

# SOSPilot - Prototype

Just van den Broecke  
Geonovum  
Amersfoort - Oct 27, 2014  
[just@justobjects.nl](mailto:just@justobjects.nl)



# ABOUT

Independent Open  
Source Geospatial  
Professional  
[justobjects.nl](http://justobjects.nl)

**Just** Objects

Member of the  
OpenGeoGroep (NL)  
[www.opengeogroep.nl](http://www.opengeogroep.nl)



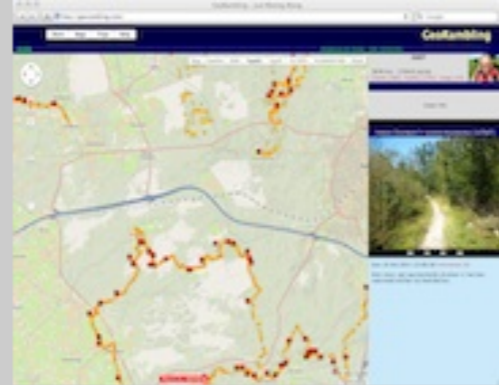
Secretary  
[OSGeo.nl](http://OSGeo.nl)



# 7 scenes



Traceland



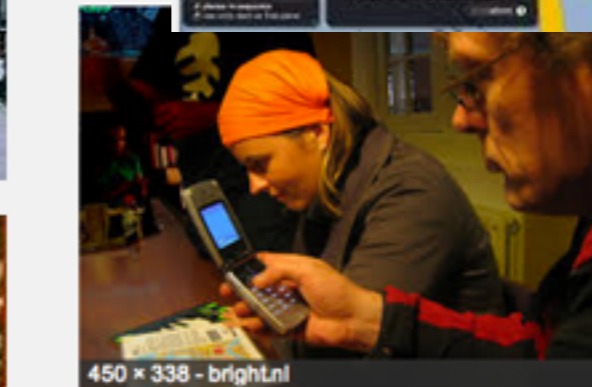
GeoRambling - Just's GPS Hikes



OtterTracing



GeoSkating



# Back into Environmental Chemistry



## 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

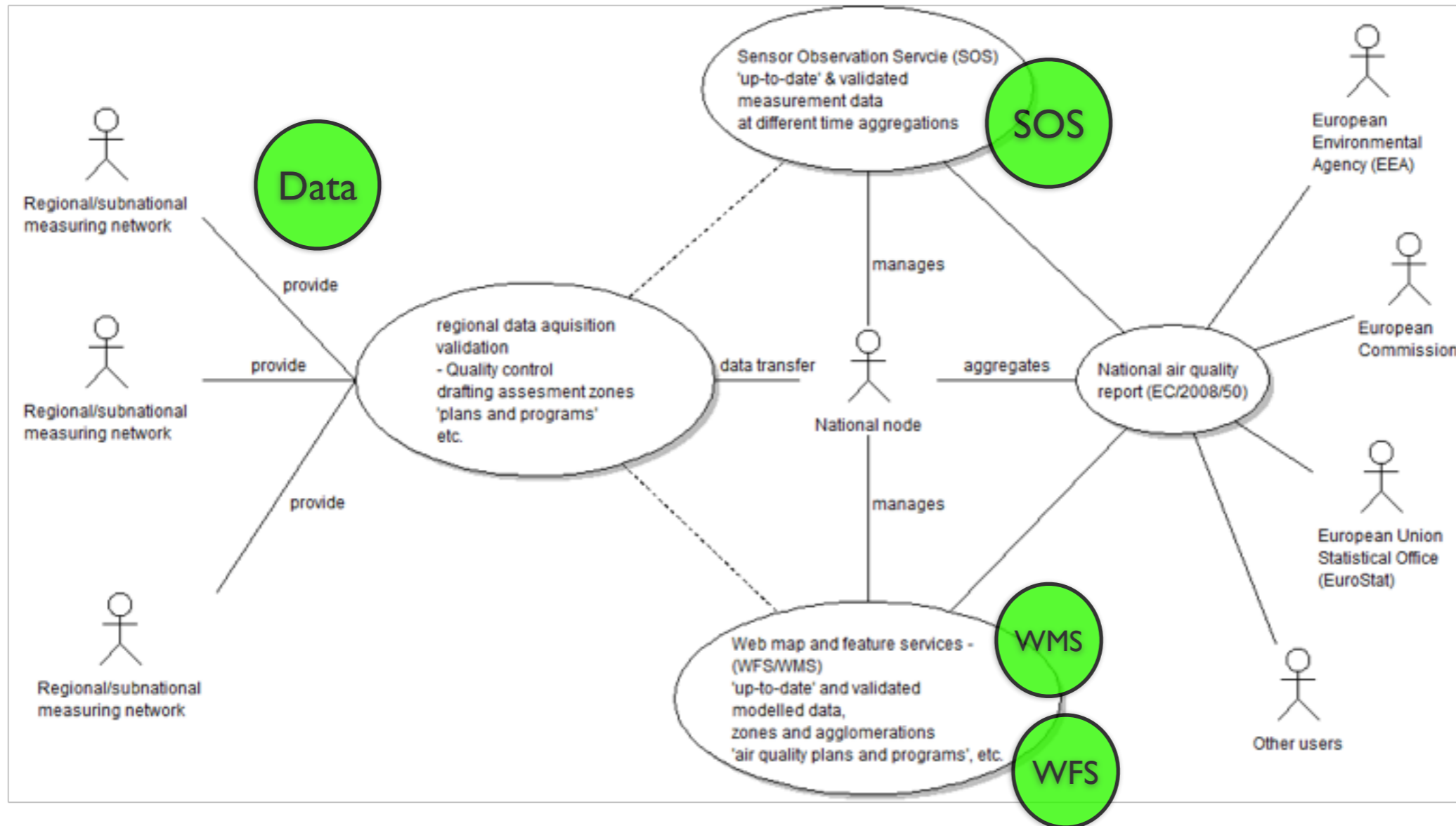
Home: [sensors.geonovum.nl](https://sensors.geonovum.nl)

Doc: [sospilot.rtfid.org](https://sospilot.rtfid.org)

Code: [github.com/Geonovum/sospilot](https://github.com/Geonovum/sospilot)

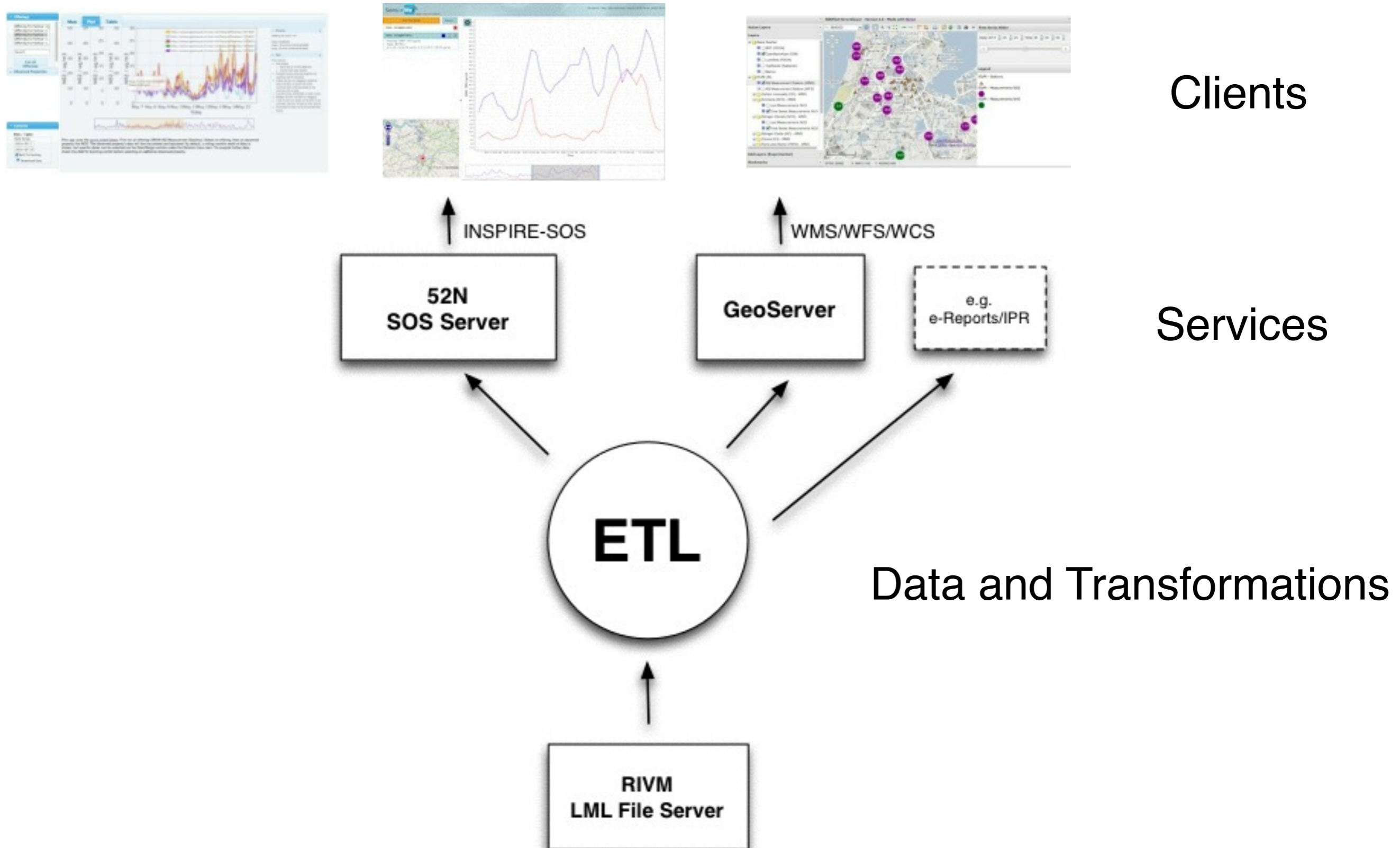
TODO: [GitHub issue tracker](#)

# 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

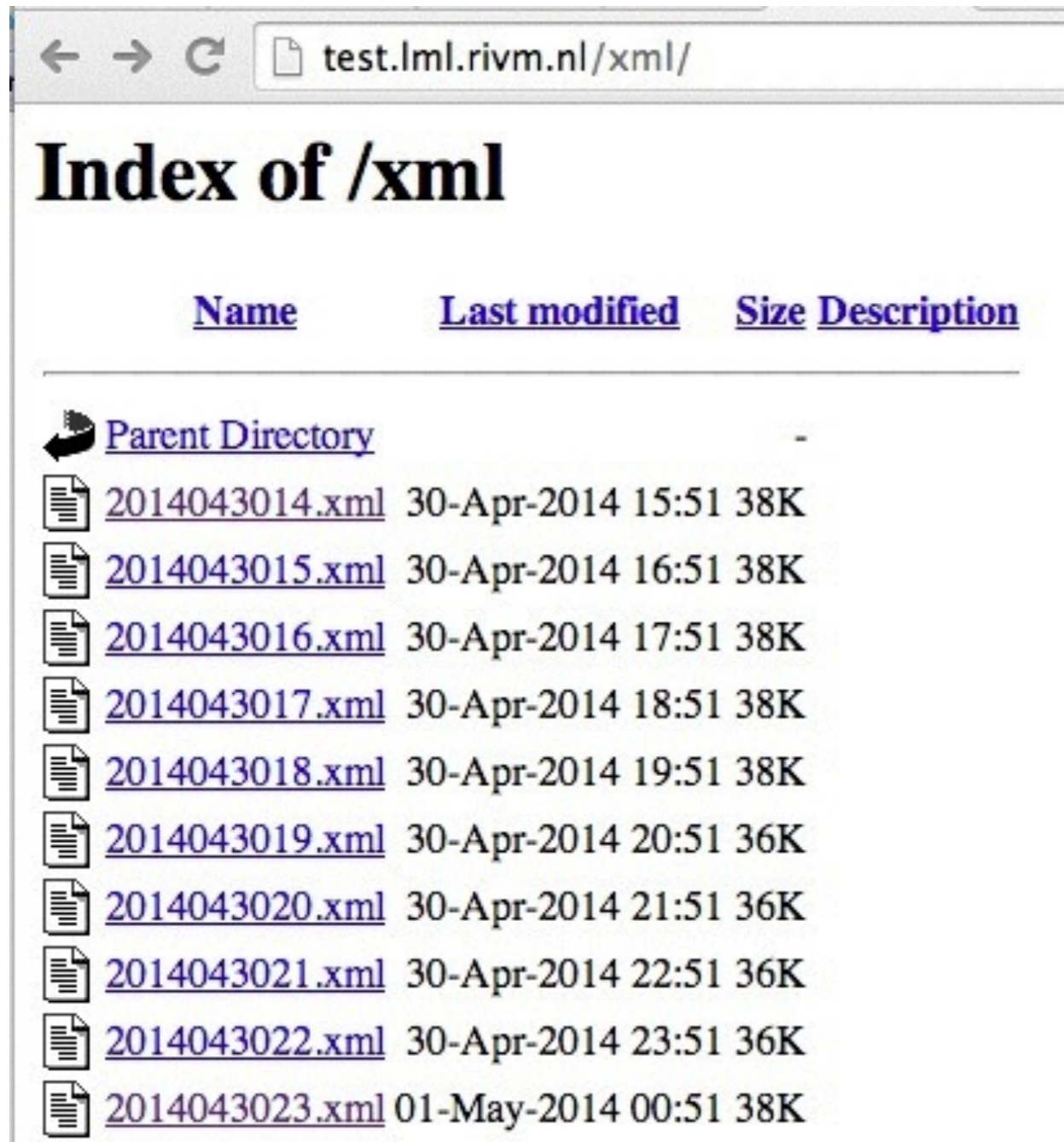
# Prototype Scope













# Data and Transformations (ETL)

# Source: Hourly Measurements



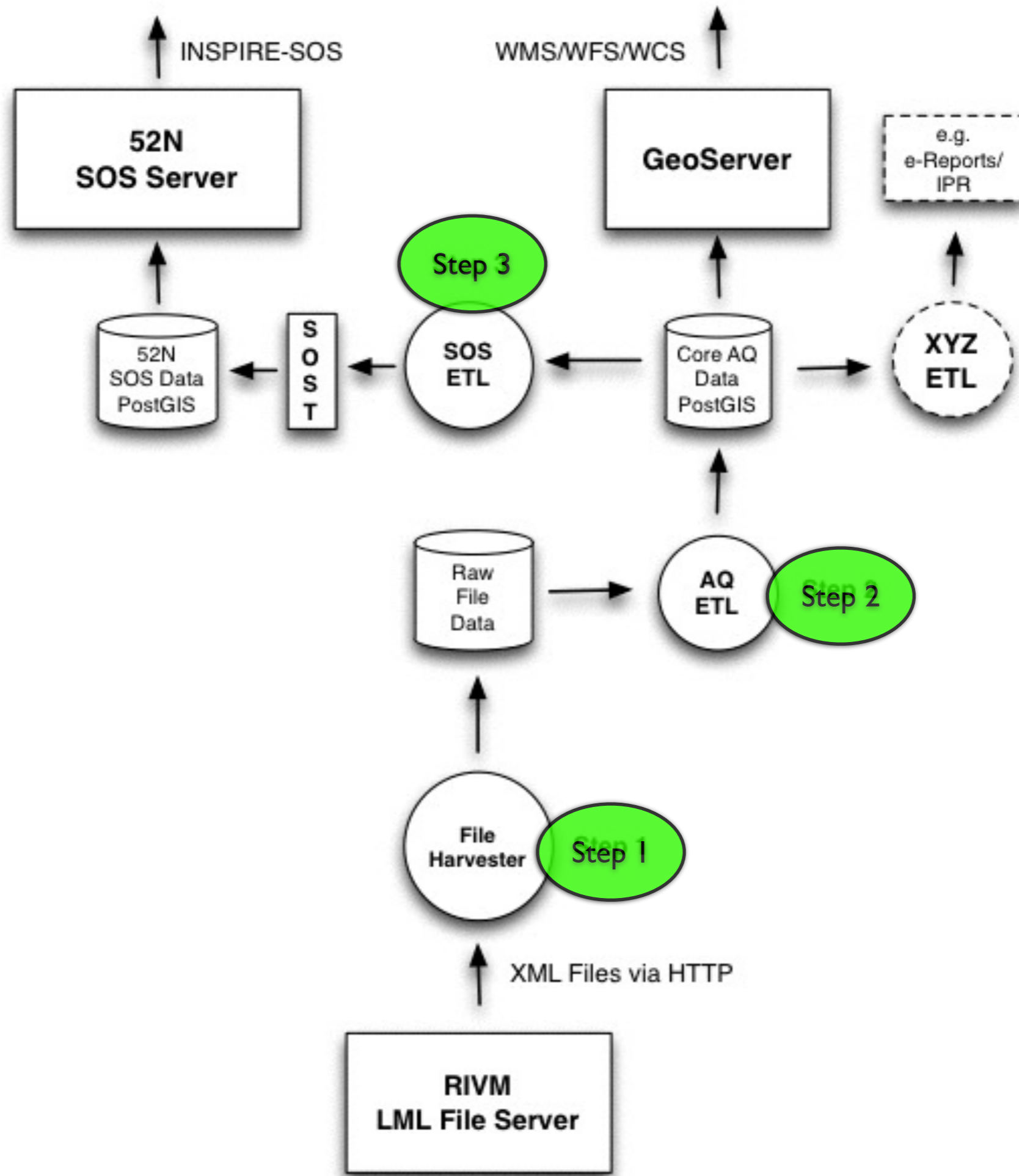
<u>Name</u>	<u>Last modified</u>	<u>Size</u>	<u>Description</u>
 <a href="#">Parent Directory</a>	-	-	-
 <a href="#">2014043014.xml</a>	30-Apr-2014 15:51	38K	
 <a href="#">2014043015.xml</a>	30-Apr-2014 16:51	38K	
 <a href="#">2014043016.xml</a>	30-Apr-2014 17:51	38K	
 <a href="#">2014043017.xml</a>	30-Apr-2014 18:51	38K	
 <a href="#">2014043018.xml</a>	30-Apr-2014 19:51	38K	
 <a href="#">2014043019.xml</a>	30-Apr-2014 20:51	36K	
 <a href="#">2014043020.xml</a>	30-Apr-2014 21:51	36K	
 <a href="#">2014043021.xml</a>	30-Apr-2014 22:51	36K	
 <a href="#">2014043022.xml</a>	30-Apr-2014 23:51	36K	
 <a href="#">2014043023.xml</a>	01-May-2014 00:51	38K	

```
▼<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)

GMLID	LocalId	Namespace	Version	NatlStationCode	Name	Municipality	EUStationCode	ActivityBegin	ActivityEnd	Lat	Lon	SRSName	Altitude	AltitudeUnit	URN
1	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:		
2	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:		
3	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	urn:ogc:def:crs:EPSG:4258		
4	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		
5	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:ogc:def:crs:EPSG:4258		
6	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		urn:ogc:def:crs:EPSG:4258		
7	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:4258		
8	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:EPSG:4258		
9	STA-NL00134	STA-NL00134	NL	RIVM.AQ	134	Beek-Vliegvelddweg		NL00134	1978-01-01 00:00:00+01:00	2013-01-01 00:00:00+01:00	50.90545	5.761917	urn:ogc:def:crs:EPSG:4258		
10	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:EPSG:4258		
11	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:ogc:def:crs:EPSG:4258		
12	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:ogc:def:crs:EPSG:4258		
13	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:ogc:def:crs:EPSG:4258		
14	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:def:crs:EPSG:4258		
15	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:def:crs:EPSG:4258		
16	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:crs:EPSG:4258		
17	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		
18	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:ogc:def:crs:EPSG:4258		
19	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:ogc:def:crs:EPSG:4258		
20	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:ogc:def:crs:EPSG:4258		
21	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:EPSG:4258		
22	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:def:crs:EPSG:4258		
23	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	urn:ogc:def:crs:EPSG:4258		
24	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	urn:ogc:def:crs:EPSG:4258		
25	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:ogc:def:crs:EPSG:4258		
26	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:crs:EPSG:4258		
27	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:crs:EPSG:4258		
28	STA-NL00434	STA-NL00434	NL	RIVM.AQ	434	Rotterdam-vliegvelddweg		NL00434	1978-01-01 00:00:00+01:00	2013-01-01 00:00:00+01:00	51.953889	4.443342	urn:ogc:def:crs:EPSG:4258		
29	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		
30	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:ogc:def:crs:EPSG:4258		
31	STA-NL00518	STA-NL00518	NL	RIVM.AQ	518	Amsterdam-Cabeliastraat	Amsterdam	NL00518	1976-04-02 00:00:00+01:00		52.38472366	4.80361414	urn:ogc:def:crs:EPSG:4258		
32	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:ogc:def:crs:EPSG:4258		
33	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:crs:EPSG:4258		
34	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:crs:EPSG:4258		
35	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:ogc:def:crs:EPSG:4258		
36	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:def:crs:EPSG:4258		
37	STA-NL00627	STA-NL00627	NL	RIVM.AQ	627	Bilthoven-Van Leeuwenhoeklaan	De Bilt	NL00627	1978-01-01 00:00:00+01:00		52.120833	5.195567	urn:ogc:def:crs:EPSG:4258		
38	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:4258		
39	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:4258		
40	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:4258		
41	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:4258		
42	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	5.125286	urn:ogc:def:crs:EPSG:4258		
43	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:ogc:def:crs:EPSG:4258		
44	STA-NL00639	STA-NL00639	NL	RIVM.AQ	639	Utrecht-Erzejstraat	Utrecht	NL00639	1987-10-01 00:00:00+01:00		52.068889	5.121114	urn:ogc:def:crs:EPSG:4258		
45	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	5.125286	urn:ogc:def:crs:EPSG:4258		
46	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:EPSG:4258		
47	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	urn:ogc:def:crs:EPSG:4258		
48	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:def:crs:EPSG:4258		
49	STA-NL00728	STA-NL00728	NL	RIVM.AQ	728	Apeldoorn-Stationstraat		NL00728	1988-04-19 00:00:00+01:00	2013-07-16 00:00:00+01:00	52.213964	5.966719	urn:ogc:def:crs:EPSG:4258		
50	STA-NL00729	STA-NL00729	NL	RIVM.AQ	729	Apeldoorn-Stationstraat		NL00729	1988-04-22 00:00:00+01:00	2002-04-03 00:00:00+01:00	52.191944	5.962789	urn:ogc:def:crs:EPSG:4258		

# Multistep 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

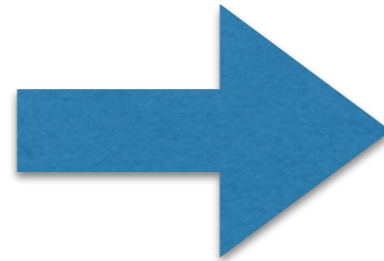
## File Harvester

test.lml.rivm.nl/xml/

### Index of /xml

Name	Last modified	Size	Description
<a href="#">Parent Directory</a>	-	-	-
<a href="#">2014043014.xml</a>	30-Apr-2014 15:51	38K	
<a href="#">2014043015.xml</a>	30-Apr-2014 16:51	38K	
<a href="#">2014043016.xml</a>	30-Apr-2014 17:51	38K	
<a href="#">2014043017.xml</a>	30-Apr-2014 18:51	38K	
<a href="#">2014043018.xml</a>	30-Apr-2014 19:51	38K	
<a href="#">2014043019.xml</a>	30-Apr-2014 20:51	36K	
<a href="#">2014043020.xml</a>	30-Apr-2014 21:51	36K	
<a href="#">2014043021.xml</a>	30-Apr-2014 22:51	36K	
<a href="#">2014043022.xml</a>	30-Apr-2014 23:51	36K	
<a href="#">2014043023.xml</a>	01-May-2014 00:51	38K	

Raw XML Files



phpPgAdmin PostgreSQL sensors rivm\_lml lml\_files

### Edit row

Column	Type	Format	Null	Value
gid	integer	Value	<input type="checkbox"/>	73
insert_time	timestamp without time zone	Value	<input type="checkbox"/>	2014-05-28 16:10:49.778991
file_name	character varying(32)	Value	<input type="checkbox"/>	2014043014.xml
file_data	text	Value	<input type="checkbox"/>	<?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

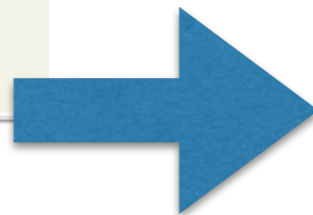
# ETL Step 2

## Raw AQ Measurements

phpPgAdmin PostgreSQL sensors rivm\_lmi lmi\_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>



phpPgAdmin PostgreSQL sensors rivm\_lmi measurements

Browse

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

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 20:10:39.735657	NO2	491	491-NO2-27/05/2014-14	2014-05-27 14:00:00	78	0
Edit Delete	1387	2014052714.xml	2014-05-29 20:10:39.736403	NO2	493	493-NO2-27/05/2014-14	2014-05-27 14:00:00	89	0
Edit Delete	1388	2014052714.xml	2014-05-29 20:10:39.737149	NO2	494	494-NO2-27/05/2014-14	2014-05-27 14:00:00	47	0
Edit Delete	1389	2014052714.xml	2014-05-29 20:10:39.737895	NO2	495	495-NO2-27/05/2014-14	2014-05-27 14:00:00	22	0
Edit Delete	1390	2014052714.xml	2014-05-29 20:10:39.738641	NO2	496	496-NO2-27/05/2014-14	2014-05-27 14:00:00	14	0
Edit Delete	1391	2014052714.xml	2014-05-29 20:10:39.739387	NO2	497	497-NO2-27/05/2014-14	2014-05-27 14:00:00	53	0
Edit Delete	1392	2014052714.xml	2014-05-29 20:10:39.740133	NO2	498	498-NO2-27/05/2014-14	2014-05-27 14:00:00	9	0

“Blobs” + meta in PostGIS

Records in PostGIS





# ETL Step 3

## SOS Publication

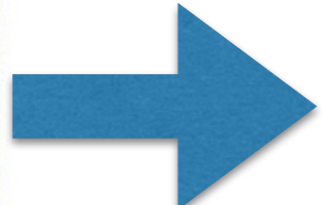
phpPgAdmin PostgreSQL sensors nvm\_lm measurements

Browse

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

Actions	gld	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 20:10:39.734877	NO2	489	489-NO2-27/05/2014-14	2014-05-27 14:00:00	95	0
Edit Delete	1386	2014052714.xml	2014-05-29 20:10:39.73567	NO2	491	491-NO2-27/05/2014-14	2014-05-27 14:00:00	78	0
Edit Delete	1387	2014052714.xml	2014-05-29 20:10:39.736493	NO2	493	493-NO2-27/05/2014-14	2014-05-27 14:00:00	89	0
Edit Delete	1388	2014052714.xml	2014-05-29 20:10:39.737339	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 20:10:39.739278	NO2	496	496-NO2-27/05/2014-14	2014-05-27 14:00:00	14	0
Edit Delete	1391	2014052714.xml	2014-05-29 20:10:39.740278	NO2	497	497-NO2-27/05/2014-14	2014-05-27 14:00:00	53	0
Edit Delete	1392	2014052714.xml	2014-05-29 20:10:39.741278	NO2	498	498-NO2-27/05/2014-14	2014-05-27 14:00:00	9	0

Raw Records  
PostGIS



S  
O  
S  
-  
T

<input type="checkbox"/>	numericvalue	sensors		97450	Browse
<input type="checkbox"/>	observableproperty	sensors		1260	Browse
<input type="checkbox"/>	observation	sensors		97450	Browse
<input type="checkbox"/>	observationconstellation	sensors		1260	Browse
<input type="checkbox"/>	observationhasoffering	sensors		97450	Browse
<input type="checkbox"/>	observationtype	sensors		0	Browse
<input type="checkbox"/>	offering	sensors		140	Browse
<input type="checkbox"/>	offeringallowedfeaturetype	sensors		140	Browse
<input type="checkbox"/>	offeringallowedobservationtype	sensors		140	Browse
<input type="checkbox"/>	offeringhasrelatedfeature	sensors		0	Browse
<input type="checkbox"/>	parameter	sensors		0	Browse
<input type="checkbox"/>	procedure	sensors		140	Browse

52N SOS  
PostGIS DB

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

Track  
Last Processed  
Record in DB

phpPgAdmin: PostgreSQL? sensors? rivm\_lml? etl\_progress?

### Browse

Actions		gid	worker	source_table	last_id	last_update
<a href="#">Edit</a>	<a href="#">Delete</a>	2	measurements2sos	measurements	-1	2014-05-29 21:20:43.020645
<a href="#">Edit</a>	<a href="#">Delete</a>	1	files2measurements	lml_files	673	2014-05-29 21:30:18.535398

# ETL Tech

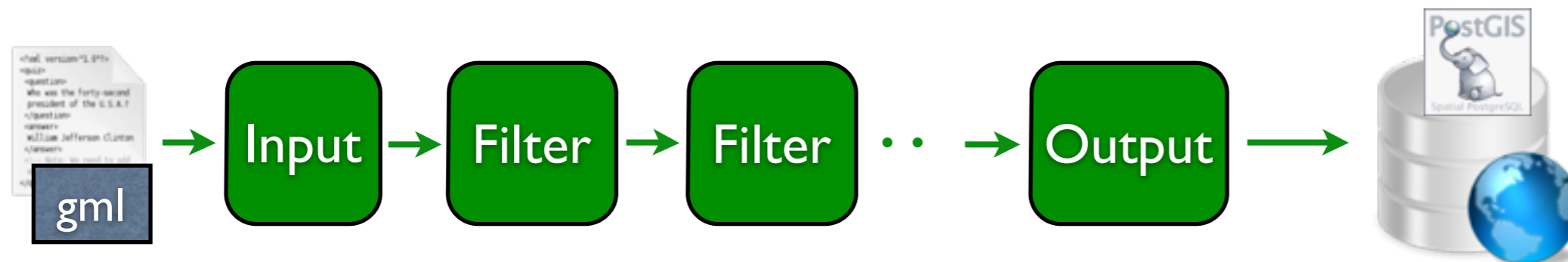
## Tool: Stetl

- 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](http://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](https://sensors.geonovum.nl/gs/ows)

Viewer

[sensors.geonovum.nl/heronviewer](https://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\_lmi measurements\_stations

Browse

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

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	0101000020E610000089E45400C6921540747DFE9F26B44940	0	2014050120.xml
5	244	Gemert-Bakel	PM10	2014-05-01 20:00:00	47	0101000020E61000001E19ABCDFF38174094F6065F98C44940	0	2014050120.xml
6	246	Moerdijk	PM10	2014-05-01 20:00:00	42	0101000020E6100000485146E0380E124058B009408ED34940	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	0101000020E61000008EA6C4BF196A174031C7FA1F43C54940	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	0101000020E6100000B18717C06BE2174090B402E0AB714940	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	0101000020E610000088B9B68FCC4E1140BCE3FB7FA8F44940	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	0101000020E610000090C8E87F880A124010E0FC9F26264A40	0	2014050120.xml
24	445		PM10	2014-05-01 20:00:00	33	0101000020E6100000C1CAA145B64311409A99999999094A40	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\_lm 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	0101000020E61000008EA6C48F196A174031C7FA1F43C54940	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	0101000020E610000084D6C39789F21740348463963D734940	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	0101000020E6100000CBF14C8021E41540F6B704E01FBC4940	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	0101000020E610000089E45400C6921540747DFEFFF28B44940	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	Vaardingen	185740	2014-06-03 10:00:00	24	0101000020E6100000BBB986BFCC4E11408CE3FB7FA8F44940	0	433-O3-03/06/2014-10
437		185741	2014-06-03 10:00:00	38	0101000020E6100000A3203860A9CD11406826F7BFCCE44940	0	437-O3-03/06/2014-10
442	Dordrecht	183722	2014-06-03 02:00:00	6	0101000020E61000002C1A420036D51240CCA800007CE64940	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	0101000020E6100000558EE27F9F97124061530860DA304A40	0	537-O3-03/06/2014-10
538	Wieringermeer	185745	2014-06-03 10:00:00	65	0101000020E6100000B8E01CE00F341440171DFB1F01674A40	0	538-O3-03/06/2014-10
564	Haarlemmermeer	185727	2014-06-03 10:00:00	56	0101000020E6100000B41EBE4C14111340D4F19881CA244A40	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

The screenshot shows the GeoServer web interface. The left sidebar contains navigation menus for 'About & Status', 'Data', 'Services', and 'Settings'. The main content area is titled 'Edit Layer' and shows the configuration for the layer 'sensors:measurements\_no2'. The 'Time' tab is selected, displaying options to enable time-based layer updates. The 'Attribute' is set to 'sample\_time' and the 'End Attribute' is set to 'Choose One'. The 'Presentation' is set to 'Interval and resolution'. The 'Resolution' is configured as 0 years, 0 months, 0 weeks, 0 days, 1 hour, 0 minutes, and 0 seconds. The 'Elevation' section is currently disabled. 'Save' and 'Cancel' buttons are at the bottom.

**GeoServer**

### Edit Layer

Edit layer data and publishing

## sensors:measurements\_no2

Configure the resource and publishing information for the current layer

**Data** | **Publishing** | **Dimensions** | **Tile Caching**

#### Time

Enabled

**Attribute**  
sample\_time

**End Attribute (Optional)**  
Choose One

**Presentation**  
Interval and resolution

**Resolution**

Years	Months	Weeks	Days	Hours	Minutes	Seconds
0	0	0	0	1	0	0

**Elevation**  
 Enabled

**Save** **Cancel**

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

The screenshot shows the '52°North SOS Test Client' web application. The browser address bar is 'sensors.geonovum.nl/sos/client'. The navigation menu includes 'Home', 'Test Client' (active), and 'Admin', with a 'Logout' link on the right. The main heading is '52°North SOS Test Client' with the 52°North logo and tagline 'exploring horizons'. Below the heading is the instruction: 'Choose a request from the examples or write your own to test the SOS.' The 'Examples' section contains a note: 'NOTE: Requests use example values and are not dynamically generated from values in this SOS. Construct valid requests by changing request values to match values in the Capabilities response.' Below the note are four dropdown menus: 'SOS', '2.0.0', 'JSON', and 'DescribeSensor'. A 'Load a example request ...' dropdown is also present. The 'Service URL' section has a text input field containing 'http://sensors.geonovum.nl/sos/service'. The 'Request' section shows a 'POST' method, two 'application/json' content types, and a 'Permalink Syntax' dropdown. A code editor displays a JSON request body: 

```
1 {
2   "request": "DescribeSensor",
3   "service": "SOS",
4   "version": "2.0.0",
5   "procedure": "http://sensors.geonovum.nl/rivm-lml/procedure/807",
6   "procedureDescriptionFormat": "http://www.opengis.net/sensorML/1.0.1"
7 }
```

 A 'Send' button is located to the right of the code editor. The 'Response' section shows a text area with the following content: 

```
200 OK
Date: Tue, 01 Jul 2014 12:21:23 GMT
Content-Encoding: gzip
Server: Apache/2.4.7
```

# Clients

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

Links via  
[sensors.geonovum.nl](http://sensors.geonovum.nl)

# Clients - WMS/WFS - HeronViewer

The screenshot displays the HeronViewer interface for SOSpilot. The main map shows a geographical area of the Netherlands with various data layers overlaid. A feature info window is open, displaying data for RIVM - Measurements NO2. The interface includes a left sidebar for layer management, a top navigation bar, and a right sidebar for time series and legend controls.

**Feature Info**

RIVM - Measurements NO2 | RIVM - All Stations

3 Results

Station_id	Municipality	Sample_time	Sample_value	Validated
+ 561	Haarlemmermeer	2014-05-24T08:00:00	24.0	0
+ 564	Haarlemmermeer	2014-05-24T08:00:00	22.0	0

**Active Layers**

- Basis Kaarten
  - BRT (PDOK)
  - OpenBasisKaart OSM
  - Luchtfoto (PDOK)
  - TopRaster (Kadaster)
  - Blanco
- RIVM LML
  - AQ Stations (WMS)
  - AQ Stations (Active WFS)
  - Carbon monoxide (CO) - WMS
  - Ammonia (NH3) - WMS
    - Last Measurements NH3
    - Time Series Measurements NH3
  - Nitrogen Oxide (NO) - WMS
  - Nitrogen Dioxide (NO2) - WMS
    - Last Measurements NO2
    - Time Series Measurements NO2
  - Ozone (O3) - WMS
  - Particulate Matter (PM10) - WMS
  - Sulfur Dioxide (SO2) - WMS
    - Last Measurements SO2
    - Time Series Measurements SO2
- KNMI - Meteorology
  - KNMI - Rain Radar (Color)
- Kadaster
- PDOK
- RO Online
- Scratch folder

**Time Series Slider**

Date: 2014-05-24 Time: 08:00:00

**Legend**

KNMI - Rain Radar (Color)

100.0  
31.6  
10.0  
3.2  
1.0  
0.3  
0.1

kg/m2/h

RIVM - Measurements SO2 (Yellow circle)

RIVM - Measurements NO2 (Purple circle)

RIVM - Measurements NH3 (Green circle)

RIVM - All Stations (Triangle)

Active Stations (Filled Triangle)

Inactive Stations (Empty Triangle)

**Add Layers (Experimental)**

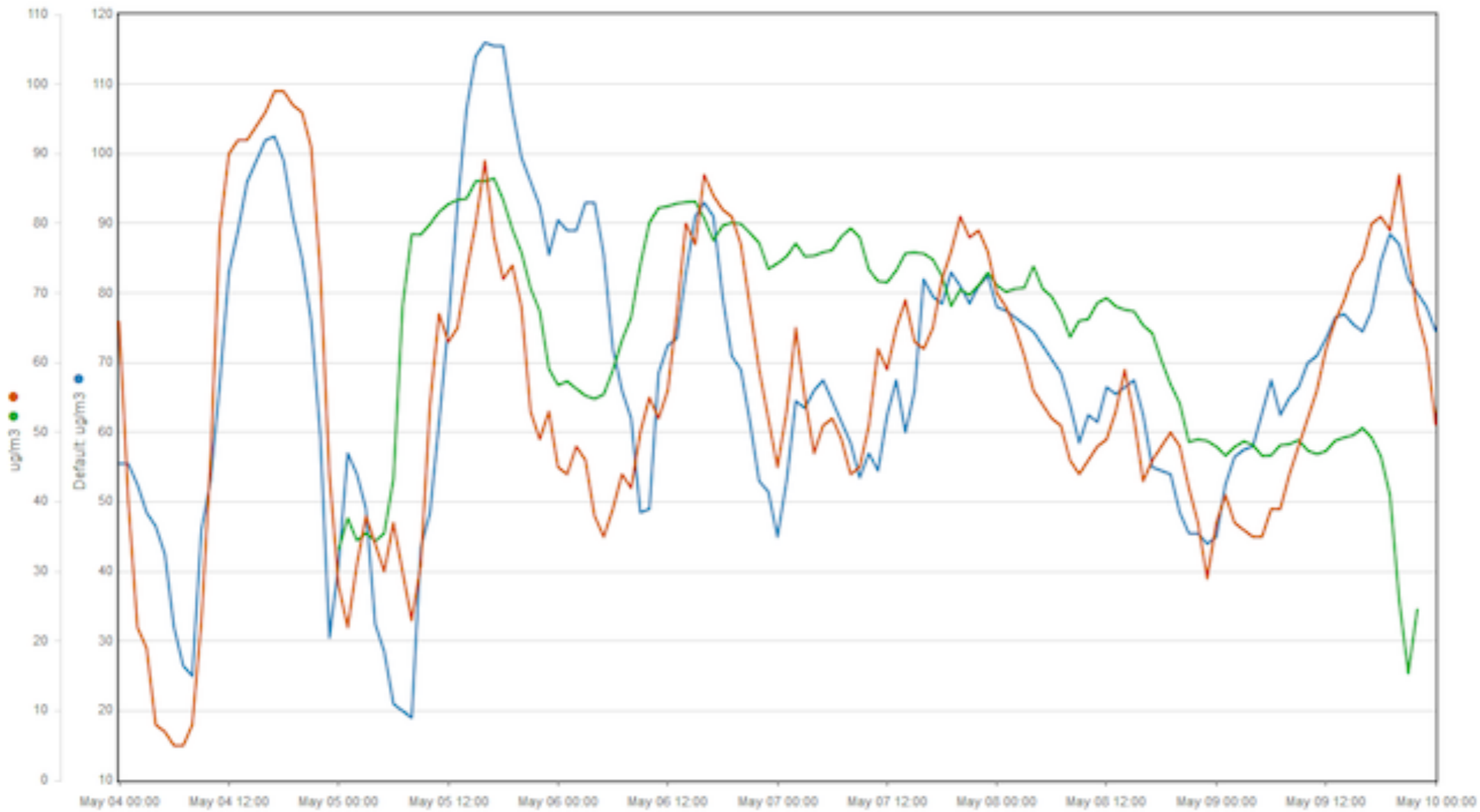
**Bookmarks**

EPSG:28992 | X: 246176.960 | Y: 564713.920

# Clients - SOS - SWClient - 52N

Diagram

Settings Map view

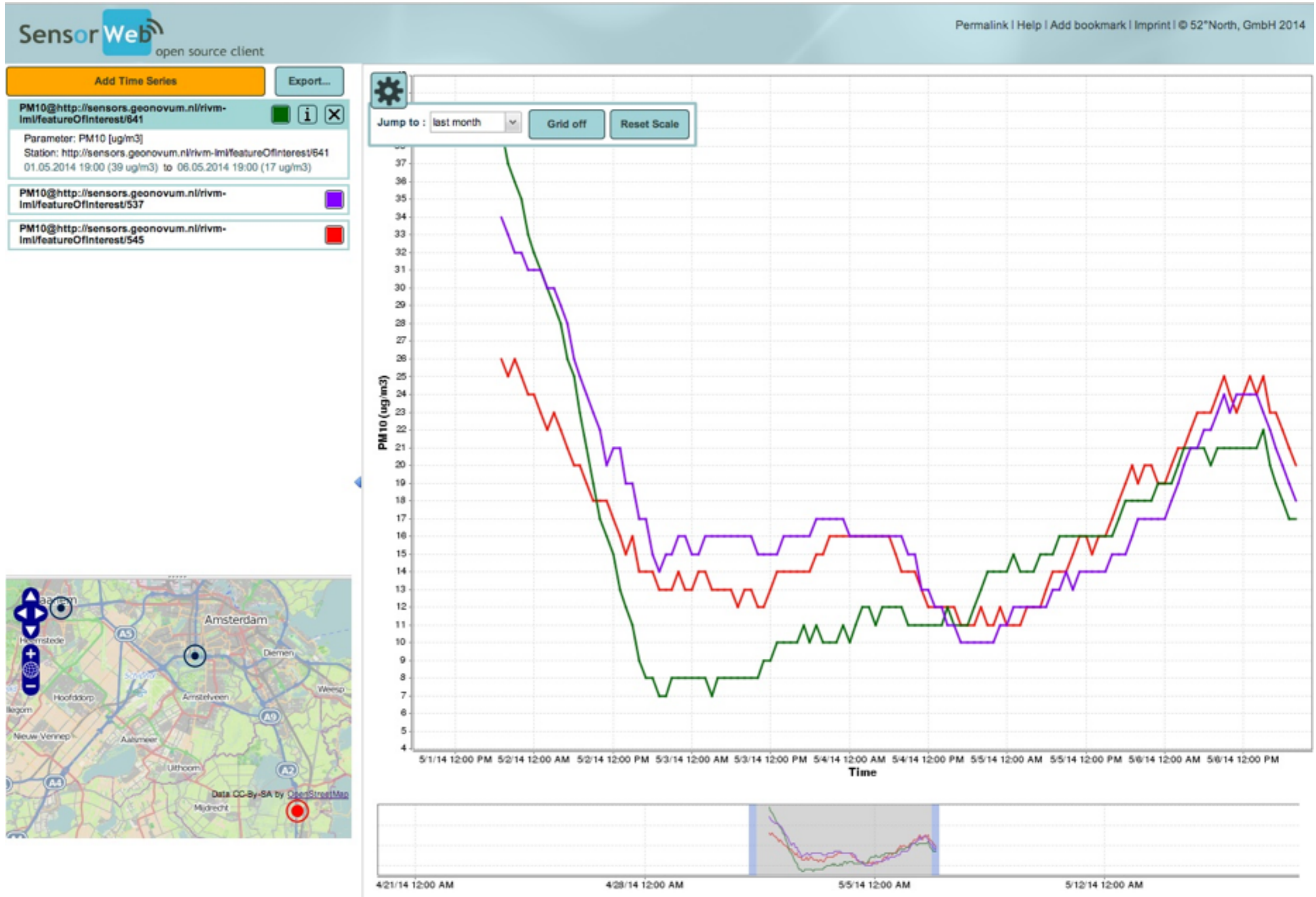


Legend

- BETN063  
44201 - O3 (Default: ug/m3)  
6899  
[Icons: speaker, location, edit, info, close]
- STA-SE0039R  
7 (ug/m3)  
SPP-SE\_UV-P\_ML8810  
<http://dd.eionet.europa.eu/vocabulary/air/pollutant/7>  
[Icons: speaker, location, edit, info, close]
- <http://sensors.geonovum.nl/rivm-lml/featureOfInterest/738>  
[http://sensors.geonovum.nl/rivm-lml/observableProperty/O3\(ug/m3\)](http://sensors.geonovum.nl/rivm-lml/observableProperty/O3(ug/m3))  
<http://sensors.geonovum.nl/rivm-lml/procedure/738>  
[Icons: speaker, location, edit, info, close]

04.05.14 - 10.05.14

# Clients - SOS - SWClient - 52N



# Clients - SOS - SOS.js - 52N

### Offerings

- Offering For Sensor 1
- Offering For Sensor 1
- Offering For Sensor 1
- Offering For Sensor 1
- Offering For Sensor 1

List all Offerings

Observed Properties

### Map Plot Table

NO2 / ug/m3

Time

- http://sensors.geonovum.nl/rivm-lml/featureOfInterest/107 NO2
- http://sensors.geonovum.nl/rivm-lml/featureOfInterest/131 NO2
- http://sensors.geonovum.nl/rivm-lml/featureOfInterest/133 NO2
- http://sensors.geonovum.nl/rivm-lml/featureOfInterest/133 NO2
- http://sensors.geonovum.nl/rivm-lml/featureOfInterest/133 NO2

### Metadata

Offering for sensor 133

Data Availability

Starts: 2014-05-01T19:00:00.000Z

Ends: 2014-05-27T06:00:00.000Z

### Help

Plot controls

- Date Range
  - Enter date as YYYY-MM-DD
  - Or pick from date selector
- Overplot further observed properties by checking Add To Existing
- Subset the plot by dragging a selection across the plot (or across the lower overview plot); click anywhere on the overview plot to reset
- Use the mouse scrollwheel to zoom in/out
- Realign the plot vertically by dragging
- Click on any two points on the plot to see summary statistics for data on that interval
- Download the data via the Download Data button

### Controls

Plot / Table

Date Range

2014-05-1

2014-05-31

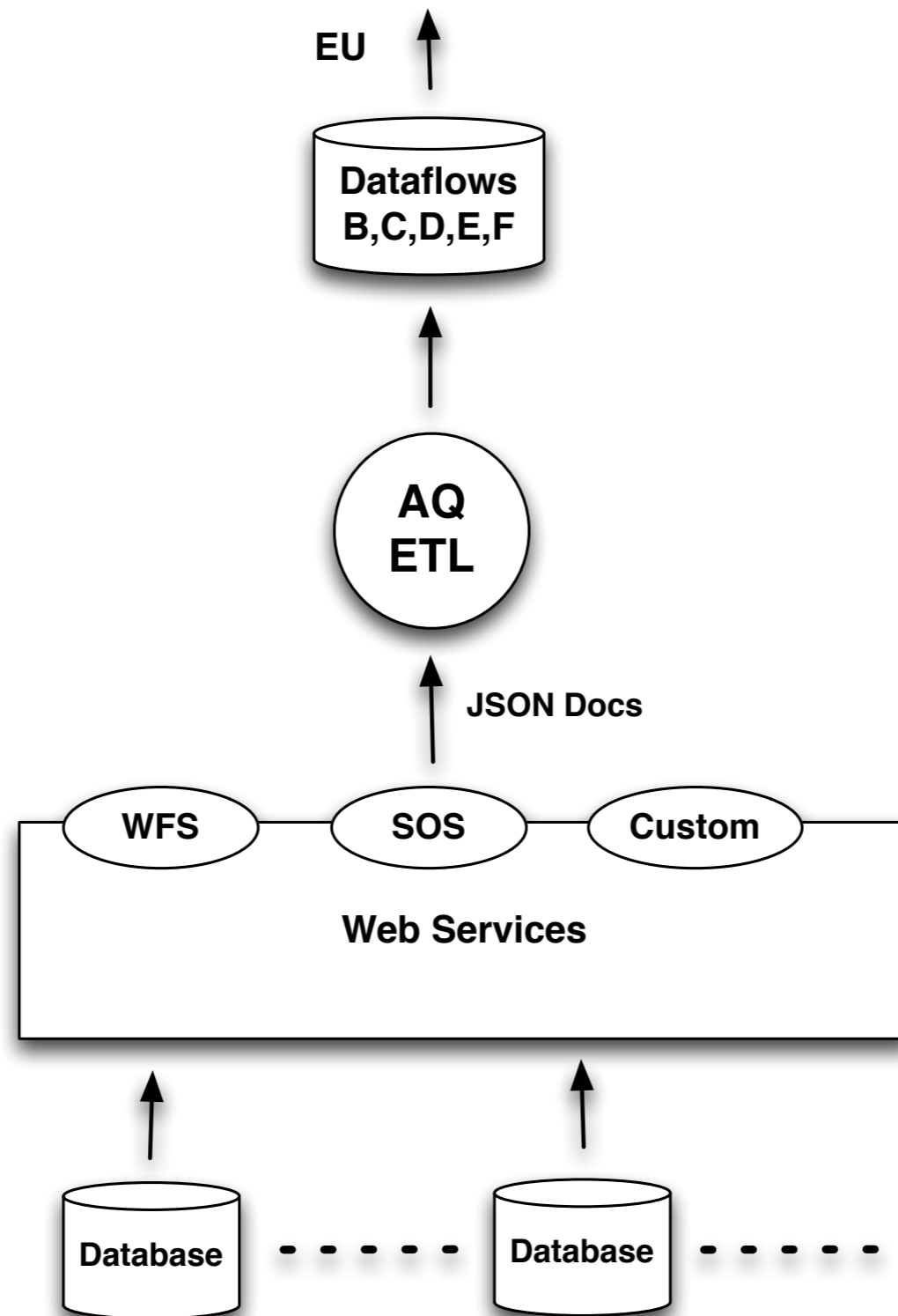
Add To Existing

This app uses the [sos-js client library](#). First list all offerings (RIVM AQ Measurement Stations). Select an offering, then an observed property like NO2. The observed property's data will then be plotted and tabulated. By default, a rolling month's worth of data is shown, but specific dates can be selected via the Date Range controls under the Controls menu item. To overplot further data, check the Add To Existing control before selecting an additional observed property.

# Automated AQ Reporting

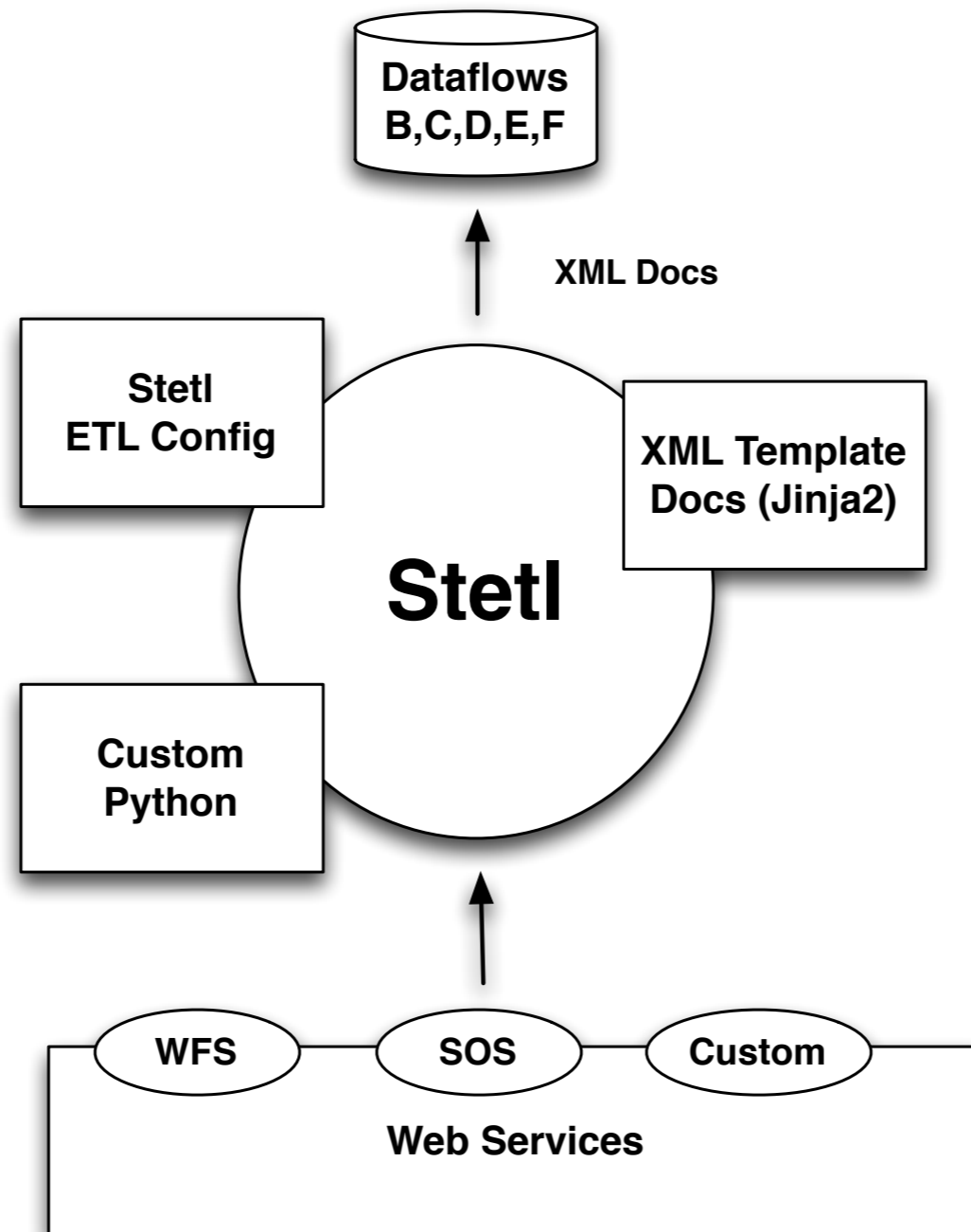
Geonovum PoC using Web services  
with Stetl

# AQ Reporting - Architecture





# 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-{{ feature.properties.local_id }}' %}
        {{ feature.geometry | geojson2gml(source_crs=crs, target_crs=4258, gml_id=gml_id,
l_format='GML3', gml_longsrns='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>
    </aqd:AQD_Station>
  </gml:featureMember>
{% endfor %}
```

# 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

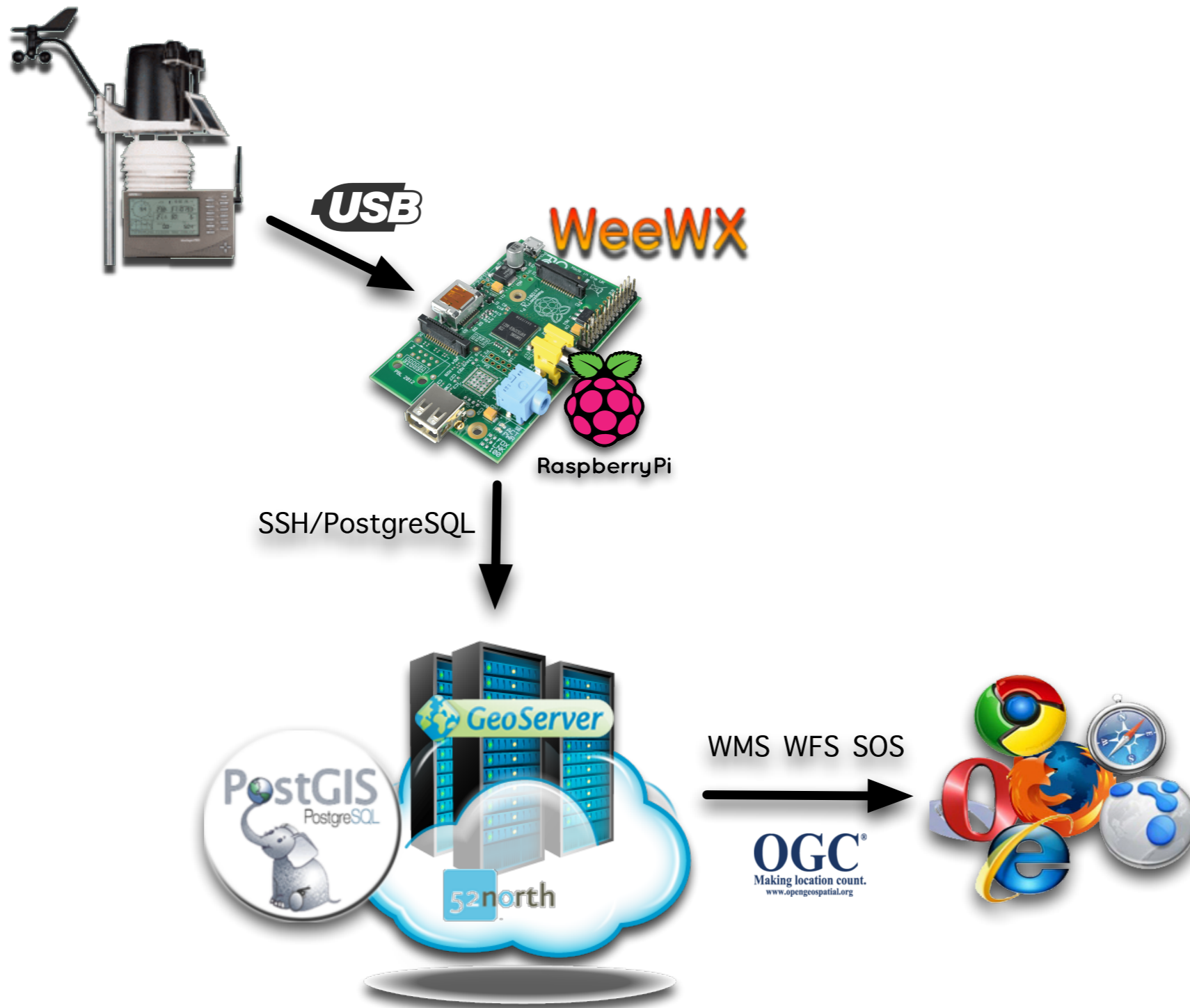
# AQ Reporting Recommendations

- 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

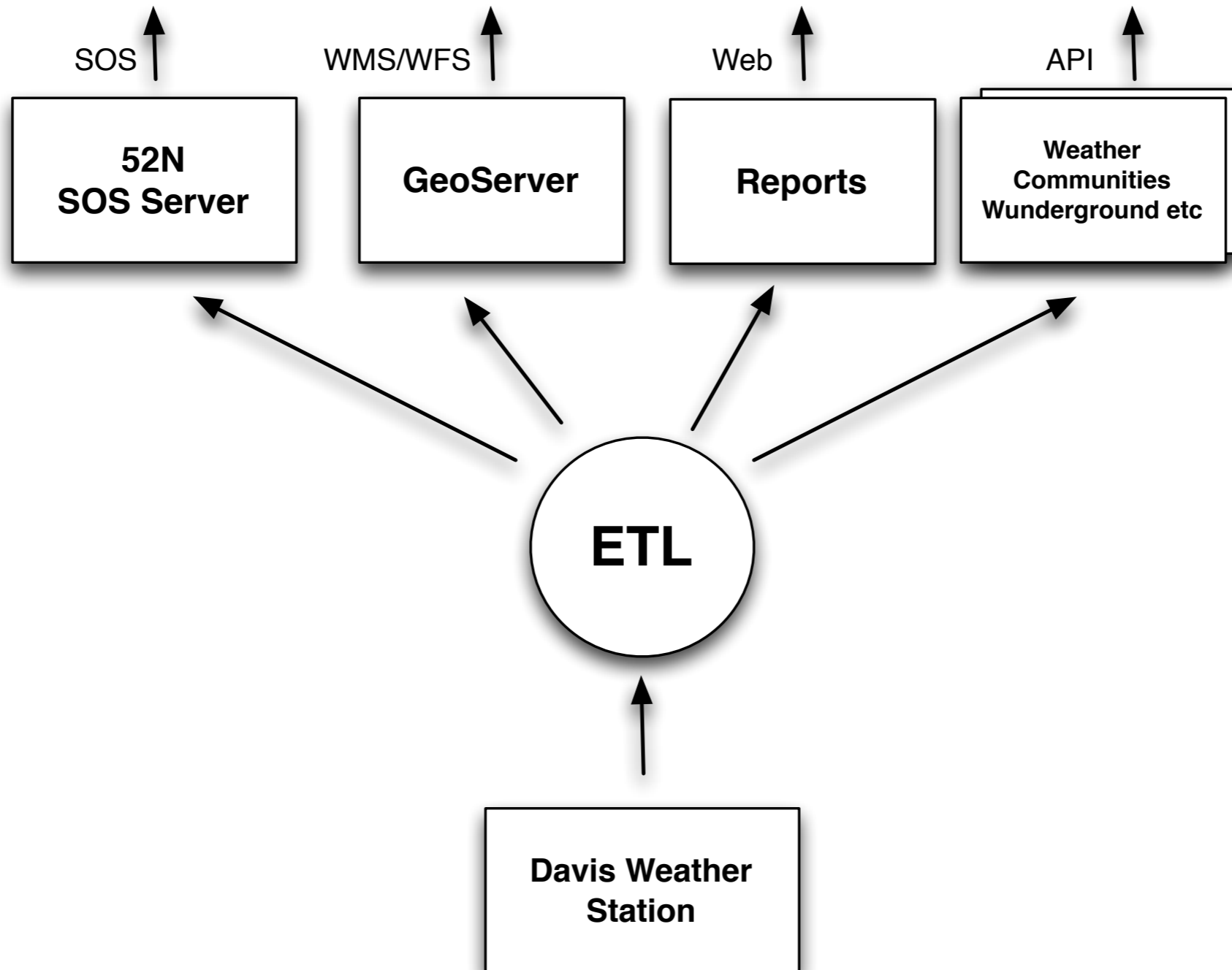
Geonovum Weather station -  
datastream integrated  
into WMS/WFS and SOS

# Architecture

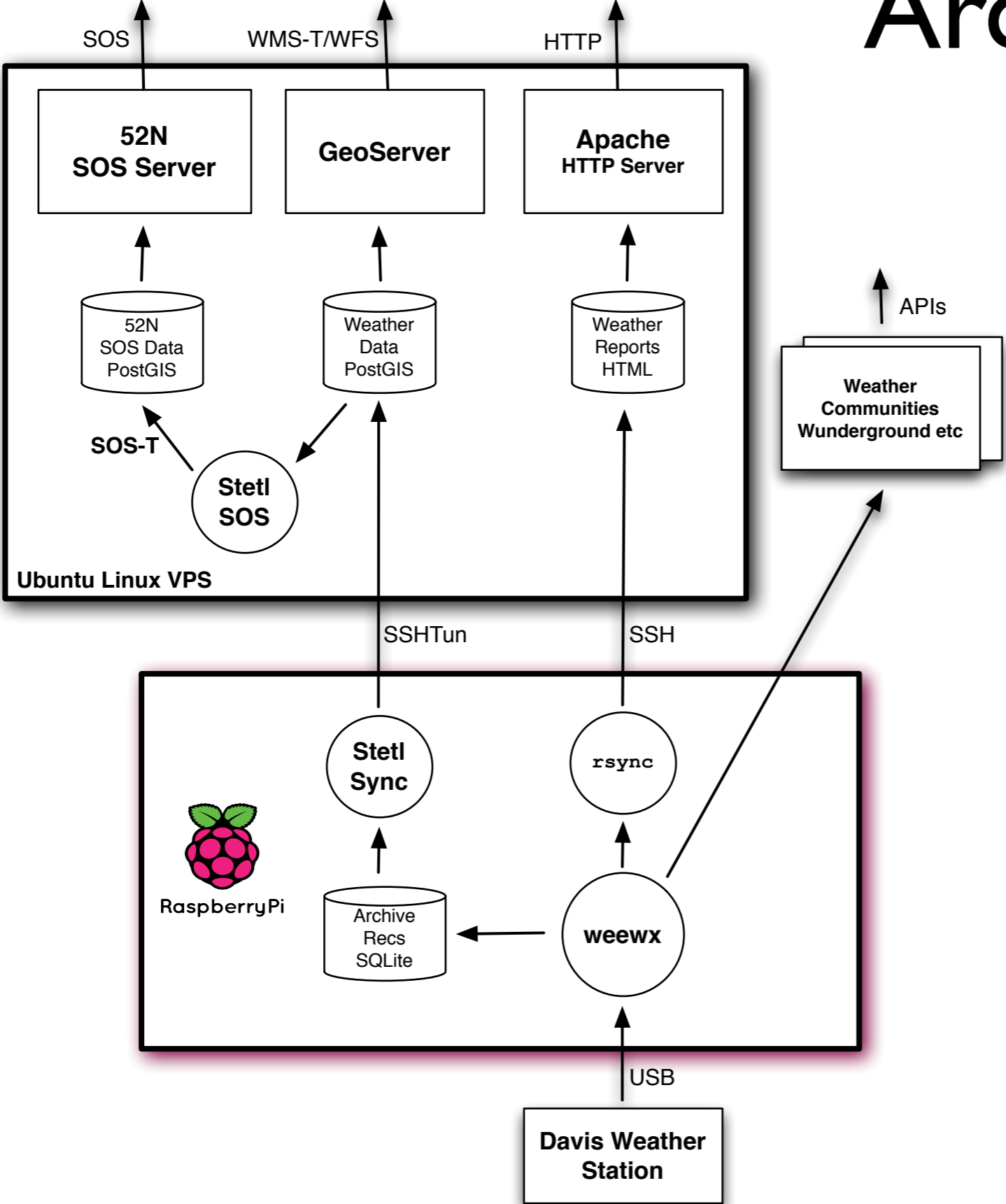




# Architecture



# Architecture



# Result - Reporting

## AMERSFOORT, THE NETHERLANDS

### Current Weather Conditions

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

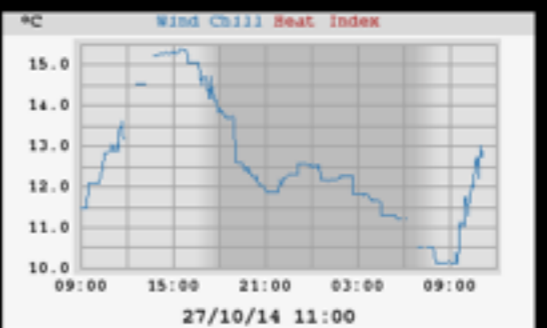
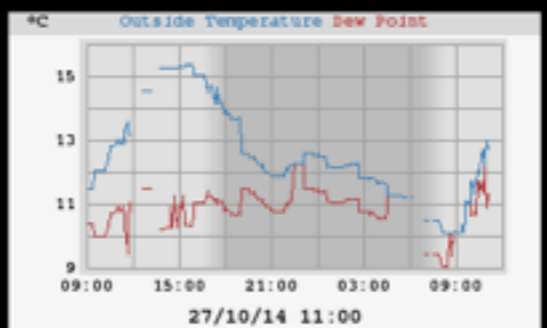
**Location**  
 Latitude: 52° 09.36' N  
 Longitude: 005° 23.27' E  
 Altitude: 20 meters



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

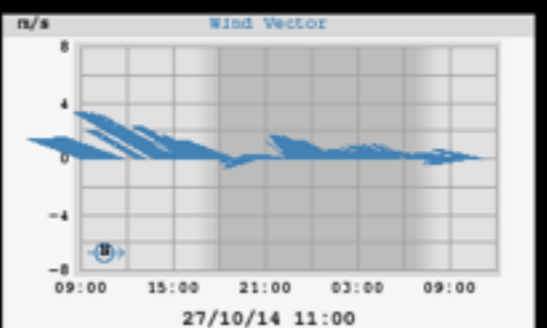
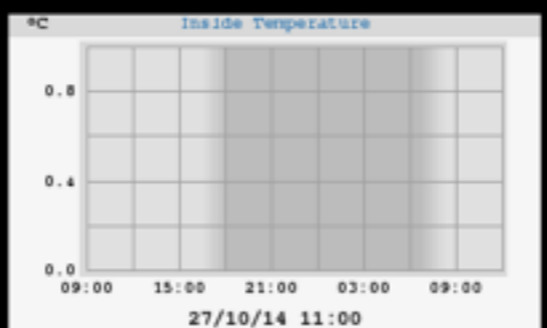
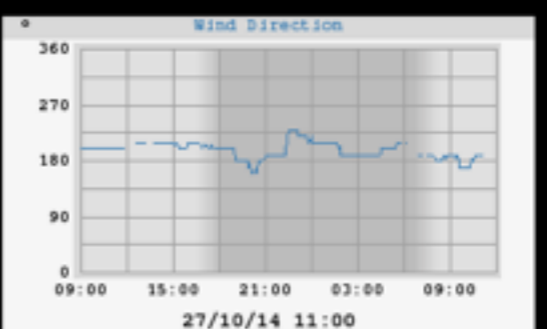
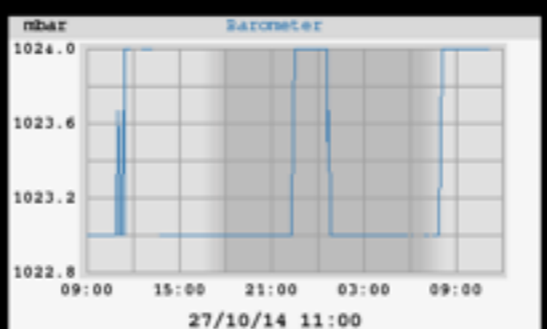
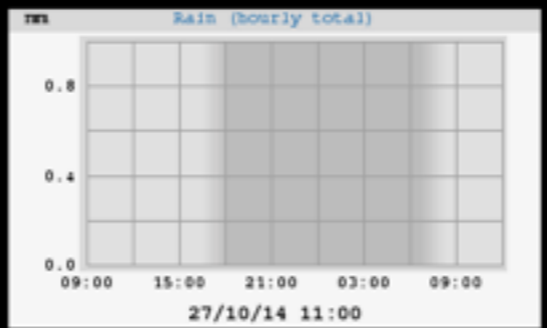
**Current Conditions**

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	13.0°C at 10:33
Low Temperature	10.1°C at 08:28
High Heat Index	13.0°C at 10:33
Low Wind Chill	10.1°C at 08:28
High Humidity	100% at 04:24
Low Humidity	87% at 10:33
High Dewpoint	12.2°C at 10:15
Low Dewpoint	9.0°C at 07:52
High Barometer	1024.0 mbar at 00:01
Low Barometer	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	2.4 m/s
Vector Average Direction	193°



# Result - Publish to Weather Community

Deeler  
6.4 °C

Geono

Forecast fo

PWS Data

Status:

PWS viewed 3588

Satellite

## Personal Weather Station Info

**Weather Station ID: IUTRECHT96**  
Station Name: Geonovum



**Latitude / Longitude:** N 52 ° 9 ' 8 ", E 5 ° 22 ' 20 "

**Elevation:** 43

**City:** Amersfoort

**State:** UTRECHT

**Hardware:** Davis Vantage Pro2 (Wireless)

**Software:** weewx-2.7.0

**Owner:** DutchMountains

[Contact owner with feedback or questions »](#)



[Monitor PWS on your Wunderground blog »](#)


[Visit Website »](#)

[View full-screen RapidFire \(Flash\) »](#)

[Download current conditions XML »](#)

[Download observations XML »](#)

 8:28 AM  5:14 PM

 Waxing Crescent | 44% Illuminated

# 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 [\[About this PWS\]](#)

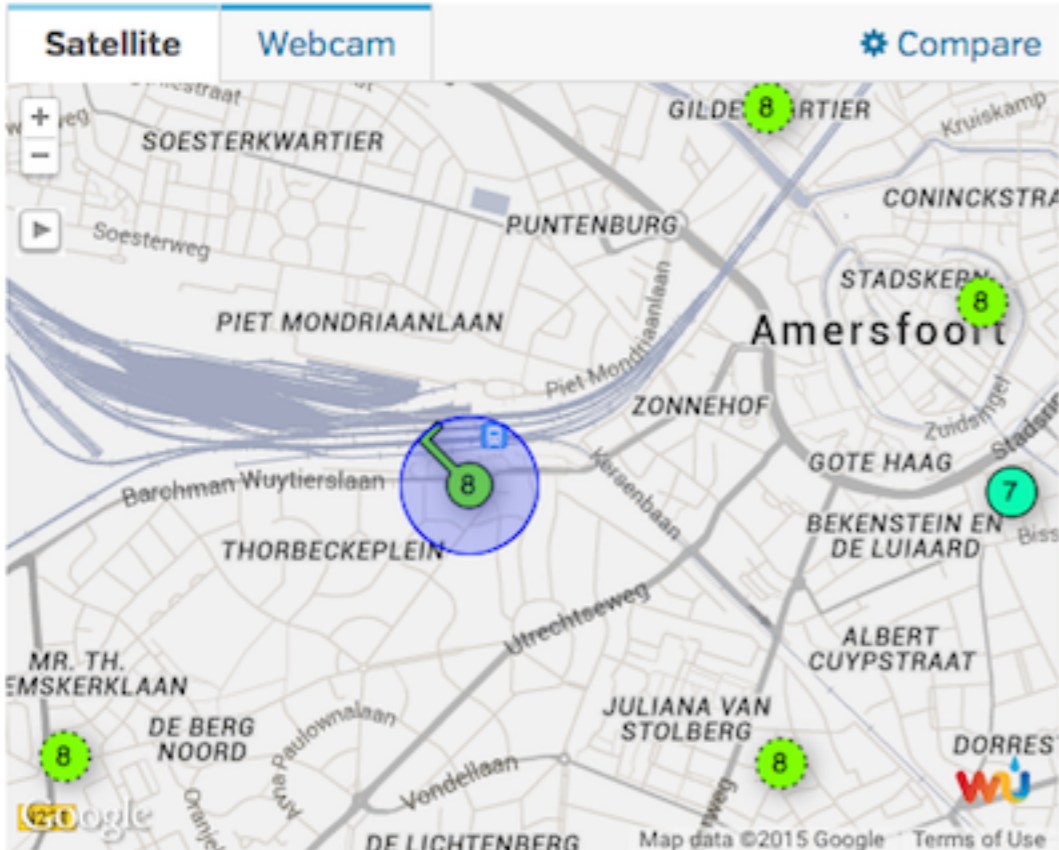
Forecast for Amersfoort, UTRECHT > 52.152 5.372 > 13 m

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**

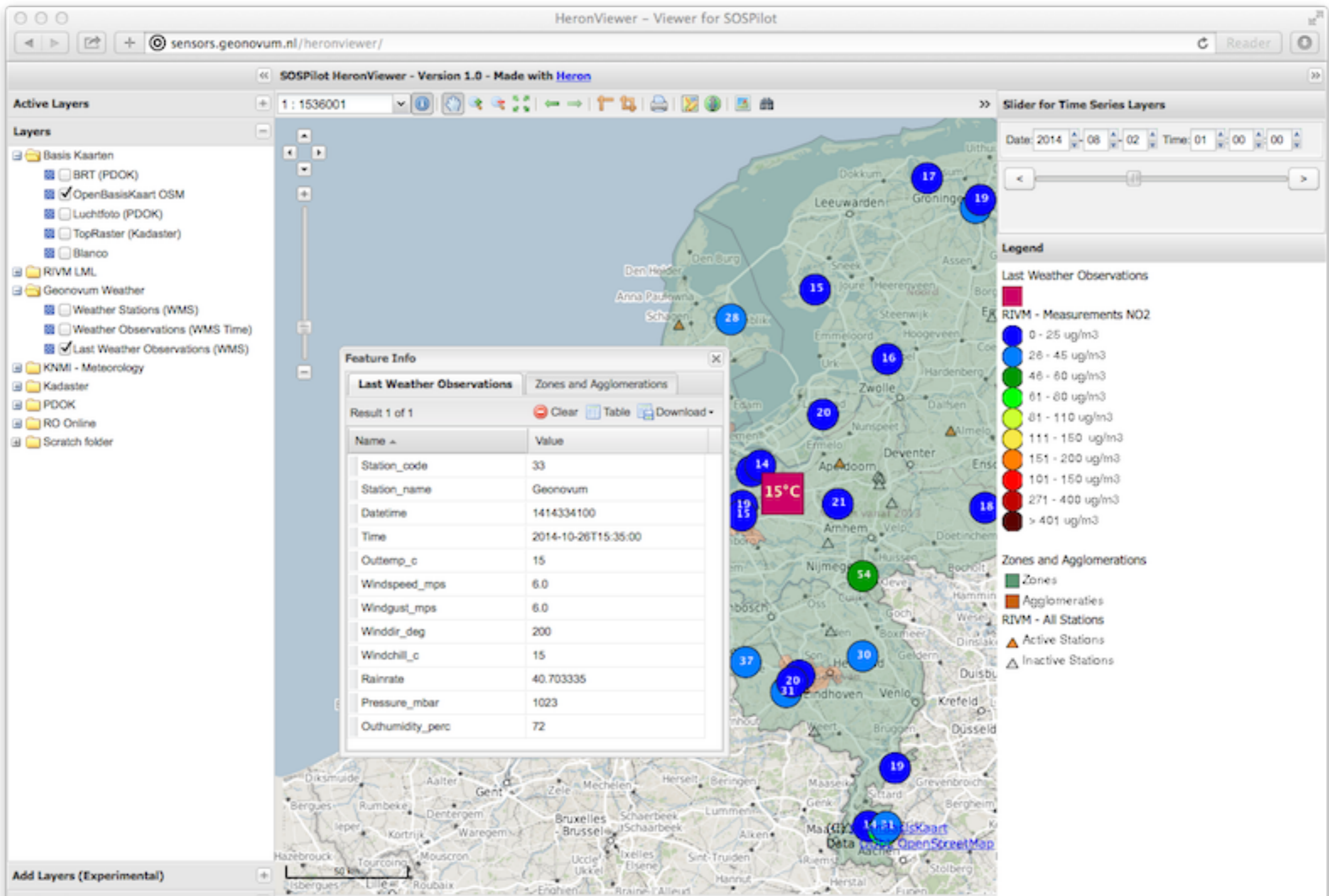
**22.5 km/h** Wind from **NW**  
Gusts **32.2 km/h**

Dew Point:	<b>4 °C</b>	UV:	<b>0.0</b>
Humidity:	<b>80%</b>	Solar:	<b>26 w/m<sup>2</sup></b>
Precip Rate:	<b>0.25 mm/hr</b>	Soil Moisture:	--
Precip Accum:	<b>2 mm</b>	Soil Temp:	--
Pressure:	<b>1017.83 hPa</b>	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

