Finnish Open Data Portal for Meteorological Data

14th Workshop on meteorological operational systems

Roope Tervo

Finnish Meteorological Institute
## Example of Data Sets -- Observations

<table>
<thead>
<tr>
<th>Data set</th>
<th>Description</th>
<th>Time Interval</th>
<th>Estimated publish date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather Observations</td>
<td>Temperature, Wind, Humidity, Ground Temperature…</td>
<td>10 min</td>
<td>Open</td>
</tr>
<tr>
<td>Sun Radiation</td>
<td>UV, Short and Long Term Radiation…</td>
<td>1 min</td>
<td>Open</td>
</tr>
<tr>
<td>Marine Observations</td>
<td>Waves, Sea Temperature, Sea Level…</td>
<td>1 h</td>
<td>Open</td>
</tr>
<tr>
<td>Weather Radars</td>
<td>Precipitation Rate, Precipitation Amount…</td>
<td>5 min</td>
<td>Open</td>
</tr>
<tr>
<td>Lightning</td>
<td>Thunder Strikes in Finland</td>
<td>5 min</td>
<td>Open</td>
</tr>
<tr>
<td>Soundings</td>
<td>Temperature, Humidity, Pressure, Wind from ground to 25 km height</td>
<td>2 times a day</td>
<td>2014</td>
</tr>
</tbody>
</table>
# Example of Data Sets - Time Series

<table>
<thead>
<tr>
<th>Data set</th>
<th>Description</th>
<th>Time Interval</th>
<th>Estimated publish date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Real Time Observations</strong></td>
<td>Real Time Observations from specific location(s)</td>
<td>AWS 2010 – Soundings 1959 – Flashes 1998 – Sea Level 1971 – Waves 2005 –</td>
<td>Open older data will be added</td>
</tr>
<tr>
<td><strong>Climatological Observations</strong></td>
<td>Dayly and monthly temperature mean and extreme values from weather stations</td>
<td>1959 -</td>
<td>Open</td>
</tr>
<tr>
<td><strong>Climatological Observations</strong></td>
<td>Monthly temperature and precipitation rate mean values interpolated to grid</td>
<td>1961 -</td>
<td>Open</td>
</tr>
</tbody>
</table>
### Example of Data Sets - Forecast Models

<table>
<thead>
<tr>
<th>Data set</th>
<th>Description</th>
<th>Time Interval</th>
<th>Estimated publish date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather forecast model</td>
<td>Point forecasts and grid data</td>
<td>Latest model run (4 times a day) 0…54 h</td>
<td>Open</td>
</tr>
<tr>
<td>HIRLAM RCR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sea forecast models</td>
<td>Sea level point forecasts, Wave (WAM), current (HBM)</td>
<td>Latest model run (4 times a day) 0…54 h</td>
<td>Open</td>
</tr>
<tr>
<td>and ice forecast models as</td>
<td>and ice forecast models as grid data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>grid data</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Other

<table>
<thead>
<tr>
<th>Data set</th>
<th>Description</th>
<th>Estimated publish date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Monitoring Facilities</td>
<td>Weather observation stations, radars…</td>
<td>2014</td>
</tr>
</tbody>
</table>
Open Data Portal

FMI Open Data Portal follows INSPIRE requirements.

- Data is provided in INSIRE compliant form
  - GML
  - O&M guideline is honored

(Inspire = Infrastructure for Spatial Information in the European Community)
Services

- **Catalog Service (CSW = Catalog Service for Web)** for meta data
- **View Service (WMS = Web Map Service)** for exploring the data
- **Download Service (WFS = Web Feature Service)** for downloading the data in GML (Geography Markup Language), Grib, NetCDF or GeoTiff depending on the nature of the data
Catalog Service

- Provides both user interface and API to search data
- Very high level meta data
  - Observation stations, forecast model
  - Temporal coverage (start and end times)
  - Spatial coverage
- Runs on GeoNetworks
View Service

- Web Map Service (WMS)
  - The most common used data published as layers
    - Observations
      - Temperature, Wind, Pressure, Humidity, Visibility
    - Forecasts
      - Grid data as color areas
      - Contour lines hard to produce with GeoServer
    - Radar images
      - Scanning angle as elevation dimension
      - Around 7 days history
Download Service

- Web Feature Service (WFS) 2.0 Simple Profile
- Based on stored queries
  - Predefined data sets with possibility for additional parameters (i.e. time and area)
- Provides data as GML (Geography Markup Language)
  - Grid data in an appropriate form (Grib, NetCDF or GeoTIFF) as a reference
- In-house production

MetoLib

- Open source JavaScript library produced by Finnish Meteorological Institute
- Helps users to load and use the data
- Supports multipoint coverage data format
- Python version is on the list

Please contribute!
https://github.com/fmidev/
Registration

• Registration is required to use View and Download Services
  • Working email address is the only mandatory information
• After registration the user gets an API key which have to be added into all requests
  • POST field fmi-apikey=…
  • GET parameter fmi-apikey=…&
  • Header fmi-apikey; …
  • Part of url http://wms.fmi.fi/fmi-apikey/…/wms?
• One can create several API keys with one email
Usage limits

With one API key it’s allowed to

- do at most 20 000 requests per day to Download Service
- do at most 10 000 requests per day to View Service
- do at most 600 requests per 5 minutes to both services

- Little over 17 000 new data sets are published daily
  - So, with one API key it’s allowed load everything once
- View service can be used for testing but can not be used as a back end for popular clients
No GeoWebCache – load balancer works as a cache

DMZ

Load Balancer

WMS (GeoServer)
WMS (GeoServer)
WMS (GeoServer)
WMS (GeoServer)

Data directory (GeoTiff images)
Configuration directory
PostGIS DB

Intranet

Configuration WMS (GeoServer)

NFS for data and configuration
Some experiences

- Quite many expected a user interface to load data to i.e. to Excel instead of machine readable interface
- Finally we have all the data behind one access point behind standard interfaces and in harmonized formats
- So far maybe even more professional interest than private
- Radar images, observations and point forecasts are the most interesting.
  - For now, very few have been interested in forecast models as a grid data.
- 3000 registered users so far