



European Commission

EOPEN T7.3: User Training

PUC 3: EOPEN User Training Material Outlook

Finnish Meteorological Institute

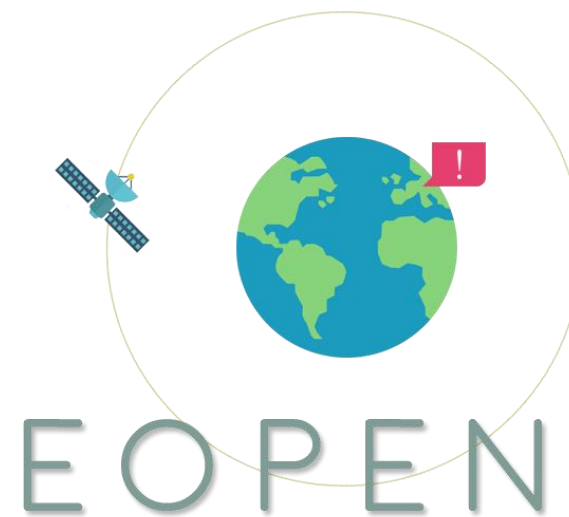




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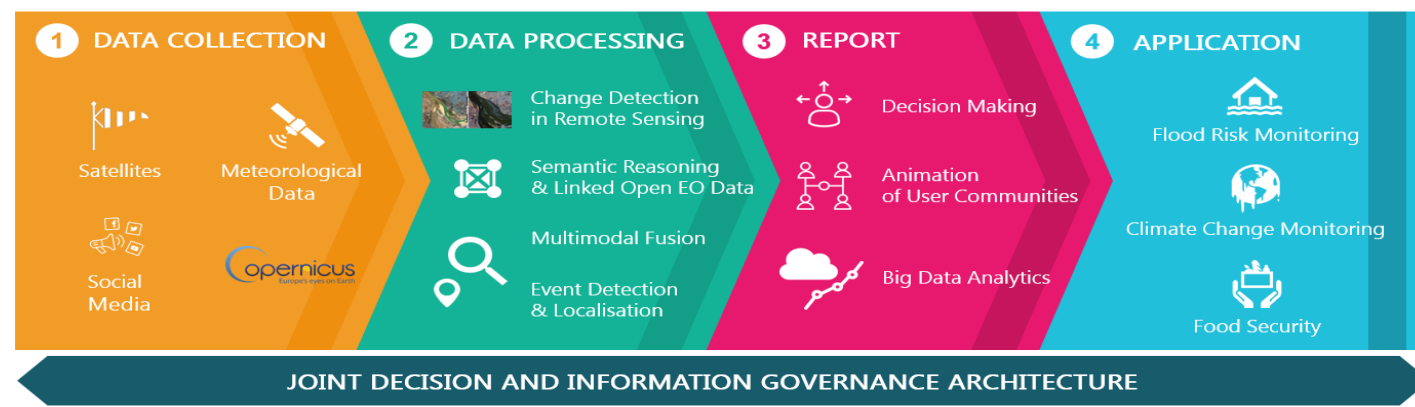
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1. Background

1-1. Background of EOPEN

- EOPEN provides a platform targeting non-expert Earth Observation (EO) data users (non-traditional user communities), experts and the SME community.
- The platform makes Copernicus data and services easy to use for Big Data applications by providing EO data analytics tools, decision making, and infrastructure.
- Consisting of three PUCs including PUC 1 - flood risk assessment and prevention, PUC 2 - food security through EO datasets and PUC 3 - monitoring climate change through EO, EOPEN provides big data analytics and supports decision making mainly in monitoring agricultural areas.



1. Background

1-2. Objective of the Training Material

- Give the opportunity to use the results of EOPEN for end-users, and interested third-parties.
- A detailed encounter for the efficient use of platform.
- Promotes additional engagement activities, training activities, pursues a significant widen use of the EOPEN platform, and contributes to the uptake of EO data from the community.
- Be supplied to EOPEN's various capacity building activities, and bring effects that will outlast the project timeframe, contributing to the sustainability of EOPEN approach and system.





2. Practical Training

2.1. Introduction

- Climate projections for Finland indicate 2° C increase in average temperatures and 5-10% increase in precipitation by 2040
- Largest changes occur for winters, especially in Lapland, Northern Finland
- Consequences affect large areas in national economy and infrastructure, and have an impact on social and cultural heritage, such as reindeer herding

2. Practical Training

2.1. Introduction

- Reindeer herding is a small-scale livelihood in Northern Finland with about 5000 herders
- It drives tourism in Northern Finland with 90% of tourists from foreign countries
- Herders are affected by climate change in both short-term and long-term time scales





2. Practical Training

2.1. Introduction

- Climate change is expected to impact all facets of the transport system: the infrastructure, modes of transport and operations and the maintenance
- Finland has a total of 78000 km of public roads, many in sparsely populated regions
- The Finnish Transport Infrastructure Agency (FTIA), who is the national authority responsible for transportation and road maintenance in Finland, makes decisions based on both yearly trends in weather and climate and daily forecasts to adapt to the changes



2. Practical Training

2.1. Introduction

- Visualizing the impact of climate change in both short-term and long-term time intervals is important for the reindeer herders and FTIA
- EOPEN provides a unique platform for combining multiple data sets for snow depth, ground freezing condition, atmospheric properties, and climate scenarios that can be compared simultaneously and tools for estimating key parameters relevant for the users



2. Practical Training

2.2. FMI Open Data WFS and workflow

- Go to the Developer Portal and login
- Click 'Workflows' and locate 'FMI Open Data WFS' → Choose 'Edit workflow' → this shows the workflow and its processes in a visual graph
- Click 'Input String' to show the input parameters to the workflow

2.2. FMI Open Data WFS and workflow



2. Practical Training

2.2. FMI Open Data WFS and workflow

- Go back to the Workflow list, find 'FMI Open Data WFS' and Click 'Execute' → this will open the execution panel
- The user-defined input parameters can be given in text boxes
- The main parameters:
 - **Storedquery ID** is the identifier for the data that user wants to query (see <https://www.ilmatieteenlaitos.fi/tallennetut-kyselyt>)
 - **Database Table Name** allow the user to specify the name for the output data that is stored in EOPEN, 'FMI-Odata.' will be added as a prefix
 - **Location parameter** and **Location value** allow the user to specify the Area-of-Interest by a bounding box, location name, or an special id

2. Practical Training

2.2. FMI Open Data WFS and workflow

- Once user has given the inputs, the workflow can be executed by clicking the 'Execute' button
- Workflow fetches the data through the FMI Open Data WFS, converts the data to JSON format, and stores the data in the EOPEN MongoDB database

Execute Workflow

FMI Open Data WFS

☐ Schedule

Inputs

WFS URL

<https://opendata.fmi.fi/wfs?>

Request

getFeature

Storedquery ID (required)

Database Table Name

CRS

End Time

Location
parameter (e.g.
bbox, place,
fmsid)

Location value

Max Locations

Parameters

Start Time

Timestep

Timezone

JSON document ID path

MongoDB URL

 Execute

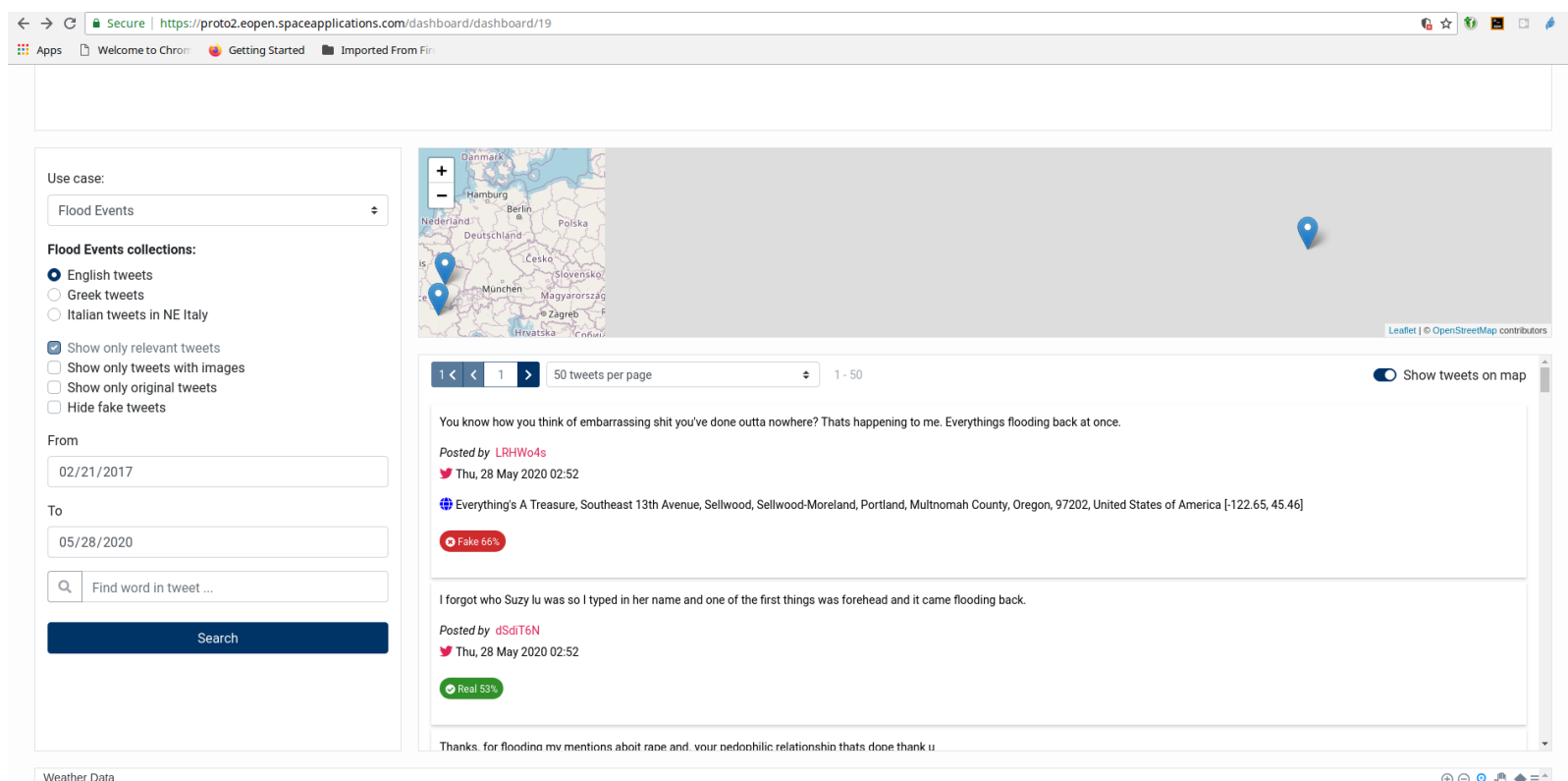
3. Visualization of Data

3.1. FMI Dashboard and snow tweets

- Go to the EOPEN Dashboard → Select 'FMI' from the 'Dashboards' menu from the top bar
- The tweet window on the right shows the tweets for different use cases
- Select 'Snow Cover' from the menu on the left under 'Use Case'
- Select 'Finnish tweets' and time interval for the tweets
- Click 'Search' → Finnish snow-related tweets are shown on the right panel → Notice that the panel shows only 50 tweets at a time
- Click 'Show tweets on map' to display the locations for the tweets on a map on top
- The latest HIRLAM Forecasts for temperature, humidity, wind speed and hourly precipitation is shown in the graph at the bottom

3. Visualization of Data

3.1. FMI Dashboard and snow tweets



The screenshot displays the FMI Dashboard interface. On the left, a sidebar contains filters for 'Use case' (set to 'Flood Events'), 'Flood Events collections' (with radio buttons for 'English tweets', 'Greek tweets', and 'Italian tweets in NE Italy'), and checkboxes for 'Show only relevant tweets', 'Show only tweets with images', 'Show only original tweets', and 'Hide fake tweets'. Below these are date range inputs for 'From' (02/21/2017) and 'To' (05/28/2020), a search bar, and a 'Search' button. The main area features a map of Europe with blue location pins. Below the map, a list of tweets is shown, including one from 'LRHWo4s' dated 'Thu, 28 May 2020 02:52' with a 'Fake 66%' label, and another from 'dSdIT6N' with a 'Real 53%' label. The bottom of the dashboard shows a 'Weather Data' section.

3. Visualization of Data

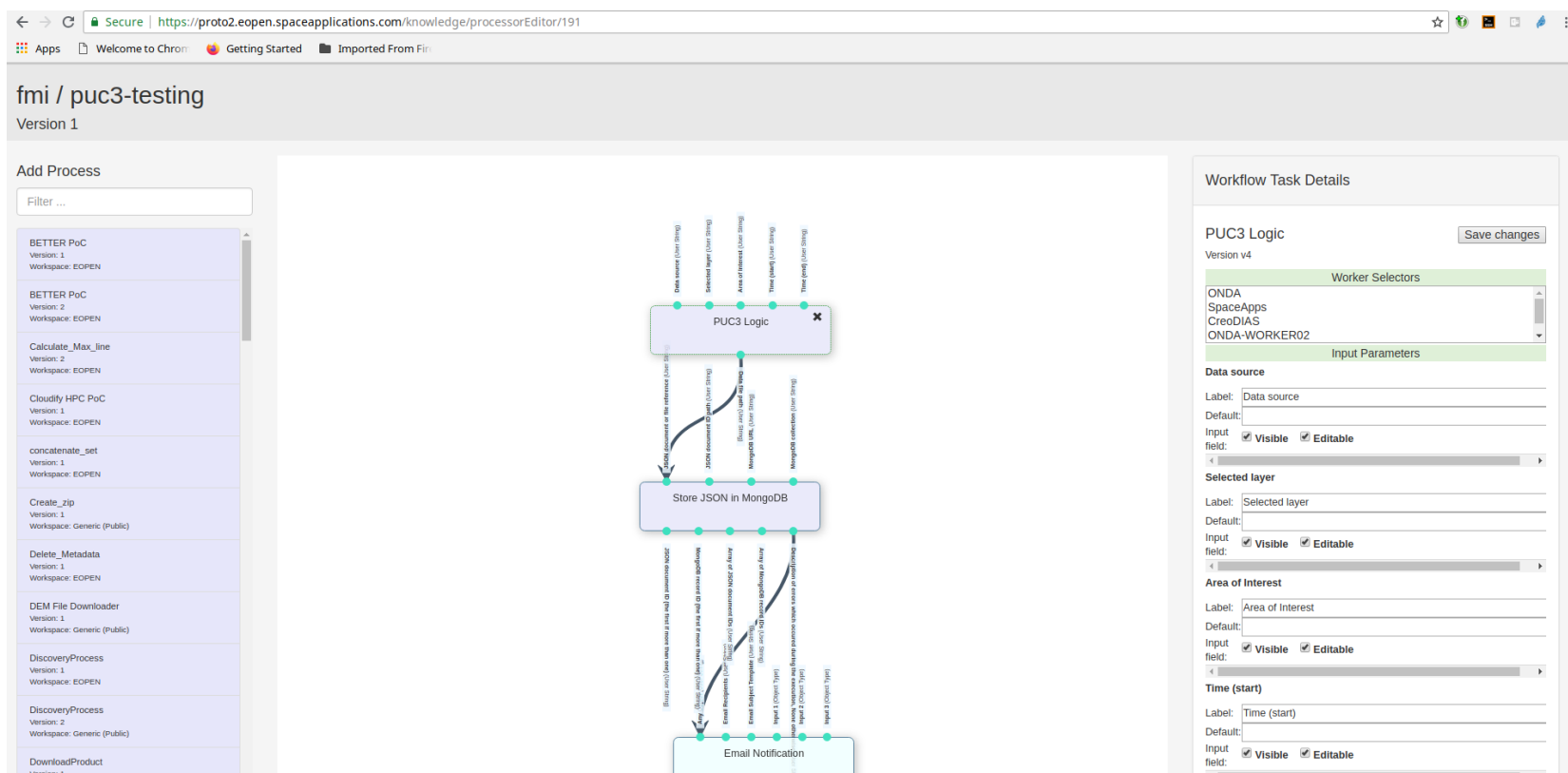
3.2. Snow depth and temperature statistics in a reindeer herding area

- To setup this exercise, make sure to login to the Developer platform
- Select 'Workflows' in the top bar → Search the 'puc3-testing' workflow
- Select 'Edit Workflow' → This shows the workflow and its processors in the middle
- Click on the 'PUC3 Logic' Processor → This shows all the input parameters to the workflow
- Scroll to the bottom to the 'User Form Preview' and change the email address and the email subject accordingly → Do not change anything else



3. Visualization of Data

3.2. Snow depth and temperature statistics in a reindeer herding area



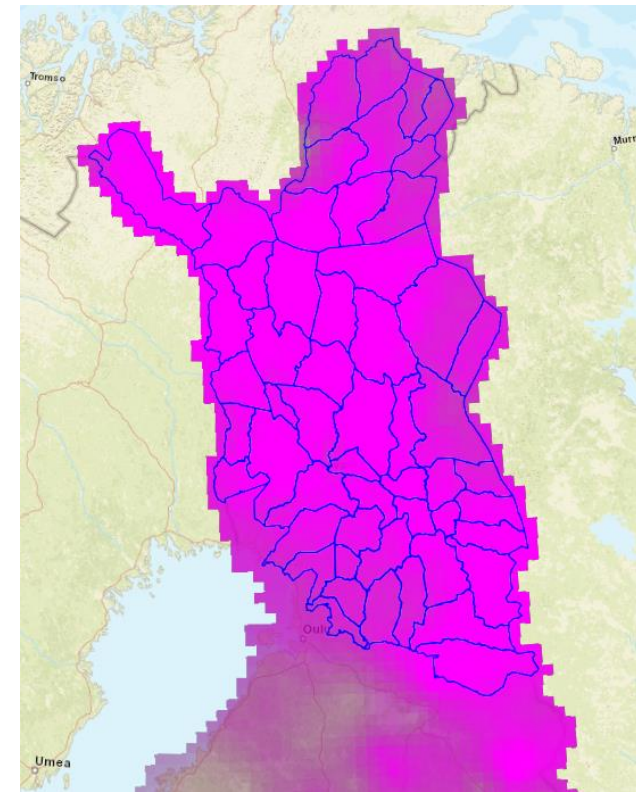
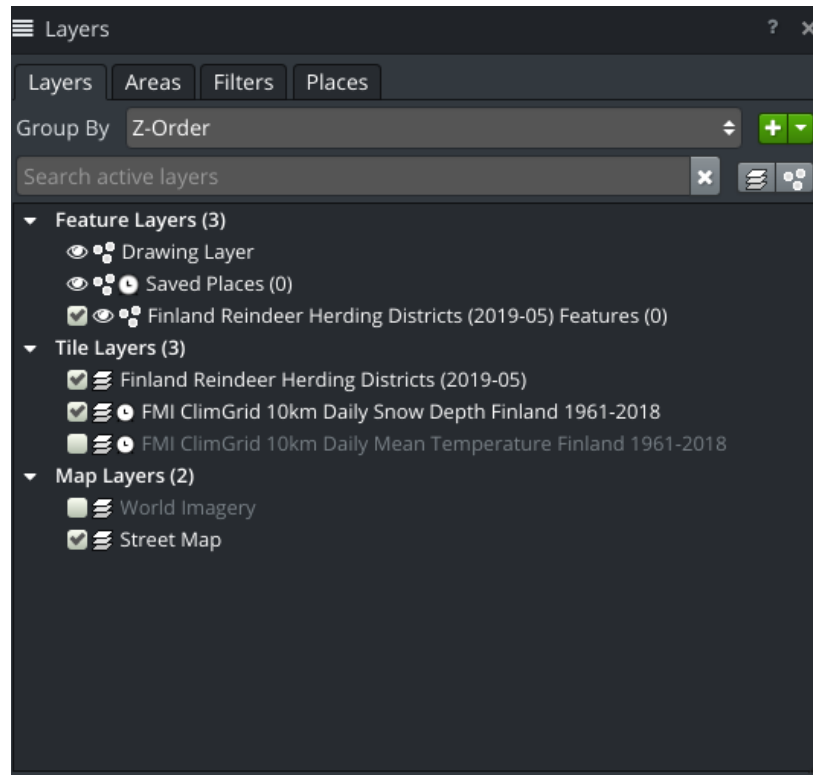
3. Visualization of Data

3.2. Snow depth and temperature statistics in a reindeer herding area

- Launch GIS Viewer from the 'Dashboards' menu
- Click 'Add Data' → Click 'EOpen GeoServer' → Switch ON 'FMI ClimGrid 10km Daily Mean Temperature Finland', 'FMI ClimGrid 10km Daily Snow Depth Finland', and 'Finland Reindeer Herding Districts (2019-05)'
- Navigate and zoom to Northern Finland
- Select Tile Layer 'FMI ClimGrid 10km Daily Snow Depth Finland' and Tile+Feature Layers 'Finland Reindeer Herding Districts (2019-05)' in the Layers window

3. Visualization of Data

3.2. Snow depth and temperature statistics in a reindeer herding area



3. Visualization of Data

3.2. Snow depth and temperature statistics in a reindeer herding area

- Select a Box from the top bar and draw a large area → Select 'Load'
- Right-click the border and select 'Save Area' → Name the area → New area is created in 'Areas' → Ignore any warnings due to invalid topology
- Go to the 'Layers' window and right-click any Layer
- Select 'Statistics' from EOPEN tools → The statistics tool opens
- Select the 'FMI ClimGrid 10km Daily Snow Depth...' Layer
- Select the area you saved from the list
- Check that the date is before the end of 2018
- Click 'Execute' to run the statistics Workflow

3. Visualization of Data

3.2. Snow depth and temperature statistics in a reindeer herding area

- Go to the Developer Portal and select 'Executions' from the top bar → This shows the status of all the workflows and the history
- Wait for the workflow to finish and then click 'Execution Report' → This shows the details in the workflow execution

The screenshot shows the 'Executions' page in the EOPEN Developer Portal. It displays a table of workflow executions with columns for Workflow, Executed by, Started at, and a status indicator. The status is shown as a green checkmark for successful executions and a red triangle for failed ones. A search bar is available at the top right of the table.

Workflow	Executed by	Started at	Status
fmi/puc3_testing	fmi	2020-06-05 16:52	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-05 16:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-05 10:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-05 04:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-04 22:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-04 16:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-04 10:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-04 04:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-03 22:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-03 16:15	Success
fmi/puc3_testing	fmi	2020-06-03 14:44	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-03 10:15	Success
fmi/puc3_testing	fmi	2020-06-03 09:44	Failed
fmi/puc3_testing	fmi	2020-06-03 08:06	Failed
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-03 04:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-02 22:15	Success
fmi/fmi-hi-lam-data-downloader	fmi	2020-06-02 16:15	Success

The screenshot shows the 'Execution Report' page for a specific workflow execution. It displays a table of execution details and a table of inputs.

Identifier	Value
Identifier	fmi/puc3_testing#21696
Executed by	fmi
Created at	2020-06-05T13:52:43.370864Z
Workspaces	()
Workflow	fmi/puc3_testing
Workflow version	1
Engine reference	2020_06_05_13_52_43_984555z_fmi_puc3_testing
Execution start time	2020-06-05 13:53:57
Execution end time	2020-06-05 13:57:09
Execution duration	0:03:11
Datasource	Datasource

Label	Value
Input 1	---
Input 2	---
Input 3	---
Email Recipients	petteri.kansisto@fmi.fi
Email Subject Template	[EOPEN][PUC3] ClimGrid workflow completed
.JSON document ID path	metadata.creationDateUTC
MongoDB collection	ClimGridStatisticsDataTest2
MongoDB URL	mongodb://185.58.96.144:27017/EOPEN

3. Visualization of Data

3.2. Snow depth and temperature statistics in a reindeer herding area

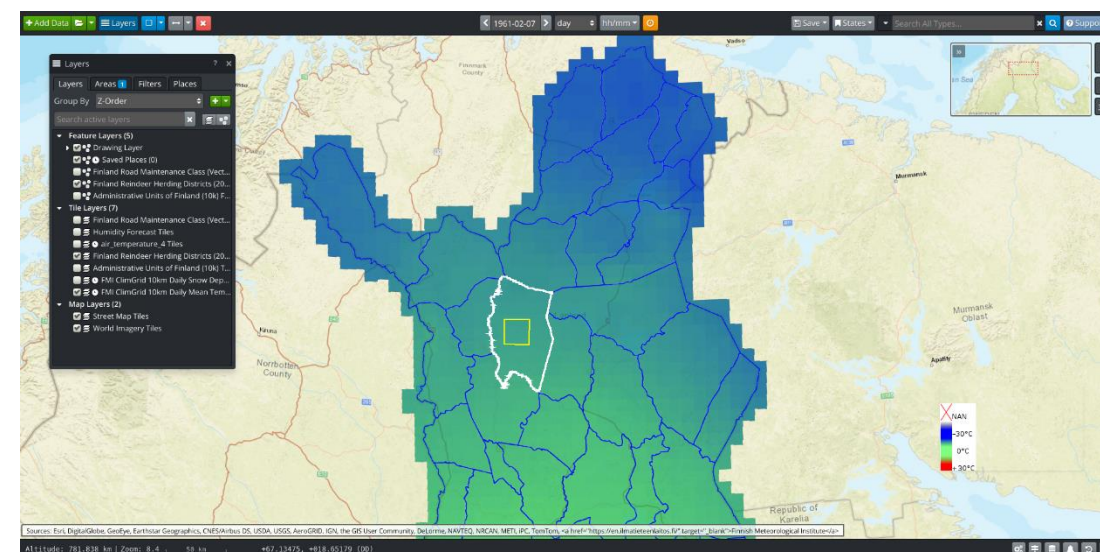
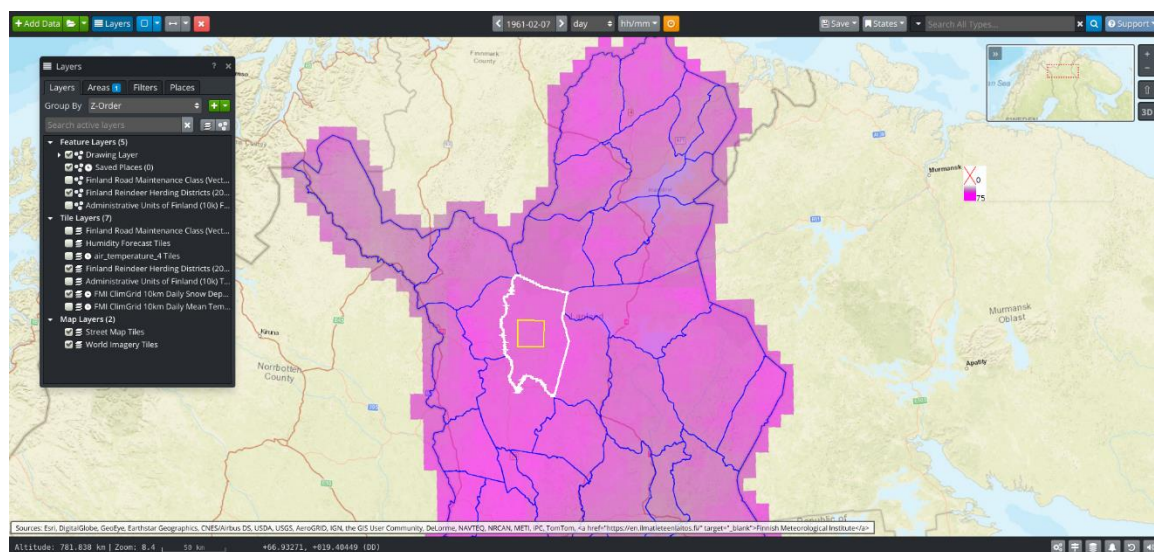
- To view the output snow depth statistics, go to the Dashboard and to the Statistics window
- Select the output including the area name from a drop down menu
- Statistics are shown below the menu

2020-06-05 13:54:32.939590, testialue, 2018-02-01, 2018-02-01, FMI ClimGrid 10km Daily Snow Depth Finland 1961-2018	
Variable	Value
Standard deviation	2.87 cm
Maximum	48.82 cm
Average	44.49 cm
Minimum	36.38 cm

3. Visualization of Data

3.2. Snow depth and temperature statistics in a reindeer herding area

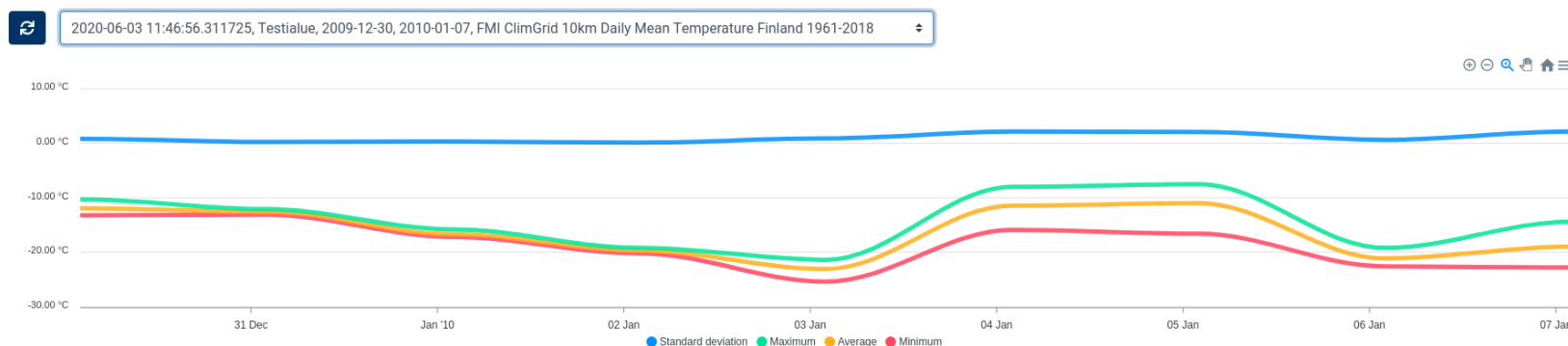
Do the same for 'FMI ClimGrid 10km Daily Mean Temperature Finland' by selecting the Tile Layer and de-selecting the current layer



3. Visualization of Data


3.3. Temperature time series in a reindeer herding area

- To view time series of the over an area, go through the steps in statistics as shown before
- Select 'Time Series' from the EOPEN Tools and add the date range in the window → Click Execute
- Go to the Dashboard and to the Time series window → Select the output from the menu



3. Visualization of Data

3.4. Animation of snow depth in Lapland

- Launch GIS Viewer from the 'Dashboards' menu
- Click 'Add Data' → Click 'EOpen GeoServer' → Switch ON 'FMI ClimGrid 10km Daily Snow Depth Finland'
- Navigate to Northern Finland
- Select Tile Layer 'FMI ClimGrid 10km Daily Snow Depth Finland' in the Layers window
- Select the 'Expand to full timeline' in top bar  → The animation tool opens
- Select 'Change timeline settings' in bottom bar → The 'Timeline Settings' window opens
- Choose the start date and end date → Click 'OK' → A new timeline is set
- Select the speed of animation → Click play button → Wait for the data to load



3. Visualization of Data

3.4. Animation of snow depth in Lapland

Timeline Settings

Load Range

Start: 2018-02-01 0 : 0 : 0 ?

End: 2018-05-31 0 : 0 : 0 ?

+ Add Range

Time Slices ? **+ Create**

Offset ? UTC+0000

✓ OK **Cancel**

