
Machine readable semantic information about observed environments

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@envinf

This years' motto

“Geospatial Sensor Webs - from data to information in the Sensor Web”

—

**From data to information:
A rather common notion ...**

FixO3

Provide access to data products as
well as derived information

JERICO-NEXT

Delivery of high quality
environmental data and
information products

ICOS

INTEGRATED
CARBON
OBSERVATION
SYSTEM

**Knowledge
through
observations**



This years' motto ... clarified

... from **observational** data to
information **about the observed**
environment ...

In other words

Semantic information

about the observed environment

derived from primary observational data
by research communities

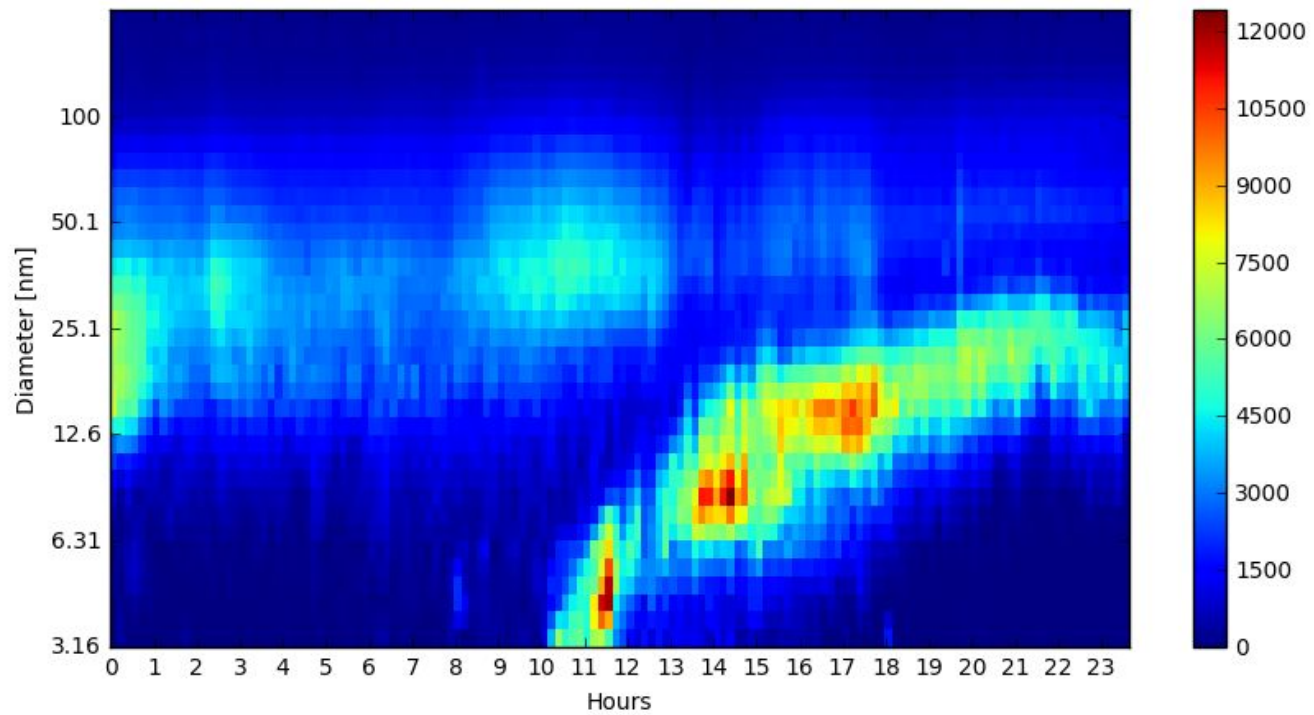
Semantic information

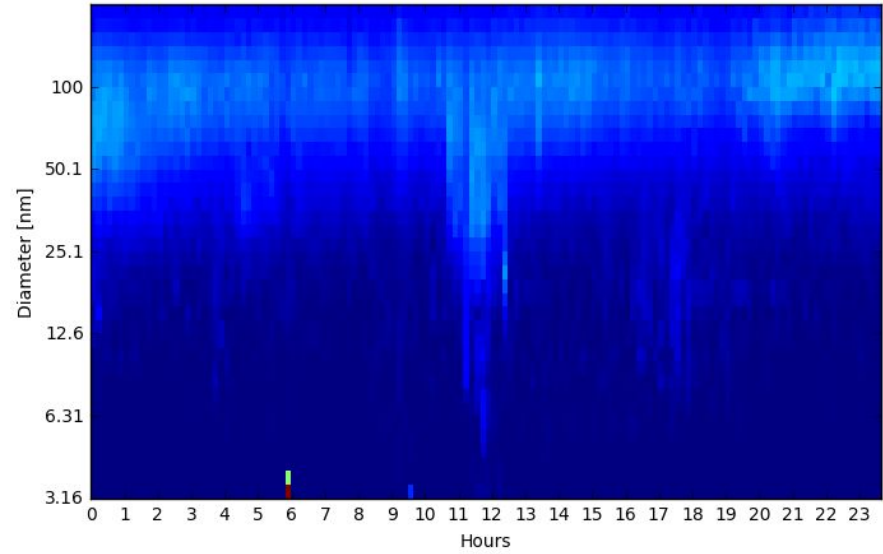
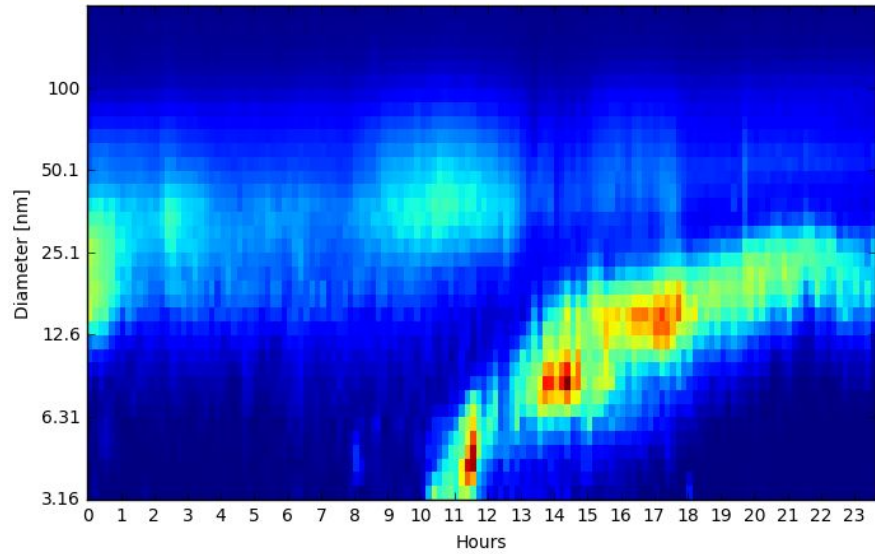
- Consists of data
- Data must be well-formed
- The well-formed data must be meaningful
- Meaningful well-formed data must be truthful
- *False information is not a kind of information*

Use case

Aerosol science for the study of
atmospheric new particle
formation







734544 0 0 0 0
734545 0 0 0 1
734546 0 1 0 0
734547 0 0 0 1
734548 0 0 0 1
734549 0 0 0 1
734550 0 0 0 1
734551 0 0 0 1
734552 0 0 1 0

MATLAB datum

734546 0 1 0 0

Class Ib event

—

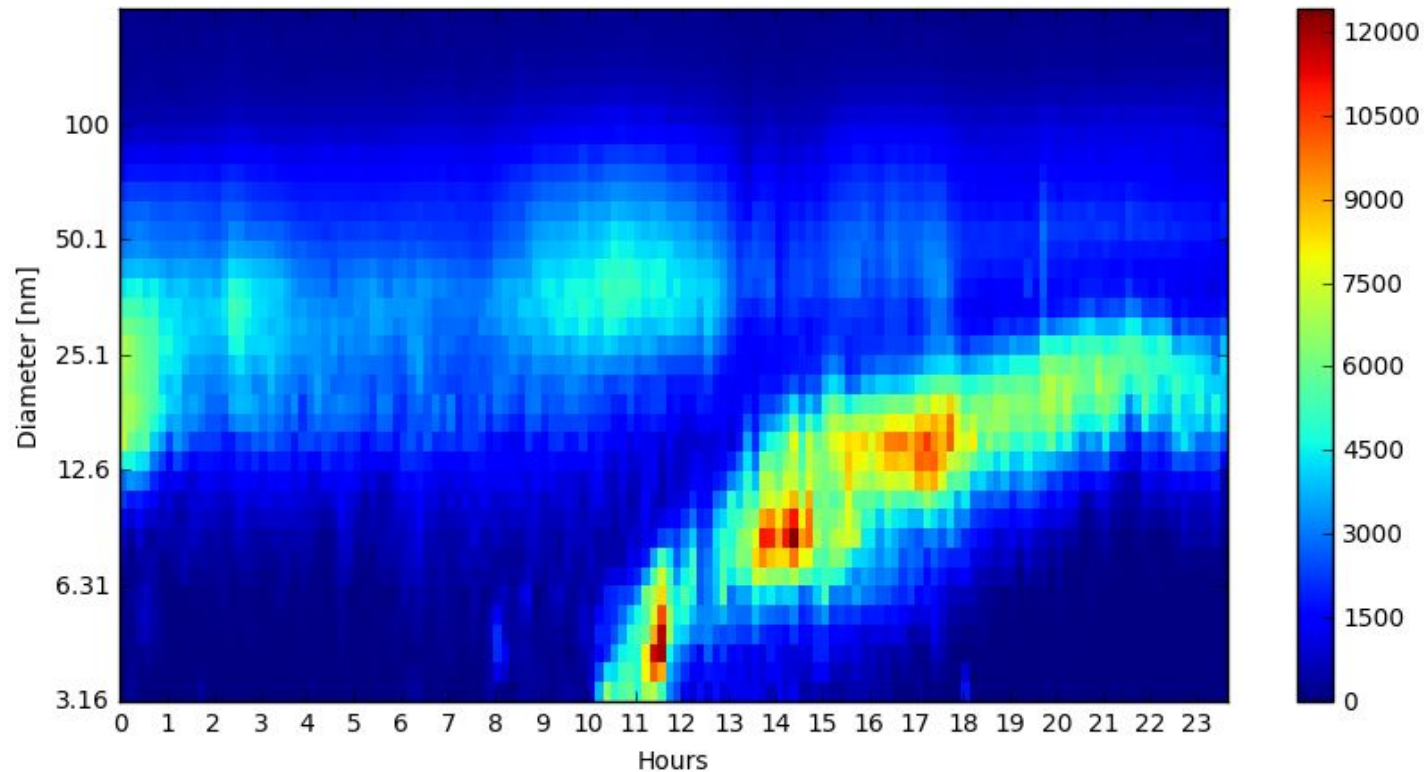
Record data and meaning
gained in interpretation



**Semantic
Web**

```
from smear.datafetcher import fetchdata
from smear.dataplotter import plotdata

# Fetch and plot concentration data for the given time and location
# from SmartSMEAR, https://avaa.tdata.fi/web/smart
plotdata(fetchdata('2013-04-04', 'Hyytiälä'))
```




```
from smear.datafetcher import fetchdata
from factory import assess

# Automated assessment for whether or not an event occurred
assess(fetchdata('2013-04-04', 'Hyytiälä'))

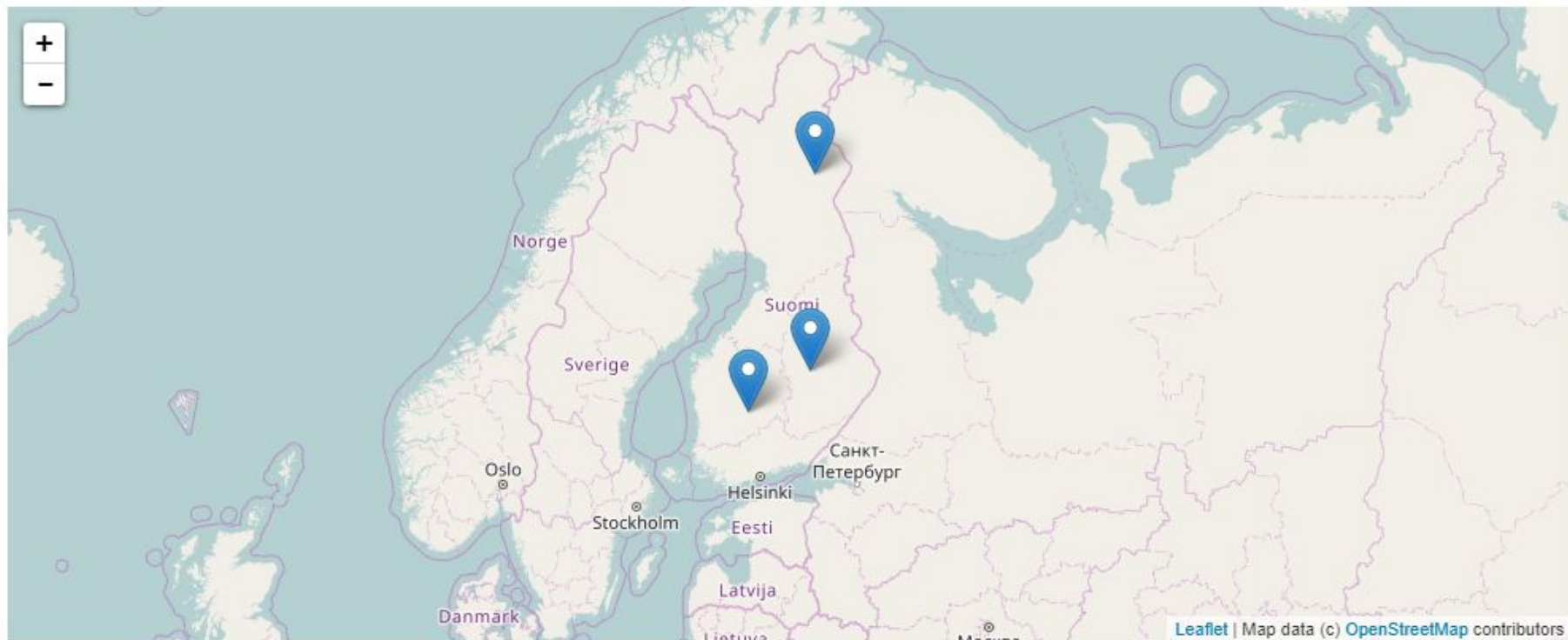
['Event']
```

```
from factory import record, event

# Record information about the new particle formation event
record(event('2013-04-04', 'Hyytiälä', '11:00', '19:00', 'Class Ia'))
```

```
from processing.visualization import imap
from factory import events
```

```
# Visualize event locations on an interactive map
imap(events())
```



```
from processing.statistics import duration
from factory import events

# Compute the average duration of events, possibly at specific locations
duration(events(), fun='avg')
```

7:00:00

```
from processing.description import describe
from factory import events

# Describe an event in plain English text
describe(events(place='Hyytiälä'), format='text')
```

A Class Ia event occurred at Hyytiälä (FI) [<http://www.geonames.org/656888/hyytiaelae.html>] on 2013-04-04 starting at 11:00 and ending at 19:00.

```
from factory import events
from processing.description import describe

# Describe an event with information in machine readable format
describe(events('2013-04-04', 'Hyytiälä'), format='rdf')
```

```
<http://pangaea.de/eb1ad69f11aec2449f6d5741c3b8ac3> a lode:Event ;
  smear:hasClassification smear:ClassIa ;
  lode:atPlace <http://sws.geonames.org/656888/> ;
  lode:atTime <http://pangaea.de/92be5465a05cc56156422d6cdb4603e1> ;
  lode:inSpace <http://pangaea.de/7f885190eb43154e01c97f814b287a4b> .

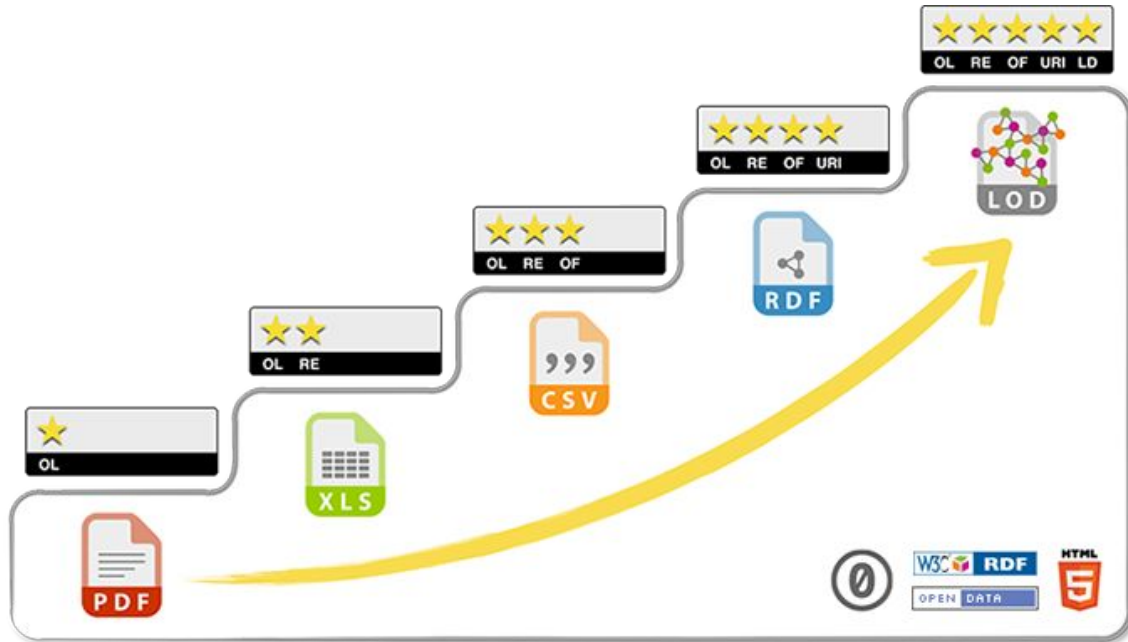
<http://pangaea.de/3ca2edb9bb13c998a0ea94082aa592dd> a time:Instant ;
  time:inXSDDateTime "2013-04-04T11:00:00+03:00"^^xsd:dateTime .

<http://pangaea.de/7f885190eb43154e01c97f814b287a4b> a sf:Point,
  wgs84:SpatialThing ;
  geosparql:asWKT "POINT (24.29077 61.84562)"^^geosparql:wktLiteral .

<http://pangaea.de/92be5465a05cc56156422d6cdb4603e1> a time:Interval ;
  time:hasBeginning <http://pangaea.de/3ca2edb9bb13c998a0ea94082aa592dd> ;
  time:hasEnd <http://pangaea.de/cc87885836375b64bf023a6bcd5ad814> .

<http://pangaea.de/cc87885836375b64bf023a6bcd5ad814> a time:Instant ;
  time:inXSDDateTime "2013-04-04T19:00:00+03:00"^^xsd:dateTime .

<http://sws.geonames.org/656888/> a gn:Feature,
  DUL:Place ;
  gn:countryCode "FI"^^xsd:string ;
  gn:locationMap <http://www.geonames.org/656888/hyytiaelae.html> ;
  gn:name "Hyytiälä"^^xsd:string ;
  wgs84:lat "61.84562" ;
  wgs84:long "24.29077" .
```



<http://5stardata.info/en/>

Environment Ontology

- Contributed new concept to recent release
 - “formation of particles in an atmosphere”
 - a particle formation process
 - that occurs in an atmosphere
 - with aerosol as output
 - Planning to adopt this concept in the use case
-

Research Data Alliance

- IG “From Observational Data to Information”
- rd-alliance.org/groups/observational-data-information
- Session at Montréal plenary, Breakout 5
- Monthly conference calls



Take aways

- Data interpretation results in semantic information
 - Truthful and meaningful well-formed data
 - Acquire semantic information in infrastructures
 - Integrate with tools researchers use
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