

Annotated Atlas

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Web-Application

- What is the Annotated Atlas?
- Who is it intended for?
- Components of the Annotated Atlas
- Deployment of the Annotated Atlas
- How it is linked to other WeaMyL components?

What is the Annotated Atlas?

It is a web browser based tool for searching through and analysing weather warnings issued as Common Alerting Protocol ([CAP](#)) documents.

Who is it intended for?

Research meteorologists

- Easy access to source observation datasets
- Identify good training data for machine learning

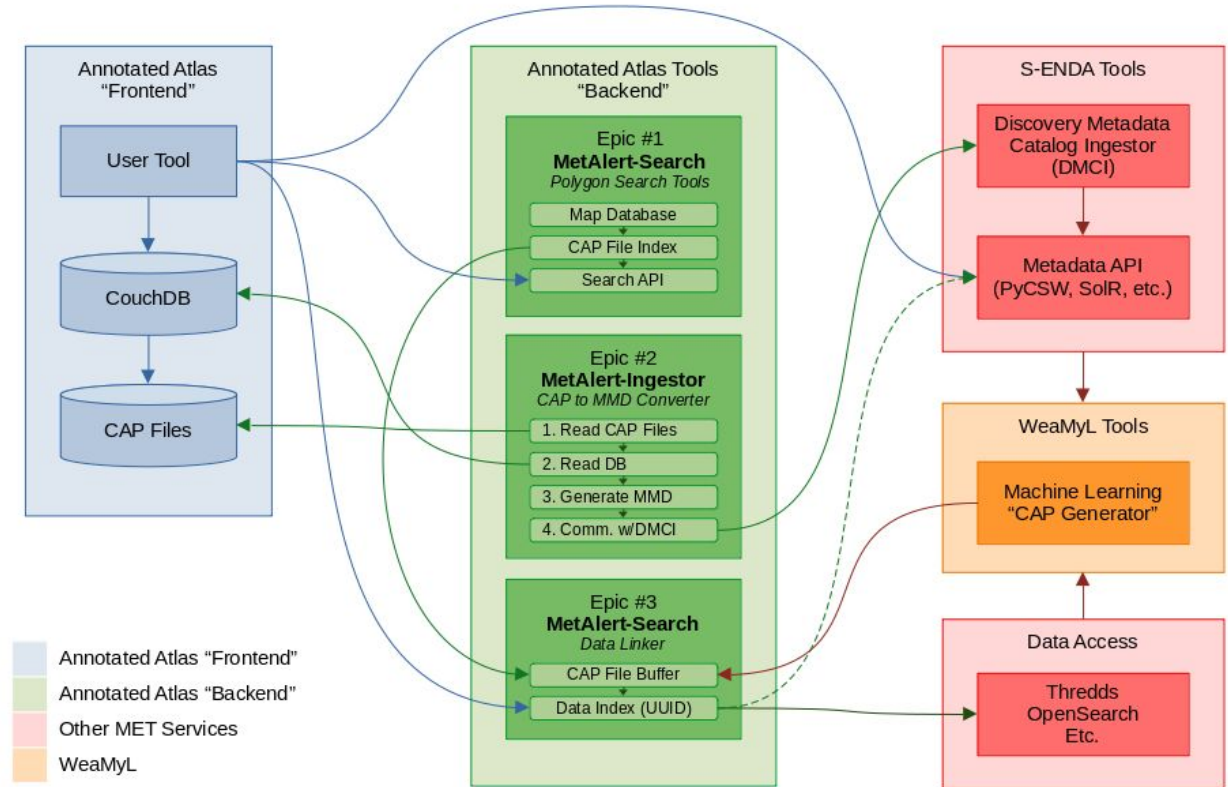
Operational meteorologists,

- Analyse the weather warnings proposal
- Review earlier warnings
- Give the earlier warnings hit rate grades

Flowchart of the main components of the Annotated Atlas

Components of the Annotated Atlas

- Front-end
 - User tools
 - CouchDB
 - CAP Files
- Back-end
 - MEtAlert Search
 - MEtAlert Ingestor








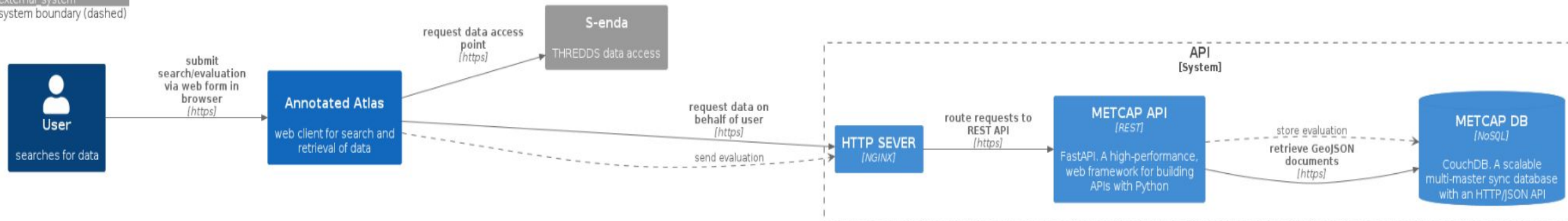
Flowchart of the main components of the Annotated Atlas

“Follow the data”

Annotated Atlas of meteorological events

Legend

-  person
-  system
-  container
-  external system
-  system boundary (dashed)





Browser interface

. specify your search

← → ↻ https://annotated-atlas-dev.k8s.met.no ☆ 🔔 🗄️ ☰

Meteorologisk institutt Annotated Atlas 🔍 ☰ Not logged in

Search parameters

Phenomenon

Different kinds of meteorological weather conditions

County Names

A list of counties

Polygon

Only works on polygons of this format [61.2481, 5.45023] [58.9953, 9.23162] [61.6041, 11.5993]

Colour

Colour is a combination of certainty and severity

Onset

Expires

Results [0]

Phenomenon	Colour	Area Description	Annotated	Duration	CAP
The table shows a list of CAP files for given search parameters					

Selected warning to annotate

Phenomena of current warning

Colour of current warning Corrected value

Threshold of current warning Corrected value

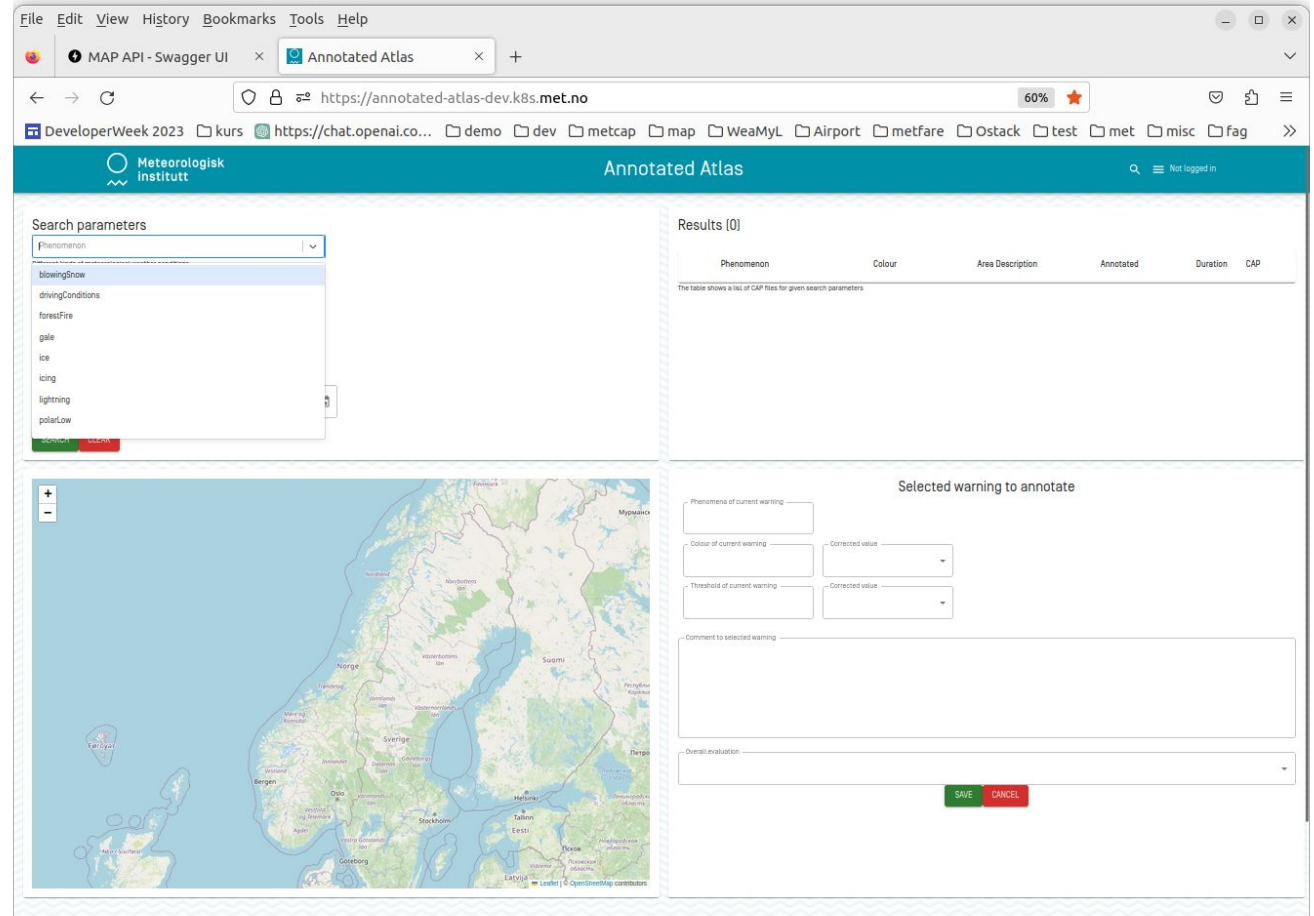
Comment to selected warning

Overall evaluation

Worki

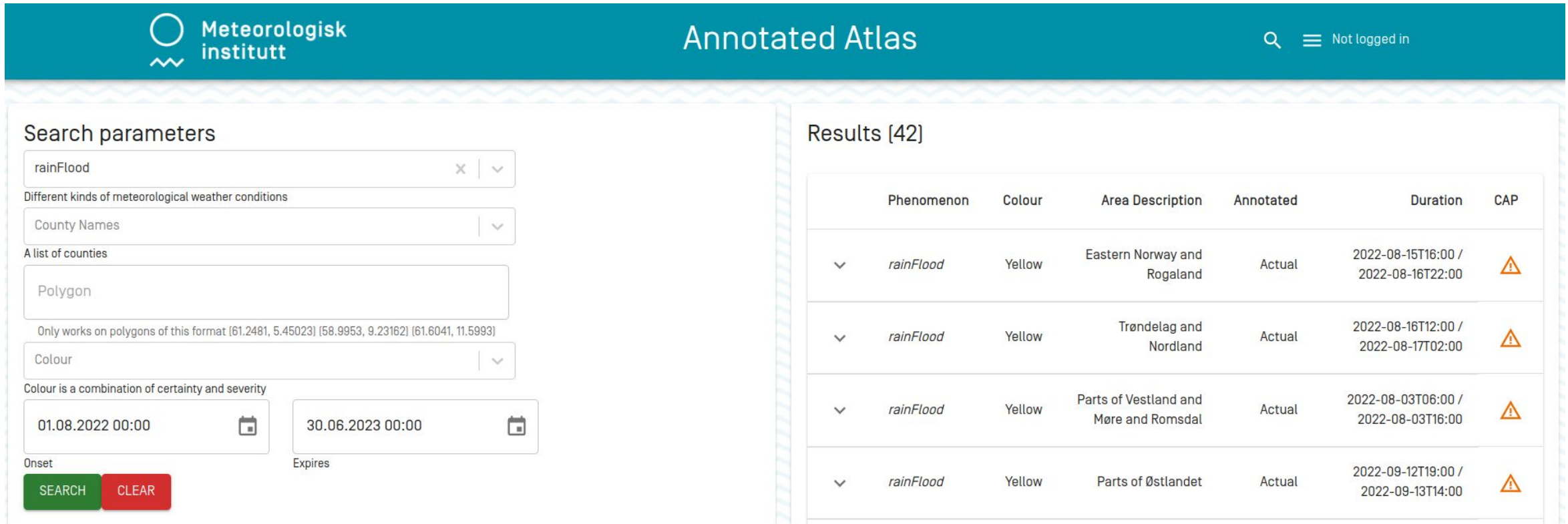
Browser interface

. dynamically updated dropdowns



Browser interface

- . number of results
- . links to data sources

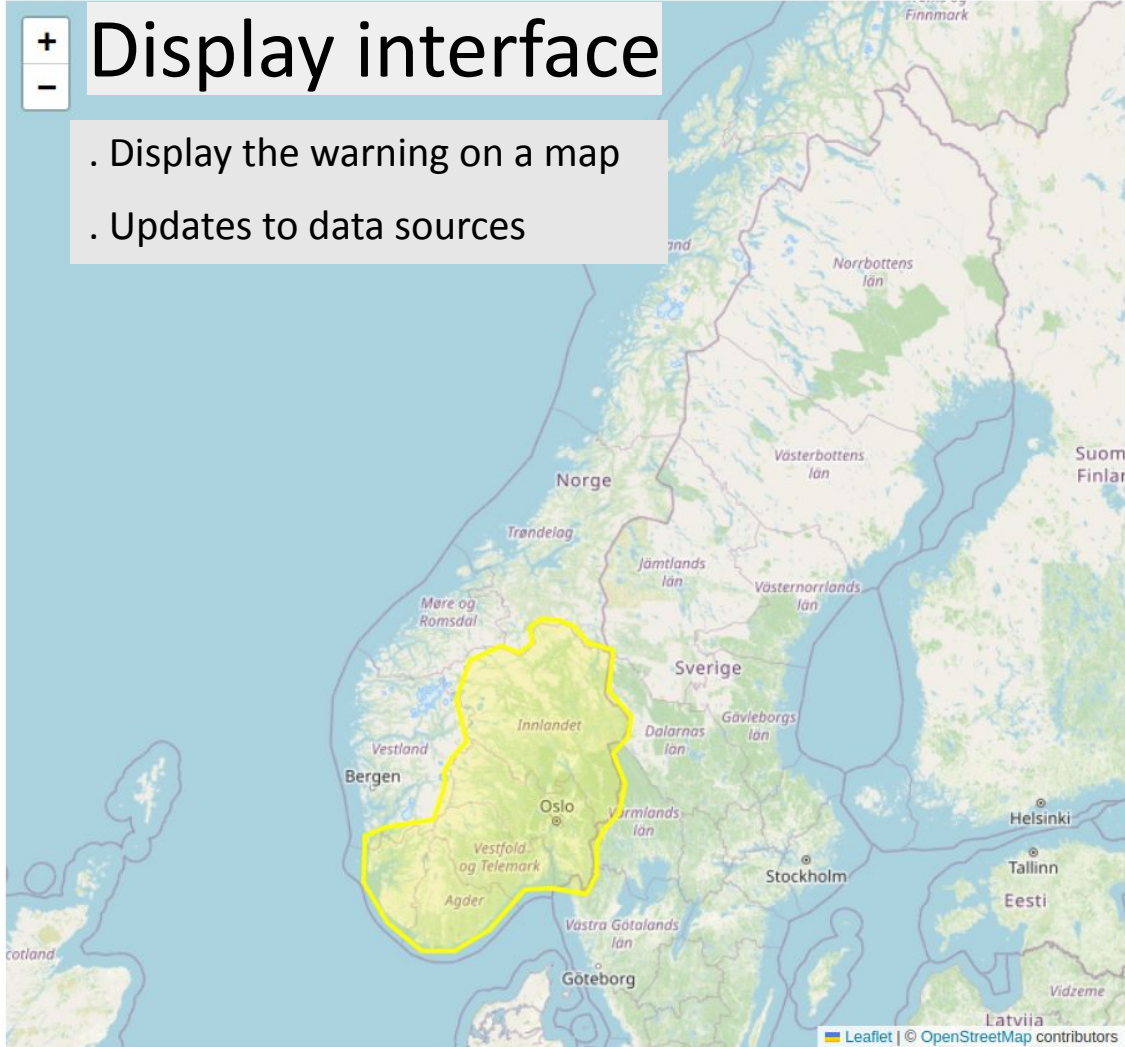


The screenshot shows the 'Annotated Atlas' interface. On the left, the 'Search parameters' section includes a search box with 'rainFlood', a dropdown for 'County Names', a 'Polygon' input field, a 'Colour' dropdown, and date pickers for 'Onset' (01.08.2022 00:00) and 'Expires' (30.06.2023 00:00). There are 'SEARCH' and 'CLEAR' buttons at the bottom. On the right, the 'Results [42]' section displays a table with the following data:

	Phenomenon	Colour	Area Description	Annotated	Duration	CAP
▼	<i>rainFlood</i>	Yellow	Eastern Norway and Rogaland	Actual	2022-08-15T16:00 / 2022-08-16T22:00	⚠
▼	<i>rainFlood</i>	Yellow	Trøndelag and Nordland	Actual	2022-08-16T12:00 / 2022-08-17T02:00	⚠
▼	<i>rainFlood</i>	Yellow	Parts of Vestland and Møre and Romsdal	Actual	2022-08-03T06:00 / 2022-08-03T16:00	⚠
▼	<i>rainFlood</i>	Yellow	Parts of Østlandet	Actual	2022-09-12T19:00 / 2022-09-13T14:00	⚠

+ Display interface

- . Display the warning on a map
- . Updates to data sources



Selected warning to annotate

Phenomena of current warning

Colour of current warning Corrected value

Threshold of current warning Corrected value

Comment to selected warning

Overall evaluation

Browser interface

. view the original CAP document

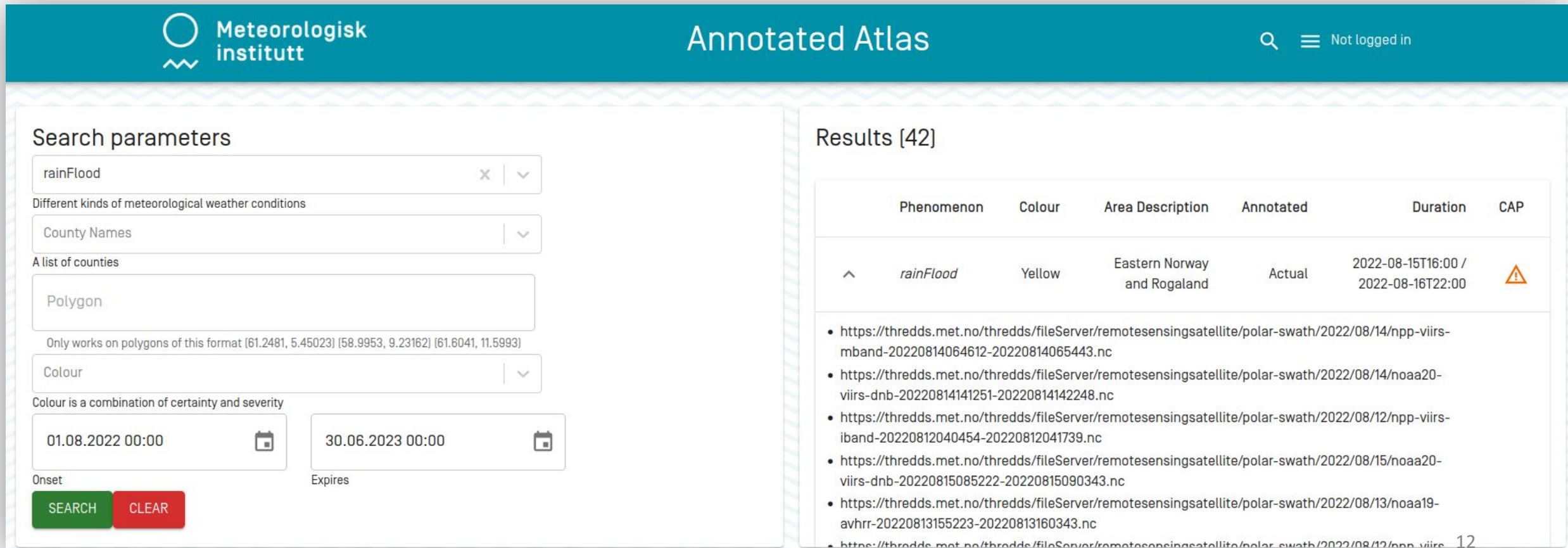
Cap-file

```
<?xml version="1.0" encoding="utf-8" standalone="yes" ?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
  <identifier>2.49.0.1.578.0.20220814105511</identifier>
  <sender>noreply@met.no</sender>
  <sent>2022-08-14T10:56:56+00:00</sent>
  <status>Actual</status>
  <msgType>Update</msgType>
  <scope>Public</scope>
  <code>CAP-V12.N0.V1.0</code>

  <references>noreply@met.no,2.49.0.1.578.0.20220814100939,
  2022-08-14T10:35:18+00:00</references>
  <incidents>0000050131</incidents>
  <info>
    <language>no</language>
    <category>Met</category>
    <event>Styrtregn</event>
    <responseType>Monitor</responseType>
    <urgency>Future</urgency>
    <severity>Moderate</severity>
    <certainty>Likely</certainty>
    <eventCode>
      <valueName>eventType</valueName>
      <value>rainFlood</value>
    </eventCode>
  </info>
</alert>
```

Browser interface

. Submit a request for **THREDDS data access** (Findability, Accessibility, Interoperability, Reusability: [FAIR](#))



The screenshot shows the 'Annotated Atlas' interface. The header includes the 'Meteorologisk institutt' logo and the title 'Annotated Atlas'. On the right, there is a search icon and a 'Not logged in' status.

Search parameters

- rainFlood (with clear and dropdown icons)
- Different kinds of meteorological weather conditions
- County Names (with dropdown icon)
- A list of counties
- Polygon (with a note: 'Only works on polygons of this format [61.2481, 5.45023] [58.9953, 9.23162] [61.6041, 11.5993]')
- Colour (with dropdown icon)
- Colour is a combination of certainty and severity
- Onset: 01.08.2022 00:00 (with calendar icon)
- Expires: 30.06.2023 00:00 (with calendar icon)
- SEARCH (green button) and CLEAR (red button)

Results [42]

	Phenomenon	Colour	Area Description	Annotated	Duration	CAP
^	rainFlood	Yellow	Eastern Norway and Rogaland	Actual	2022-08-15T16:00 / 2022-08-16T22:00	⚠️

Below the table, there is a list of THREDDS URLs:

- https://thredds.met.no/thredds/fileServer/remotesensingssatellite/polar-swath/2022/08/14/npp-viirs-mband-20220814064612-20220814065443.nc
- https://thredds.met.no/thredds/fileServer/remotesensingssatellite/polar-swath/2022/08/14/noaa20-viirs-dnb-20220814141251-20220814142248.nc
- https://thredds.met.no/thredds/fileServer/remotesensingssatellite/polar-swath/2022/08/12/npp-viirs-iband-20220812040454-20220812041739.nc
- https://thredds.met.no/thredds/fileServer/remotesensingssatellite/polar-swath/2022/08/15/noaa20-viirs-dnb-20220815085222-20220815090343.nc
- https://thredds.met.no/thredds/fileServer/remotesensingssatellite/polar-swath/2022/08/13/noaa19-avhrr-20220813155223-20220813160343.nc
- https://thredds.met.no/thredds/fileServer/remotesensingssatellite/polar-swath/2022/08/12/npp-viirs-...

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OPeNDAP Dataset Access Form

Action:

Data URL:

Global Attributes: Unlimited_Dimension: time

Variables: **time**: Array of 32 bit Integers [time = 0..125]

time:

```
units: seconds since 1970-01-01 00:00:00 +00:00  
axis: T  
long_name: time  
standard_name: time  
_ChunkSizes: 1024
```

Xc: Array of 32 bit Reals [Xc = 0..1693]

Xc:

```
axis: X  
standard_name: projection_x_coordinate  
units: m  
_ChunkSizes: 1694
```

Yc: Array of 32 bit Reals [Yc = 0..2133]

THREDDS

OPeNDAP



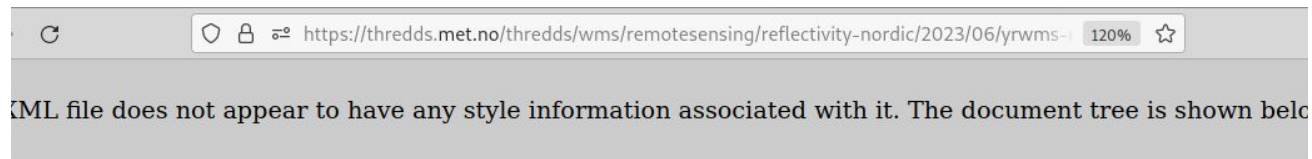
THREDDS

WCS Capabilities

```
_Capabilities version="1.0.0">
vice>
ees>NONE</fees>
ccessConstraints>NONE</accessConstraints>
rvice>
pability>
request>
:GetCapabilities>
  -<DCPType>
    -<HTTP>
      --<Get>
        <OnlineResource xlink:href="https://thredds.met.no/thredds/wcs/remotesensing/reflectivity-nordic/2023/06/yrwms-nordic.mos.pcappi-0-dbz.noclass-clfilter-novpr-clcorr-block.nordiclcc-1000.202306">
        </Get>
      </HTTP>
    </DCPType>
  :/GetCapabilities>
:DescribeCoverage>
  -<DCPType>
    -<HTTP>
      --<Get>
        <OnlineResource xlink:href="https://thredds.met.no/thredds/wcs/remotesensing/reflectivity-nordic/2023/06/yrwms-nordic.mos.pcappi-0-dbz.noclass-clfilter-novpr-clcorr-block.nordiclcc-1000.202306">
        </Get>
      </HTTP>
    </DCPType>
```

THREDDS

WMS Capabilities



```
MS_Capabilities version="1.3.0" updateSequence="2023-06-08T10:52:30.563Z"  
chemaLocation="http://www.opengis.net/wms http://schemas.opengis.net/wms/1.3.0/capabilities_1_3_0.x  
mlservice>  
<Name>WMS</Name>  
<Title>MET Norway Thredds Service</Title>  
<Abstract>Scientific Data</Abstract>  
<KeywordList>  
  <Keyword>meteorology</Keyword>  
  <Keyword>atmosphere</Keyword>  
  <Keyword>climate</Keyword>  
  <Keyword>ocean</Keyword>  
  <Keyword>earth science</Keyword>  
  <Keyword>humanGeographicViewer</Keyword>  
</KeywordList>  
<OnlineResource xlink:type="simple" xlink:href="http://met.no/">  
<ContactInformation>  
  <ContactPersonPrimary>  
    <ContactPerson>Servicedesk</ContactPerson>  
    <ContactOrganization>MET Norway</ContactOrganization>  
  </ContactPersonPrimary>  
  <ContactVoiceTelephone>+47 22 96 31 00</ContactVoiceTelephone>  
  <ContactElectronicMailAddress>thredds@met.no</ContactElectronicMailAddress>  
</ContactInformation>  
<Fees>  
  Credit should be given to The Norwegian Meteorological Institute as the source of data  
</Fees>
```

THREDDS

Godiva

Auto-zoom on select

MET Norway Thredds Service

yrwms-nordic.mos.pcappi-0-dbz.noclass-clfilter-novpr-clcorr-block.nordiclc-1000.20230608.nc

- lwe_precipitation_rate
- equivalent_reflectivity_factor
- No data
- Low elevation
- High elevation
- Blocked data
- Geometrical blocking
- Sea clutter
- Ground clutter
- Other clutter
- Probability of clutter
- Precipitation phase
- Convective / Stratiform

[set guide](#)

Layer: MET Norway Thredds Service > yrwms-nordic.mos.pcappi-0-dbz.noclass-clfilter-novpr-clcorr-block.nordiclc-1000.20230608.nc > equivalent_reflectivity_factor
Units: dBZ

Date/time: 08 Jun 2023 00:00:00 UTC [first frame](#) [last frame](#)

[Fit layer to window](#)

50.00
16.67
-16.67
-50.00

boxfill
linear
auto
lock

test image [Open in Google Earth](#)

Overlay opacity: 100%

June, 2023						
Today						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

Select date

Examine NetCDF

ncdump

```
projection_lambert proj4 = '+proj=tec +lat_0=65 +lon_0=15 +lat_1=65  
efs +R=6.371e+06" ;  
    int mosaic_info ;  
        mosaic_info:nodes = "norsg,noand,nober,nobml,nohas,nohgb,nohur,nohfj,  
smn,nosta,fianj,fikan,fikes,fikor,fikuo,filuo,finur,fipet,fiuta,fivih,fivim,sebaa,seh  
,selek,selul,seosu,seovi,sevar,sevil" ;  
        mosaic_info:missing_nodes = "seang,sease" ;  
    float lwe_precipitation_rate(time, Yc, Xc) ;  
        lwe_precipitation_rate:standard_name = "lwe_precipitation_rate" ;  
        lwe_precipitation_rate:long_name = "Radar Precipitation Rate" ;  
        lwe_precipitation_rate:units = "mm/h" ;  
        lwe_precipitation_rate:FillValue = 9.96921e+36f ;  
        lwe_precipitation_rate:coordinates = "lon lat" ;  
        lwe_precipitation_rate:grid_mapping = "projection_lambert" ;  
    float equivalent_reflectivity_factor(time, Yc, Xc) ;  
        equivalent_reflectivity_factor:standard_name = "equivalent reflectivi  
equivalent_reflectivity_factor:long_name = "Radar Reflectivity" ;  
        equivalent_reflectivity_factor:units = "dBZ" ;  
        equivalent_reflectivity_factor:FillValue = 9.96921e+36f ;  
        equivalent_reflectivity_factor:coordinates = "lon lat" ;  
        equivalent_reflectivity_factor:grid_mapping = "projection_lambert" ;  
    byte is_nodata(time, Yc, Xc) ;  
        is_nodata:long_name = "No data" ;  
        is_nodata:units = "flag: 1=on, 0=off" ;  
        is_nodata:coordinates = "lon lat" ;  
        is_nodata:grid_mapping = "projection_lambert" ;  
    byte is_lowele(time, Yc, Xc) ;  
        is_lowele:long_name = "Low elevation" ;  
        is_lowele:units = "flag: 1=on, 0=off" ;
```

Examine NetCDF

Ncview

displaying radar reflectivity
 frame 1/124 8-Jun-2023 00:00:00
 displayed range: -42.1267 to 70.8087 dBZ
 Current: (i=1693, j=1617) 9.96921e+36 (x=30.14393, y=57.62859)

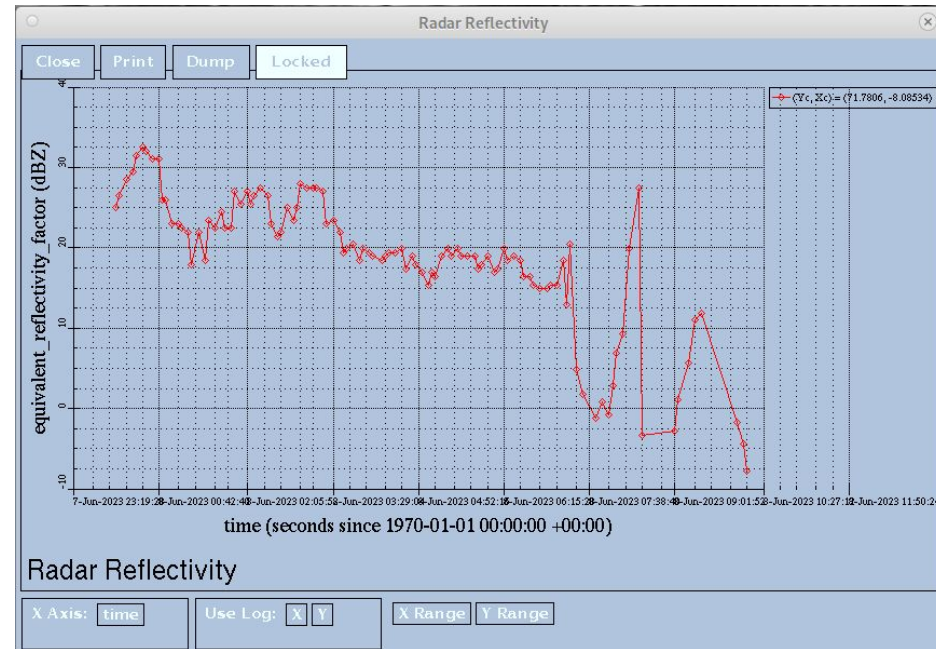
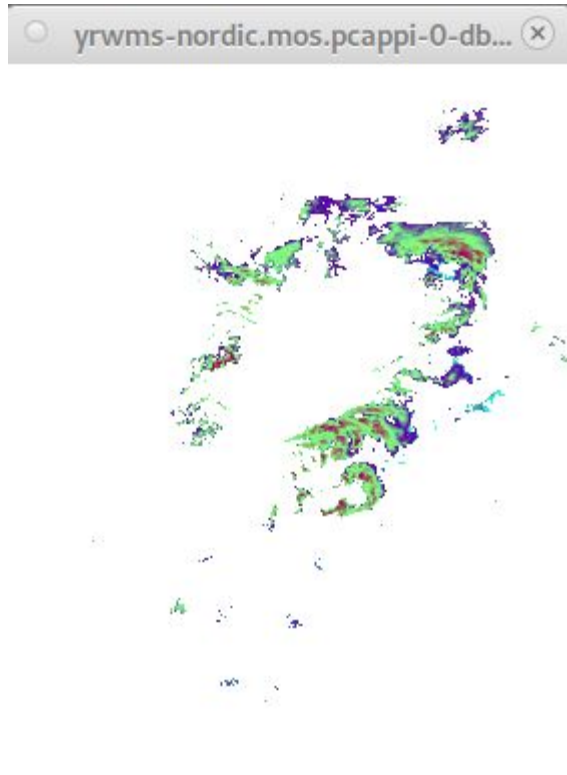
Quit >1 << < || > >> Edit ? Delay: Opts

3gaus: Inv P Inv C M 1/6 Linear Axes Range Bi-lin Print

-40 -20 0 20 40 60

Var: lon lat lwe_precipitat equivalent_ref
 is_nodata is_lowele is_highele is_blocked
 block_percent is_seaclutter is_groundclut is_otherclutter
 clutter_probab classification is_convective

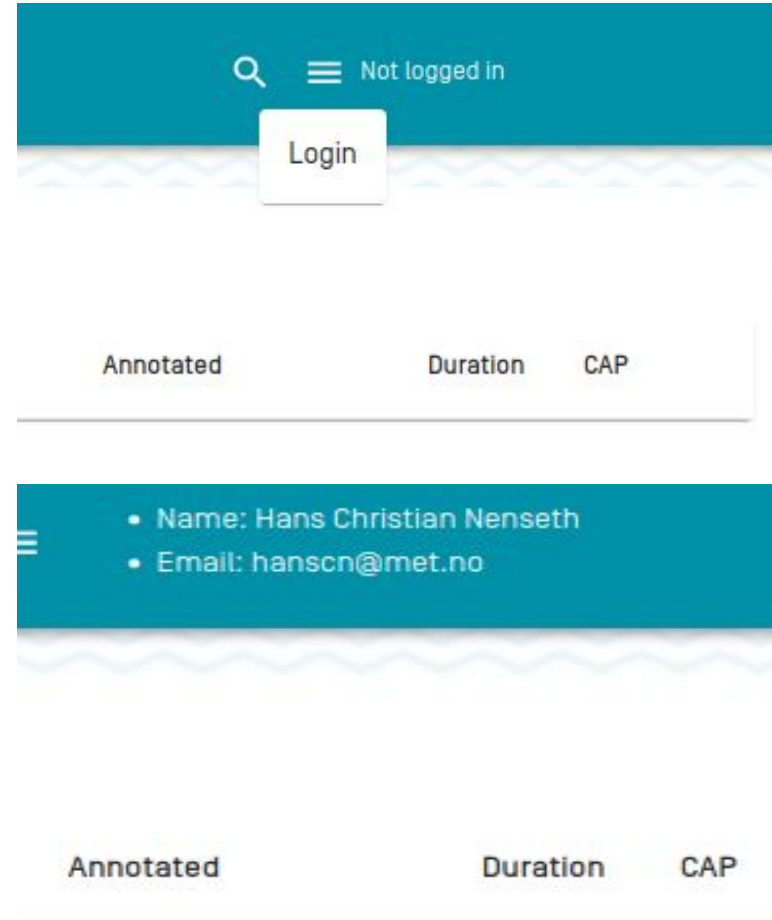
Dim:	Name:	Min:	Current:	Max:	Units:
Scan:	time	1.68618e+C	8-Jun-2023	1.68622e+C	seconds sin



Other tools for analysis include [Panoply](#), [Integrated Data Viewer](#) and [HDFView](#).

Browser interface

login to “annotate” CAP



Selected warning to annotate

Phenomena of current warning
Rain flood

Colour of current warning
yellow

Threshold of current warning
no value given

Corrected value
Orange

Corrected value
30mm/12h

Comment to selected warning
Overall evaluation

Overall evaluation

SAVE CANCEL

Under the hood: webserver, API and DB

METNO METCAP API 1.0 GA53

/api/openapi.json

METNO METCAP API

Terms of service

Get Help with this API - Website

Send email to Get Help with this API

Apache 2.0

map

GET	/api/v1/map/	Greet	▼
POST	/api/v1/map/	Search	▼
GET	/api/v1/map/metrics	Requests Count	▼
GET	/api/v1/map/lowres/fylke/{administrativeId}	Search Lowres Fylke	▼
GET	/api/v1/map/lowres/county/{administrativeId}	Search Lowres County	▼
GET	/api/v1/map/lowres/fylke/list/	Get Lowres Fylke List	▼
GET	/api/v1/map/lowres/kommune/list/	Get Lowres Kommune List	▼
GET	/api/v1/map/lowres/kommune/{administrativeId}	Search Lowres Kommune	▼
POST	/api/v1/map/short/	Search Short	▼
POST	/api/v1/map/echo/	Echo Query	▼

cap

GET	/api/v1/cap/	Greet	▼
POST	/api/v1/cap/	Search	▼
GET	/api/v1/cap/archived/list/	Get Warnings Archived List	▼
GET	/api/v1/cap/areaDesc/list/	Get Warnings Areadesc List	▼

GET /api/v1/cap/phenomenon/List/ Get Warnings Phenomenon List

Returns list of current CAP warning phenomena in the database.

Parameters Cancel

No parameters

Execute
Clear

Responses

Curl

```
curl -X 'GET' \
  'https://dev.metcap.met.no/api/v1/cap/phenomenon/List/' \
  -H 'accept: application/json'
```

Request URL

```
https://dev.metcap.met.no/api/v1/cap/phenomenon/List/
```

Server response

Code	Details
200	<p>Response body</p> <pre>["blowingSnow", "drivingConditions", "forestFire", "gale", "ice", "icing", "lightning", "polarLow", "rain", "rainFlood", "snow", "stormSurge", "wind"]</pre> <p style="text-align: right;">Download</p> <p>Response headers</p> <pre>access-control-allow-headers: Content-Type,x-requested-with,access-control-allow-origin,Accept,authorization access-control-allow-methods: GET,POST,OPTIONS,DELETE,PUT,HEAD access-control-allow-origin: * content-length: 138 content-type: application/json date: Thu,01 Jun 2023 11:00:52 GMT server: nginx/1.18.0 (Ubuntu) strict-transport-security: max-age=63072000 x-firefox-spdy: h2</pre>

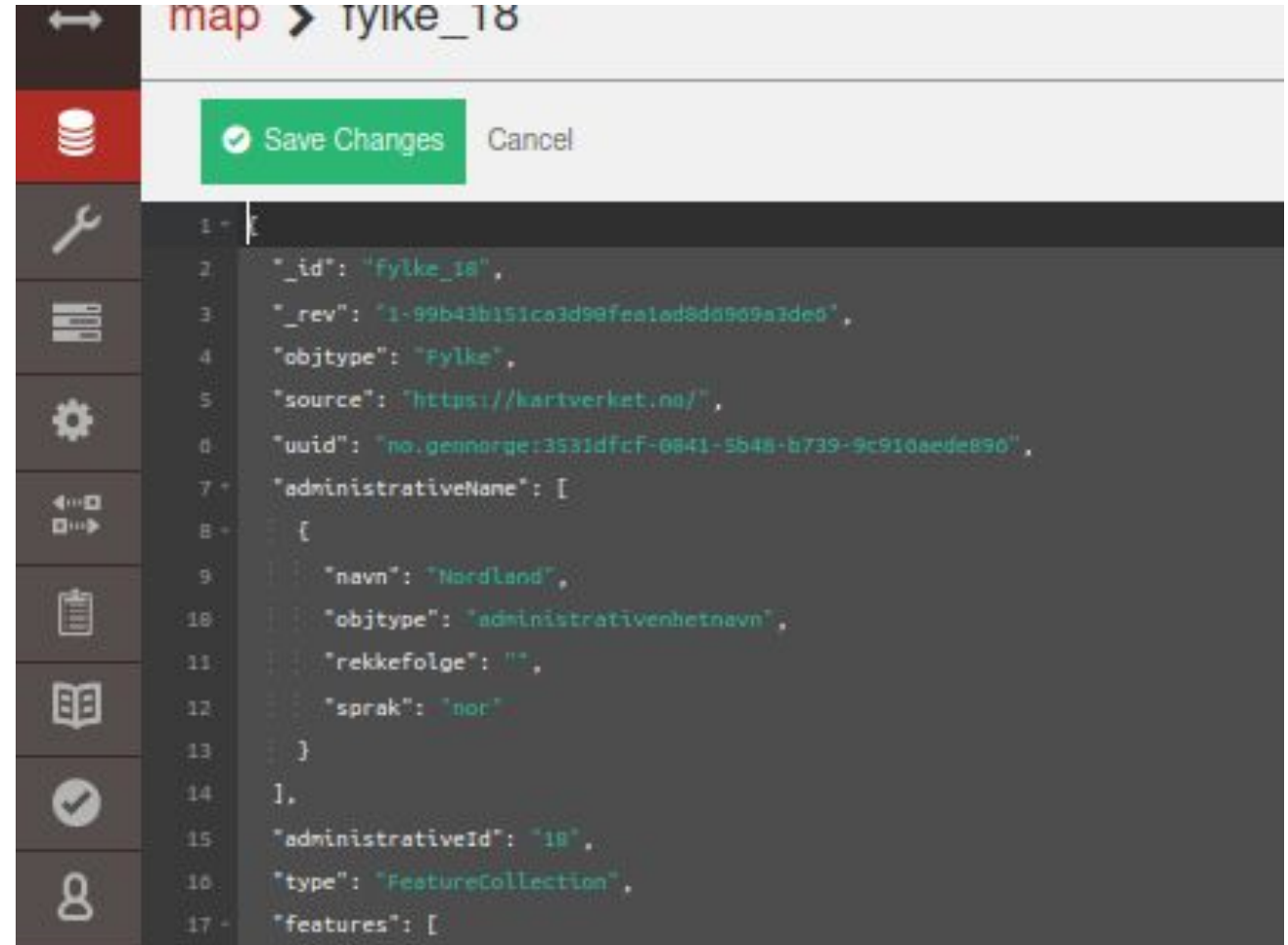
Responses

Code	Description	Links
------	-------------	-------

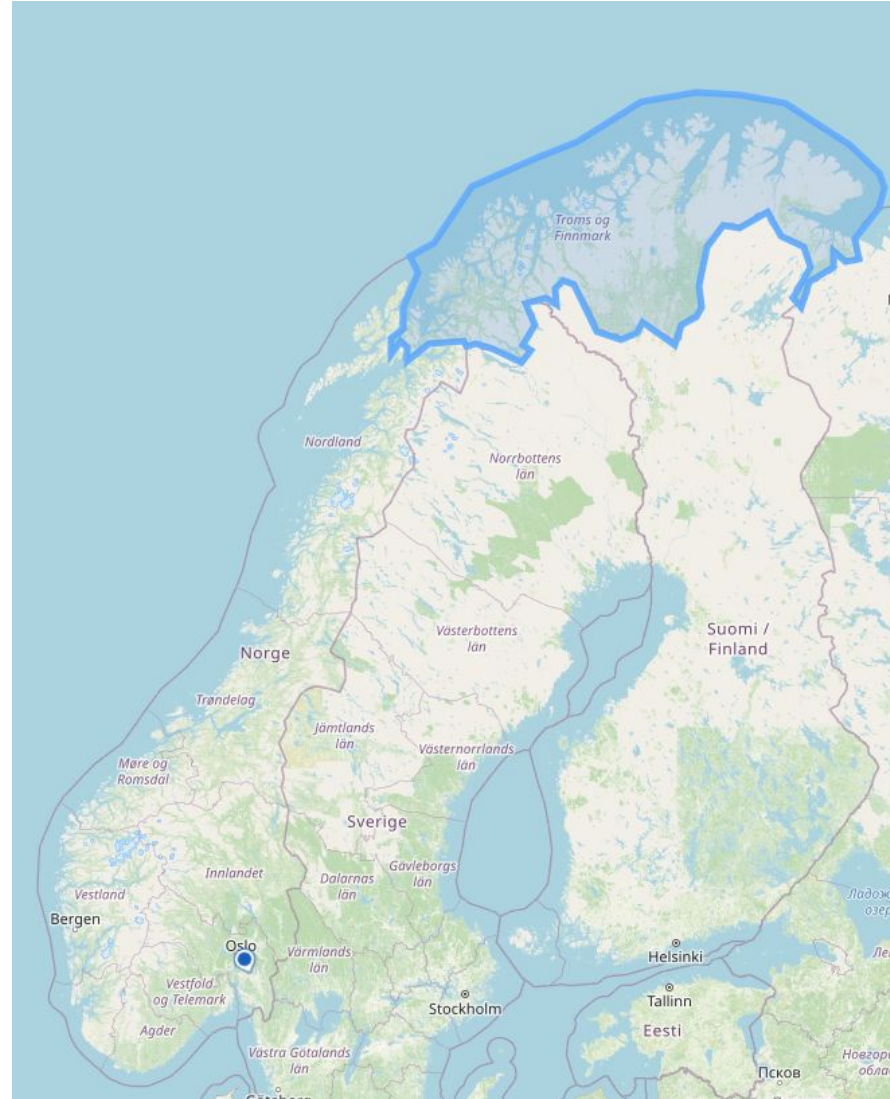
Databases					Database name	Create Database	{ } JSON
Name	Size	# of Docs	Partitioned	Actions			
_global_changes	86.2 KB	20	No				
_replicator	4.3 KB	4	No				
_users	2.3 KB	1	No				
archive_incidents	0 bytes	0	No				
archive_warnings	17.2 MB	3600	No				
cmap	0 bytes	0	No				
evaluations	16.5 KB	8	No				
incidents	95.4 KB	652	No				
lmap	0.7 MB	371	No				
map	18.3 MB	376	No				
warnings	57.0 MB	13984	No				

CouchDB

MAP as GeoJSON



```
1 - [
2   "_id": "fylke_18",
3   "_rev": "1-99b43b151ca3d98fe1ad8dd969a1de0",
4   "objtype": "Fylke",
5   "source": "https://kartverket.no/",
6   "uuid": "no.gennorge:3531dfcf-0841-5b48-b739-9c910aede896",
7   "administrativeName": [
8     {
9       "navn": "Nordland",
10      "objtype": "administrativenhetnavn",
11      "rekkefolge": "",
12      "sprak": "nor"
13    }
14  ],
15  "administrativeId": "18",
16  "type": "FeatureCollection",
17  "features": [
```



CouchDB

CAP as GeoJSON

```
warnings > 2.49.0.1.578.0.220530160055008.1641
```

Save Changes

```
1 {
2   "_id": "2.49.0.1.578.0.220530160055008.1641",
3   "_rev": "2-2ee353f2050b7a79d10528d1edb08398",
4   "threshold": "40",
5   "saved_at": "2022-05-30T10:00:55+00:00",
6   "transmitted_at": "2022-05-30T10:00:55+00:00",
7   "onset": "2022-05-30T10:00:00+00:00",
8   "expires": "2022-00-04T12:00:00+00:00",
9   "phenomenon": "forestFire",
10  "incident": "49200",
11  "archived": true,
12  "author": "lustre_archive_importer.py@met.no",
13  "transmission_state": "transmitted",
14  "status": "Actual",
15  "certainty": "Likely",
16  "severity": "Moderate",
17  "msgType": "Alert",
18  "altitude": "0",
```

geojson.io powered by mapbox Sign up for Mapbox

Open Save New Meta Search

</>JSON Table ? Help

```
1 {
2   "type": "FeatureCollection",
3   "features": [
4     {
5       "geometry": {
6         "type": "Polygon",
7         "coordinates": [
8           [
9             [
10              17.759833,
11              69.687167
12            ],
13            [
14              16.458667,
15              69.425667
16            ],
17            [
18              16.333167,
19              69.233167
20            ],
21            [
22              16.049833,
23              69.033167
24            ],
25            [
26              15.866667,
27              68.949833
28            ],
29            [
30              15.766667,
31              68.833167
32            ],
33            [
34              15.716667,
35              68.766667
```

Deployment

- Open source and available on GitHub: [Annotated Atlas](#) and [METCAP API](#)
- Docker/Docker compose container based