meteomatics

Your Experts in Weather Data Processing.

Weather API

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Meteomatics Company Profile

meteomatics
Your Experts in Weather Data Processing.

- Weather service provider
- Specialized on industrial weather forecasts, high-resolution local weather models and data distribution
- Located in Berlin & St. Gallen
- 20-25 employees with strong backgrounds in physics, mathematics and computer sciences
- Over 10 years of experience, customers in various sectors

Meteomatics AG

Weather API

Company backbone:

- Model mix
- Model data
- Station data
- Satellite data
- Ocean data
- Soil data
- Derived parameters
- Astronomical parameters
- ...

Industrial Services

Bespoke solutions:

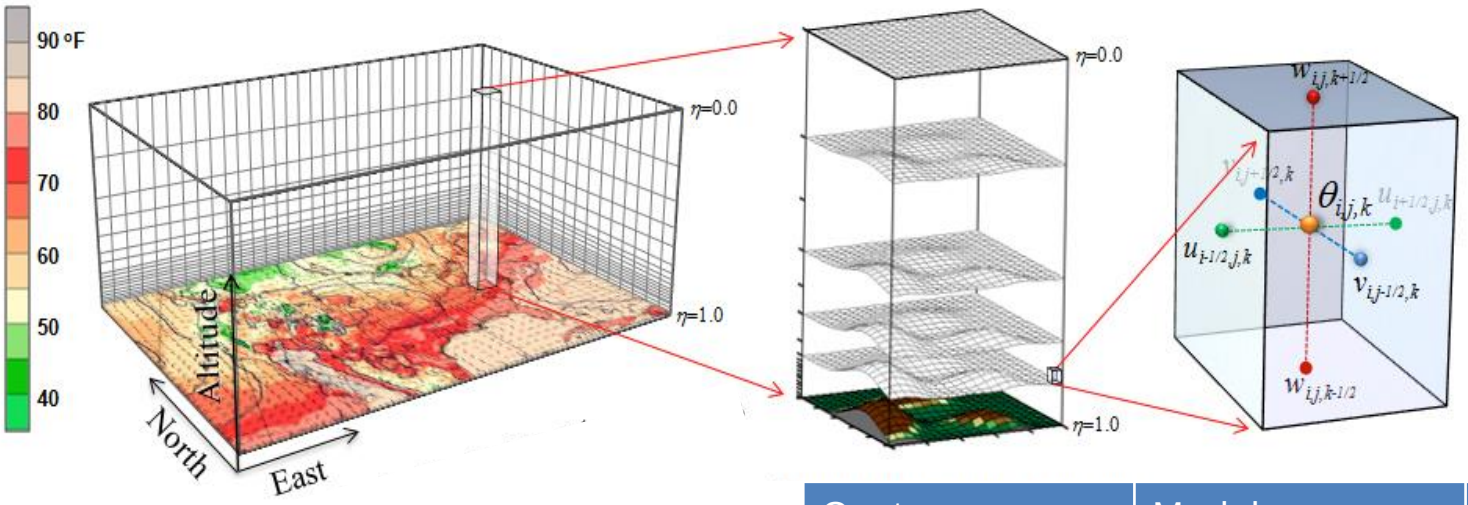
- Wind power
- Solar power
- Hydro power
- Snow drift
- ...

Meteodrone SWISS1k

High-resolution weather modeling:

- Better PBL data
- Improve fog & storm forecasts
- Customized solutions

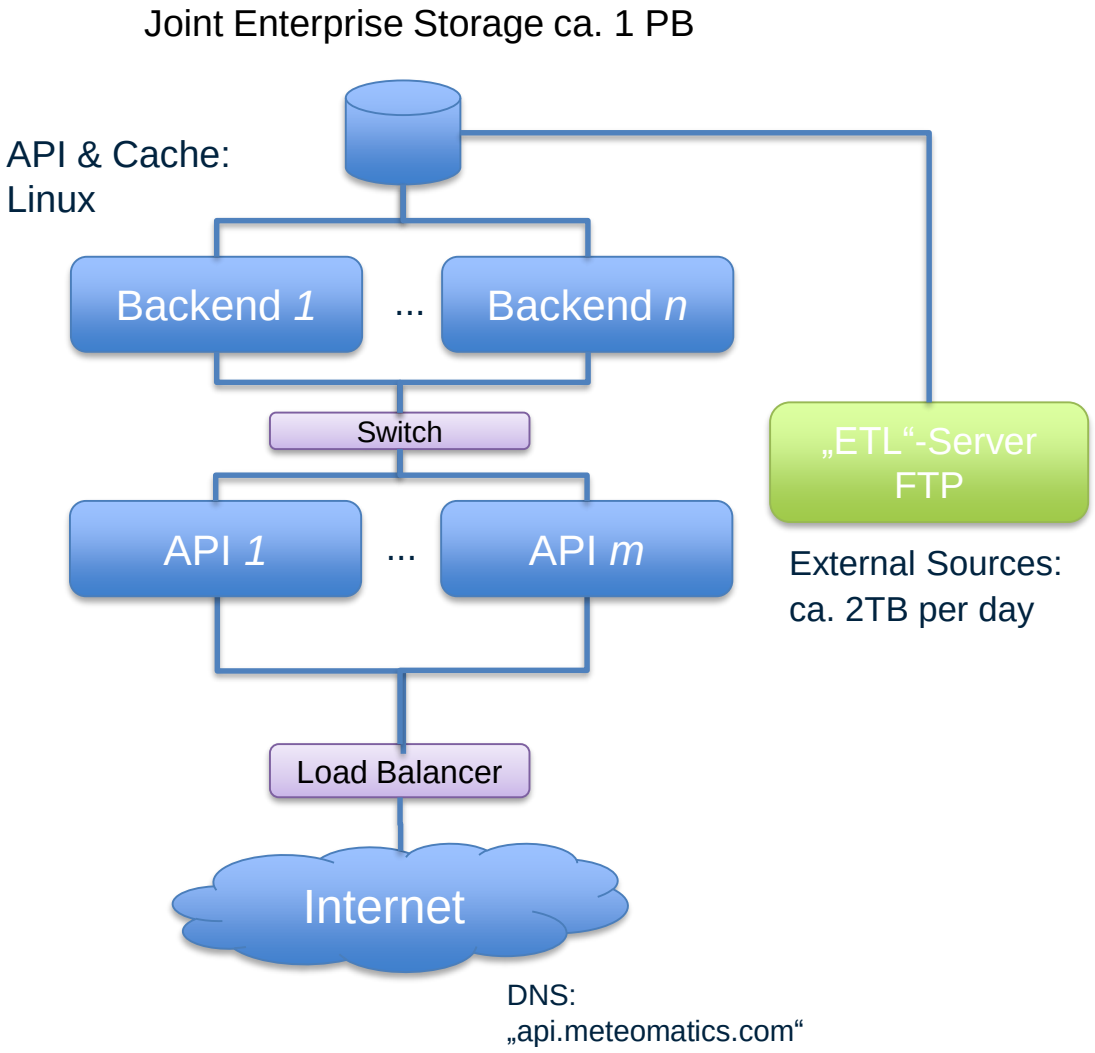
Numerical Weather Prediction = Big Data!



With 4d-grids we end up immediately in the Big Data universe!

Center	Model	Volume p.d.
ECMWF	IFS, IFS-ENS, Seasonal	150 GB
NCEP	GFS, NAM, Ens.	90 GB
Env. Canada	GEM	100 GB
UK MetOffice	UKMO, EURO4	40 GB
WRF	SWISS1k	150 GB
Satellite, Radar	...	....
…	…	…

Meteo Cache Framework



Weather API

Data format:
XML, JSON, CSV, NetCDF,…

Temporal resolution:
5min-60min.

Performance:
> 10.000 queries per second*

Coverage:
“Global weather data”

**) depending on query type*

Industrial, scalable APIs

Weather forecast data through an API:

HTTPS request:
https://api.meteomatics.com/2018-06 04T00:00:00ZP2D:PT3H/t_2m:C/47.41,9.34/xml

JSON-Response:


```
{
  "version":"3.0",
  "user":"meteomatics-mapserver",
  "dateGenerated":"2018-06-04T20:00:42Z",
  "status":"OK",
  "data":[
    {
      "parameter":"t_2m:C",
      "coordinates":[
        {
          "lat":47.4122,
          "lon":9.34065,
          "dates":[
            {
              "date":"2018-06-04T00:00:00Z",
              "value":16.9
            },
            {
              "date":"2018-06-04T03:00:00Z",
              "value":15.4
            },
            {
              "date":"2018-06-04T06:00:00Z",
              "value":17.3
            },
            {
              "date":"2018-06-04T09:00:00Z",
```


XML-Response:


```
<meteomatics-api-response version="3.0">
  <user>meteomatics-mapserver</user>
  <dateGenerated>2018-06-04T20:00:03Z</dateGenerated>
  <status>OK</status>
  <data>
    <parameter name="t_2m:C">
      <location lat="47.4122" lon="9.34065">
        <value date="2018-06-04T00:00:00Z">16.9</value>
        <value date="2018-06-04T03:00:00Z">15.4</value>
        <value date="2018-06-04T06:00:00Z">17.3</value>
        <value date="2018-06-04T09:00:00Z">21.4</value>
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        <value date="2018-06-04T15:00:00Z">25.2</value>
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        <value date="2018-06-05T00:00:00Z">17.3</value>
        <value date="2018-06-05T03:00:00Z">17.1</value>
        <value date="2018-06-05T06:00:00Z">17.6</value>
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        <value date="2018-06-05T21:00:00Z">19.7</value>
        <value date="2018-06-06T00:00:00Z">18.5</value>
      </location>
    </parameter>
  </data>
</meteomatics-api-response>
```
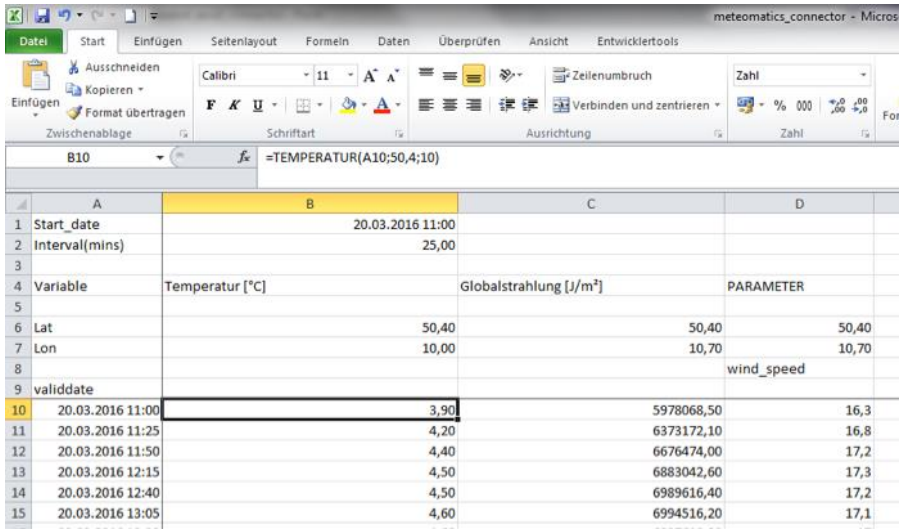

Weather API: Connectors

Data Connectors

- Python, Excel, Java, C++, C#
- Flexible & fast integration
- Historical, current & forecast data
- Radar, satellite, model data…

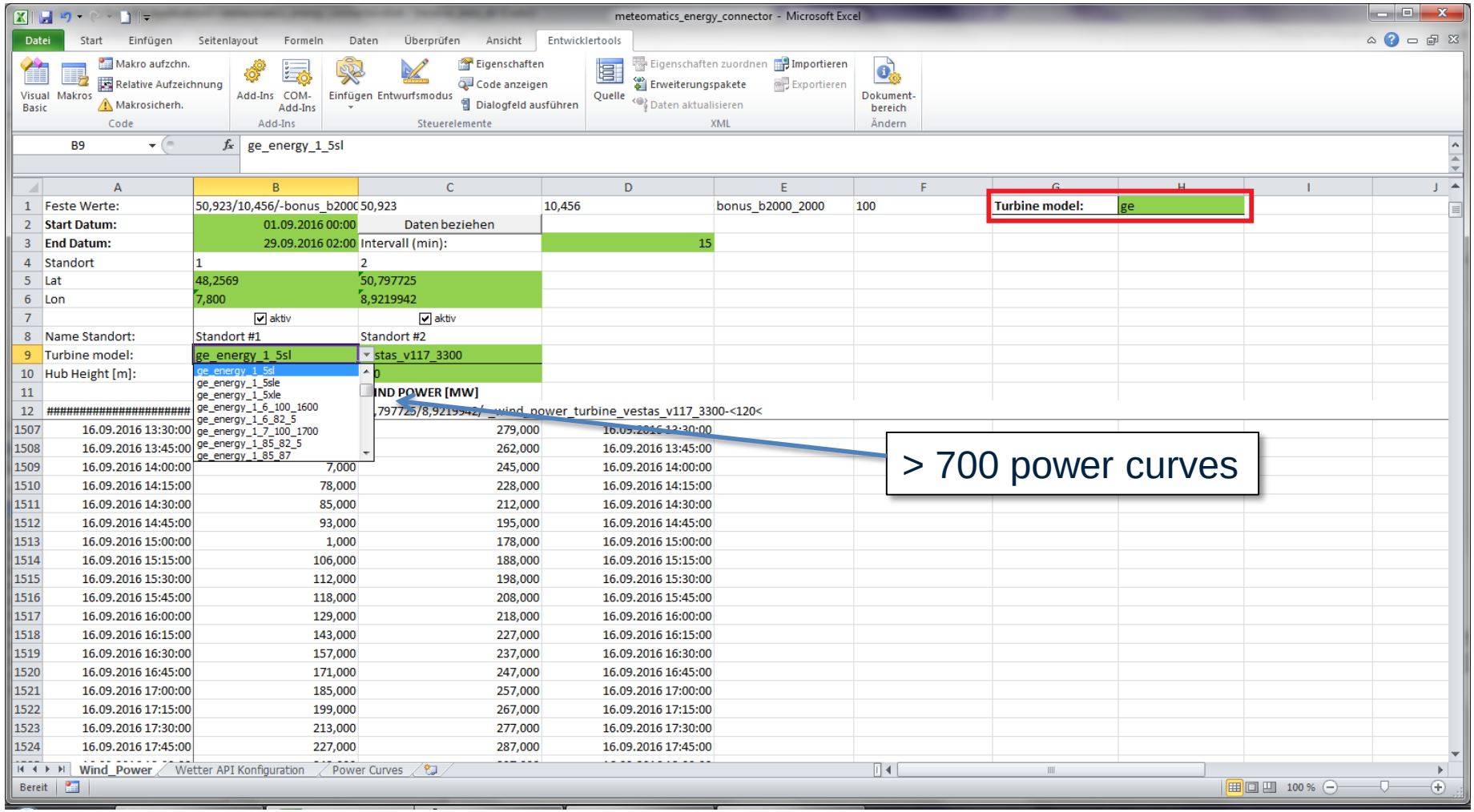


	A	B	C	D
1	Start_date	20.03.2016 11:00		
2	Interval(mins)	25,00		
3				
4	Variable	Temperatur [°C]	Globalstrahlung [J/m²]	PARAMETER
5				
6	Lat	50,40	50,40	50,40
7	Lon	10,00	10,70	10,70
8				wind_speed
9	validdate			
10	20.03.2016 11:00	3,90	5978068,50	16,3
11	20.03.2016 11:25	4,20	6373172,10	16,8
12	20.03.2016 11:50	4,40	6676474,00	17,2
13	20.03.2016 12:15	4,50	6883042,60	17,3
14	20.03.2016 12:40	4,50	6989616,40	17,2
15	20.03.2016 13:05	4,60	6994516,20	17,1

```python
import meteomatics_weather_api as api
import datetime as dt

username   = 'max'
password   = 'mustermann'
lat        = 47.11
lon        = 11.47
startdate  = dt.datetime.utcnow().replace(hour=0, minute=0, second=0, microsecond=0)
enddate    = startdate + dt.timedelta(days=1)
interval   = dt.timedelta(hours=1)
parameters = ['air_temperature','relative_humidity','precipitation_amount_3h','wind_speed','wind_from_direction']

df = api.query_time_series(lat,lon,startdate,enddate,interval,parameters,username,password)
```

Applications: Wind power analysis

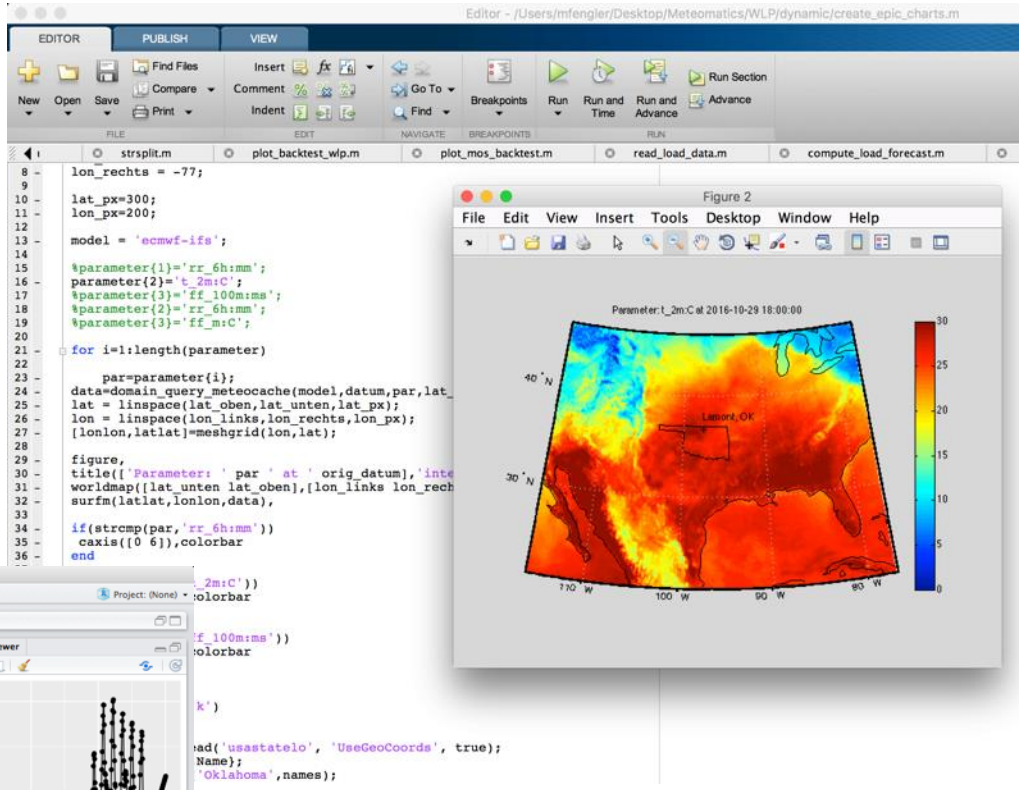
Analysis of new/potential portfolios. Deal or no deal?

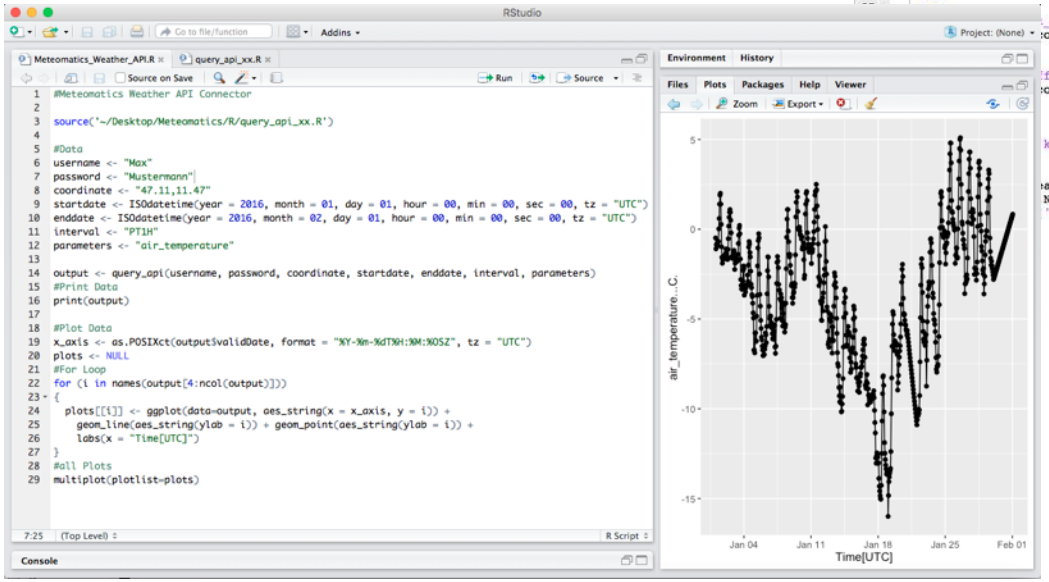


Weather API: Connectors

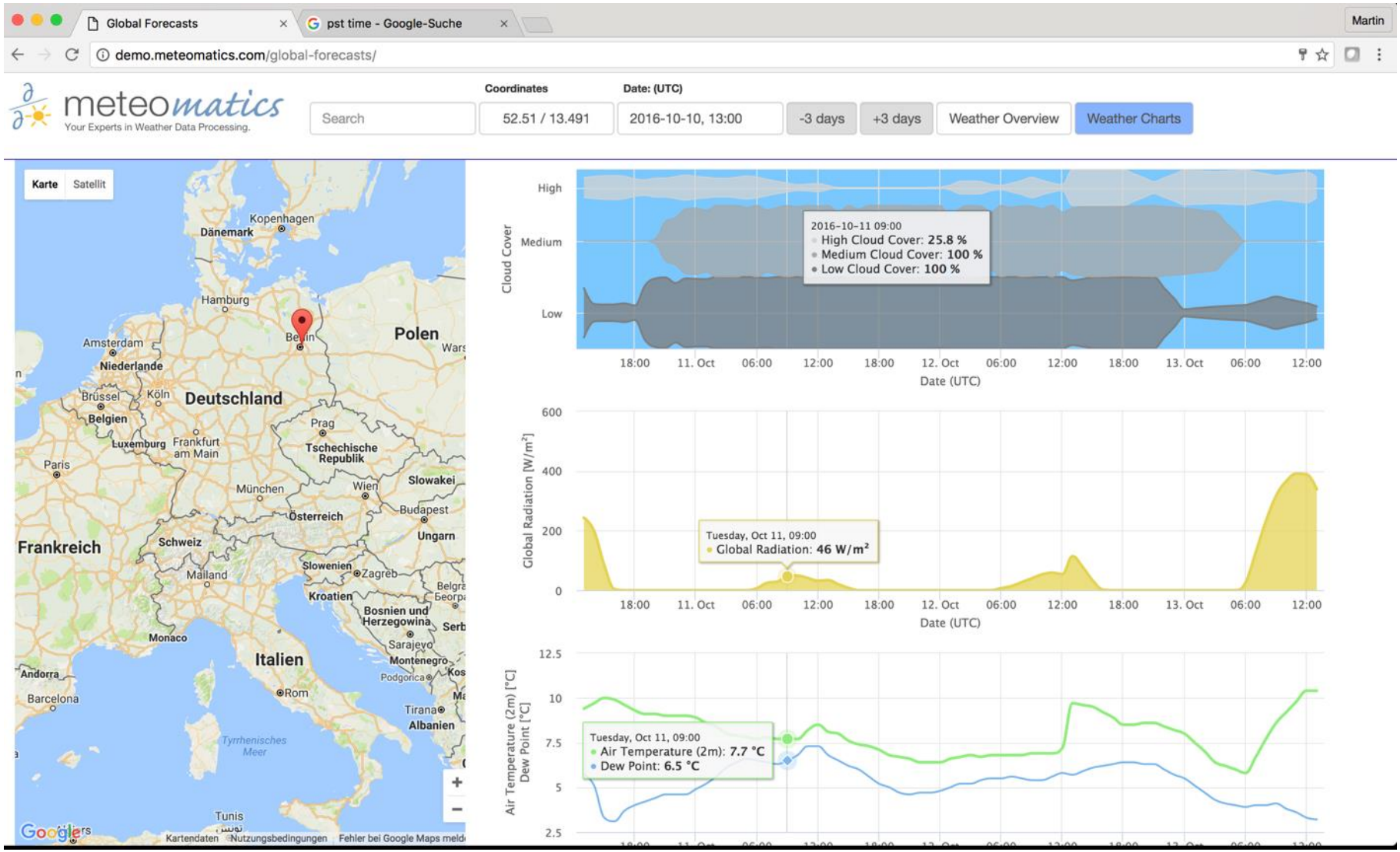
Data Connectors

- Matlab, R,…
- Flexible & fast integration
- Radar, satellite, model data…



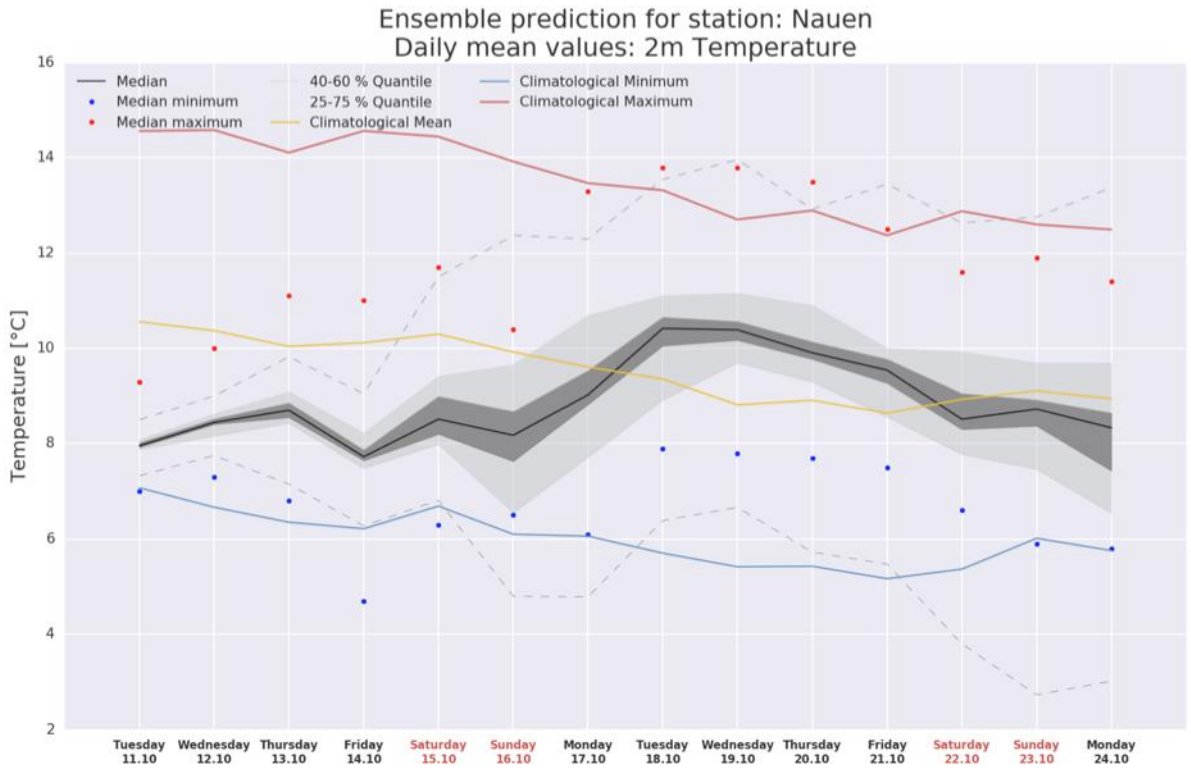


Weather API: data for arbitrary locations

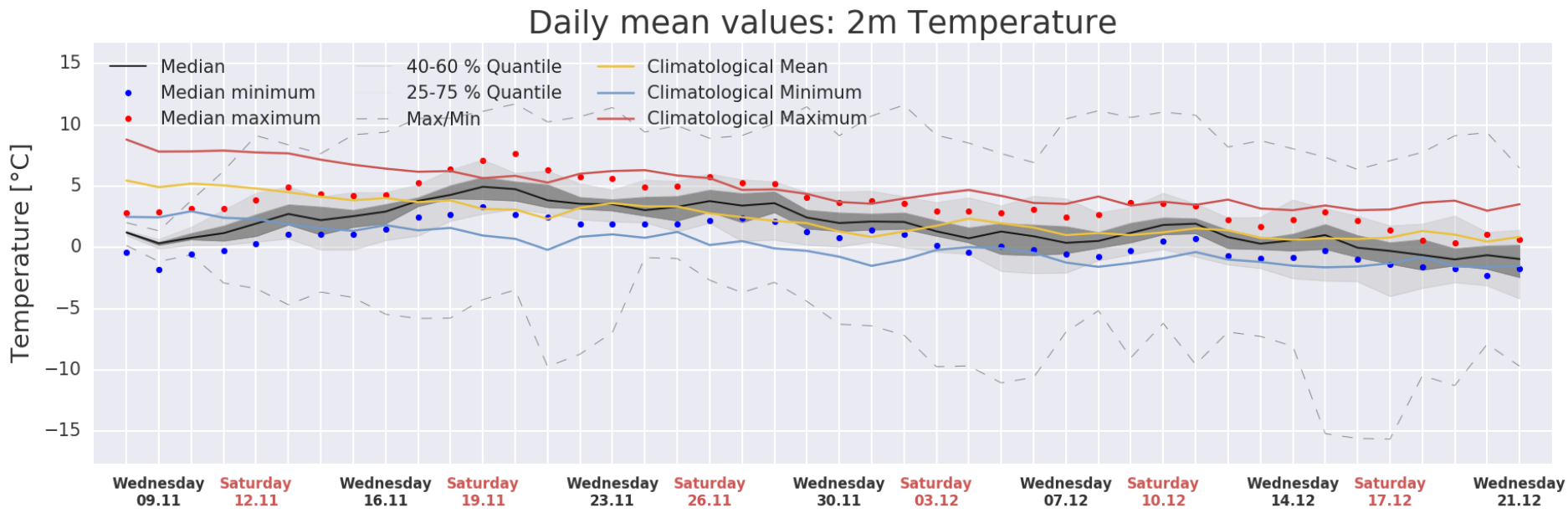


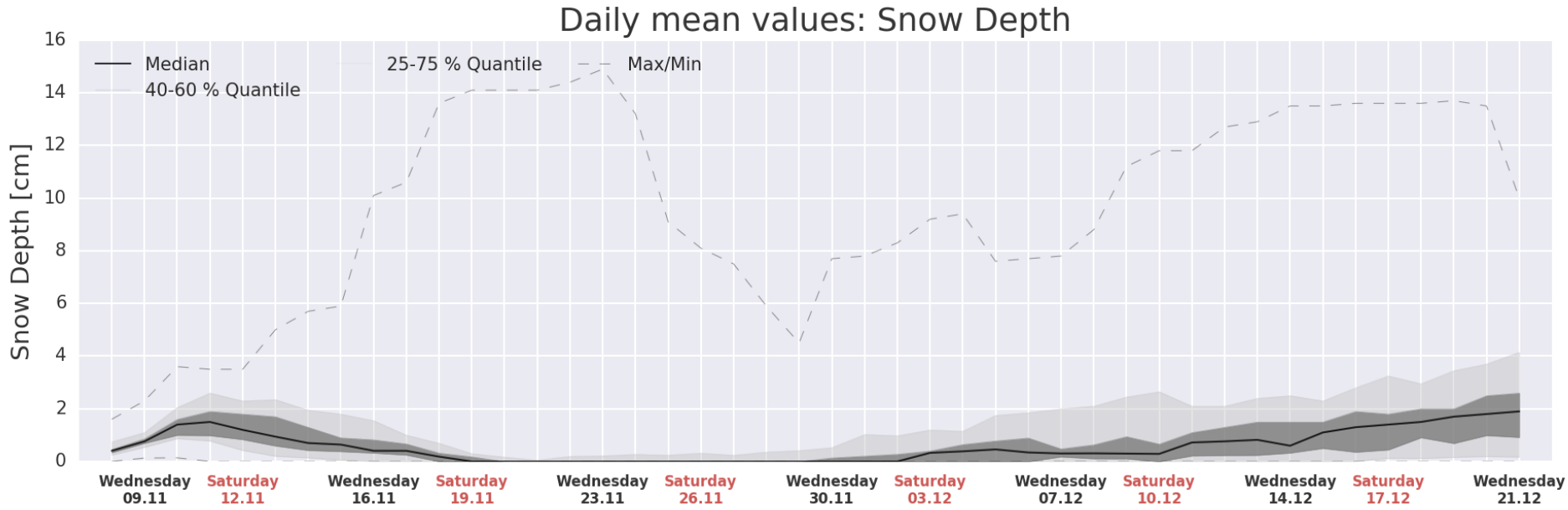
Weather API: 15 days ensemble data

ECMWF Ensemble forecast to analyze upcoming trends: 15days

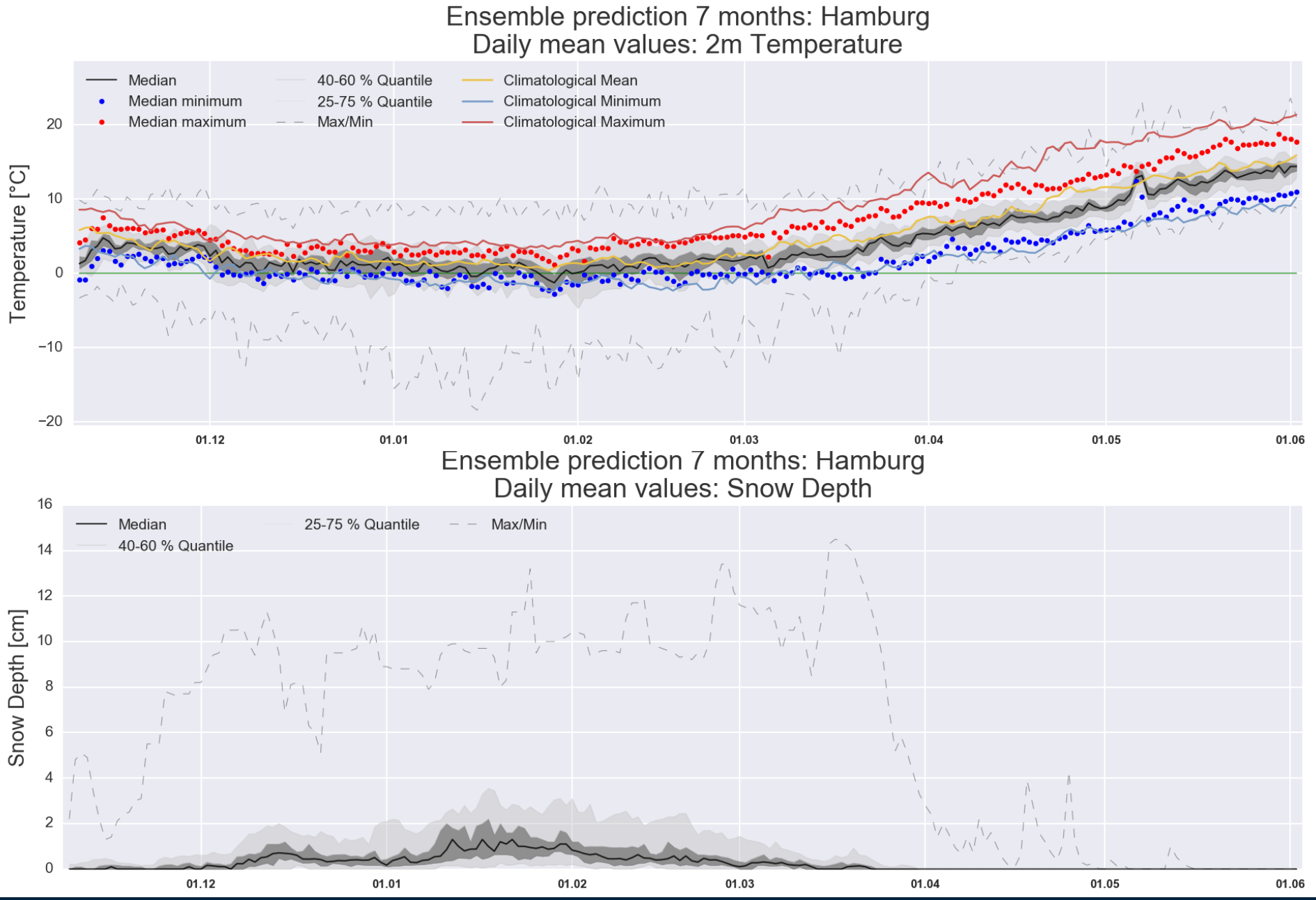


Weather API: ECMWF 46 days ensemble data

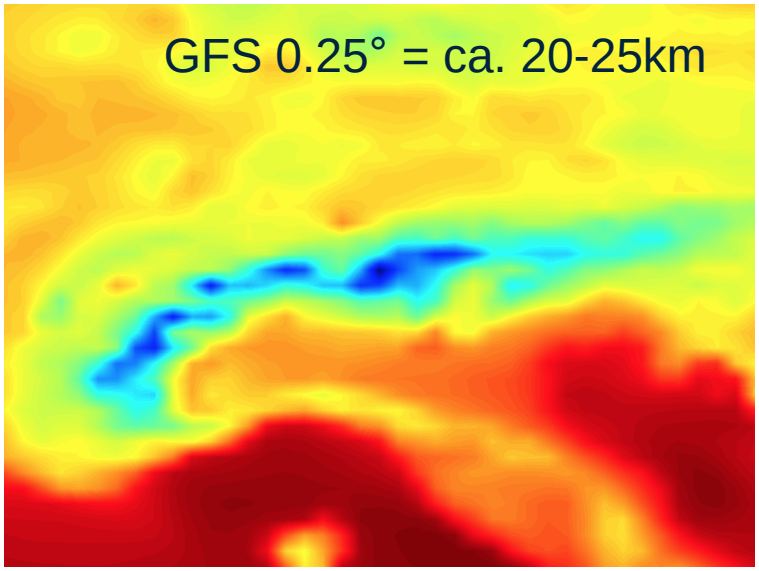


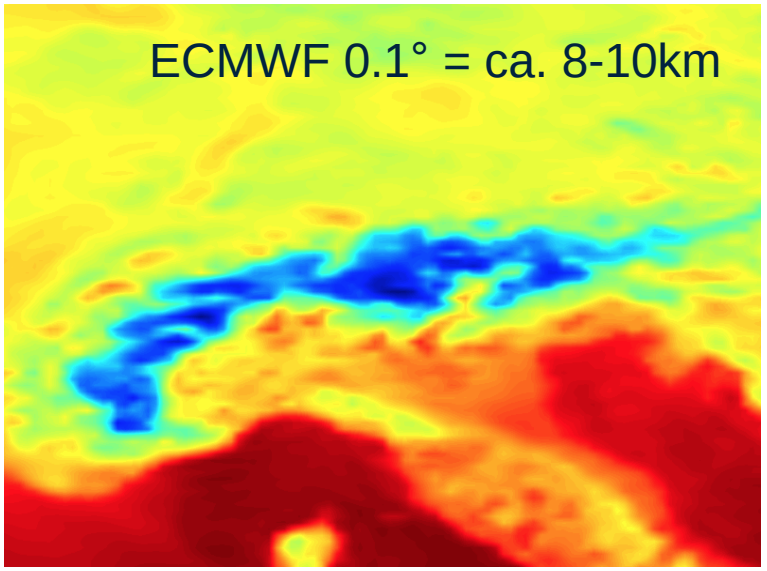


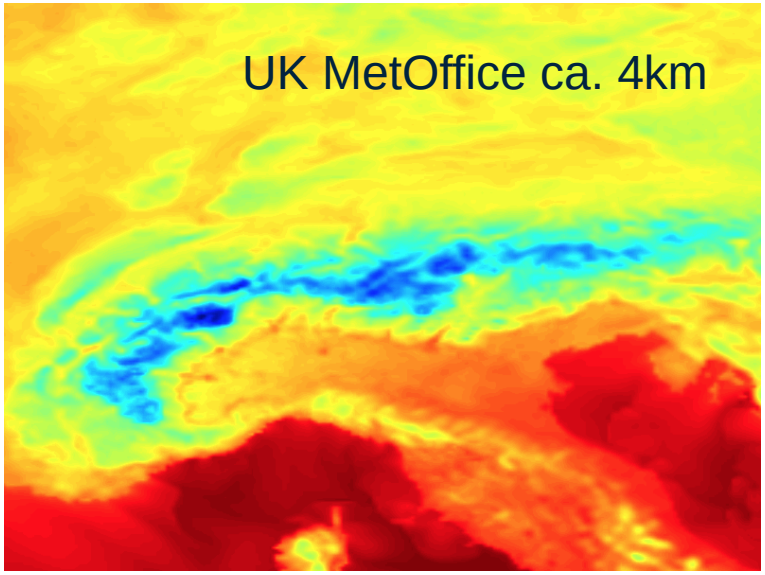
Weather API: Seasonal Forecasts for 7-months

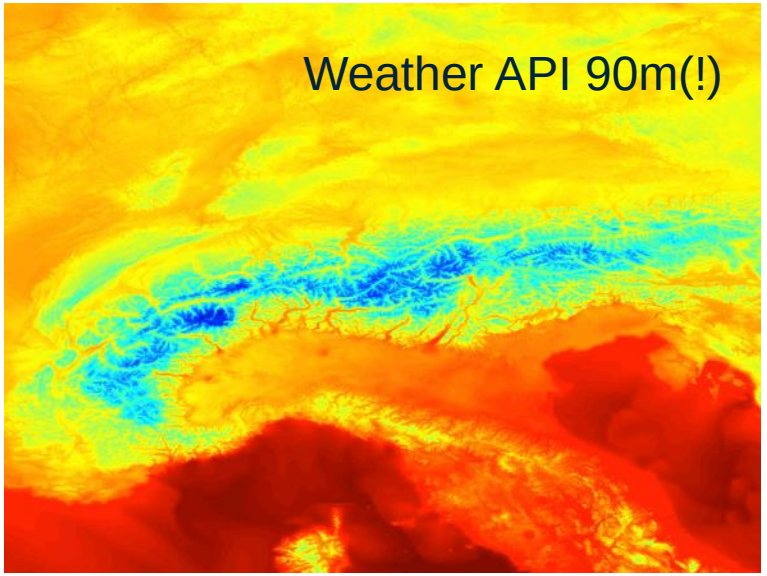


On the fly down-scaling: improving data insights!

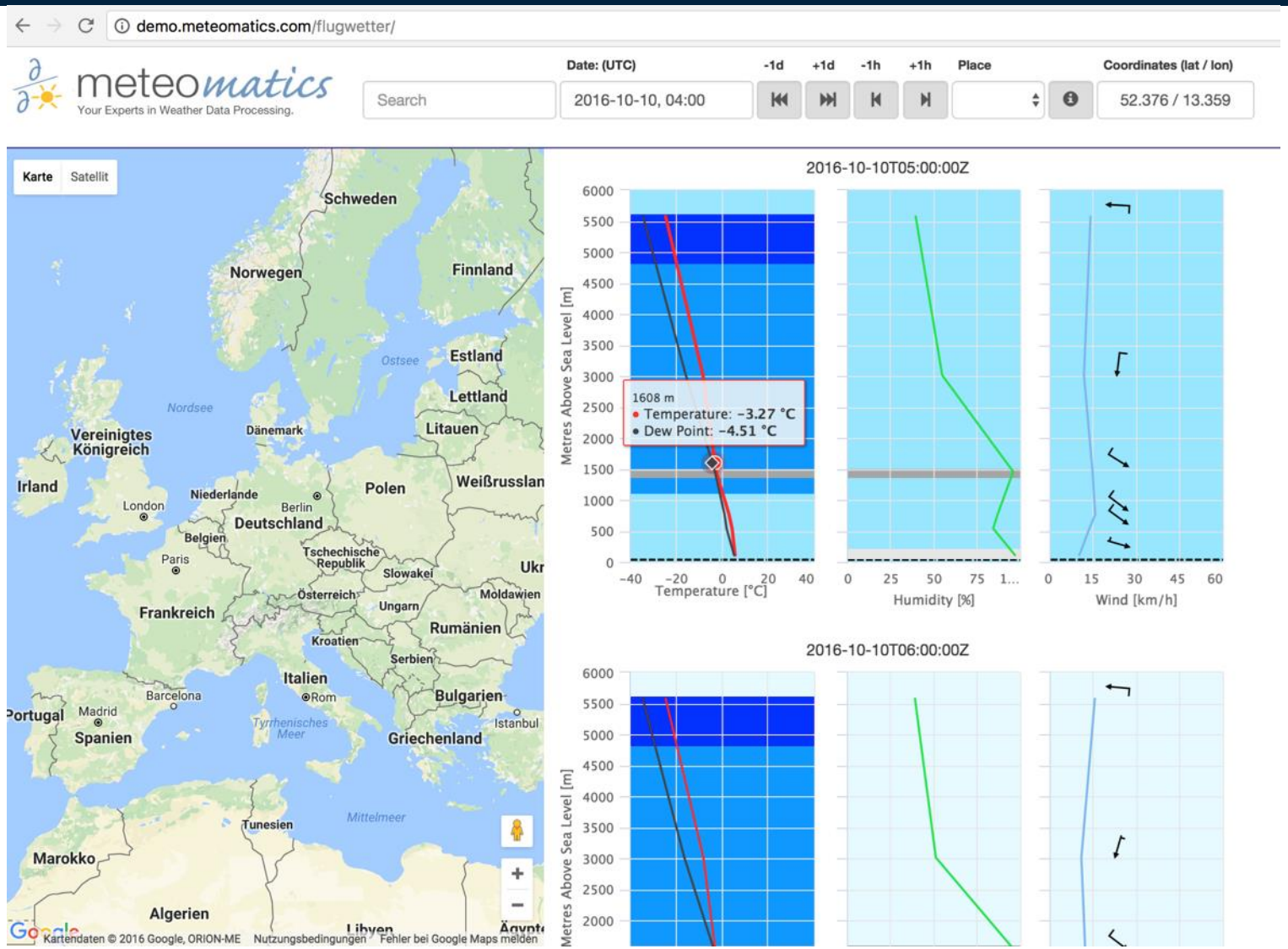








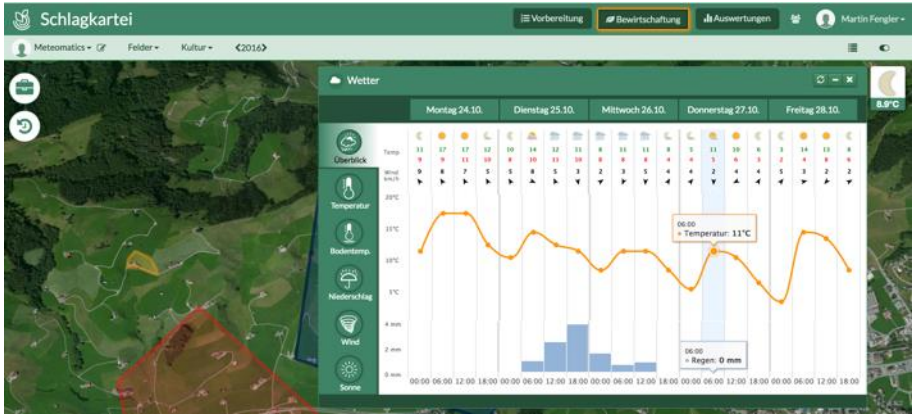
Upper air level data for arbitrary locations



Our experience in AgriCulture

Agriculture parameters:

- Dew-Index, Rime-Index
- Leaf wetness, Guttation
- Growing Degree Days (Basis 10°C)
- Phytophthora Negativ Forecast
- Soil temperature 5/15/50/150 cm
- Evaporation, Evapotranspiration
- Frost, soil temperature, Frost warning
- Grassland fire index
- Palmer Drought Index
- Moisture Stress index
- Moon light index



Maritime Data available today from our API

Maritime Parameters

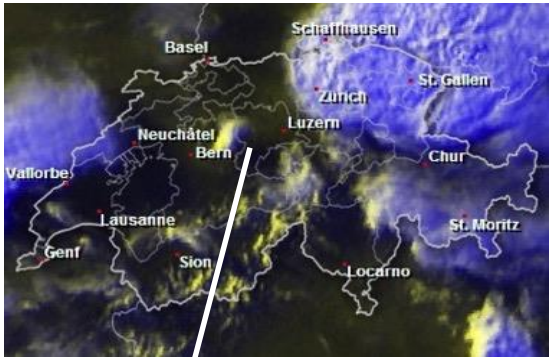
- wave height (mean/max)
- wave direction
- wave period
- direction of total swell
- direction of wind waves
- wave period 1st moment
- wave period 2nd moment
- period of total swell
- period of wind waves
- direction of first swell
- direction of second swell
- direction of third swell
- drift (speed & direction)

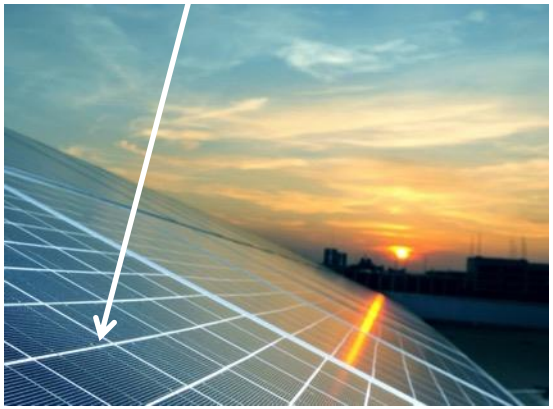
Applications: Solar Power Forecasts

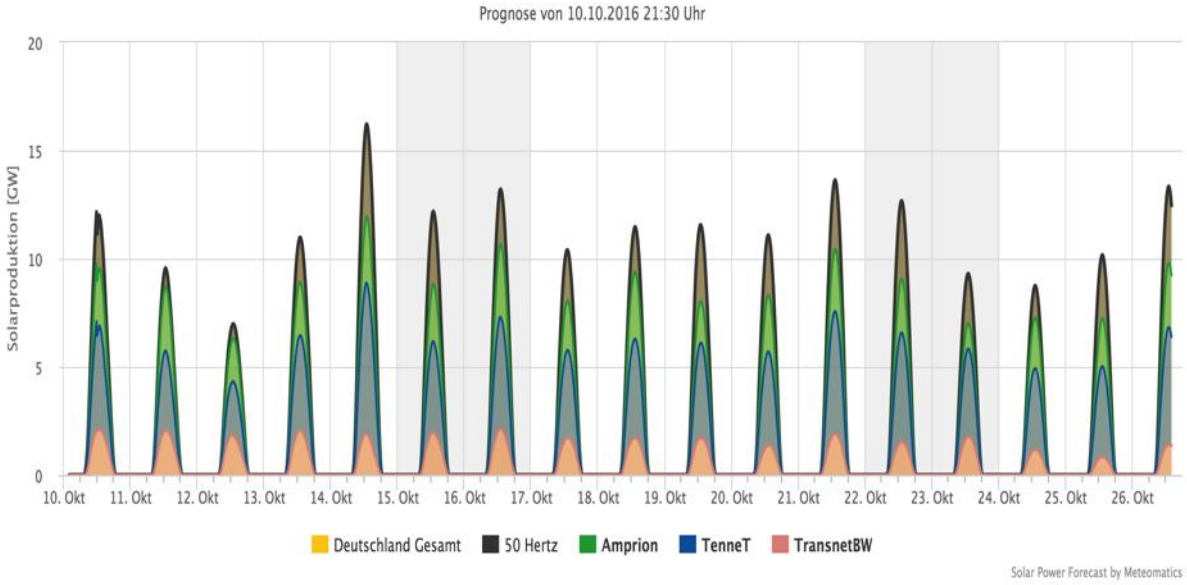
(i) Take historical data from your sites
(ii) Calibrate/train your model with historical model and panel data

=> for a model of your choice from API

(iii) Apply your regression coefficients to any future model run

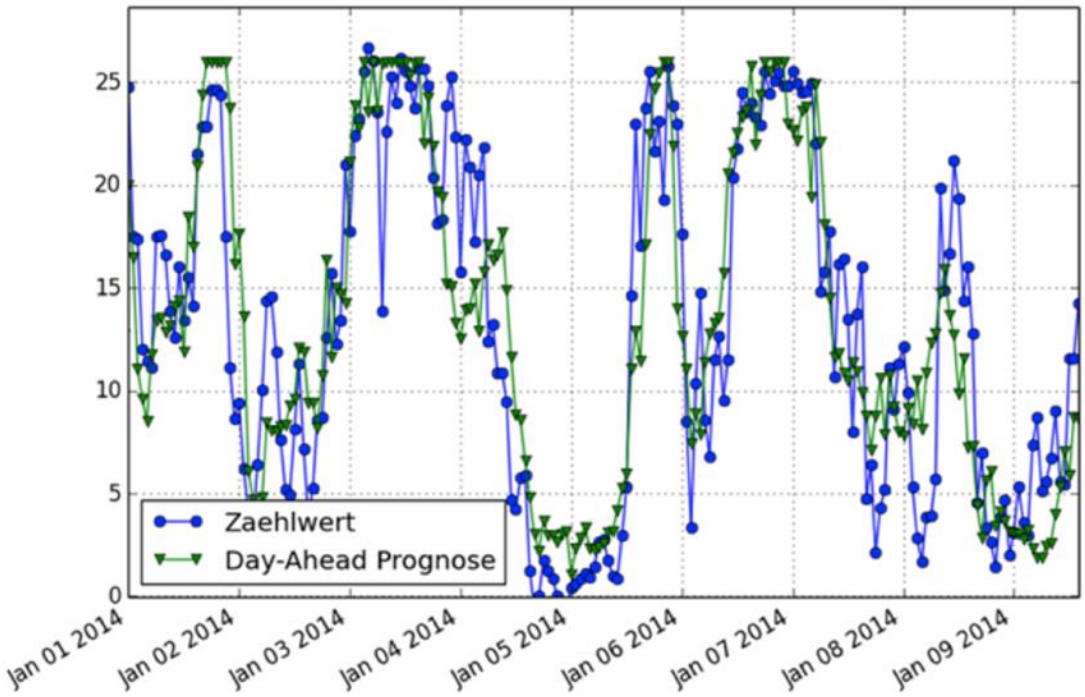






Applications: Wind Power Forecasts

Mix the forecast of the different models!



Wind farm (nRMSE):
Intraday < 8%
Day Ahead < 10%

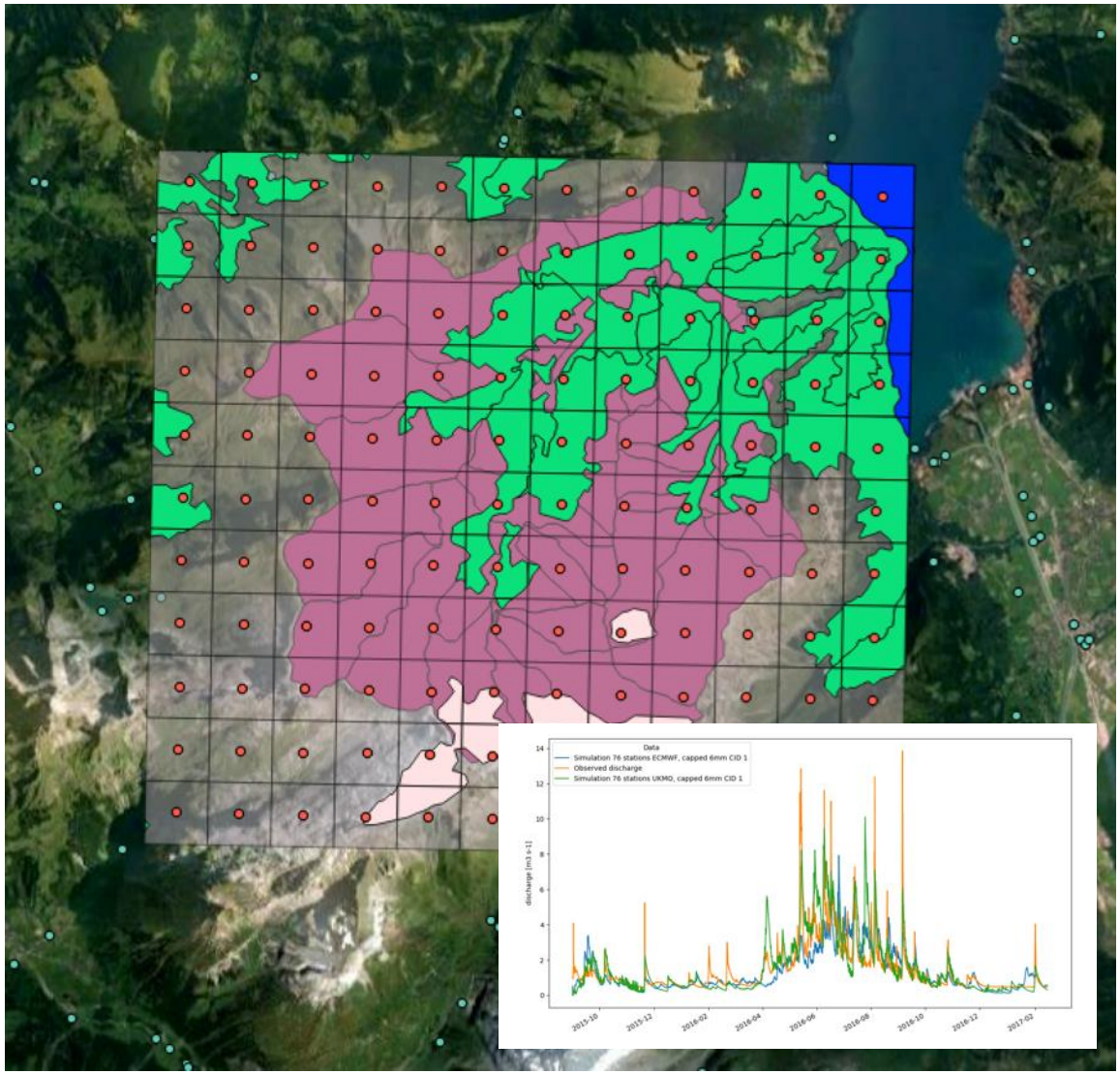
Applications: Hydro Power Forecasts

Feeding API data into hydro power codes.

- radar & precip data
- radiation
- evaporation
- temperature

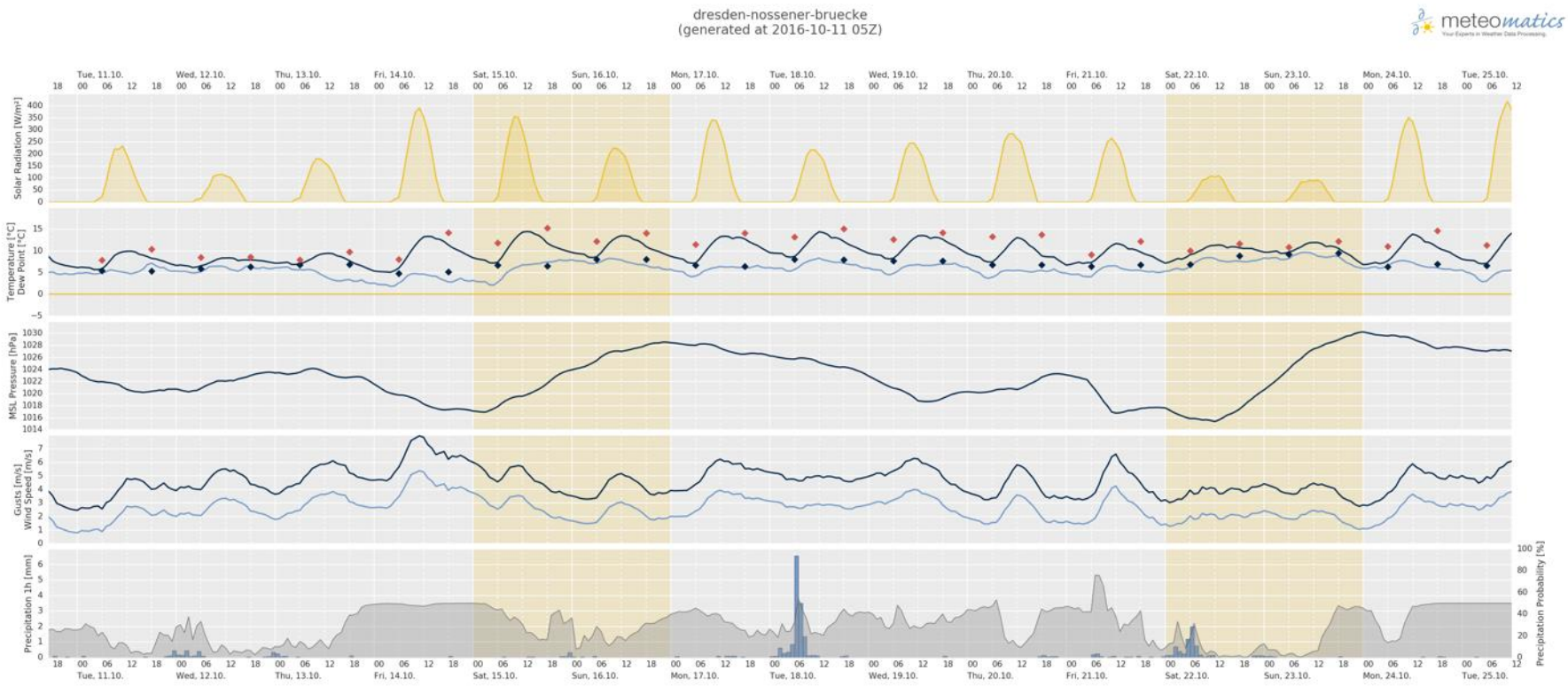
HYDRO

EWA URNER POWER



Applications: Forecasts for your own station data

Build your own „MOS“/model:



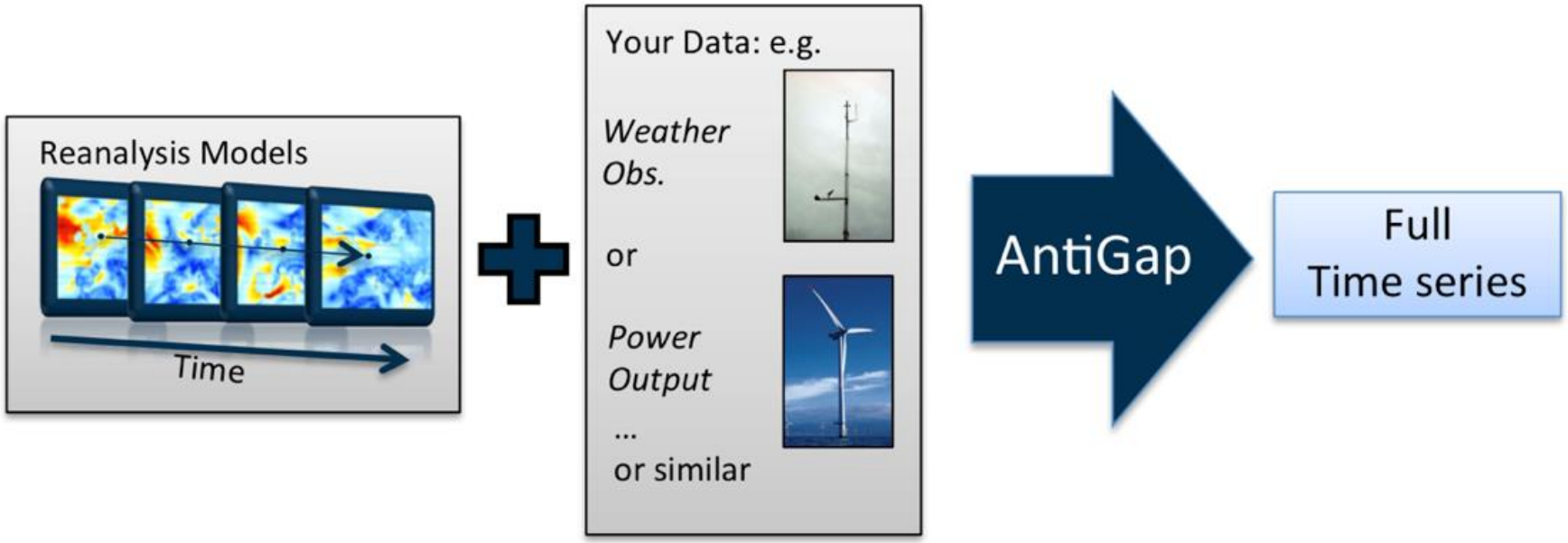
Temperature Error MAE Intraday/Day Ahead: 0.8°C-1.0°C.

Applications: Filling gaps in time series

HindCast & fill missing data:

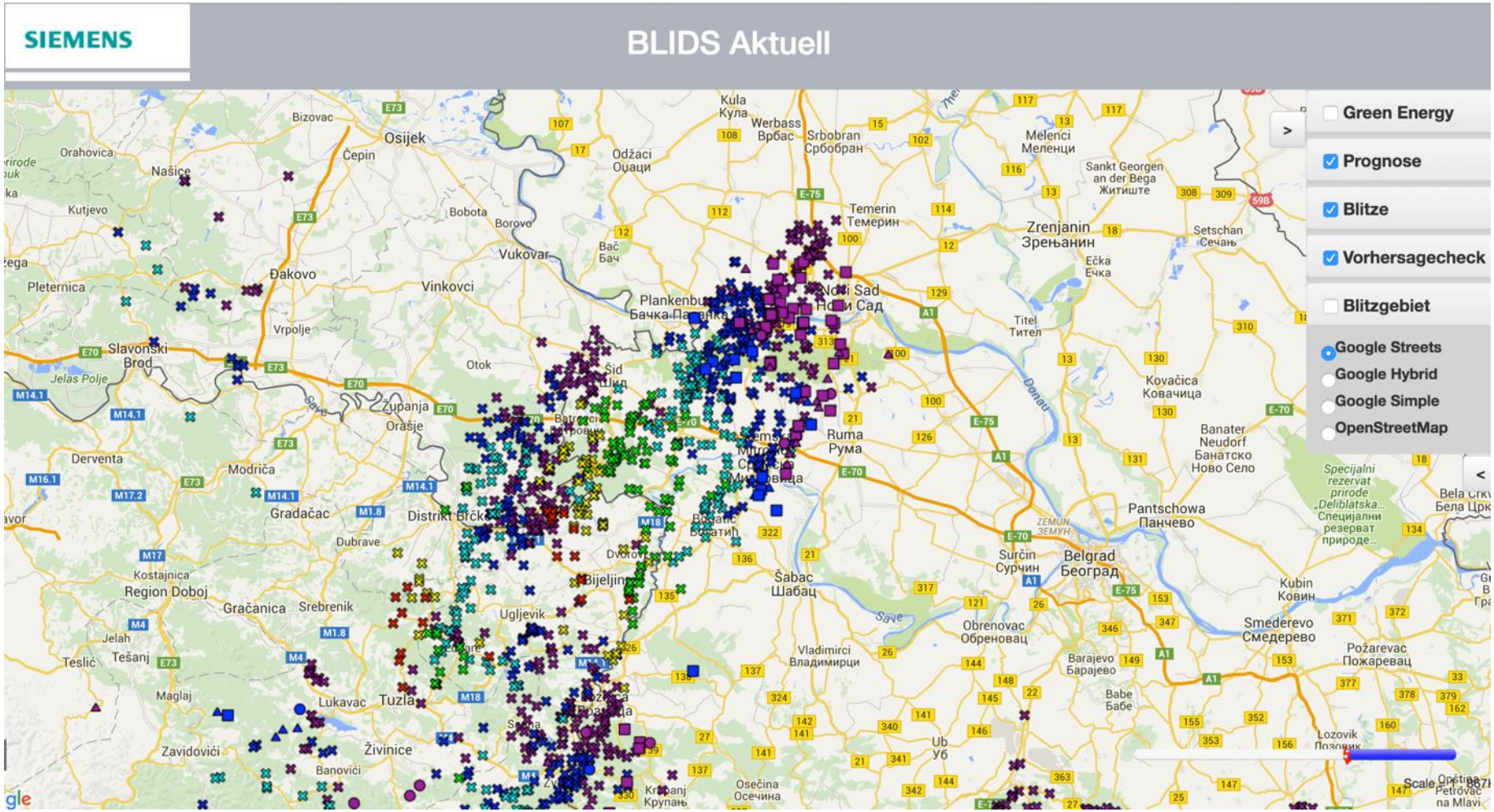
- ECMWF ERA Interim model data reach back till 1979.
- ECMWF IFS data reach back till 2014*
- GFS, UK MetOffice....

Functionality of AntiGap

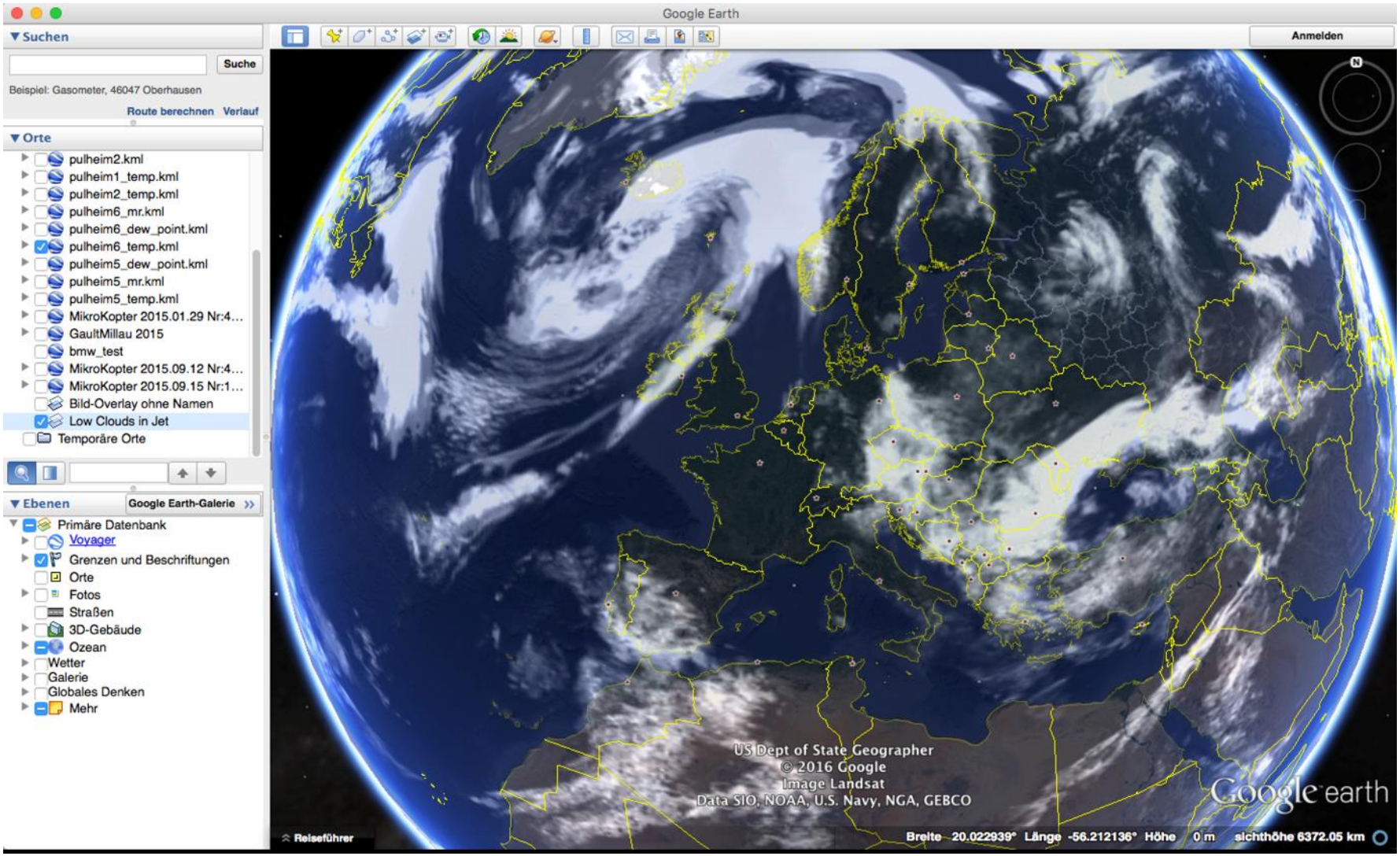


*) can be extended

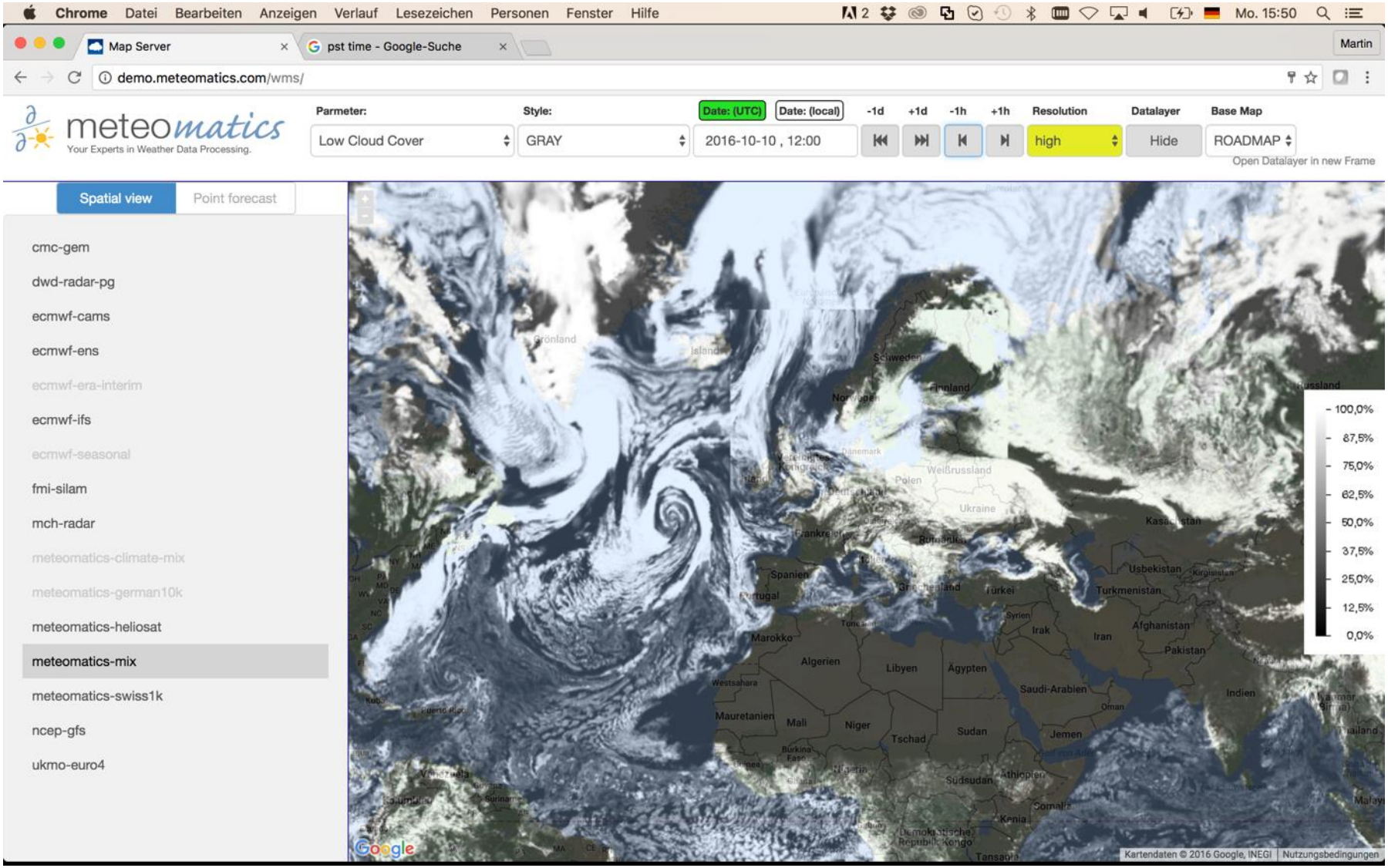
Applications: Real-time Lightning Forecasts



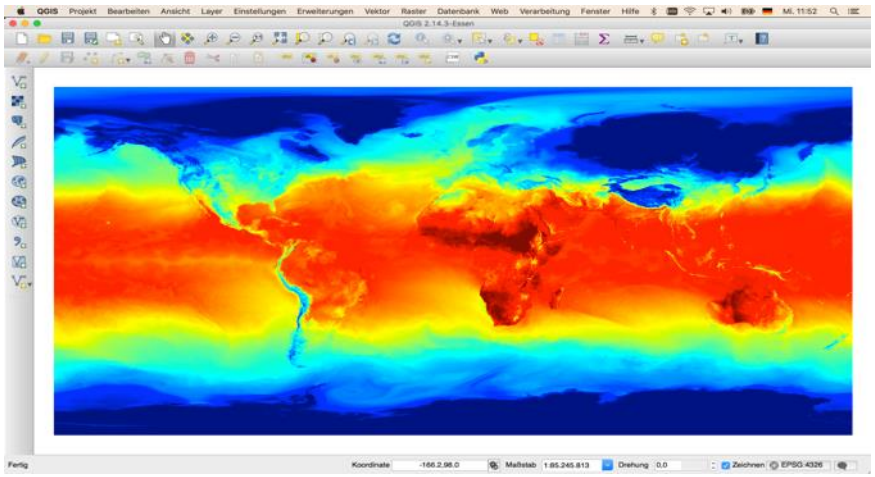
Our Weather-API supports also WMS: Google Earth



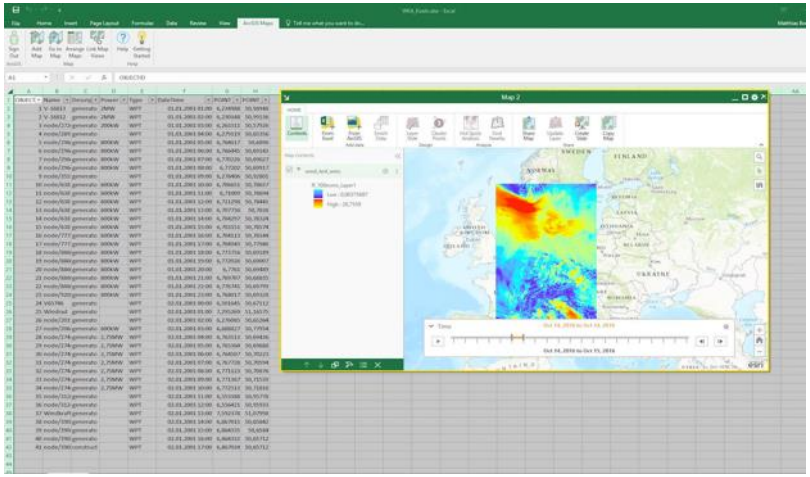
Integration into GoogleMaps



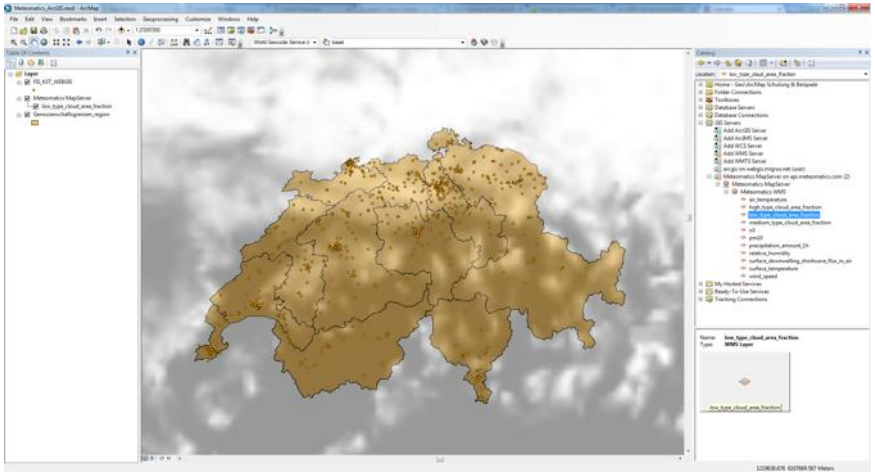
Integration into ESRI and QGIS



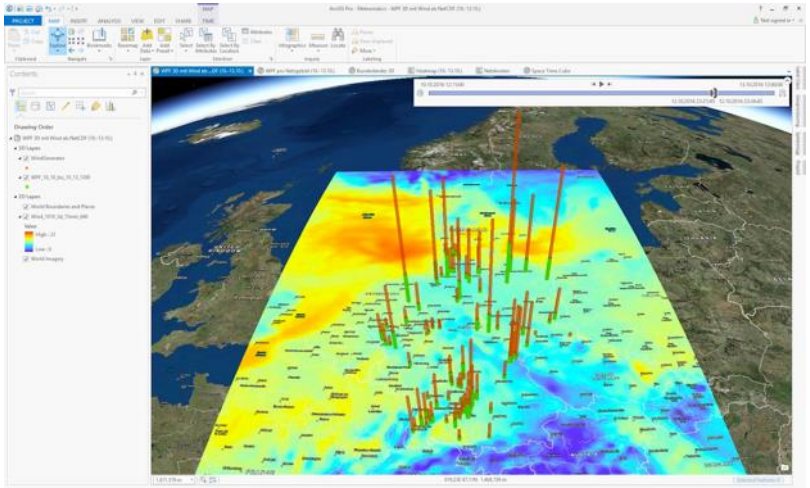
QGIS



ArcGIS for office



ArcGIS

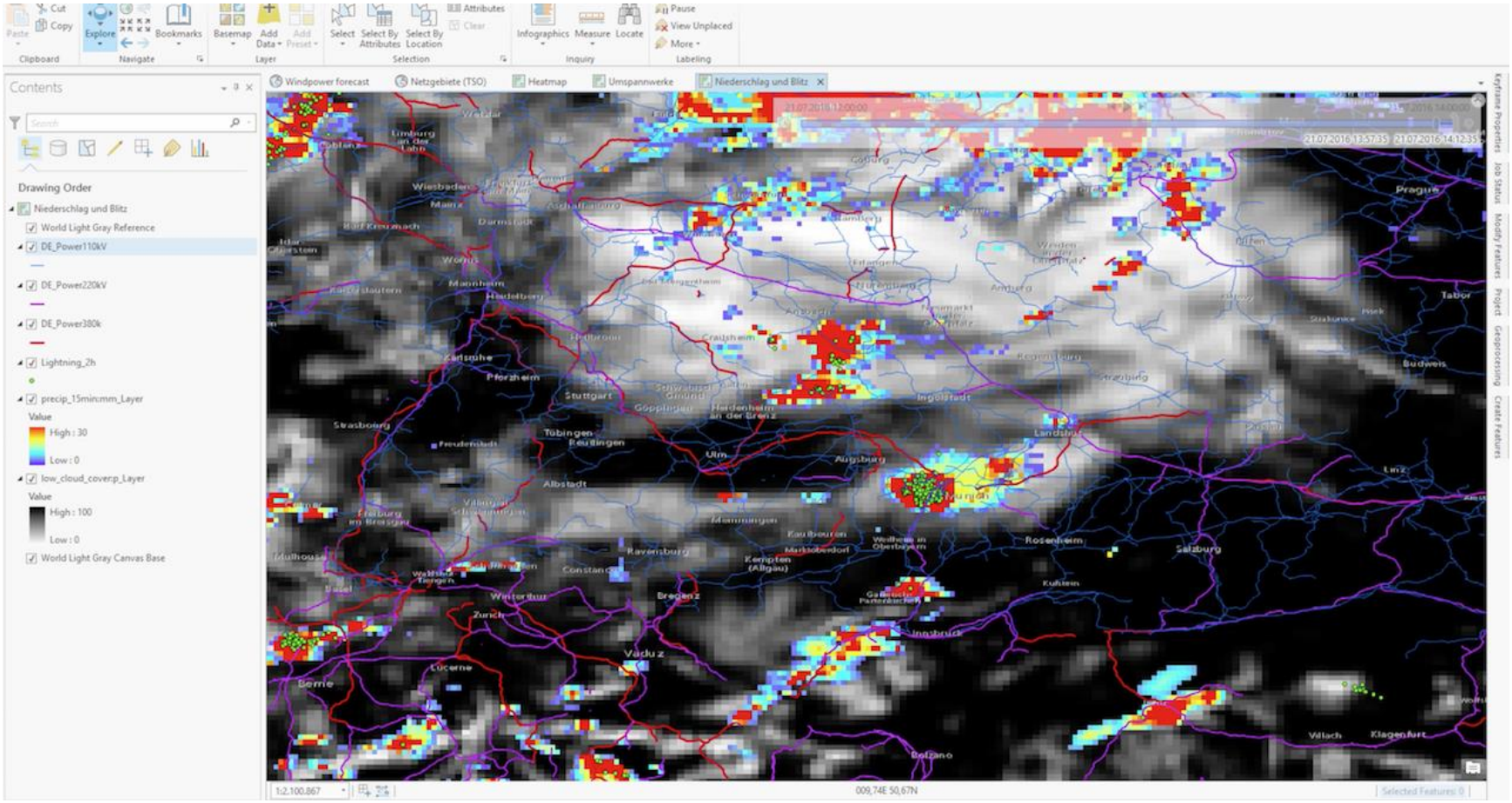


ArcGIS Pro

Integration into ESRI (ArcGIS)

Multi-Layer representation for a transmission system operator (TSO):

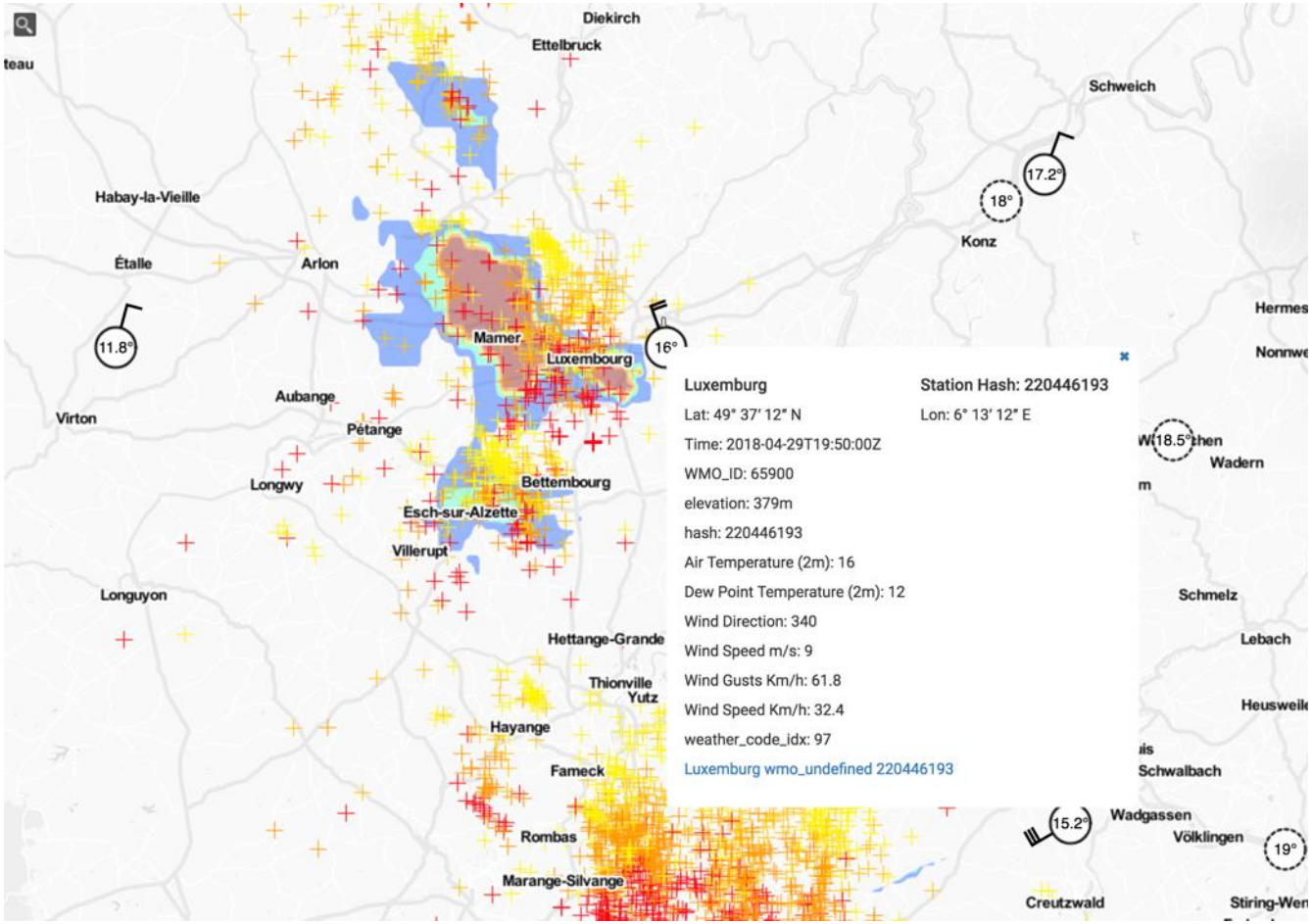
- Cloud layer (satellite images), radar images, lightning data
- Historical & actual data and nowcasting 2hours ahead, weather model data even up to 10 days
- Overlay with power line network



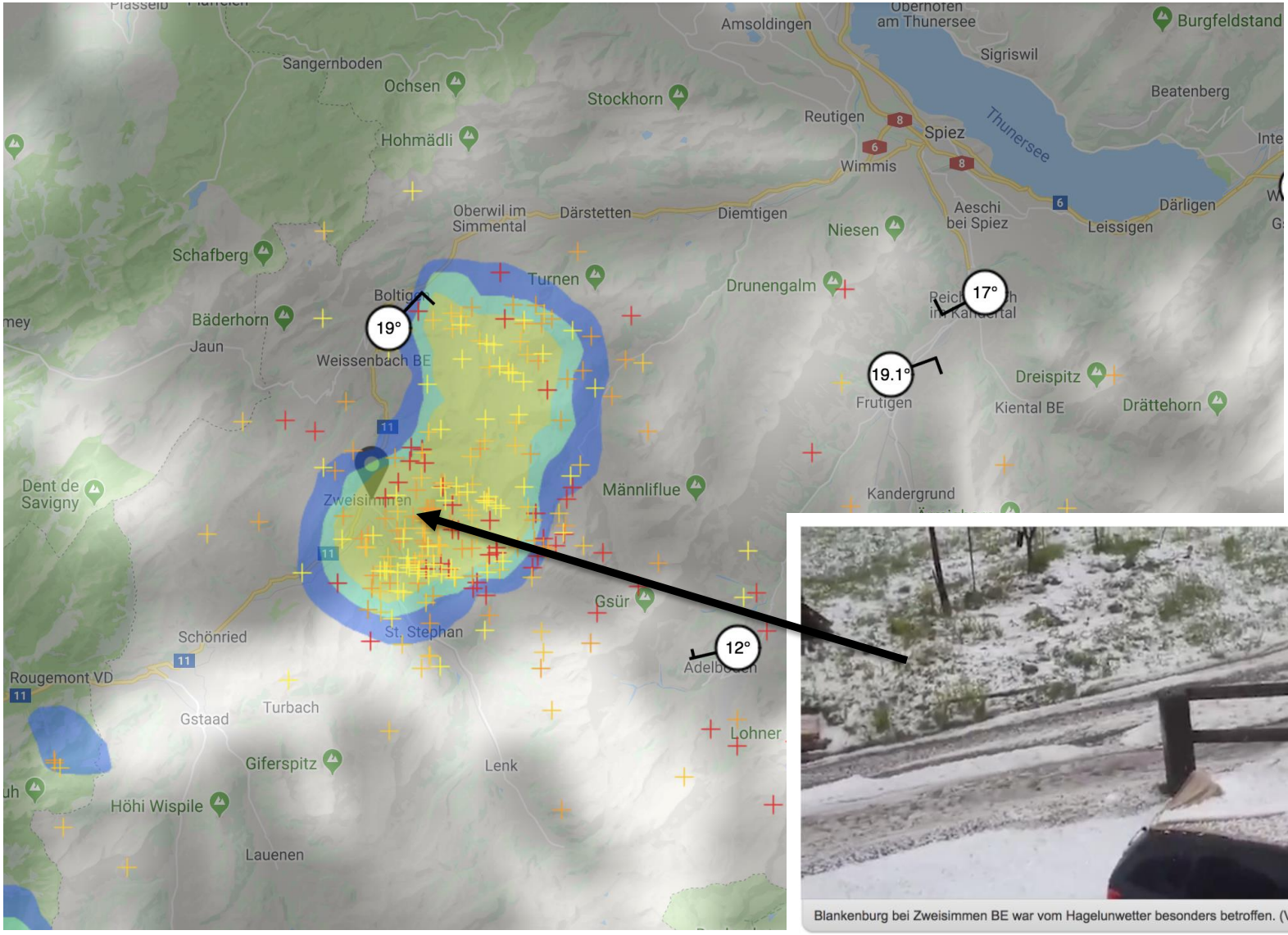
Radar, hail & lightning data (WMS/WFS layer)

For insurances it is highly important to get precise data on

- Historical lightning & hail events
- Storm data
- Rain & flood data

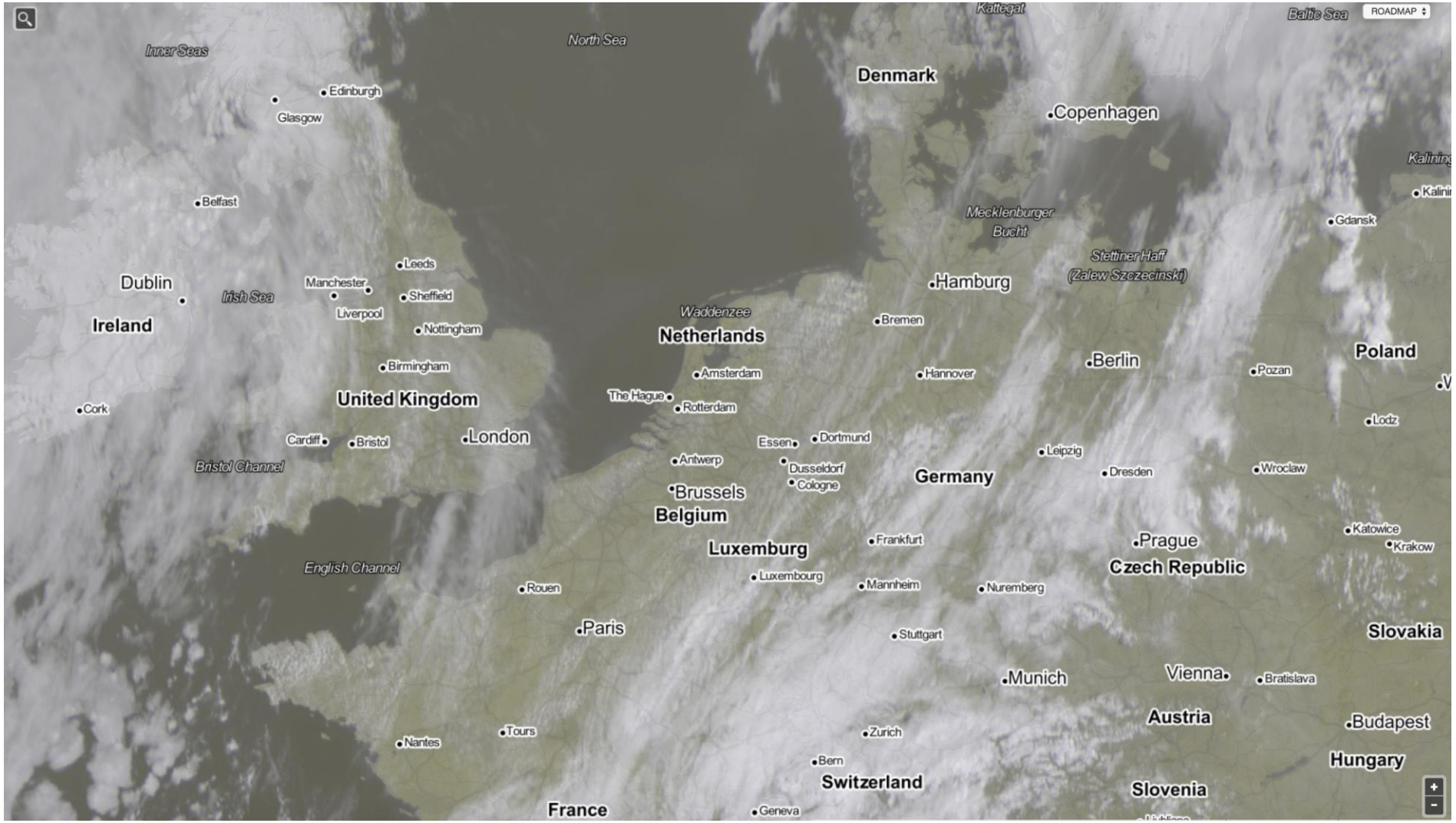


Radar, hail & lightning data (WMS/WFS layer)

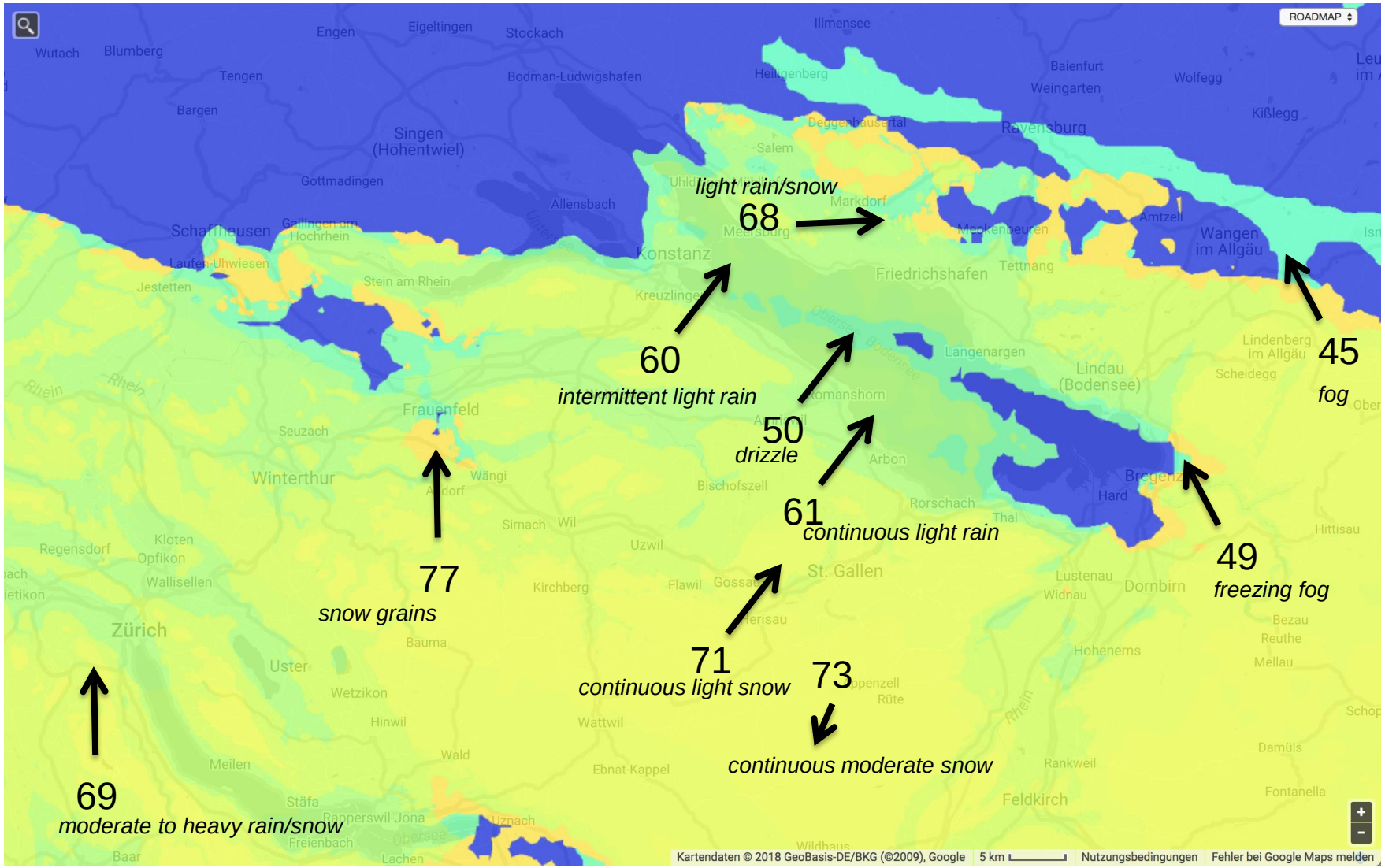


Blankenburg bei Zweisimmen BE war vom Hagelunwetter besonders betroffen. (Video: SRF Meteo)

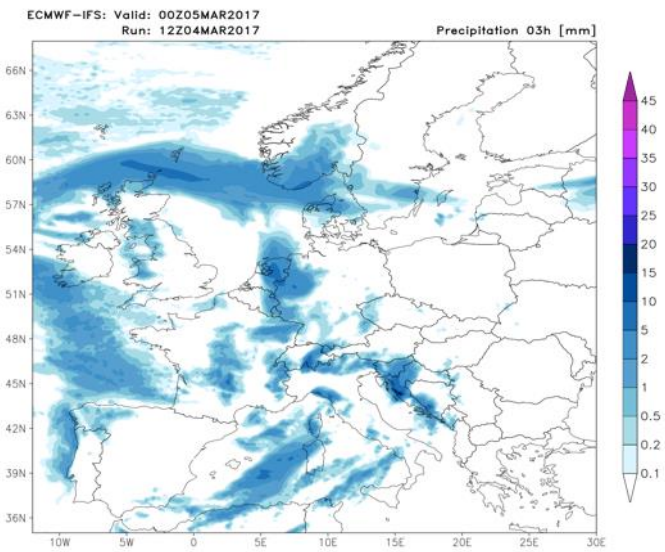
Real-time satellite images

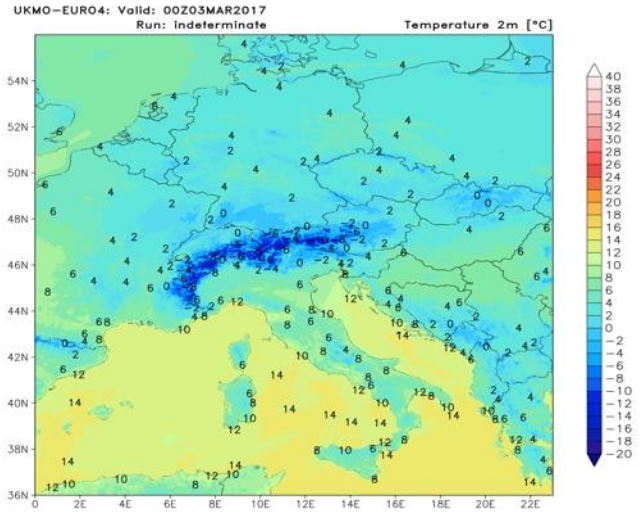


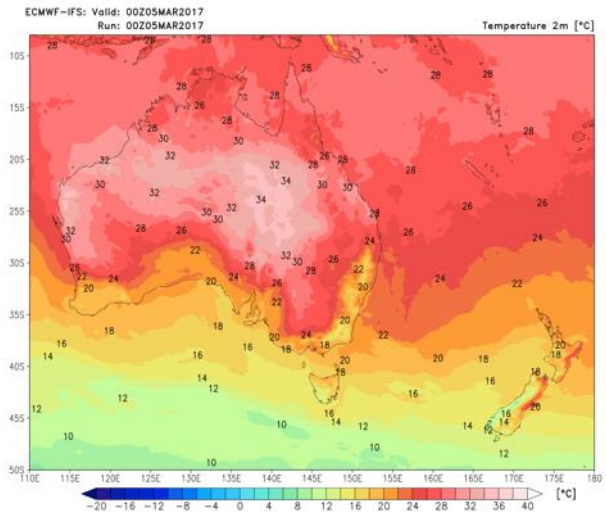
Computing the weather code (ww) on-the-fly from radar data

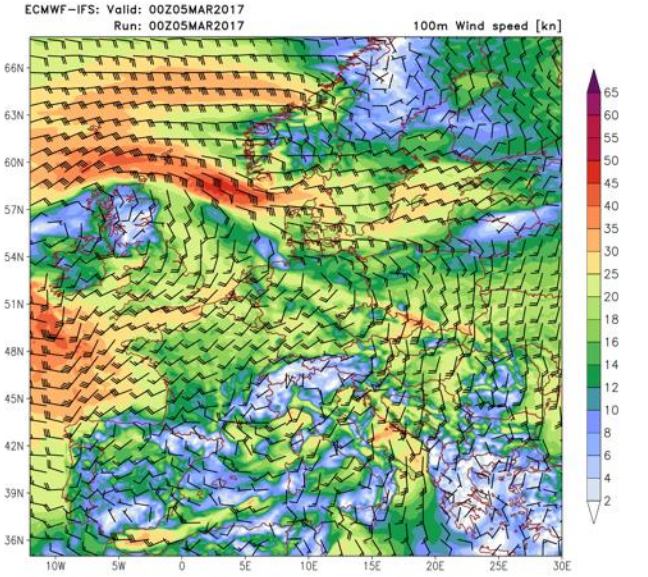


Meteorological Maps on Arbitrary Models & Domains









Integration into Customized Products

Homepage weather

Calendar integration into ical & iphone:

References


gas union
MeteoGroup
BKW
endios
ALPIQ
Kanton Uri
Soptim
Zukunft gestalten
SRF METEO
ENNI
Energie & Umwelt Niederrhein
TenneT
Kanton Graubünden
ONZO
DAIMLER
FUJITSU
RUAG
ESO
Kanton St.Gallen
yuso.be
energy marketing
WINGAS
e2m
HYDRO
Qmet
swarco
Leipziger
Stadtwerke
VENIOS
Uniting IT and Energy
KW
Energy Weather
uniper
ELE
Emscher Lippe Energie GmbH
swissgrid
ECMWF
EUROPEAN CENTRE FOR MEDIUM RANGE WEATHER FORECASTS
WATTELSE
OPTIMISED BUILDING AUTOMATION
SBB CFF FFS
VATTENFALL
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Bundesamt für Zivilluftfahrt BAZL
Eidgenössisches Departement des Innern EDI
Bundesamt für Meteorologie und Klimatologie MeteoSchweiz
Hochschule Bochum
Bochum University of Applied Sciences
BO
SolarCar Team
LAMBRECHT meteo
innogy
RWE
MONTEL

Workshop

- User: ecmwf-workshop , PW: ecmwf2018
- API online documentation: https://api.meteomatics.com
- Demo-Tool: https://wms.meteomatics.com

Contact

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Your Experts in Weather Data Processing.

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