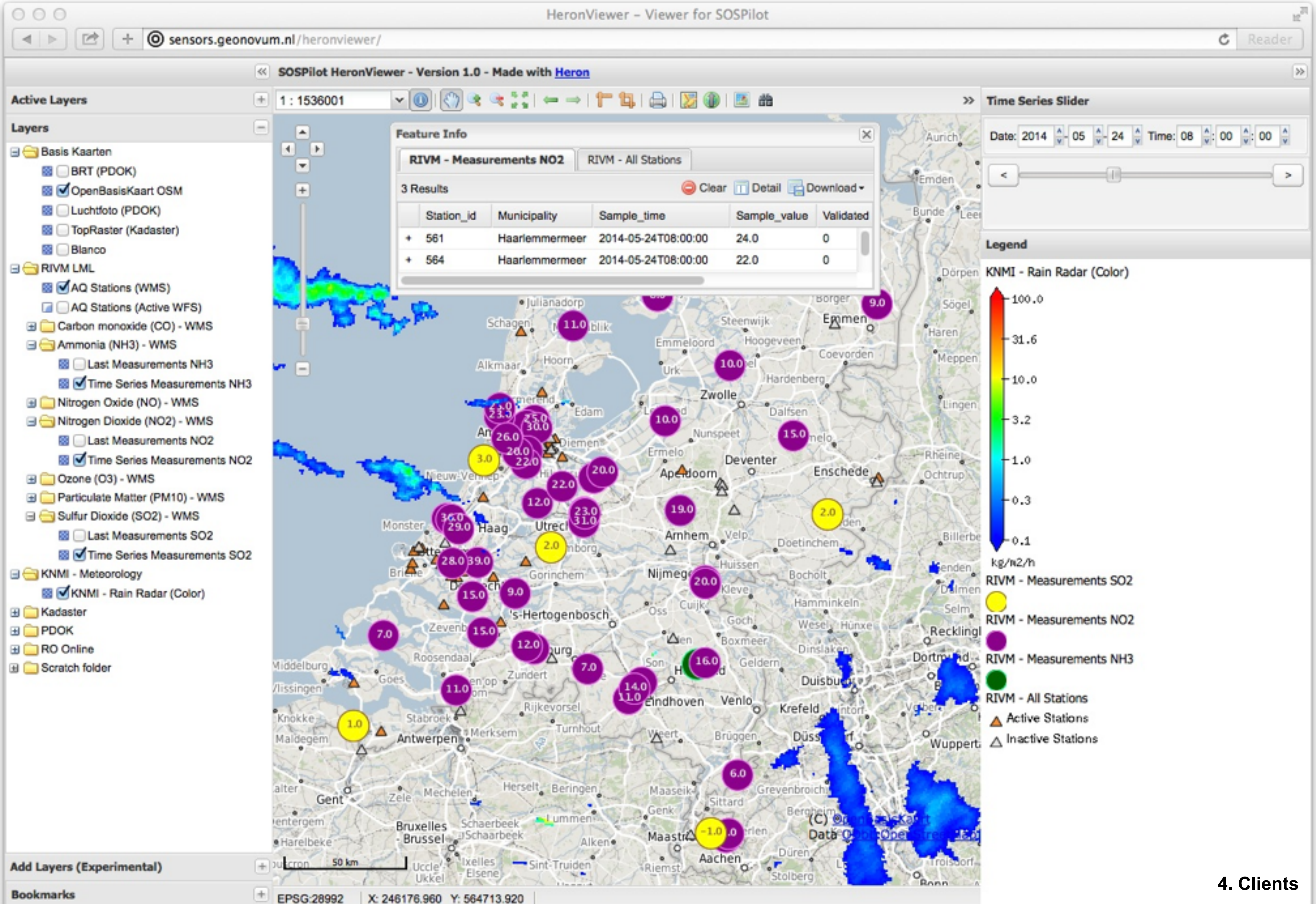


Clients

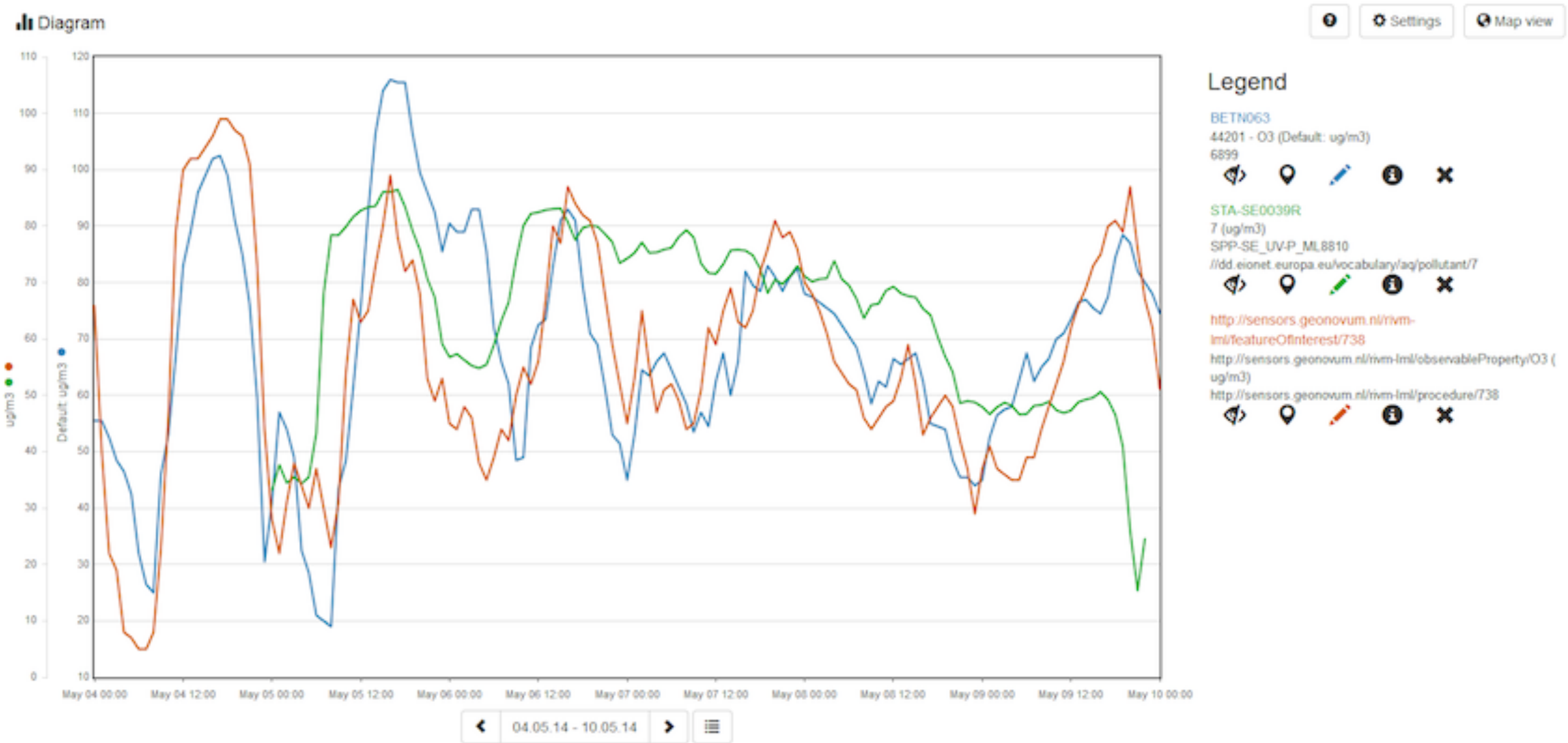
- WMS/WFS - “HeronViewer”
- SensorWebClient - 52North
- SOS.js - JavaScript - 52 North

Links via
sensors.geonovum.nl

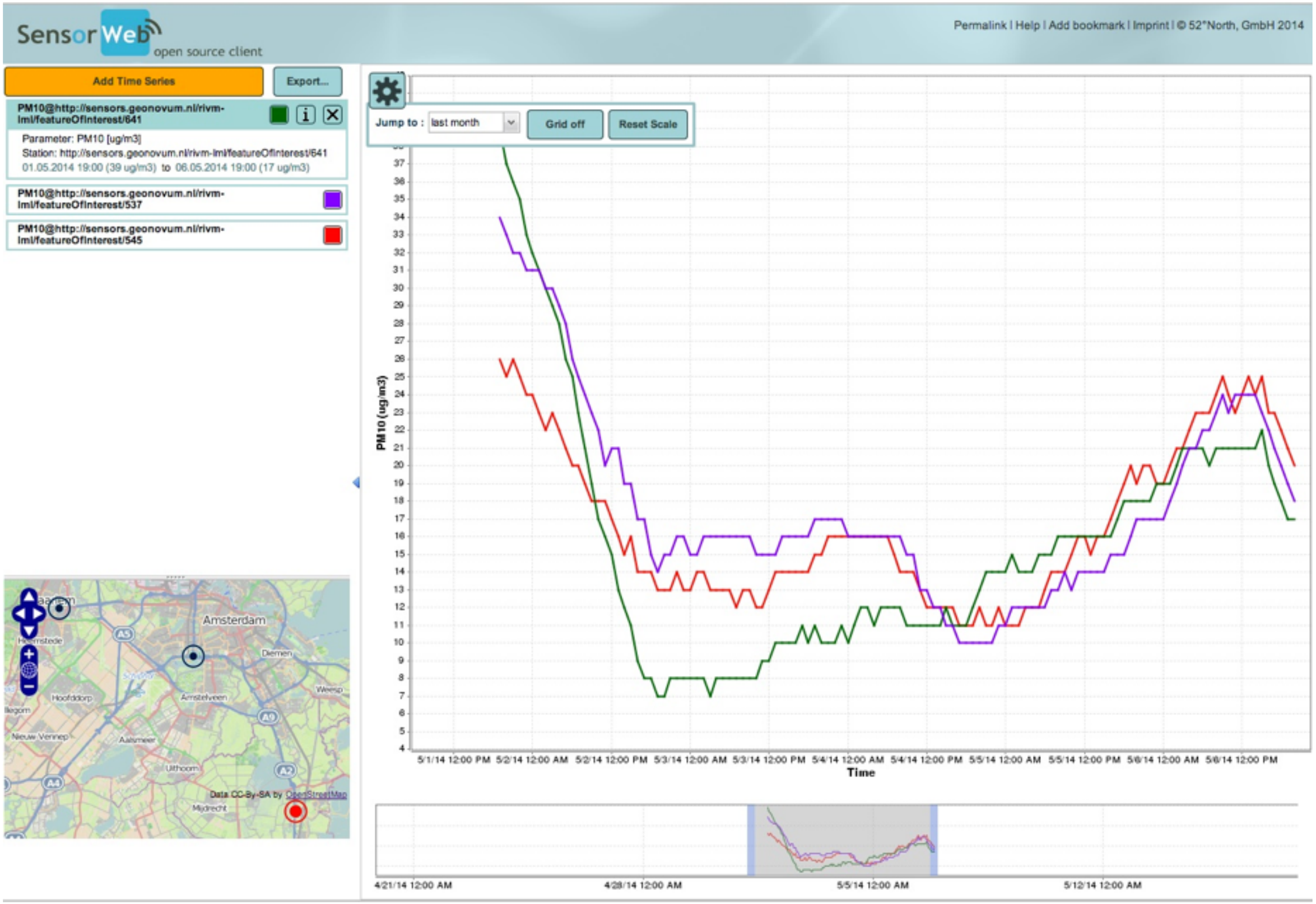
Clients - WMS/WFS - HeronViewer



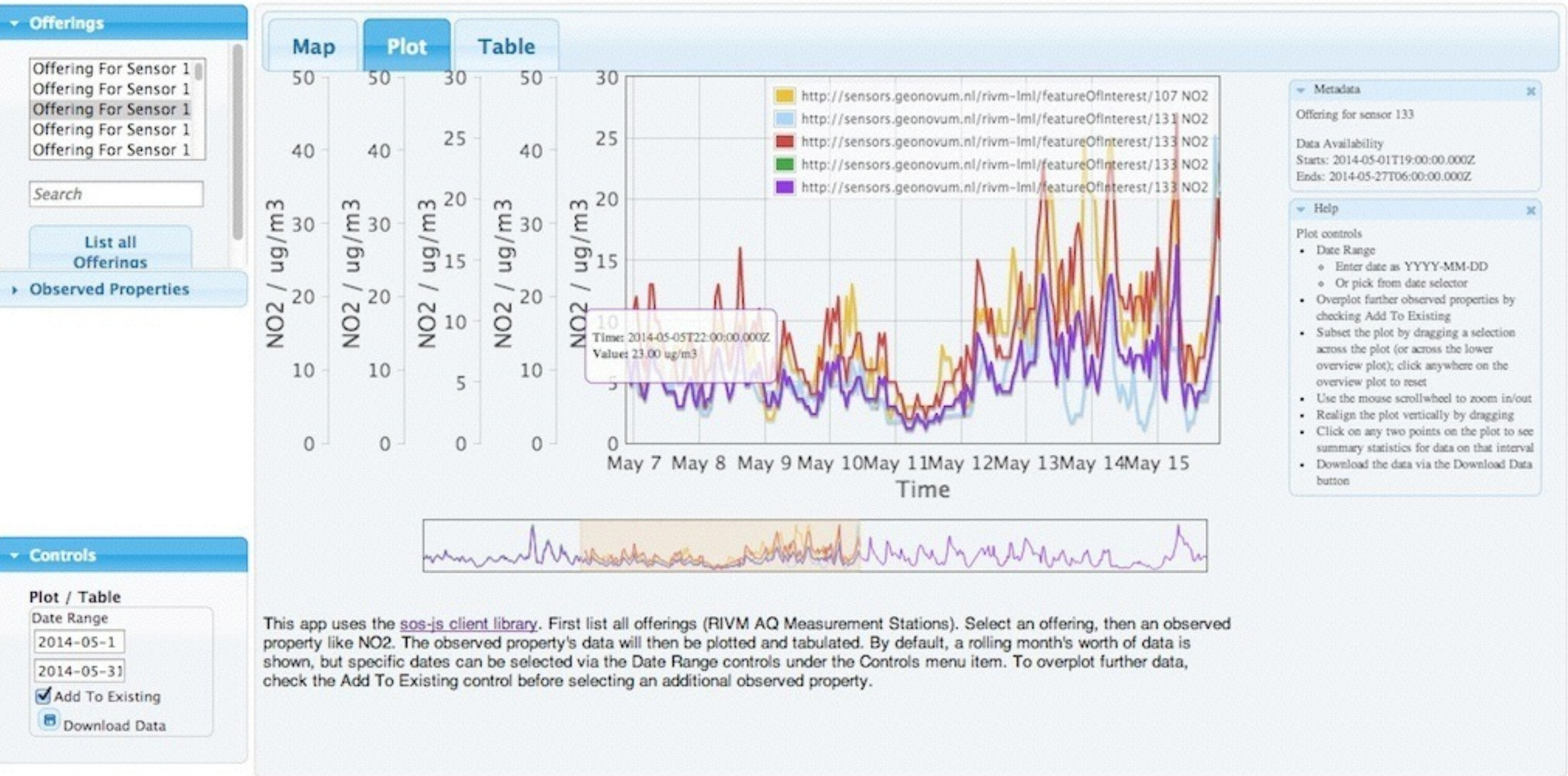
Clients - SOS - SWClient - 52N



Clients - SOS - SWClient - 52N



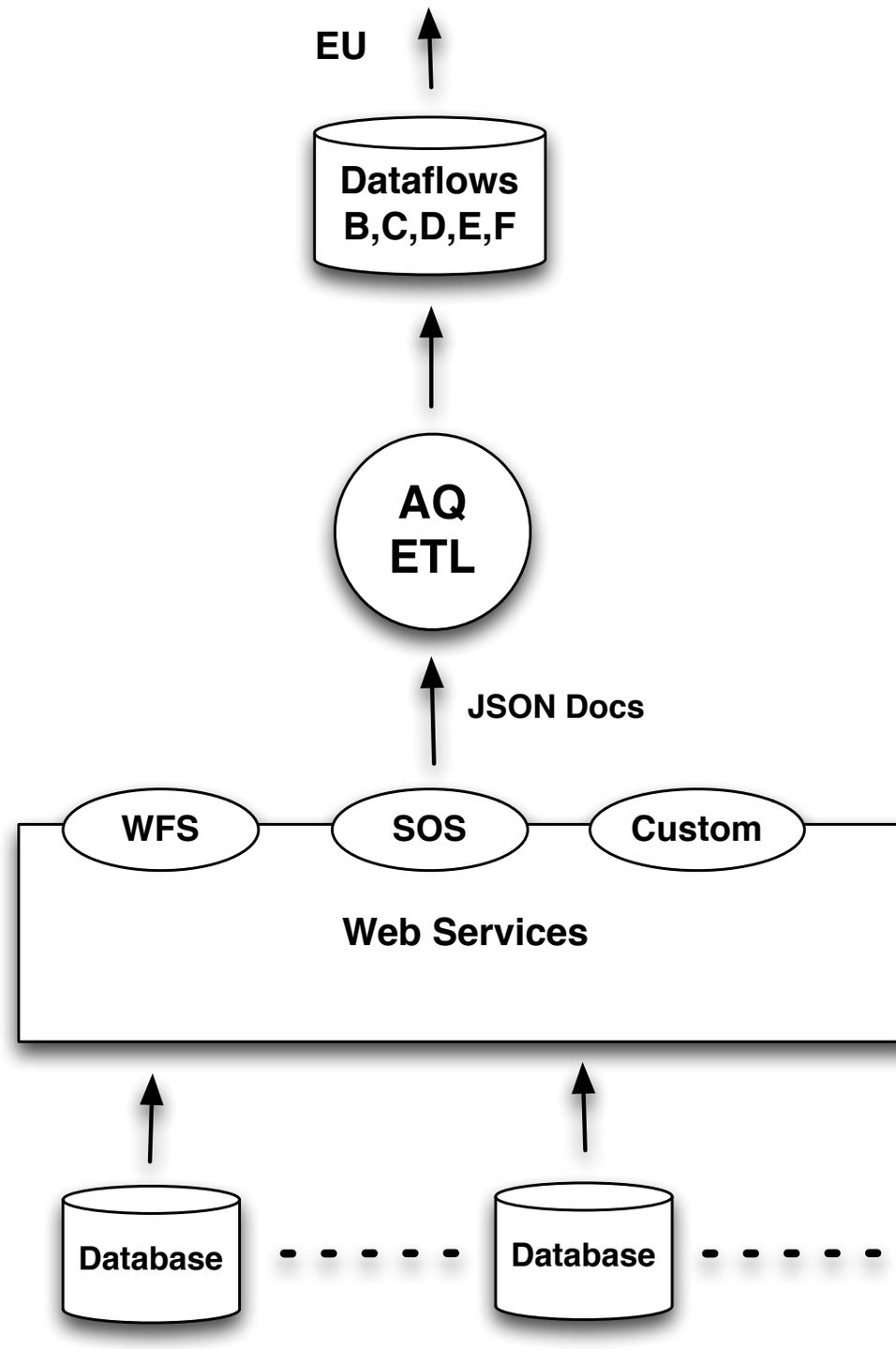
Clients - SOS - SOS.js - 52N



Automated AQ Reporting

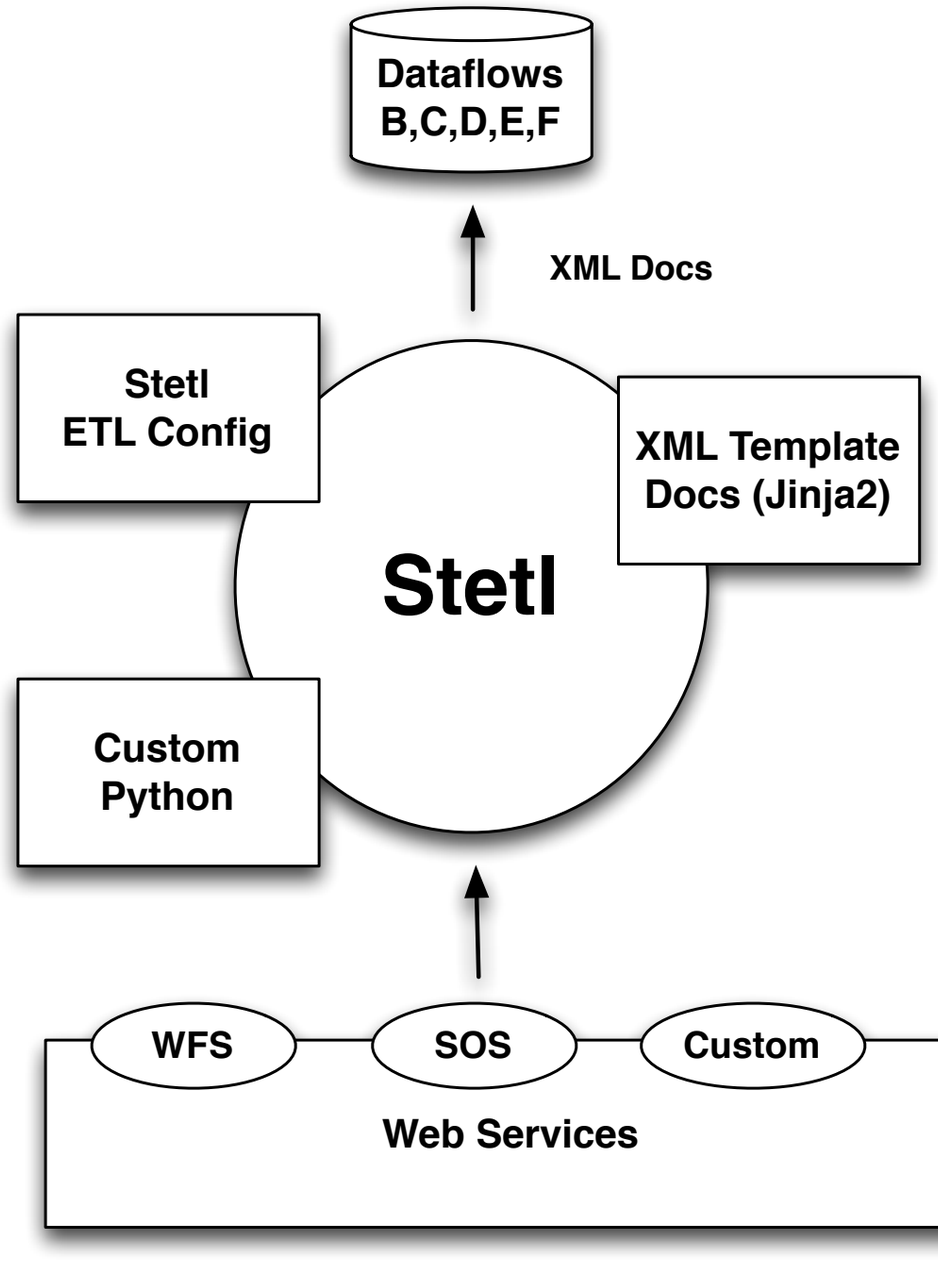
Geonovum PoC using Web services with Stetl

AQ Reporting - Architecture



4. Clients

AQ Reporting - ETL



Stetl Config - Dataflow D

```
# Example dataflow-D (Assessment Methods metadata) report generation using Stetl with Jinja2 templating filter.
# The input data comes directly from a WFS providing station info.
# The template files and global variables (globals.json) are under templates folder.
#
# All rendered output under output/
#
[etl]
chains = input_json|dataflow-D_template | output_dataflow-D_file

[input_json]
class = inputs.fileinput.JsonFileInput
file_path = http://sensors.geonovum.nl/gs/ows?service=WFS&request=GetFeature
    &typeName=sensors:active_stations&outputformat=JSON&srsName=EPSG:4326

# Advanced gml templating with globals for more or less static content
# in rivm-globals.json like id-prefixes and contact info etc
[dataflow-D_template]
class = filters.templatingfilter.Jinja2TemplatingFilter
template_file = templates/dataflow-D.jinja2
template_globals_path = input/globals-rivm.json

[output_dataflow-D_file]
class = outputs.fileoutput.FileOutput
file_path = output/dataflow-D.xml
```

ETL Chain

WFS Input

XML Template

Output File

Stetl Config - Dataflow D - WFS Data


```
{"type": "FeatureCollection", "totalFeatures": 109, "features": [
    {
        "type": "Feature",
        "id": "active_stations.fid-7d46fd2a_14864b87f63_17c8",
        "geometry": {
            "type": "Point",
            "coordinates": [3.91694736, 51.63555908]
        },
        "geometry_name": "point",
        "properties": {
            "gid": 19,
            "local_id": "STA-NL00301",
            "natl_station_code": "301",
            "eu_station_code": "NL00301",
            "name": "Zierikzee-Lange Slikweg",
            "municipality": "Schouwen-Duiveland",
            "altitude": -1,
            "altitude_unit": "m",
            "area_classification": "http://dd.eionet.europa.eu/vocabulary/aq/areaclassification/rural",
            "activity_begin": "1976-01-01T23:00:00Z",
            "activity_end": null,
            "version": "",
            "zone_name": "Zuid",
            "lon": "3.91694736",
            "lat": "51.63555908",
            "zone_code": "NL00300",
            "pollutants": "NO,NO2,O3"
        }
    },
    {
        "type": "Feature",
        "id": "active_stations.fid-7d46fd2a_14864b87f63_17c9",
        "geometry": {
            "type": "Point",
            "coordinates": [5.85361385, 51.54111099]
```

Stetl Config - Dataflow D - Template

```
  <!-- START STATIONS -->
  {% for feature in features %}
      <gml:featureMember>
          <aqd:AQD_Station gml:id="{{ feature.properties.local_id }}">
              <ef:inspireId>
                  {{ macros_inspire.render_inspire_id(globs.namespace, feature.properties.local_id) }}
              </ef:inspireId>
              <ef:name>{{ feature.properties.name }}</ef:name>
              <ef:mediaMonitored xlink:href="http://inspire.ec.europa.eu/codeList/MediaValue/air"/>
              <ef:geometry>
                  {% set gml_id = 'STA_G-%s' % feature.properties.local_id %}
                  {{ feature.geometry | geojson2gml(source_crs=crs, target_crs=4258, gml_id=gml_id,
l_format='GML3', gml_longsrs='YES') }}
              </ef:geometry>
              <ef:measurementRegime
          xlink:href="http://inspire.ec.europa.eu/codeList/MeasurementRegimeValue/continuousDataCollection"/>
              <ef:mobile>false</ef:mobile>
              <ef:operationalActivityPeriod>
                  <ef:OperationalActivityPeriod gml:id="STA_P-{{ feature.properties.local_id }}">
                      <ef:activityTime>
                          <gml:TimePeriod gml:id="STA_T-{{ feature.properties.local_id }}">
                              <gml:beginPosition>{{ feature.properties.activity_begin }}</gml:beginPosition>
                              <gml:endPosition indeterminatePosition="unknown"/>
                          </gml:TimePeriod>
                      </ef:activityTime>
                  </ef:OperationalActivityPeriod>
              </ef:operationalActivityPeriod>
              <ef:belongsTo xlink:href="{{ globs.namespace }}/NET-NL010A"/>
              <aqd:natlStationCode>{{ feature.properties.natl_station_code }}</aqd:natlStationCode>
              <aqd:municipality>{{ feature.properties.municipality }}</aqd:municipality>
              <aqd:EUStationCode>{{ feature.properties.local_id }}</aqd:EUStationCode>
              <aqd:meteoParams xlink:href="{{ globs.dataflow_D.meteo_params }}"/>
              <aqd:areaClassification xlink:href="{{ feature.properties.area_classification }}"/>
              <aqd:altitude uom="{{ feature.properties.altitude_unit }}">{{ feature.properties.altitude }}</
d:altitude>
```

AQ Reporting Status

- Dataflows B,C,D more or less done
- Main issue is lack of source data
- See GitHub for code: https://github.com/Geonovum/sospilot/tree/master/src/aq-report
- Very quick way to develop, about one day per dataflow

AQ Reporting Recommendations

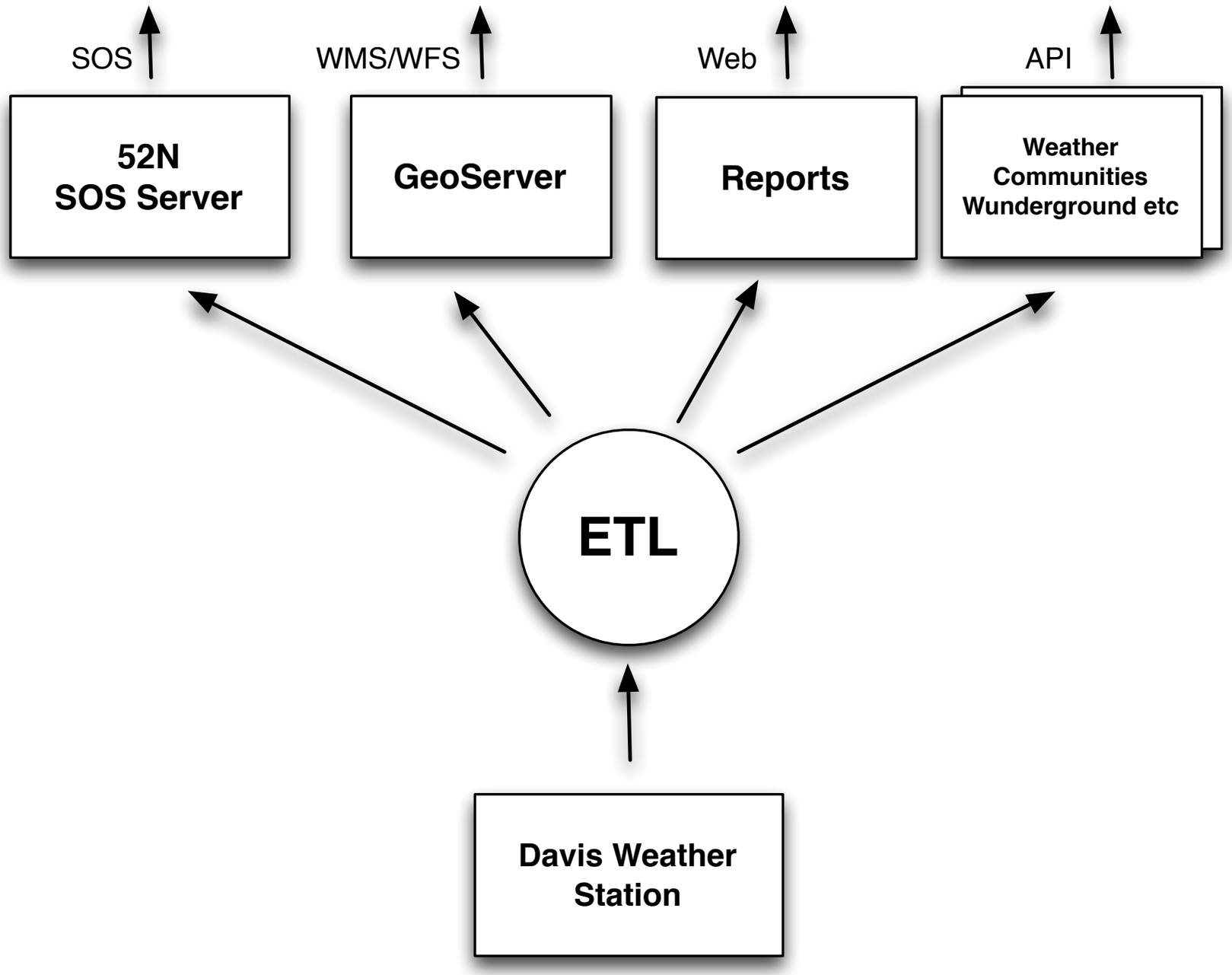
- Store **all** relevant data in database(s) - PostgreSQL!
- Expose data via web services: WFS, SOS, Custom
- Let these web services provide JSON (i.s.o. XML)
- Keep the SOS basic/let ETL do the AQ reporting
- Use template substitution as ETL mechanism

Weather Station

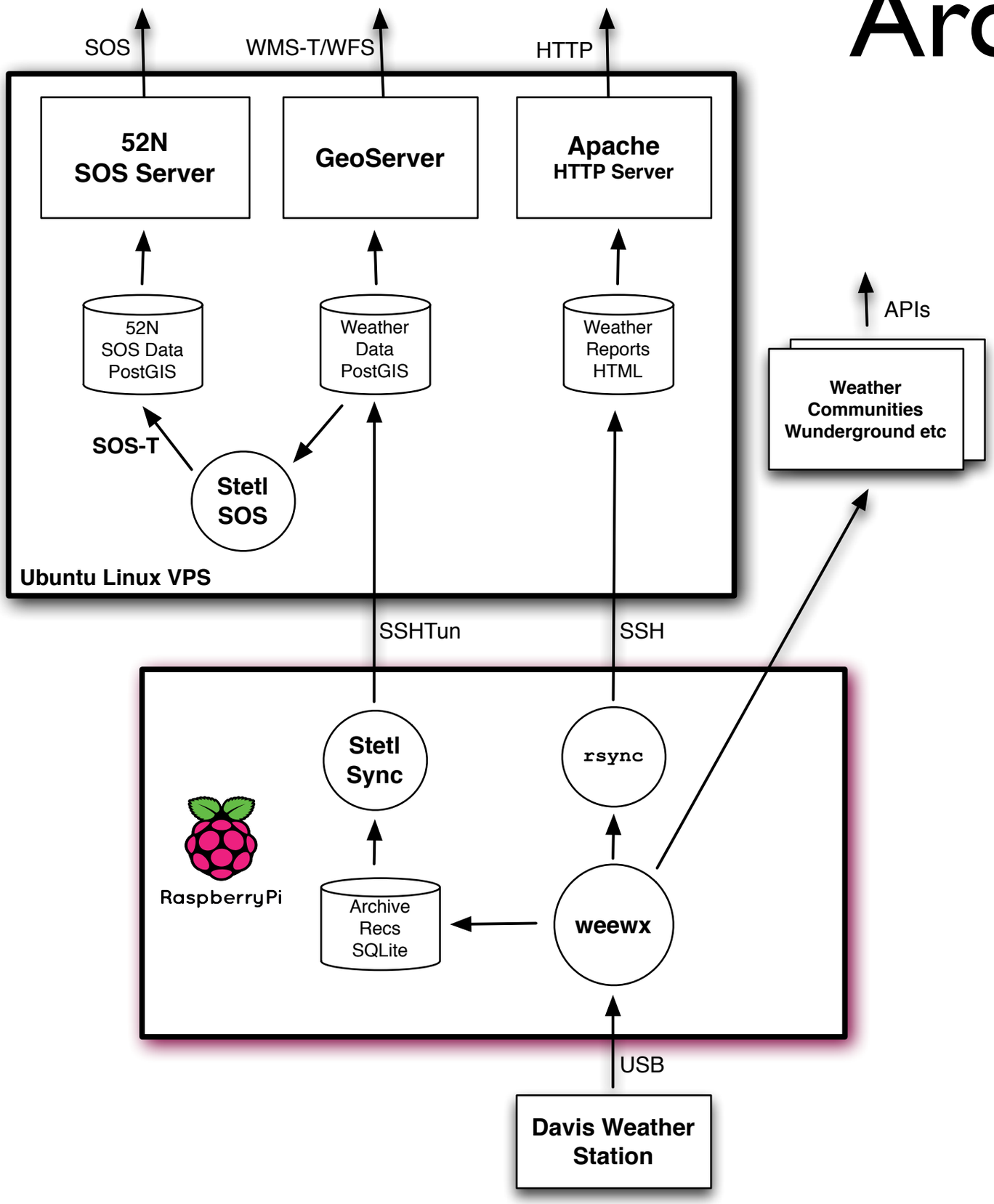
Geonovum Weather station - datastream integrated into WMS/WFS and SOS

Architecture

Architecture



Architecture



Result - Reporting

Amersfoort, The Netherlands Current Weather Conditions

sensors.geonovum.nl/weewx/

AMERSFOORT, THE NETHERLANDS

Current Weather Conditions

27-Oct-2014 11:00

Stats

Weewx uptime: 0 days, 6 hrs, 57 minutes
Server uptime: 0 days, 6 hrs, 58 minutes
weewx v2.7.0

Location

Latitude: 52° 09.36' N
Longitude: 005° 23.27' E
Altitude: 20 meters

GEONOVUM

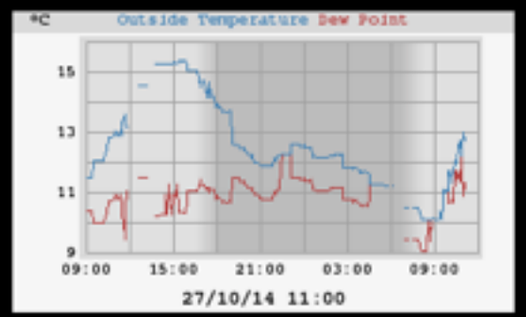
Home | Week | Month | Year | Monthly | Yearly | RSS | WAP | Mobile

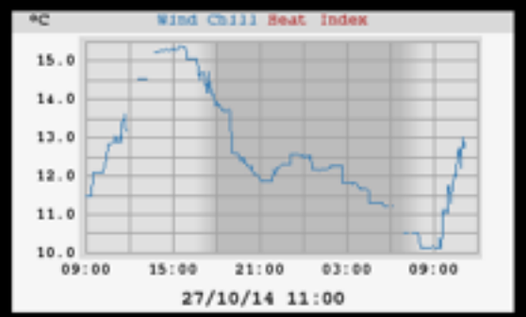
Current Conditions

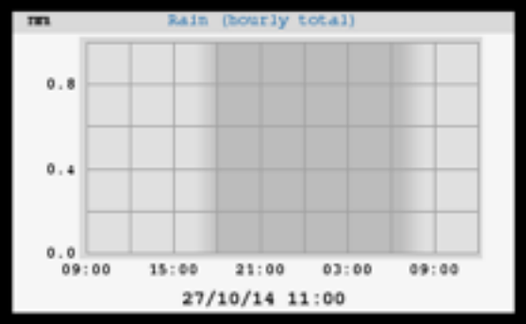
Outside Temperature	*12.7°C*
Wind Chill	*12.7°C*
Heat Index	*12.7°C*
Dewpoint	*11.3°C*
Humidity	*91%*
Barometer	*1024.0 mbar*
Barometer trend (3 hrs)	*0.0 mbar*
Wind	*3.0 m/s from 190° (S)*
Rain Rate	*1133.9 mm/hr*

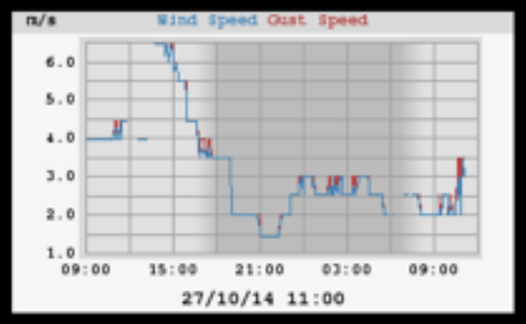
Since Midnight

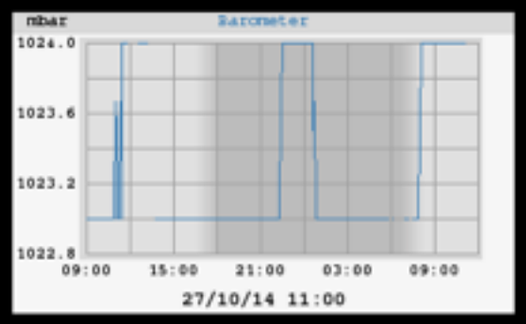
High Temperature Low Temperature	*13.0°C at 10:33* *10.1°C at 08:28*
High Heat Index Low Wind Chill	*13.0°C at 10:33* *10.1°C at 08:28*
High Humidity Low Humidity	*100% at 04:24* *87% at 10:33*
High Dewpoint Low Dewpoint	*12.2°C at 10:15* *9.0°C at 07:52*
High Barometer Low Barometer	*1024.0 mbar at 00:01* *1023.0 mbar at 00:50*
Today's Rain	*0.0 mm*
High Rain Rate	*1200.7 mm/hr at 00:01*
High Wind	*3.5 m/s from 190° at 10:33*
Average Wind	*2.4 m/s*
RMS Wind	*2.5 m/s*
Vector Average Speed Vector Average Direction	*2.4 m/s* *193°*

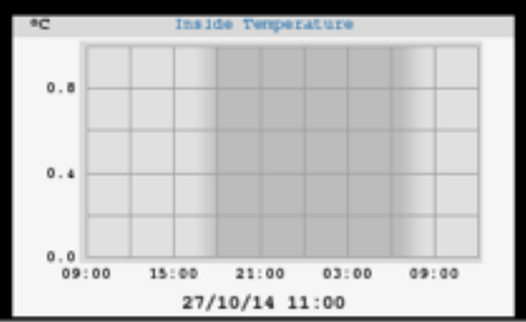


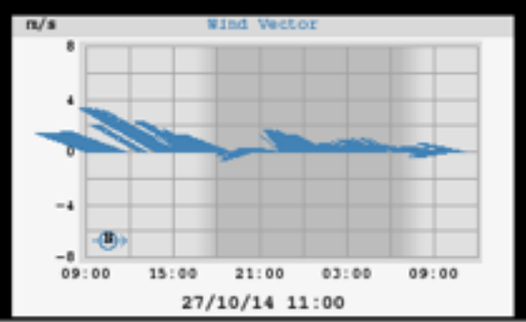




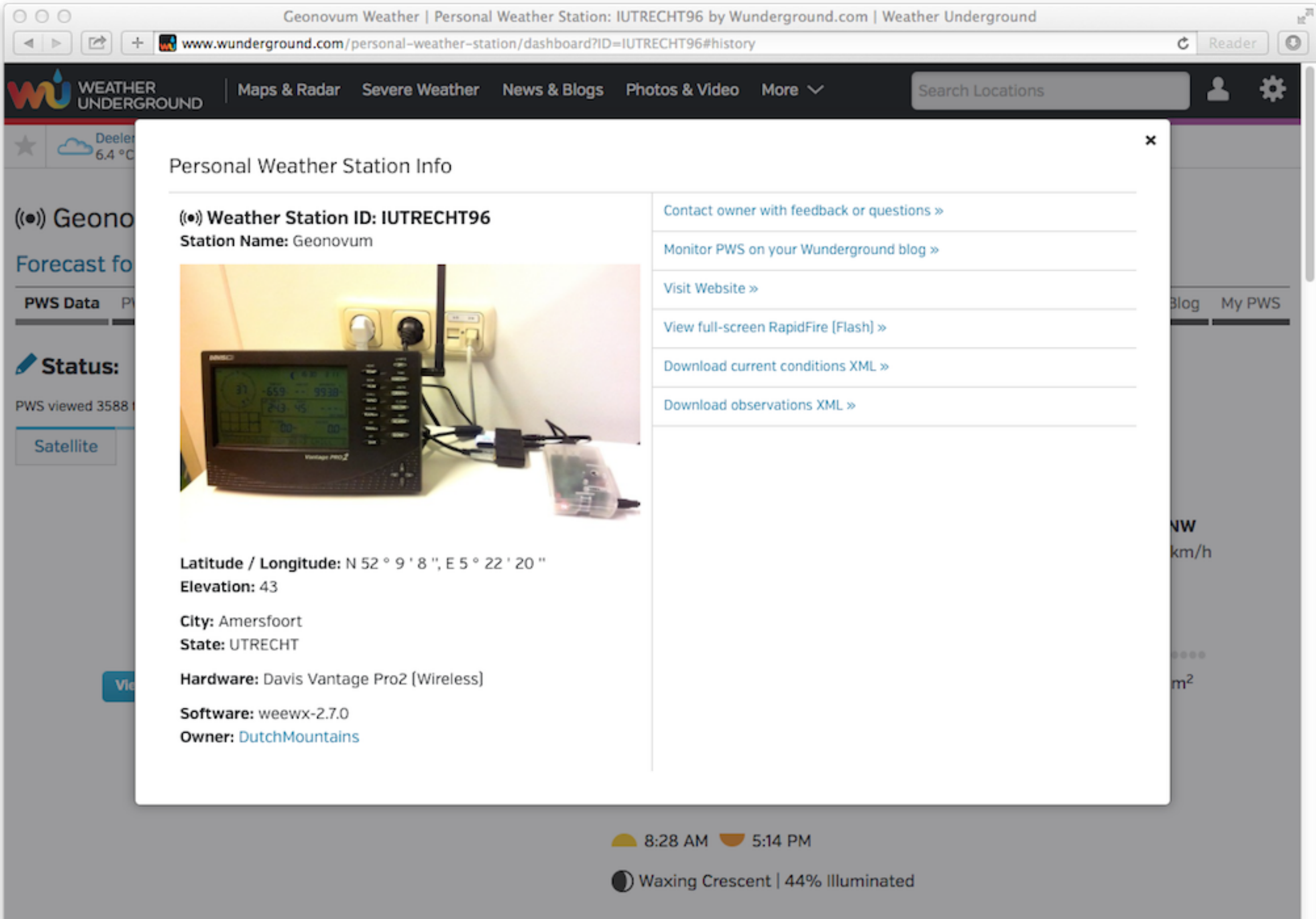








Result - Publish to Weather Community



Result - Publish to Weather Community

Geonovum Weather | Personal Weather Station: IUTRECHT96 by Wunderground.com | Weather Underground

www.wunderground.com/personal-weather-station/dashboard?ID=IUTRECHT96

WEATHER UNDERGROUND | Maps & Radar | Severe Weather | News & Blogs | Photos & Video | More | Search Locations

Deelen, NL 6.4 °C Overcast | Soesterberg, NL 6.3 °C Partly Cloudy | Recent Cities: Soesterberg, Netherlands | Amsterdam, Netherlands

Geonovum **IUTRECHT96** [About this PWS]

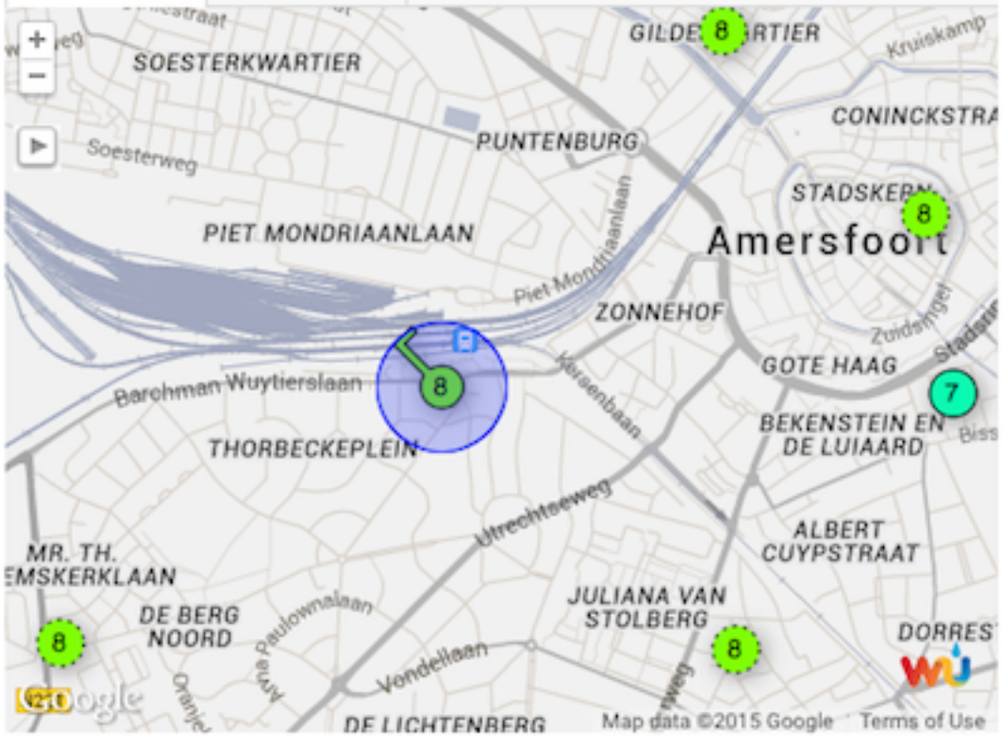
Forecast for Amersfoort, UTRECHT > 52.152 5.372 > 13 m

PWS Data | PWS Widgets | WunderStation | PWS Blog | My PWS

Status:

PWS viewed 3592 times since January 1, 2015

Satellite | Webcam | Compare



Low Clouds — High Clouds

Warm — Cold

View WunderMap

Current Conditions

Station reported 4 minutes ago

7.6 °C

Feels Like **7.6** °C

22.5 km/h

Wind from **NW**

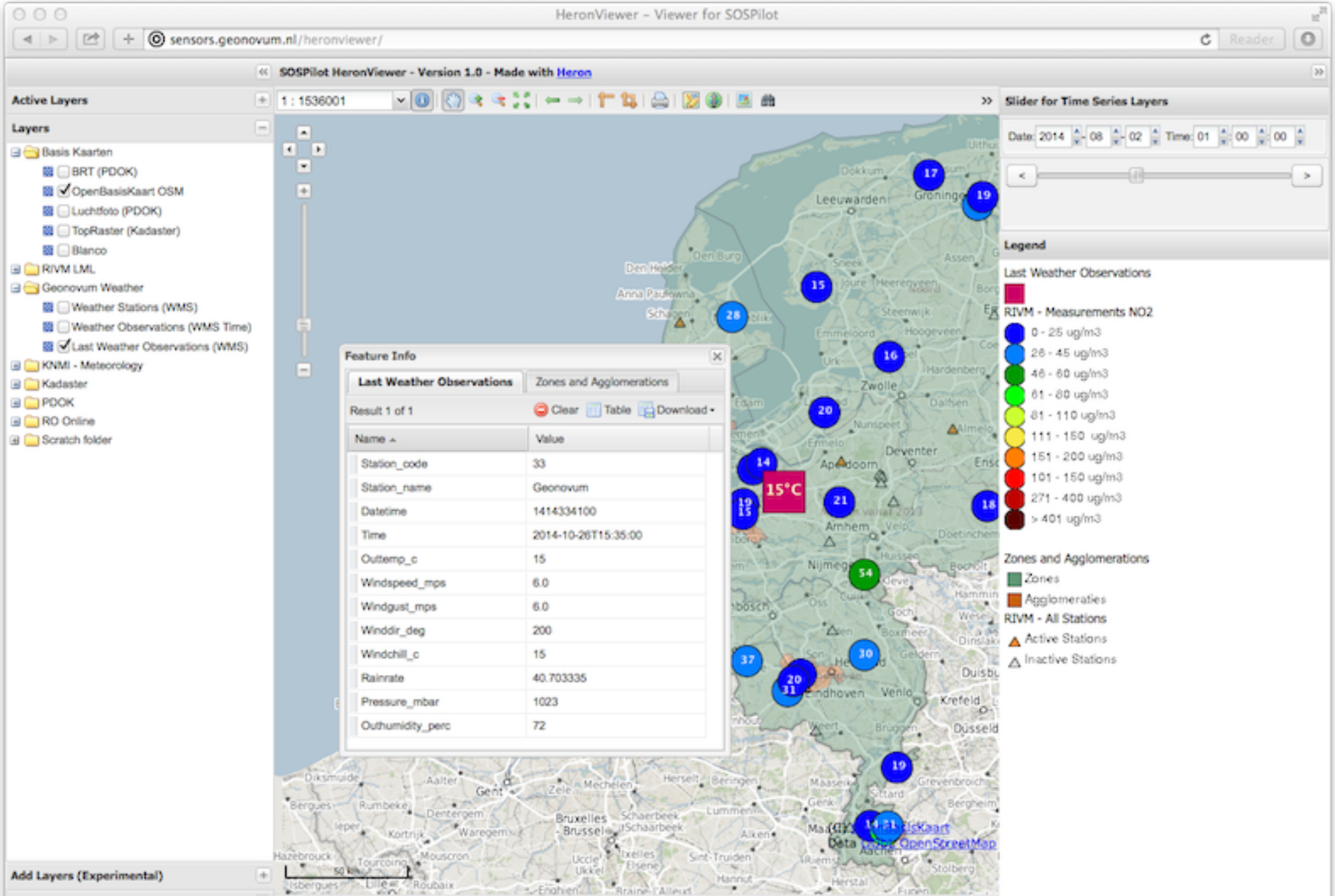
Gusts **32.2** km/h

Dew Point:	**4** °C	UV:	0.0
Humidity:	**80**%	Solar:	**26** w/m²
Precip Rate:	**0.25** mm/hr	Soil Moisture:	--
Precip Accum:	**2** mm	Soil Temp:	--
Pressure:	**1017.83** hPa	Leaf Wetness:	--

8:28 AM | 5:14 PM

Waxing Crescent | 44% Illuminated

Result - WMS-Time/WFS



Result - SOS Integration

Demo

Discussion

Open Items/TODO

Tracked on https://github.com/Geonovum/sospilot/issues

- Source data
  - http://www.lml.rivm.nl/xml or
  - http://www.lml.rivm.nl/sos
- Stations info
  - name attribute Eionet only municipality
- Standardize/Harmonize SOS Model Elements
  - pollutant naming, codelists
- Time format (timezone) from source to SOS
- INSPIRE-related
- 2 Client-frameworks: SOS.js and SWC
- (Historical) weather data in WMS-T and SOS