meteomatics
Your Experts in Weather Data Processing.

Weather API

World class talent in meteorology, data science, drone development and service delivery

35 People | 3 Offices | 3 Countries | Global Partnerships

We are proud of Meteomatics' fair, hardworking, 'can-do' culture and a highly skilled multi-disciplinary team who rise to the challenge with our customers in a positive fashion. Creativity is a core skill whether it be in thinking, design, architecture or science.

Meteomatics AG

Weather API

Worldwide parameters

Model data
Station data
Satellite data
…

Industry

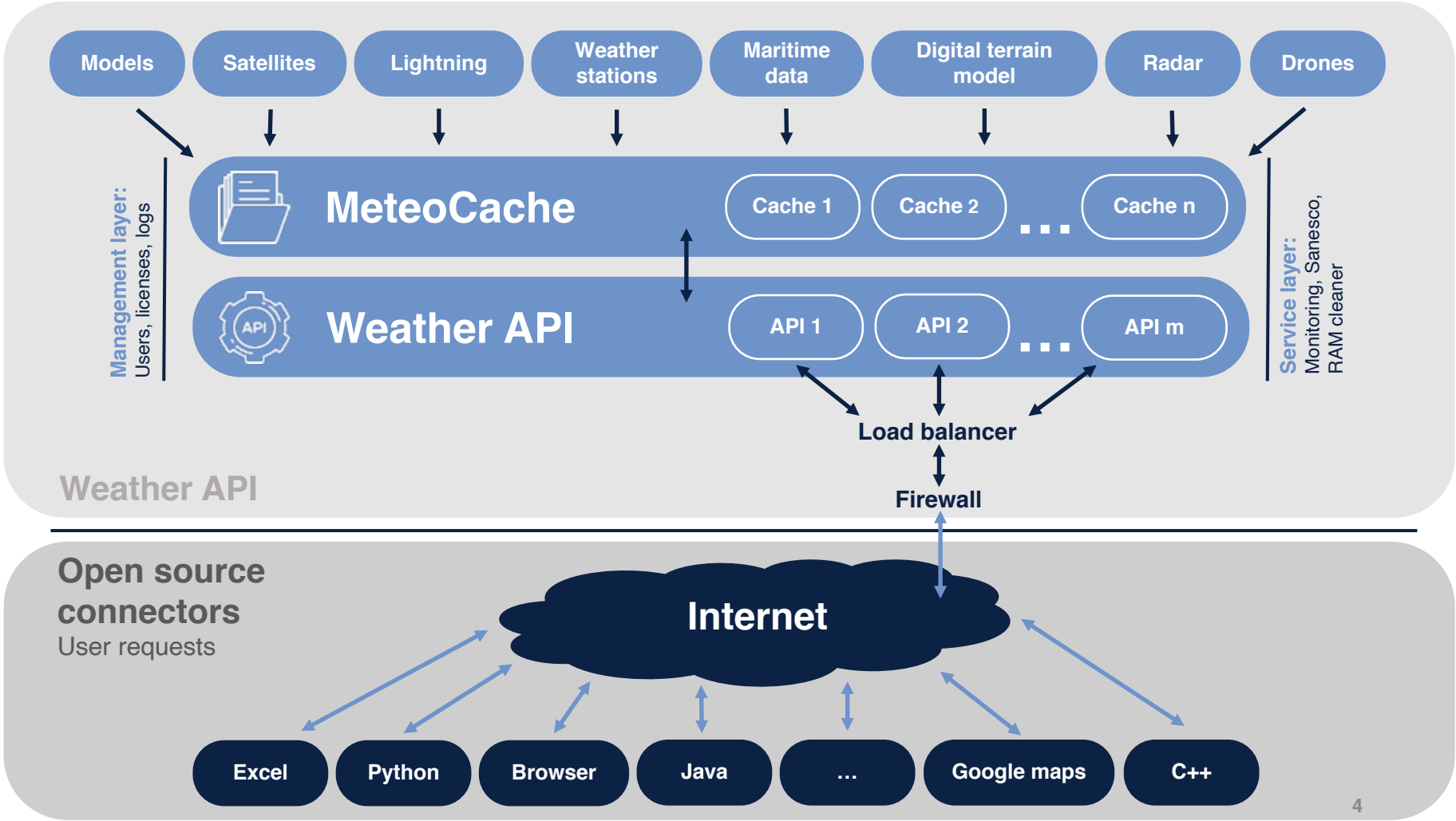
Bespoke solutions

Wind power
Solar power
Hydro power
…

Meteodrone

High-resolution weather modeling

Better PBL data
Improve fog & storm forecasts
Customized solutions


Models
Satellites
Lightning
Weather stations
Maritime data
Digital terrain model
Radar
Drones
Management layer:
Users, licenses, logs
MeteoCache
Cache 1
Cache 2
Cache n
API
Weather API
API 1
API 2
API m
Service layer:
Monitoring, Sanesco, RAM cleaner
Load balancer
Firewall
Weather API
Open source connectors
User requests
Internet
Excel
Python
Browser
Java
...
Google maps
C++

Why does weather matter?

It affects our daily life.

It affects our business.

It is highly variable.

Better understanding weather helps reduce business costs.

Better understanding weather improves predictive maintenance.

Better understanding weather helps reduce the impacts of natural hazards.

Weather API – data

Forecast data

- ✓ **Global** and **regional** weather model data from a variety of National Met Services and scientific institutions
- ✓ **Models:** ECMWF, UK MetOffice, Meteo France, Swiss1k, NOAA, KNMI, FMI, Env. Canada
- ✓ Observational data of thousands of weather stations globally
- ✓ Weather data in up to **5-minute** temporal resolution
- ✓ On the fly downscaling 90 m horizontal resolution
- ✓ Up to 15 days in advance
- ✓ Seasonal forecasts up to 7 months
- ✓ Ensemble forecasts from ECMWF and GFS
- ✓ Temporal and spatial interpolation for each coordinate worldwide
- ✓ Depending on the package up to 1'000'000 accesses per day

Historical data

- ✓ Worldwide historical model data and observational data from 1979 onwards
- ✓ Basic weather parameters such as temperature, precipitation, wind, and solar radiation
- ✓ Radar precipitation data for various countries (Germany, UK, US and more), both historical and short term forecast
- ✓ Downscaled forecast model data from various sources including ECWMF, GFS and UK MetOffice
- ✓ Ensemble forecast from ECMWF and GFS
- ✓ MOS forecast for selected weather stations and parameters

Weather API – data

Historical, current & forecast data

- ✓ Global and regional weather model data from a variety of National Met Services
- ✓ Models: ECMWF, NOAA, UK MetOffice, Meteo France, Swiss1k, KNMI, FMI, Env. Canada
- ✓ Observational data of thousands of weather stations globally
- ✓ Weather data in up to 5-minute temporal resolution
- ✓ On the fly Downscaling to 90 m horizontal resolution
- ✓ Ensemble forecasts from ECMWF and GFS
- ✓ Maritime, radar & satellite data
- ✓ Worldwide coverage

Weather API

USP

Weather data as a single version of truth

On the fly calculation for most up-to-date forecasts

Hyperlocal forecasts delivering enhanced temporal and spatial resolution

Variety of formats and connectors in different programming languages

Detailed and up-to-date documentation

Flexible & fast integration & use

Simple one-stop access to high quality weather data worldwide

Output formats

Weather forecast data through an industrial, scalable API

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


```
validdate;t_2m:C
2018-06-04T00:00:00Z;16.8
2018-06-04T03:00:00Z;15.3
2018-06-04T06:00:00Z;17.2
2018-06-04T09:00:00Z;21.3
2018-06-04T12:00:00Z;23.7
2018-06-04T15:00:00Z;25.2
2018-06-04T18:00:00Z;20.6
2018-06-04T21:00:00Z;17.5
2018-06-05T00:00:00Z;17.3
2018-06-05T03:00:00Z;15.8
```

```
<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>
        <value date="2018-06-04T12:00:00Z">23.8</value>
        <value date="2018-06-04T15:00:00Z">25.2</value>
```


```
{
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  "user":"meteomatics-mapserver",
  "dateGenerated":"2018-06-04T20:00:42Z",
  "status":"OK",
  "data":[
    {
      "parameter":"t_2m:C",
      "coordinates":[
        {
          "lat":47.4122,
          "lon":9.34865,
          "dates":[
            {
              "date":"2018-06-04T00:00:00Z",
              "value":16.9
            },
            {
              "date":"2018-06-04T03:00:00Z",
              "value":15.4
            },
            {
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              "value":17.3
            },
            {
              "date":"2018-06-04T09:00:00Z",
```

Data connectors

01

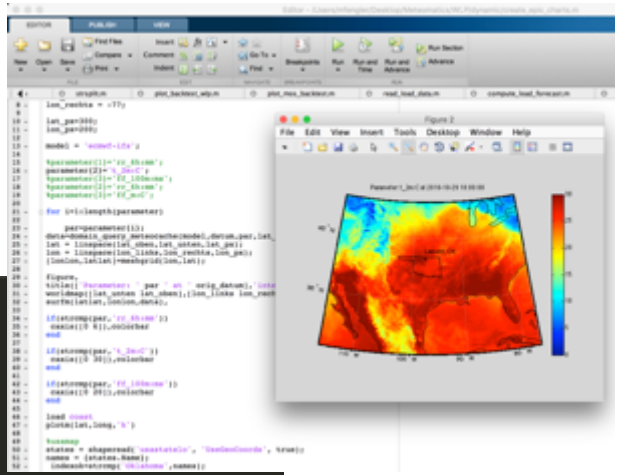
Weather API

Using our Weather API gives you access to historical, current & forecast data, whereas it includes radar, satellite, model data and more.

02

Flexible and fast integration

Variety of different connectors such as Python, Excel, Java, C++, Matlab etc.



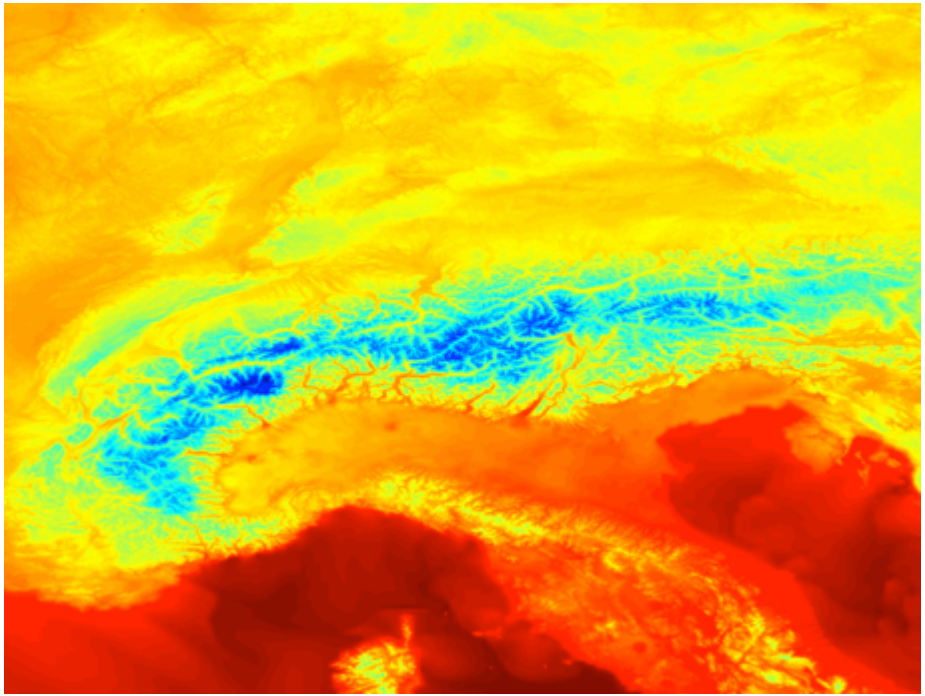
```python
import meteomatics_weather_api as api
import datetime as dt

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)
```

03

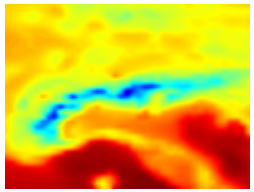
Applied weather data

Thanks to worldwide available weather data you can access the for arbitrary locations.

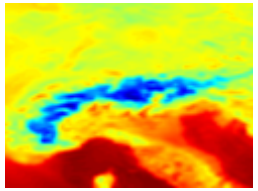
Downscaling weather data on the fly



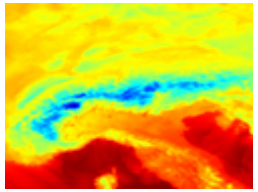
Meteomatics API 90 m (!)



GFS 0.25° = ca. 20-25 km

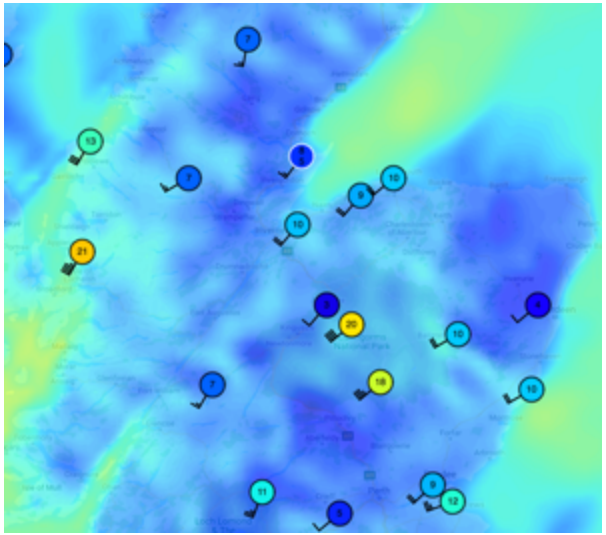


ECMWF 0.1° = ca. 8-10 km

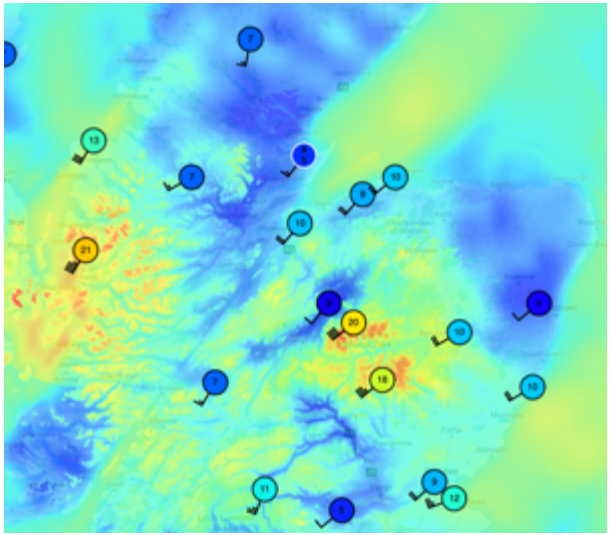


UK MetOffice ca. 4 km

Reanalysis mode



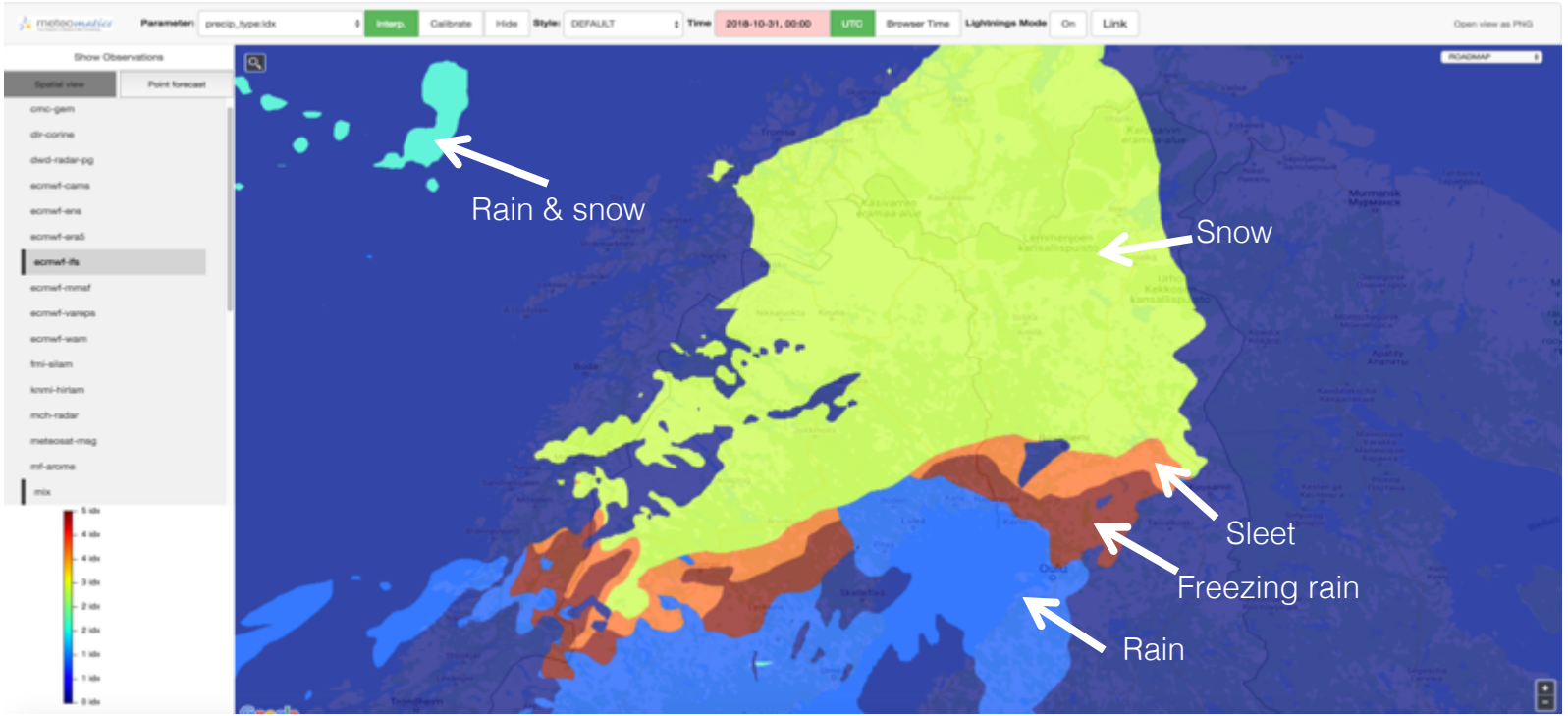
without calibration



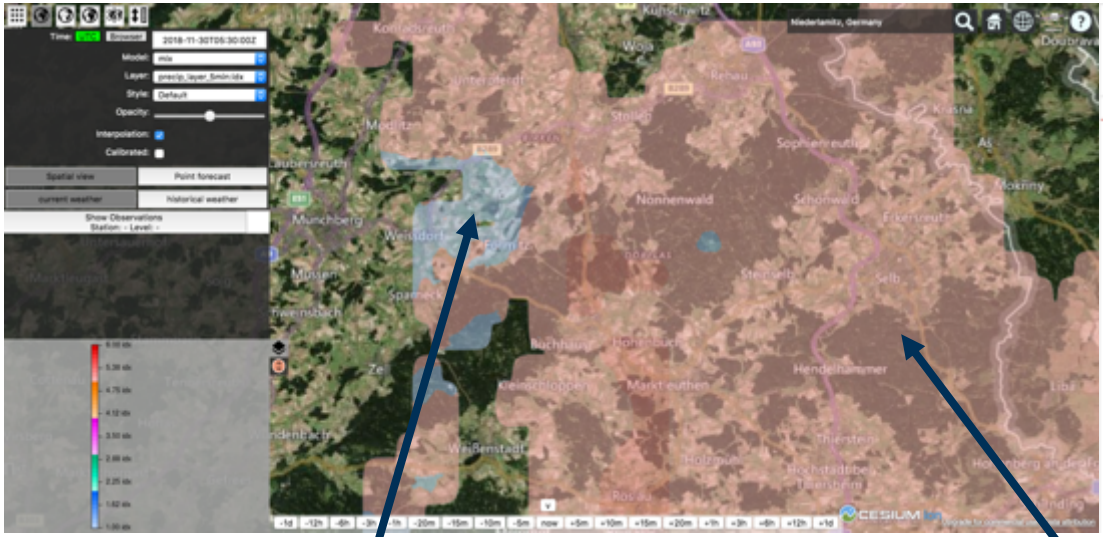
with calibration

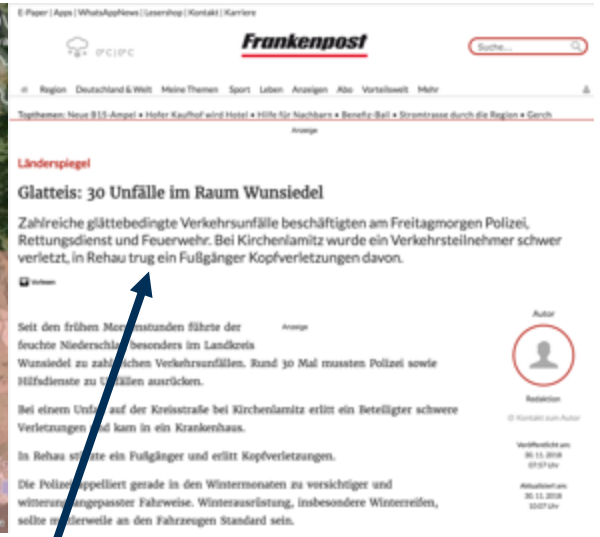
High-resolution model output is calibrated against weather station data.

Precipitation types on the fly



Hyperlocal forecasting freezing rain

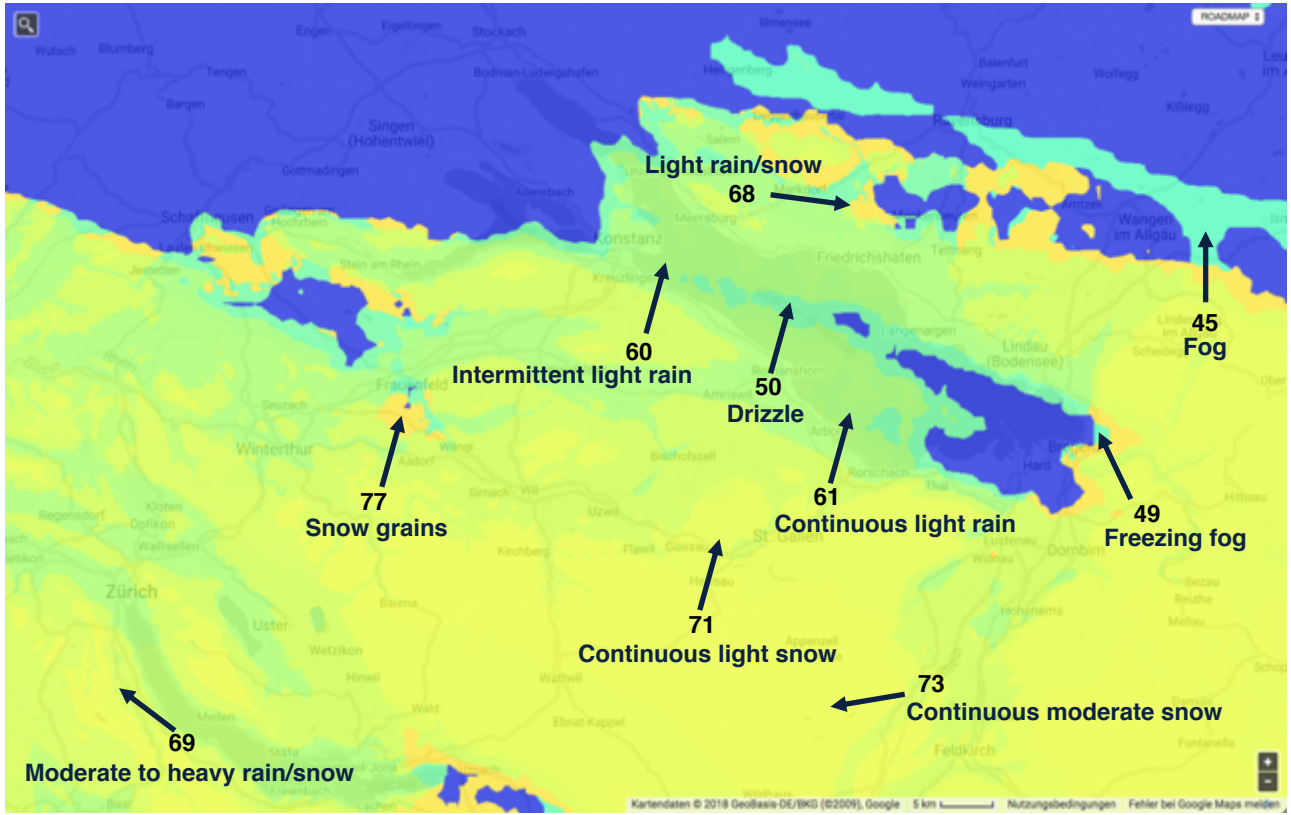




Rain

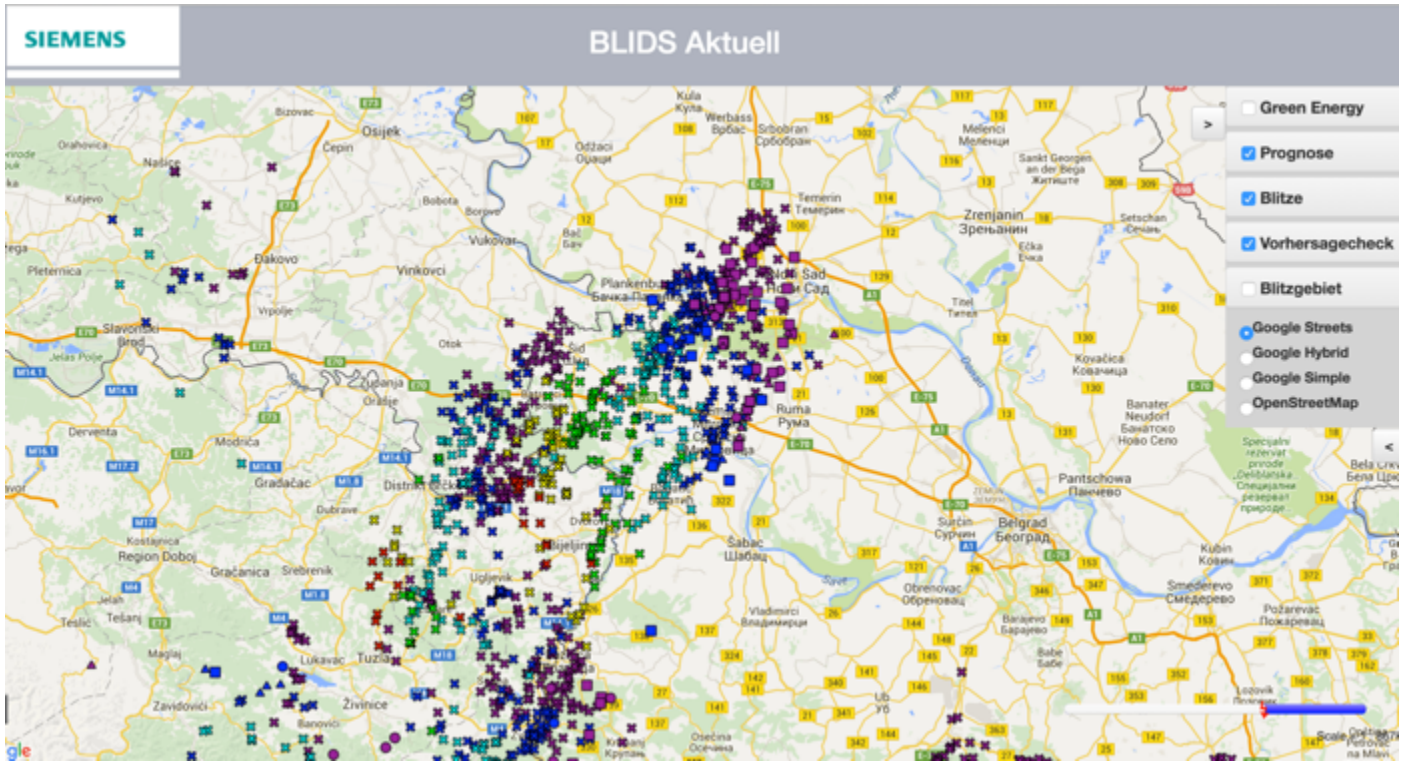
Freezing rain

The weather code (ww) on the fly

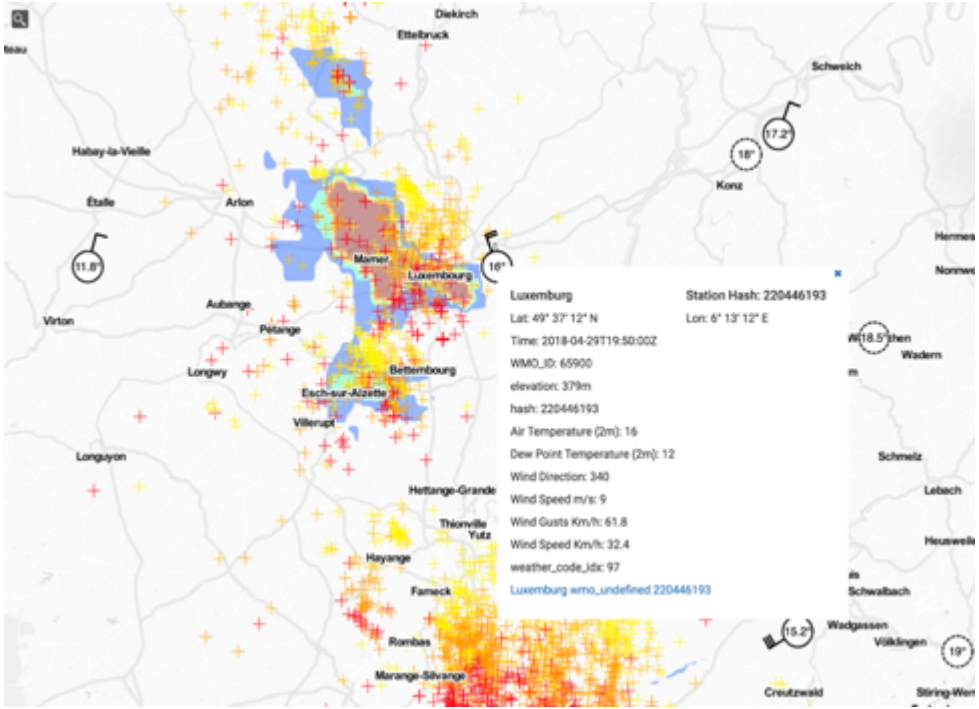


Real-time lightning forecasts

Our applications



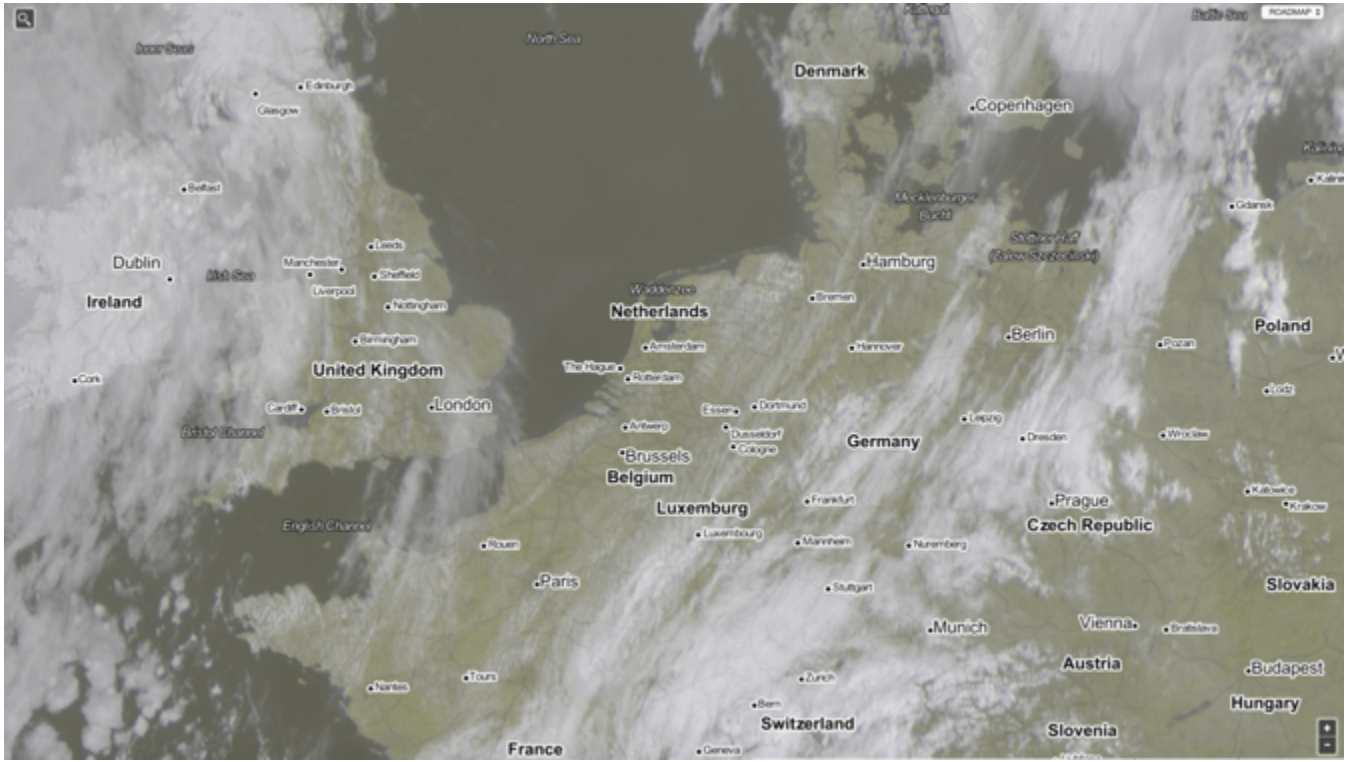
Radar, hail & lightning data (WMS/WFS layer)



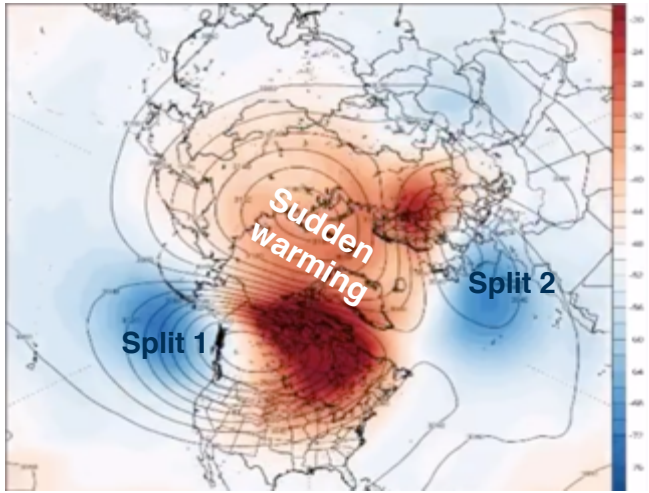
For insurances, it is highly important to get precise data on:

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

Real-time satellite images



Stratospheric polar vortex index (SPV)



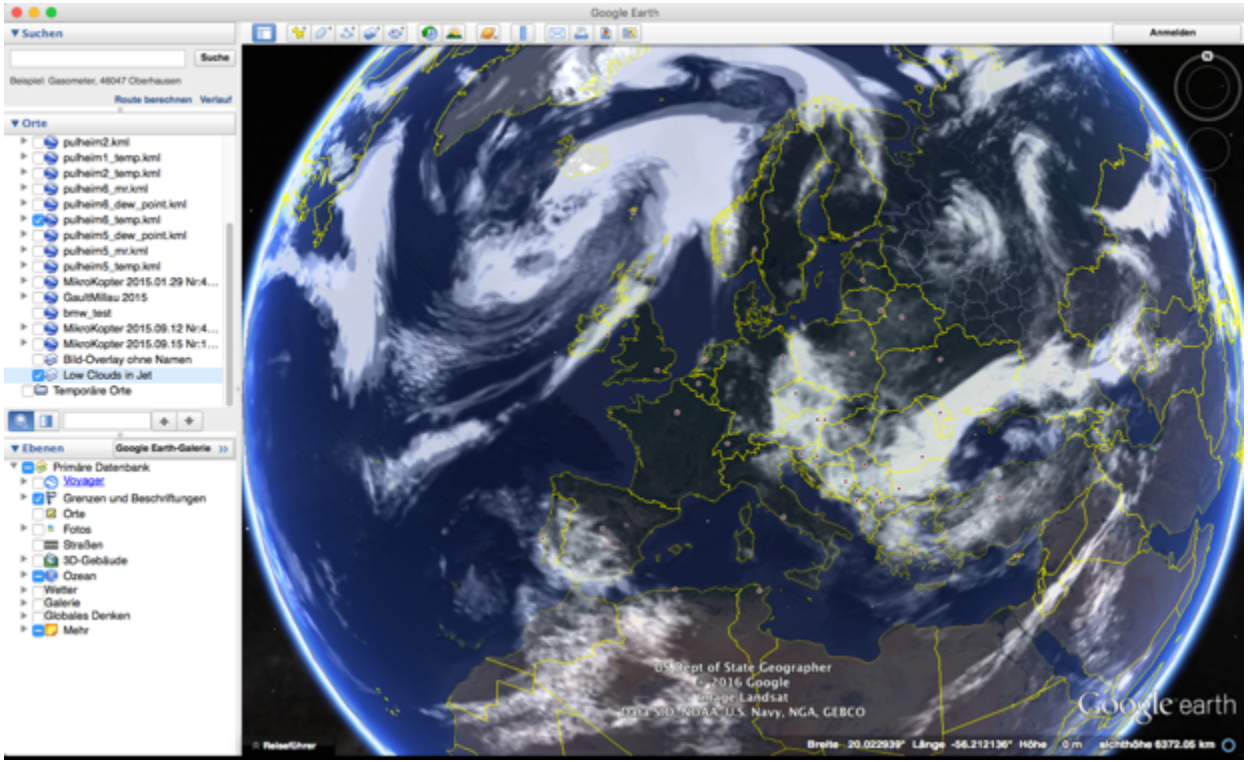
The SPV-index allows the monitoring of the stratospheric vortex strength and warns of possible cold outbreaks at mid-latitudes during the northern winter.

Historical and forecast data:

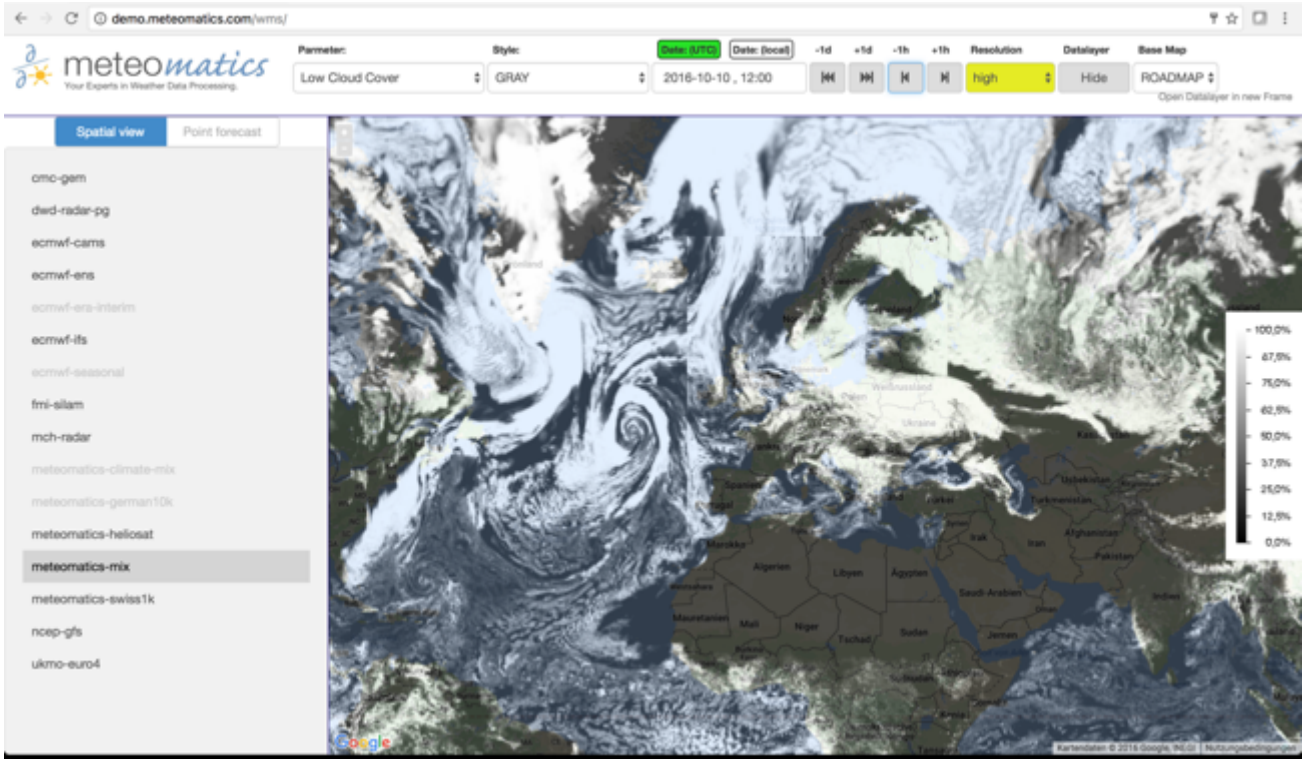
- ECMWF ERA-5, IFS and extended-range EC46 model output
- Range: 60°N – 90°N around the globe
- Levels: 200hPa, 50hPa, and 10hPa
- Parameter: mean wind speed

Variety of possible integrations

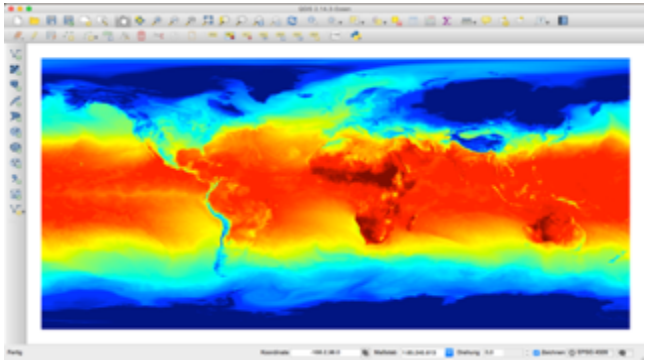
Support of WMS: integration into Google Earth



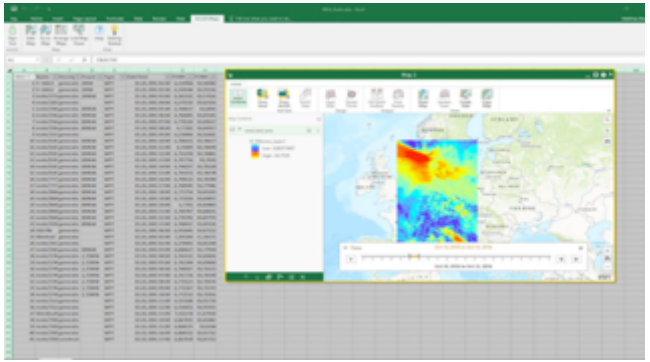
Integration into Google Maps



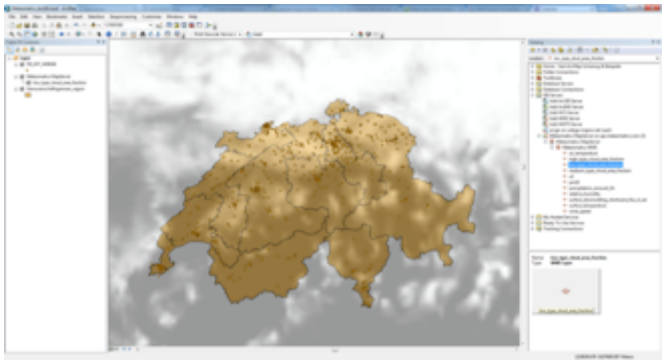
Integration into ESRI & QGIS



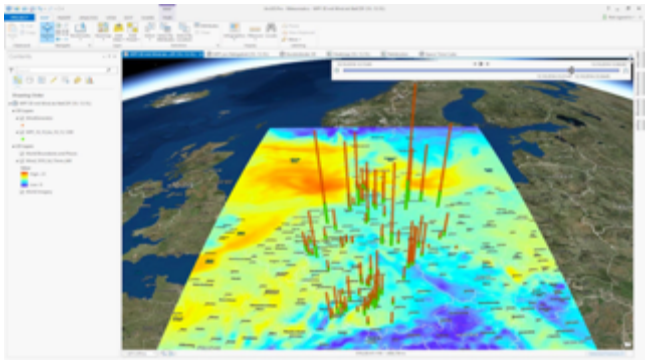
QGIS



ArcGIS for Office

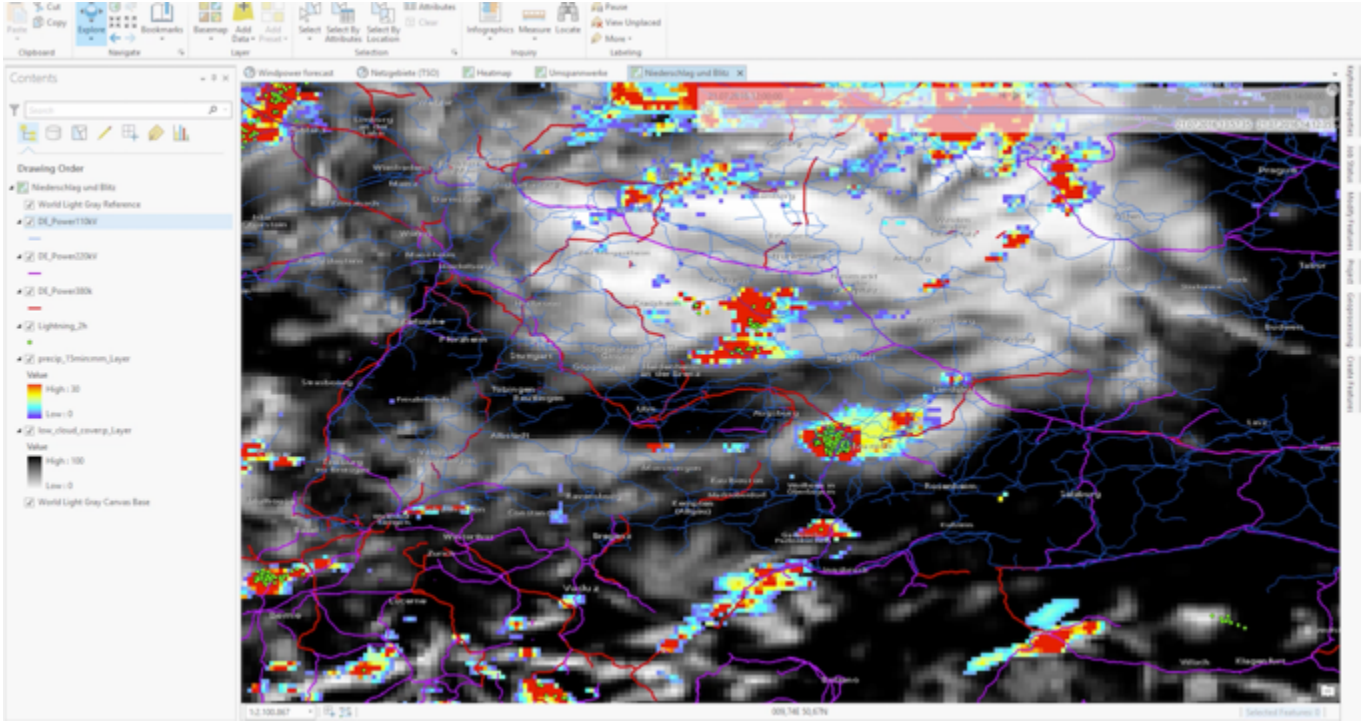


ArcGIS



ArcGIS Pro

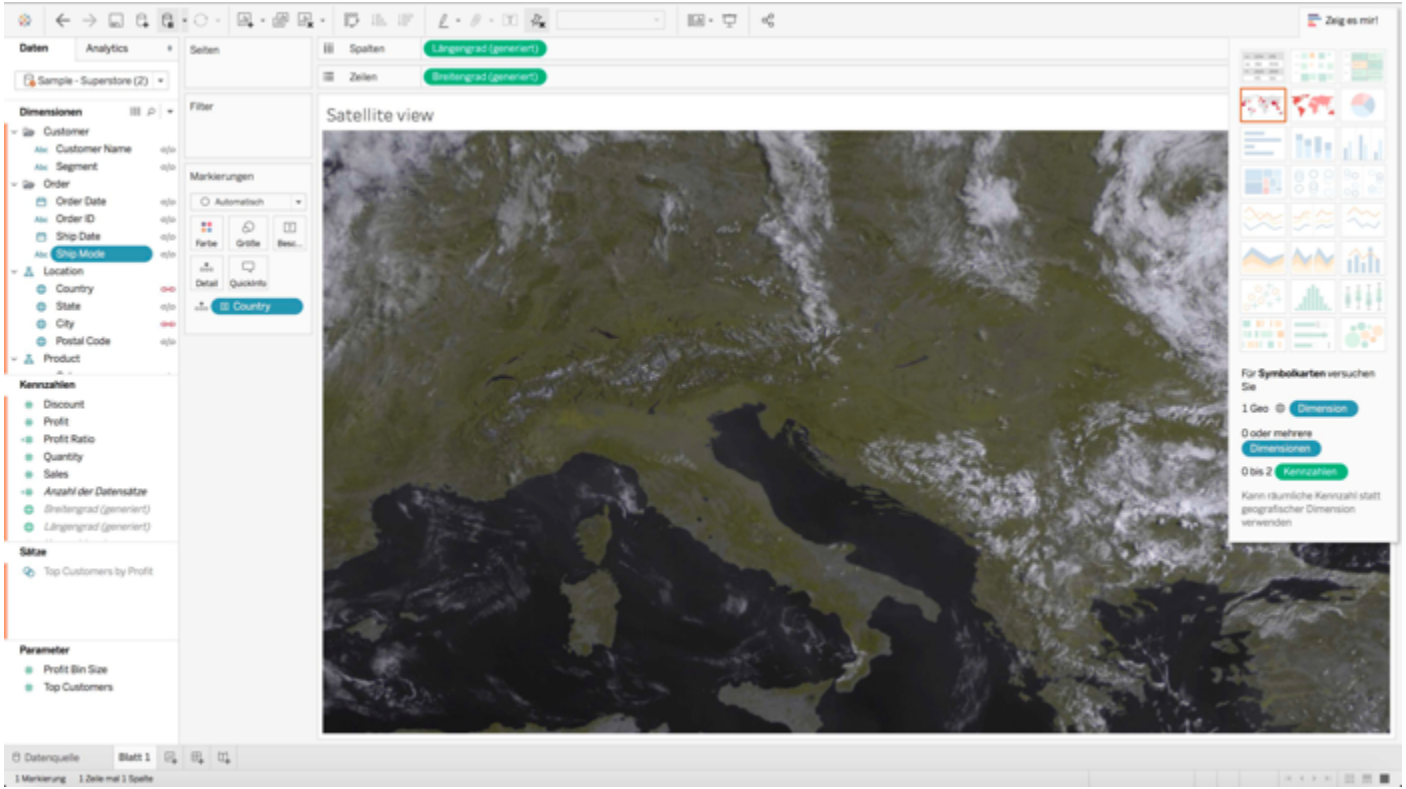
Integration into ESRI (ArcGIS)



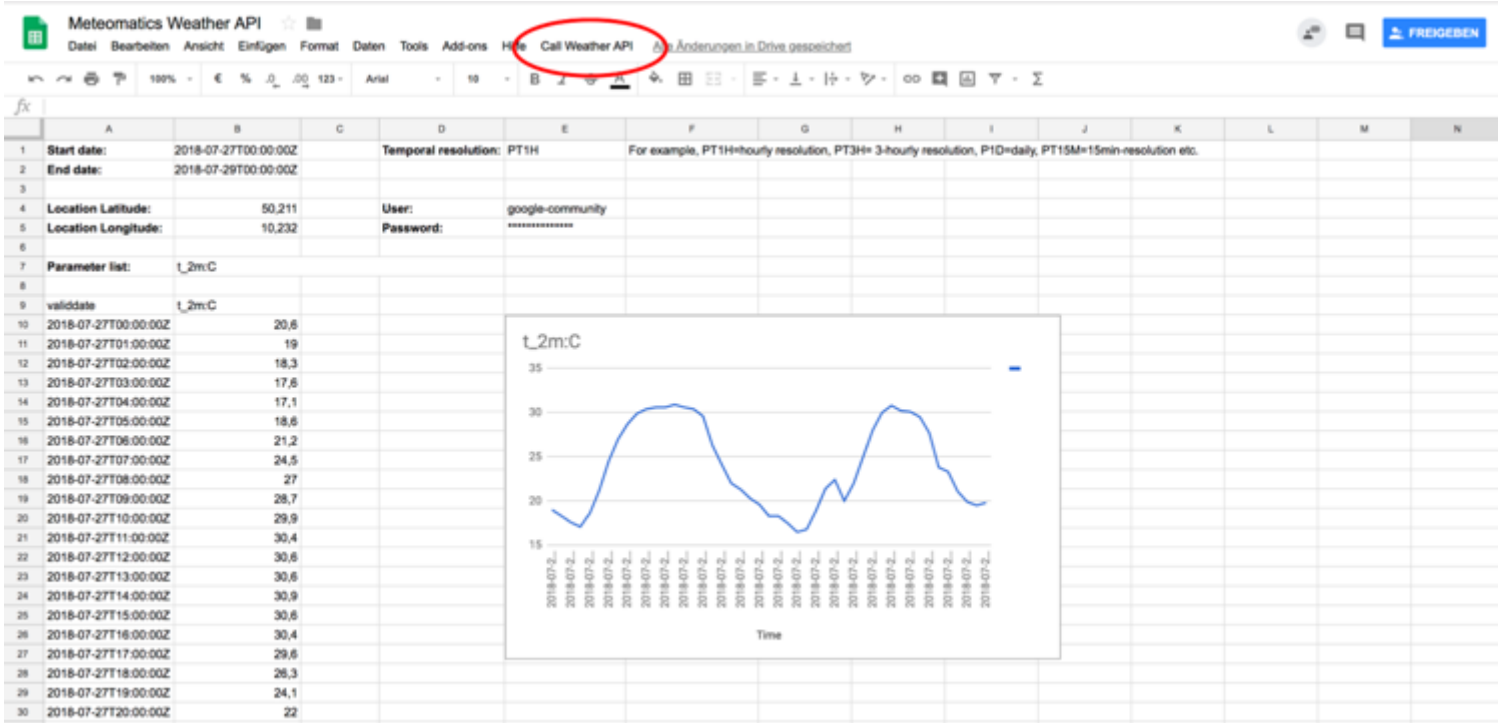
Multi-layer representation
for a transmission system operator (TSO)

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

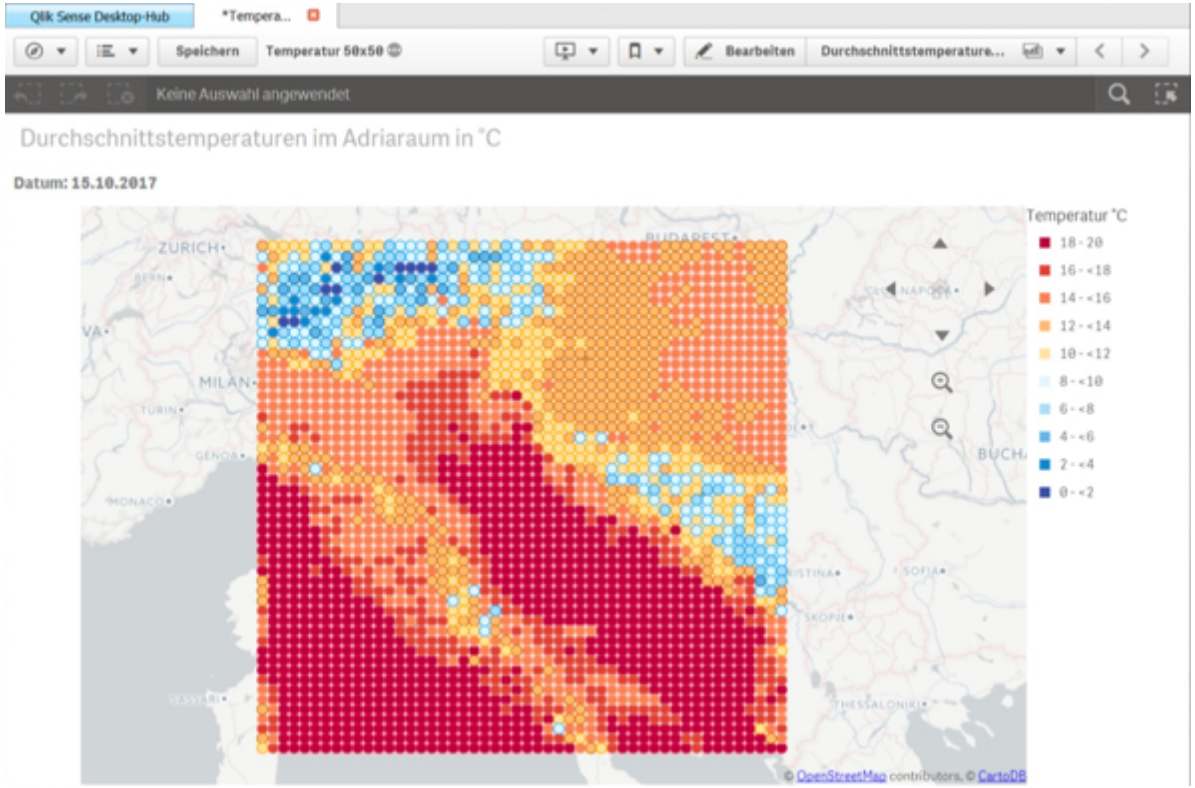
Integration into Tableau



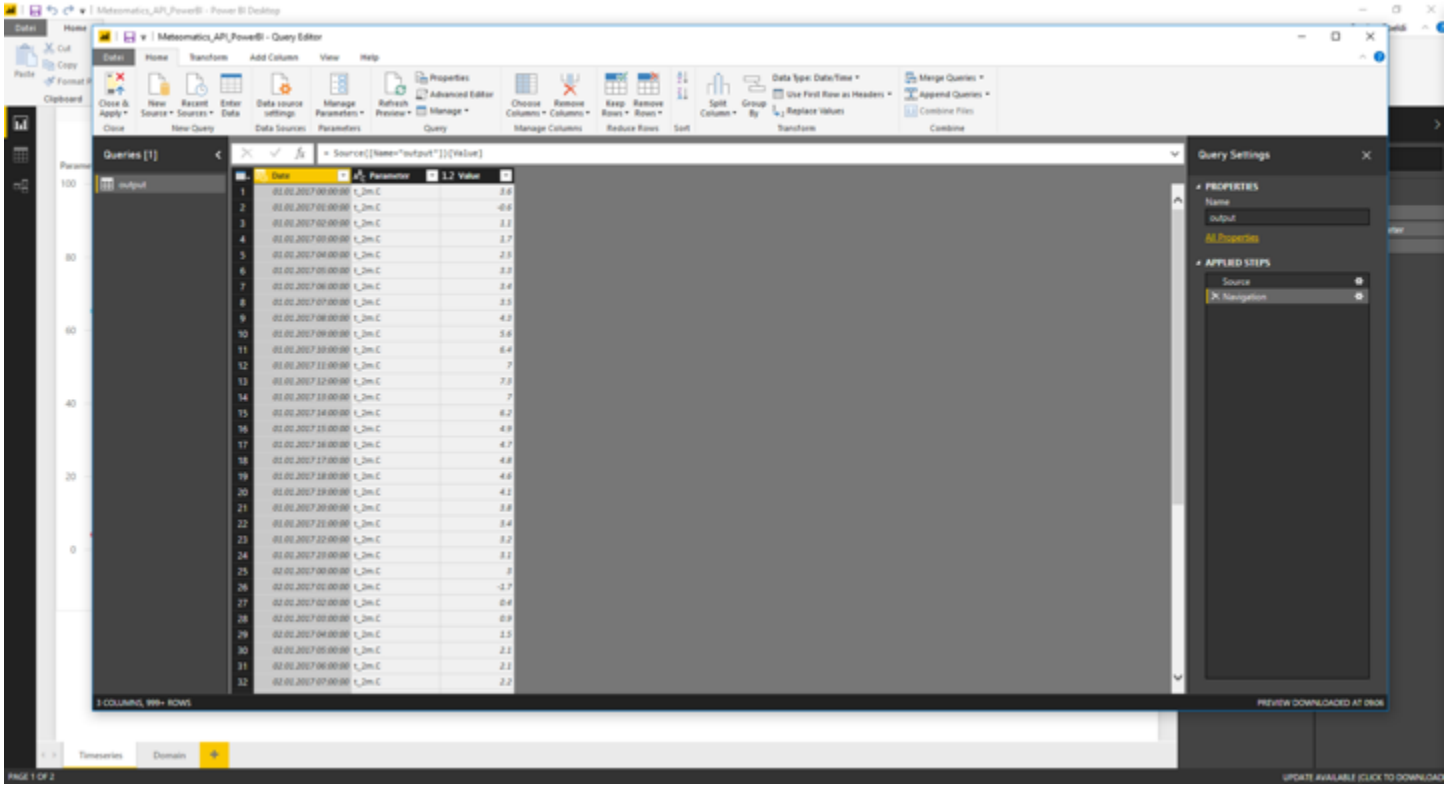
Integration into Google Spreadsheet



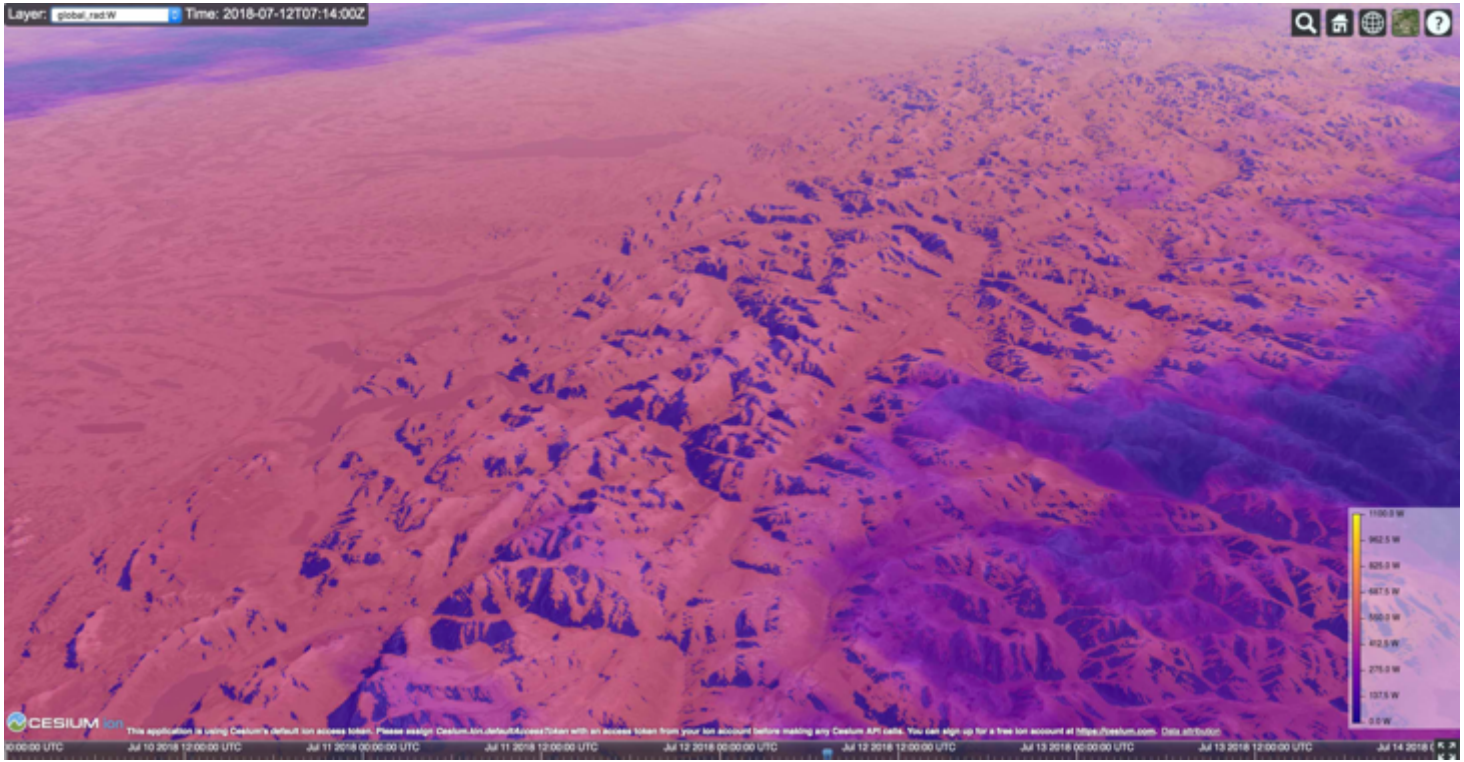
Integration into Qlik



Integration into Power BI



Integration into CesiumJS



Industry-specific solutions

Agricultural parameters
Leaf wetness
Frost warning
Moisture stress index
Soil temperature 5/15/50/150 cm

Rime index
Moon light index
Grassland fire index
Growing degree days (basis 10°C)

Maritime parameters
Wave height (mean/max)
Wave direction
Direction of wind waves
Direction of total swell

Wave period 1st moment
Period of total swell
Direction of first swell
Drift (speed & direction)

Industry-specific solutions

Automotive industry
Visibility
Wind
Temperature in 90 m resolution
Nowcasting

Storm & hail forecasts
En route weather conditions
Slippery road indicator
Freezing rain
Black ice

Multiple atmospheric layers
Cloud cover
Turbulence
Solar inclination
En route flight weather forecast

Aviation
Visibility
Wind & gusts
Fan blade icing
Icing conditions

Industry-specific parameters

Insurance
Lightning data
Hail information
Storm data
Hurricane tracks

Drought indices
Flash floods
Extreme weather
Ocean wave heights
Climatological values

Are you interested in another industry sector?

We have many more parameters for you !

Power forecasts

Our applications

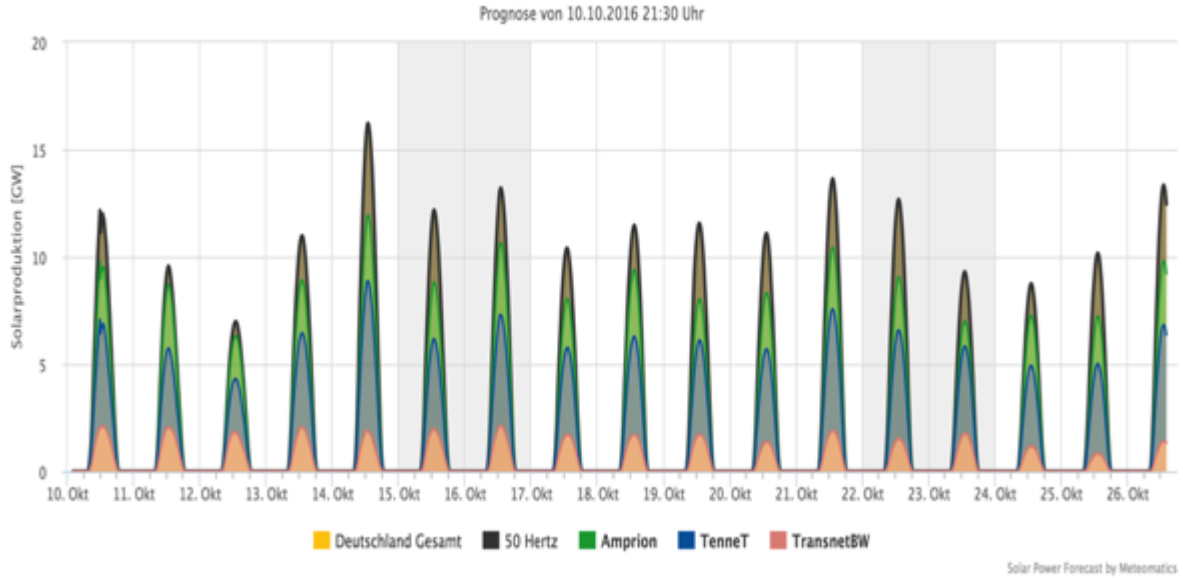
Solar power forecasts
- Radiation
- Solar inclination
- Effective cloud cover
- Downscaled temperature

Wind power forecasts
- Wind speed
- Wind angle
- Turbine type
- Generator capacity

Hydro power forecasts
- Radiation
- Evaporation
- Temperature
- Radar & precipitation data

Solar power forecasts

Our applications



i. Take historical data from your sites

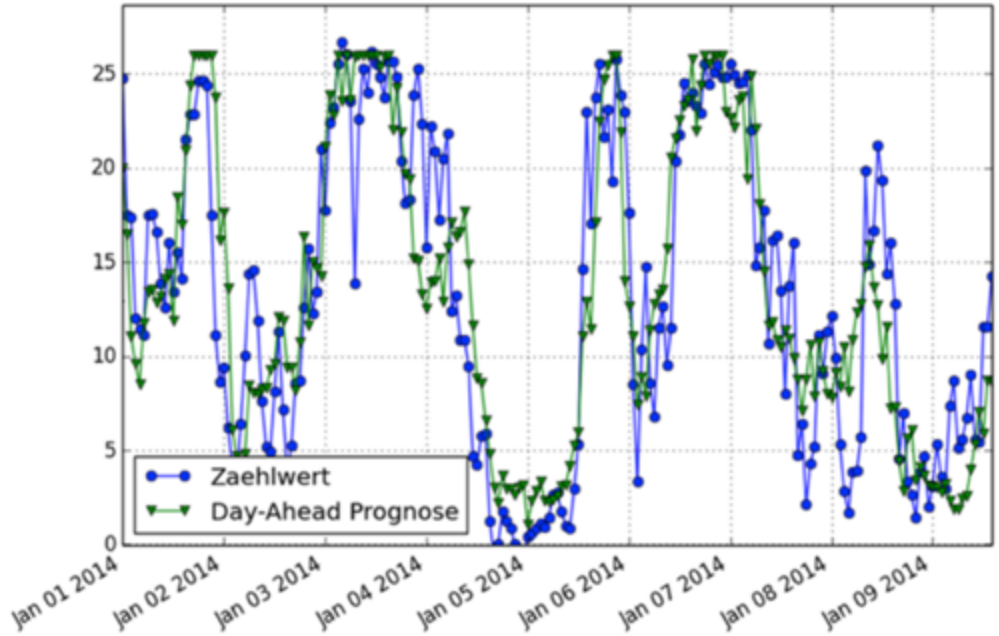
ii. Calibrate/train your model with historical model and panel data → for a model of your choice from API

iii. Apply your regression coefficients to any future model run

Wind power forecasts

Our applications

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



Mix the forecast of the different models!

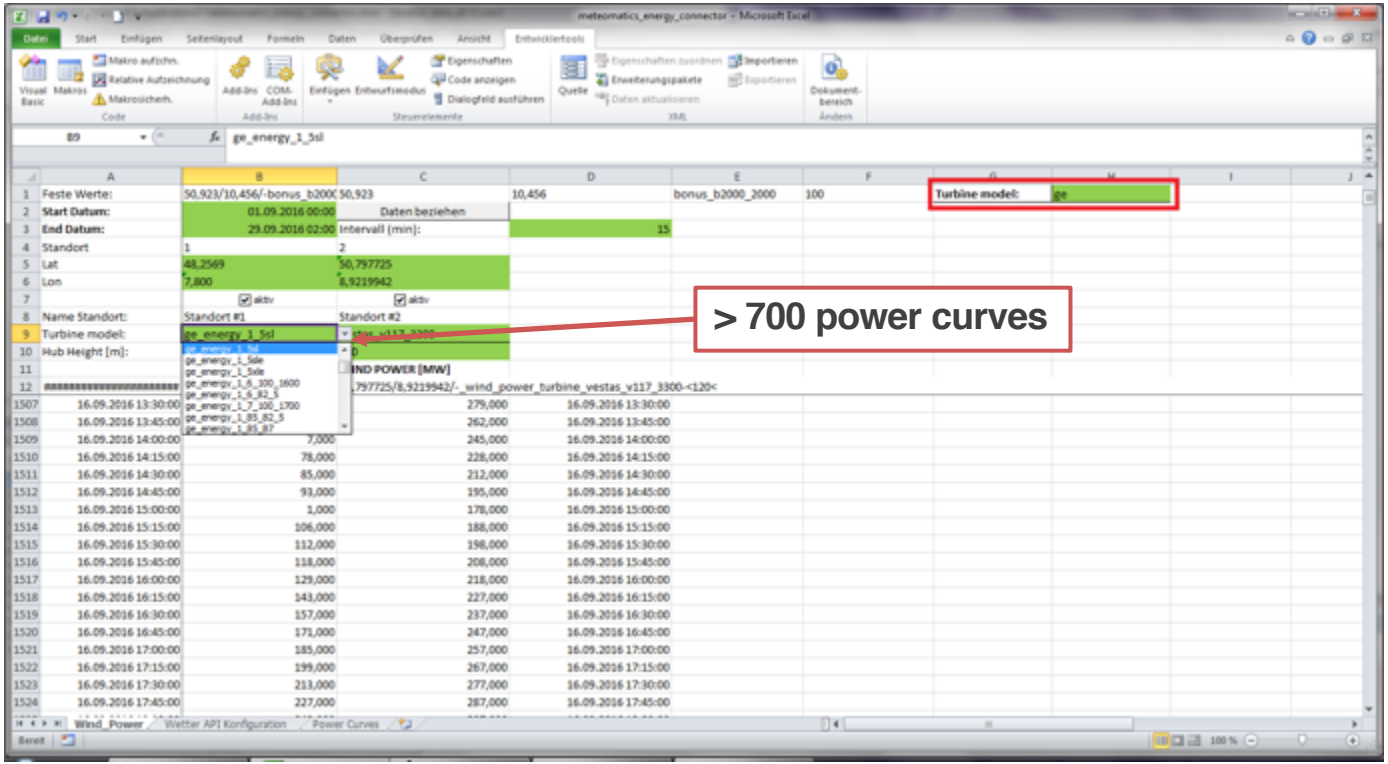
Choose your own:

- Generator capacity
- Hub height
- Turbine type
- …

Wind power analysis

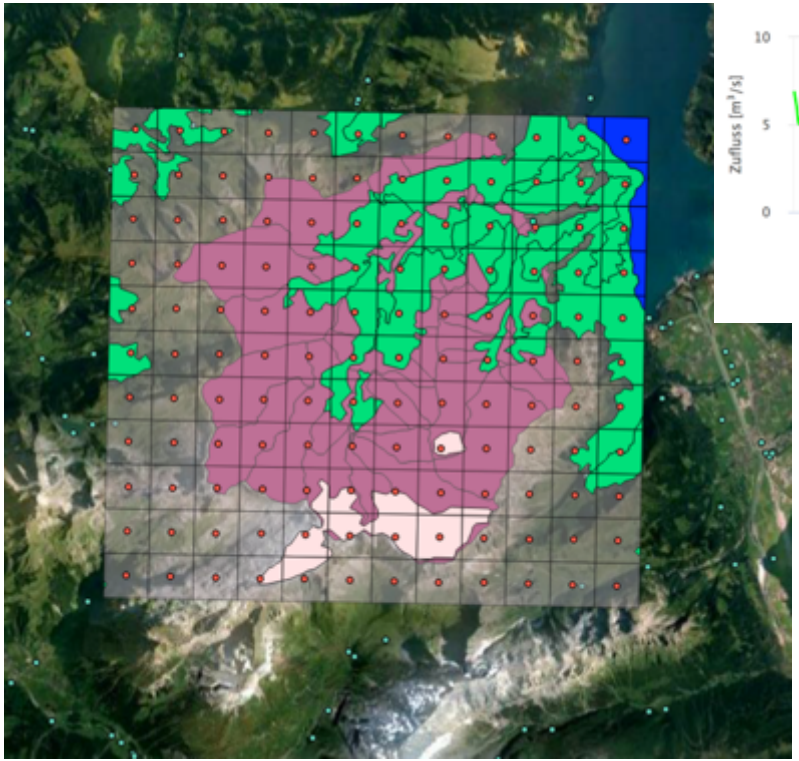
Our applications

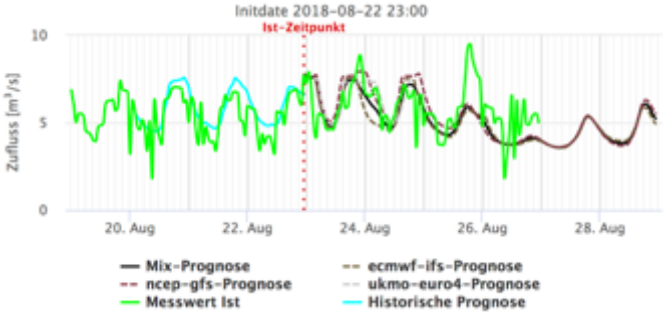
Analysis of new or potential portfolios



Hydro power forecasts

Our applications





EWA URNER POWER

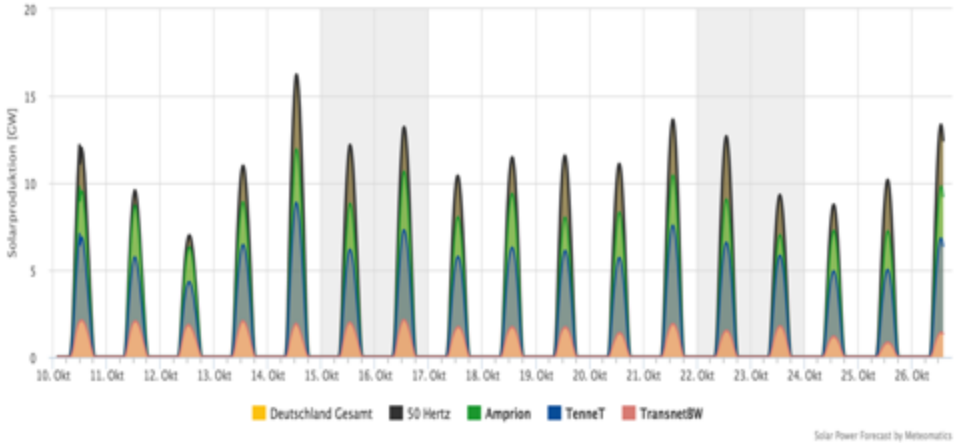
FOXTRAIL Play with the city.

ewz

HYDRO

Solar power forecasts

Our applications



Solar power forecasts

- Radiation
- Solar inclination
- Effective cloud cover
- Downscaled temperature
- Direct & diffuse radiation

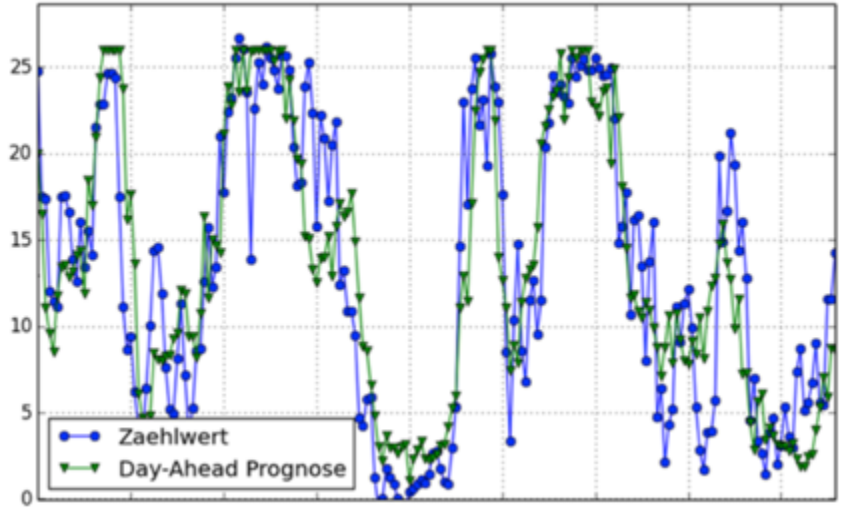
Wind power forecasts

Our applications

Mix the forecast of the different models!

Choose your own:
- Generator capacity
- Hub height
- Turbine type
- …

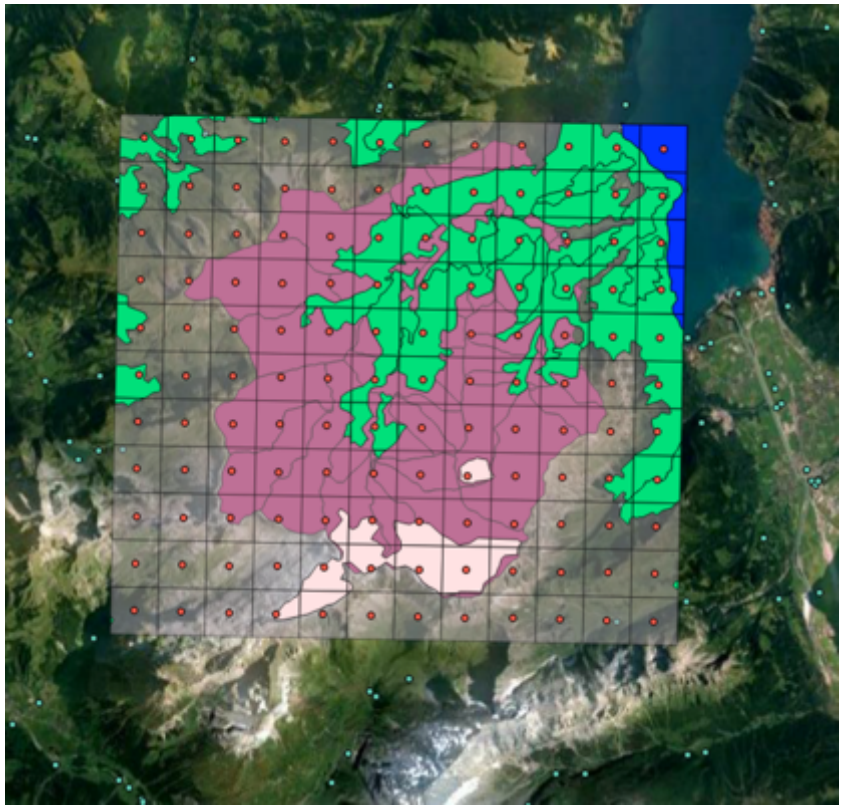
Wind farm (nRMSE): intraday < 8 % & day ahead < 10 %

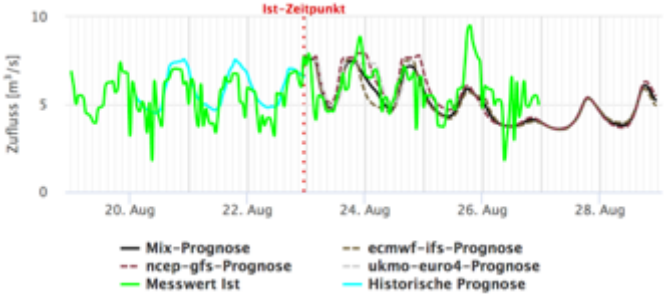


Wind power forecasts
- Wind speed
- Wind angle
- Turbine type
- Generator capacity

Hydro power forecasts

Our applications





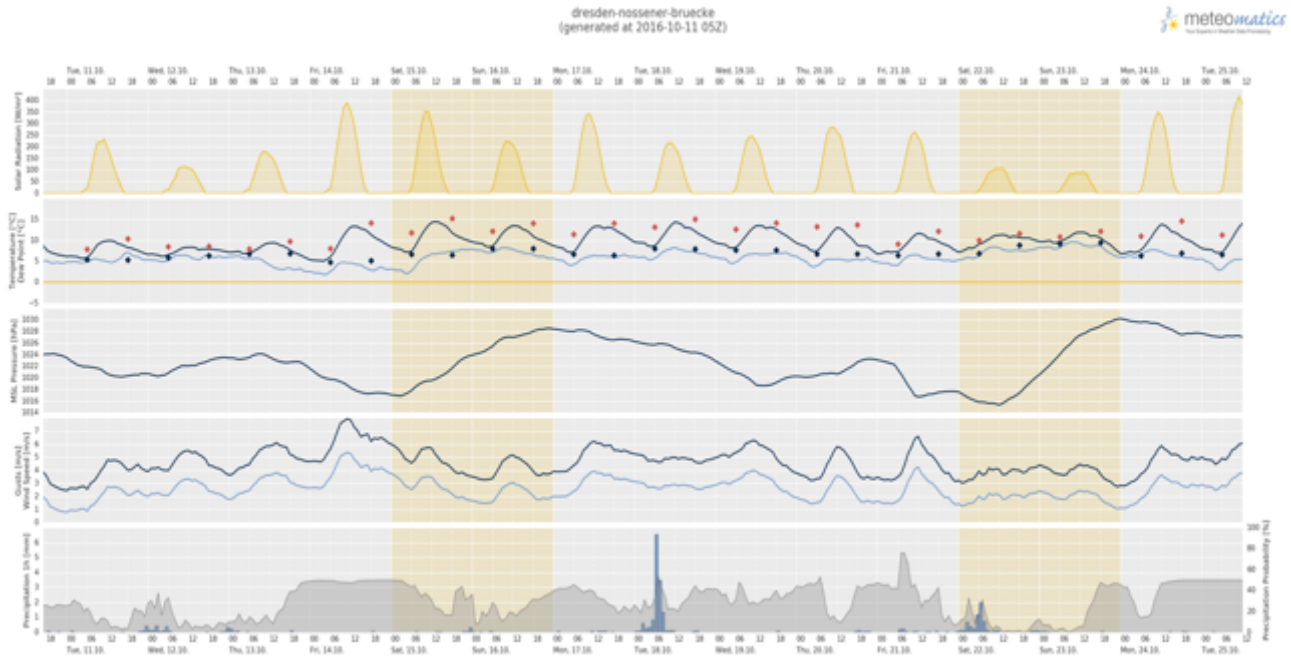
Hydro power forecasts

- Radiation
- Evaporation
- Temperature
- Radar & precipitation data

Own station forecasts

Our applications

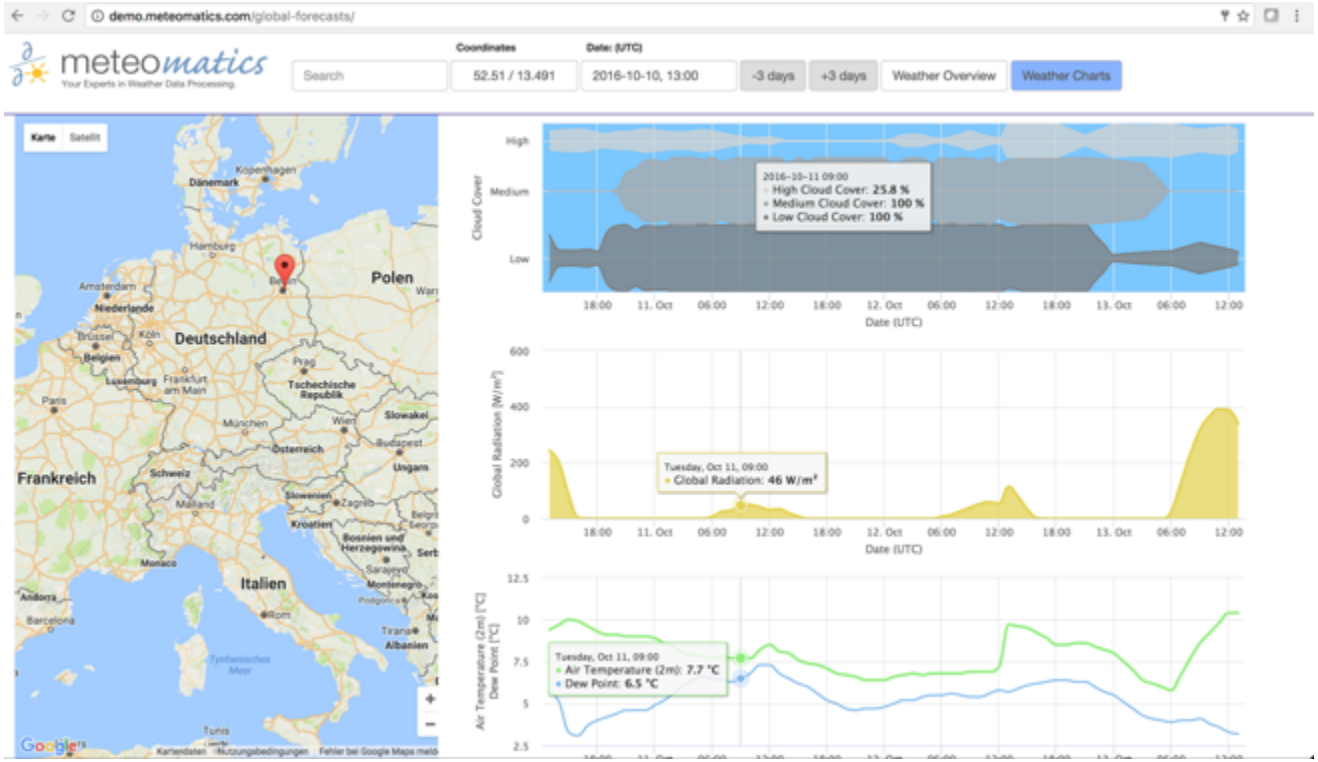
Build your own „MOS“/model



Temperature error MAE intraday/ day ahead: 0.8 °C - 1.0 °C

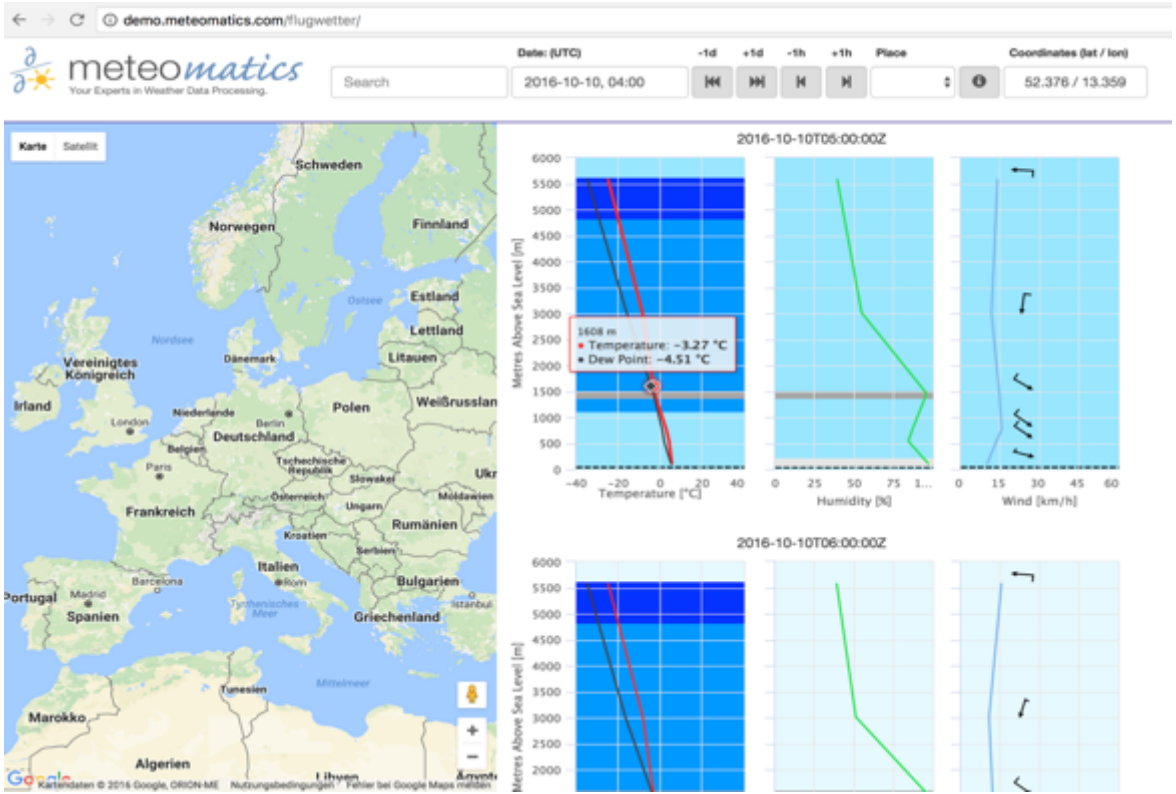
Data for arbitrary locations

Our applications



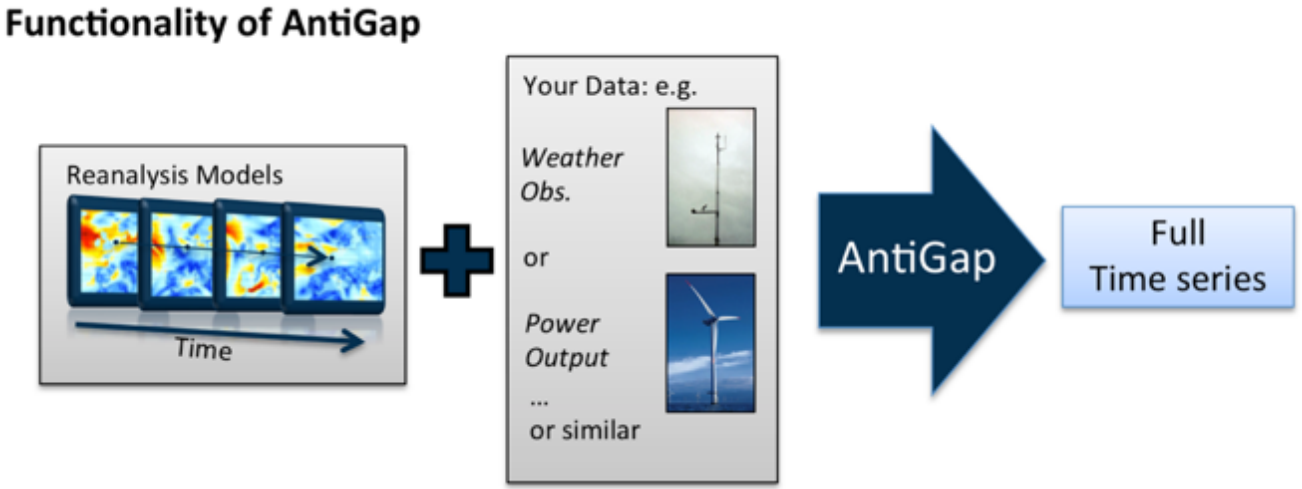
Upper air level data for arbitrary locations

Our applications



Filling gaps in time series

Our applications



Hindcast & fill missing data

- ECMWF ERA interim model data reach back until 1979
- ECMWF IFS data reach back until 2014 (can be extended)
- GFS, UK MetOffice, …

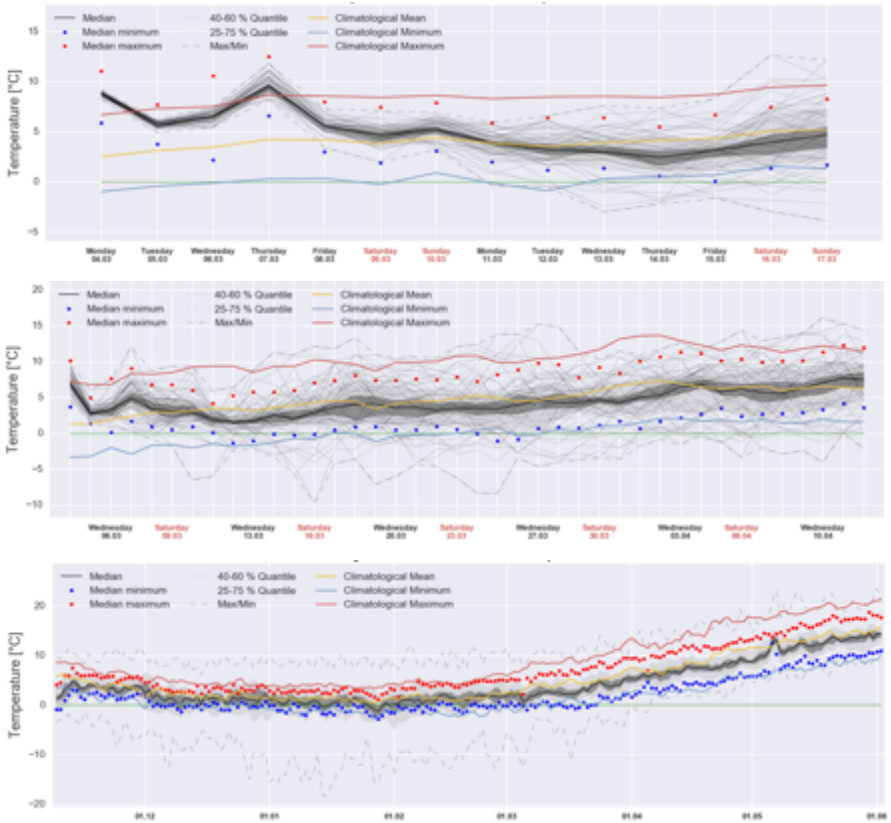
ECMWF ensemble data

Our applications

GFS & ECMWF ensemble forecasts for:

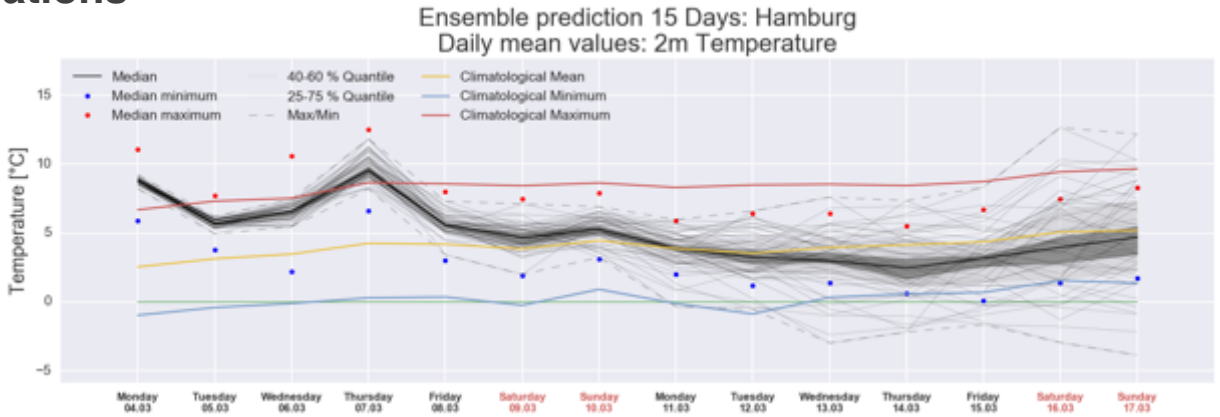
- 15 days
- 46 days
- 7 months

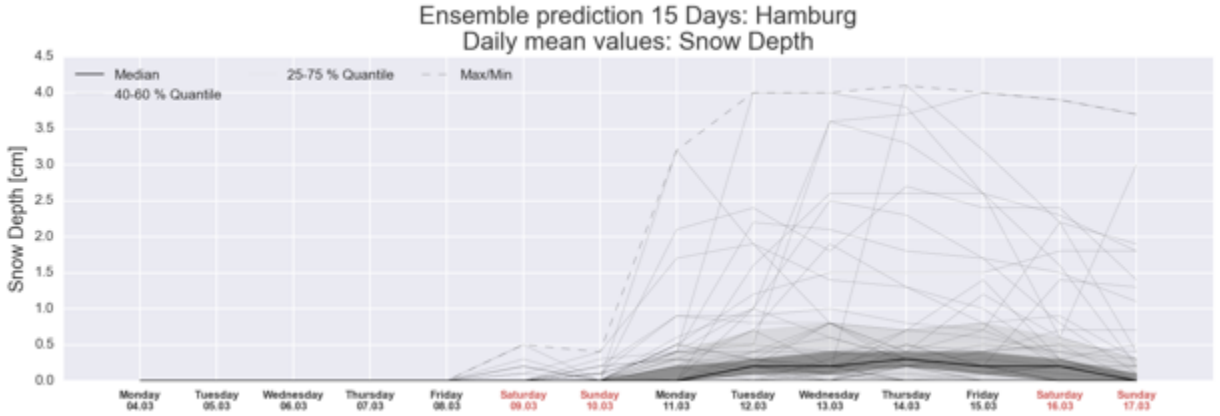
Choose your own parameter and find out about its future development!



ECMWF 15 days ensemble data

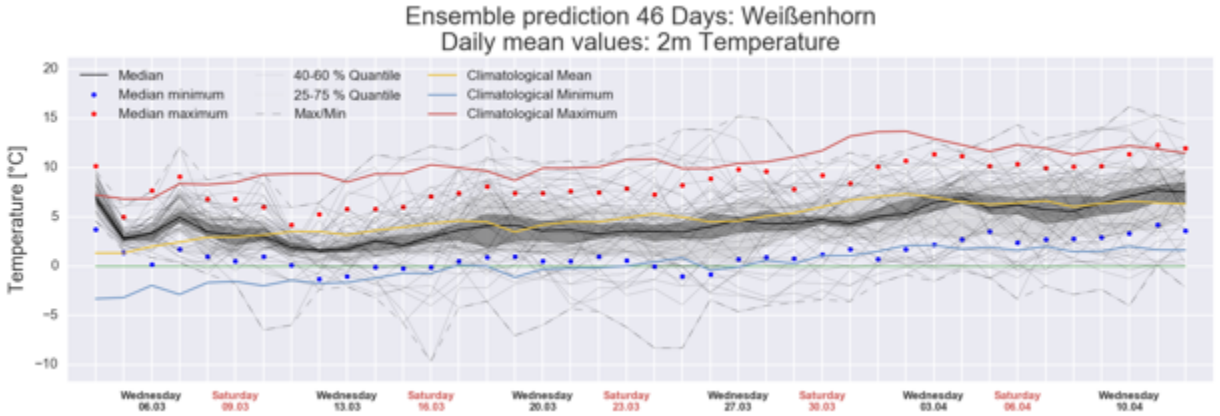
Our applications

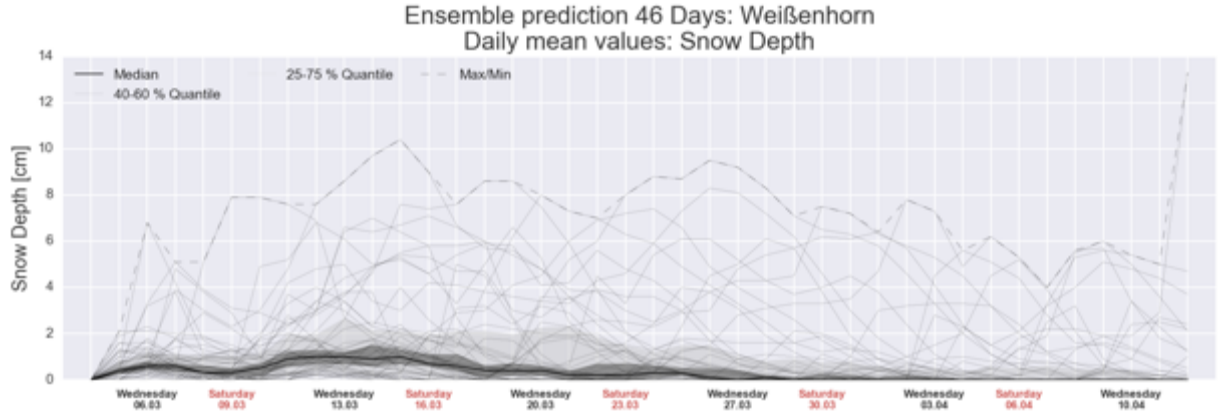




ECMWF 46 days ensemble data

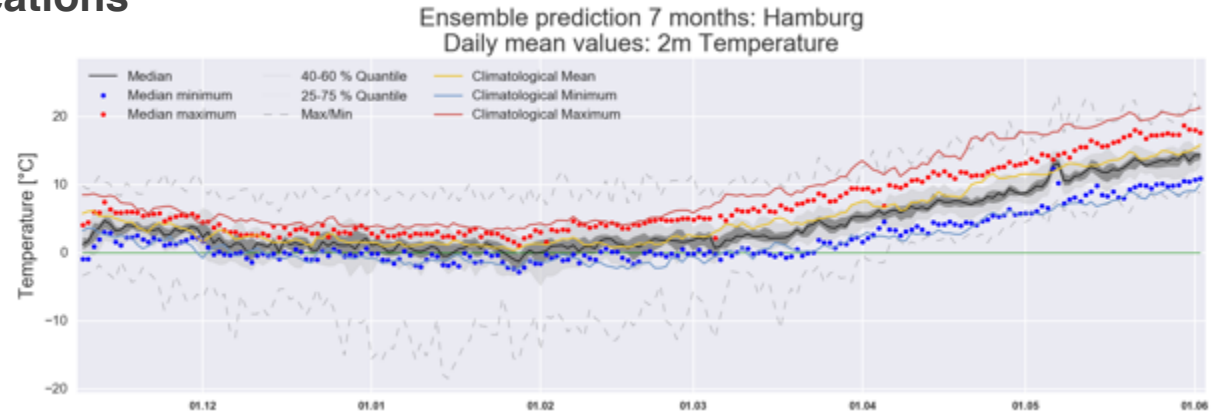
Our applications

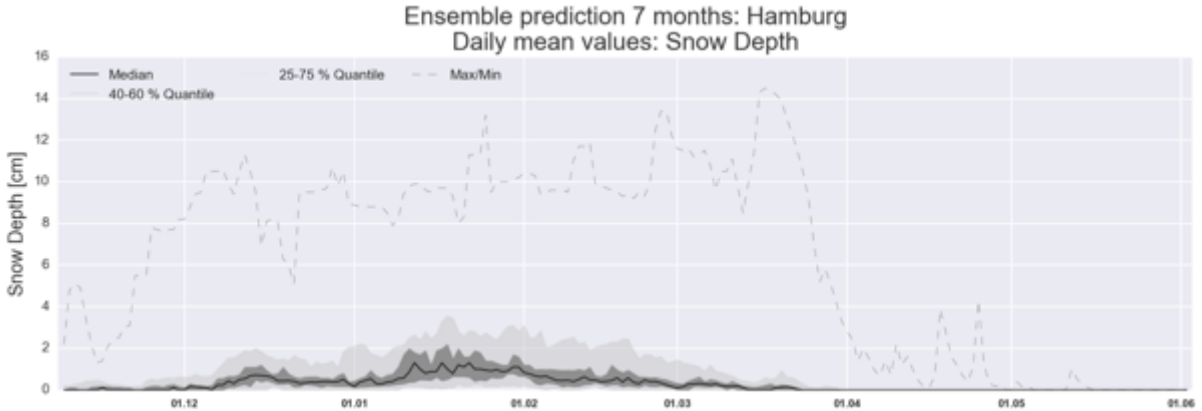




Seasonal forecasts for 7 months

Our applications





We are proud to work with pioneering customers