openSenseMap

Dokumentation

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openSenseMap

The openSenseMap (OSeM) is a webplatform which provides upload, visualisation and analysis of location-specific sensordata.

Stations may be registered on the platform, which host one or more Sensors on a specific location. Data up- & download is done via the restful API.

Features

- timeseries visualization for each phenomenon
- filtering by various parameters
- spatial interpolation
- data download with bounding box

openSenseMap and it's API is open source software. Sourcecode and issuetracker are located here:

- openSenseMap
- openSenseMap API

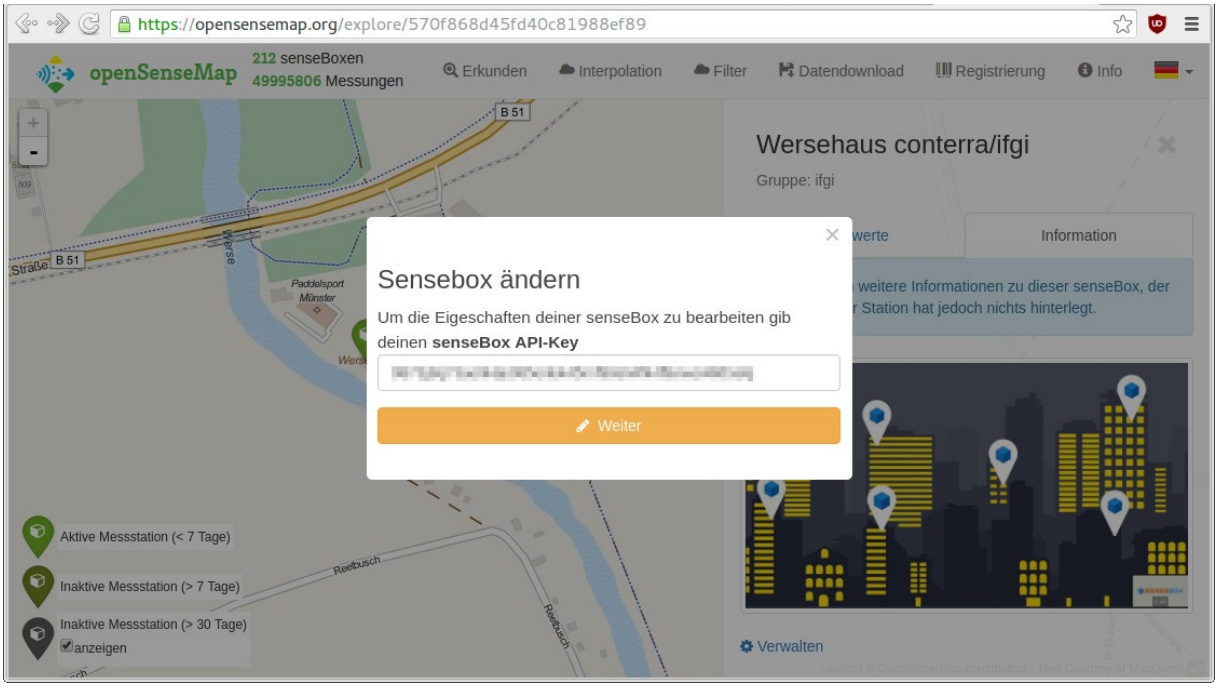
Registration on the OSeM

Modifying a station

All properties of a station may be changed after the registration.

To do this, authorization with the API-key is required, which was sent to you in the registration e-mail!

1. Select your station on the map by clicking on the marker on the map.
2. Select the tab "Info" in the sidebar and click "Manage".
3. Enter your API-key in the dialog.



4. Make your desired changes in the appearing form. You may edit metadata, geolocation, photo, as well as the stations sensor configuration.

   > Hint: If you have added a new sensor and want to download the updated arduino-sketch, a page-reload after saving is required.

5. Click "save" or "cancel" in the top of the dialog to apply or discard your changes.

Deleting a station

Follow the steps under "Modifying a station", then type `DELETE` in the textfield "Delete senseBox" and confirm.

> warning: All associated sensor data will be permanently deleted!

Data download

Data analysis

Filter

Interpolation

The openSenseMap provides a REST API, which can be used to query & post senseBox metadata & measurements. The endpoint is `https://api.opensensemap.org/` .

This documentation can also be found here with an improved layout.

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openSenseMap API documentation

methods to manage senseBoxes and get/post measurements

Boxes

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Boxes

Validate authorization method GET

Validate authorization through API key and senseBoxId. Will return status code 403 if invalid, 200 if valid.

```
GET /users/:senseBoxId
```

Headers

Name	Type	Description
x-apikey	String	the secret API key which corresponds to the `senseBoxId` parameter.

Parameter

Name	Type	Description
returnBox	String	optional if supplied and non-empty, returns the senseBox with the senseBoxId with hidden fields
:senseBoxId	String	the ID of the senseBox you are referring to.

Success 200

Name	Type	Description
Response	json	`{"code": "Authorized", "message":"ApiKey is valid"}`

Error Response

Error-Response:

```
HTTP/1.1 403 Forbidden
{"code":"NotAuthorized","message":"ApiKey is invalid or missing"}
```

Get one senseBox method GET

```
GET /boxes/:boxId
```

Parameter

Name	Type	Description
format	String	optional the format the sensor data is returned in. Default value: json Allowed values: "json","geojson"
:senseBoxId	String	the ID of the senseBox you are referring to.

Success Response

Example data on success:


```
{
  "_id": "57000b8745fd40c8196ad04c",
  "boxType": "fixed",
  "createdAt": "2016-06-02T11:22:51.817Z",
  "exposure": "outdoor",
  "grouptag": "",
  "image": "57000b8745fd40c8196ad04c.png?1466435154159",
  "loc": [
    {
      "geometry": {
        "coordinates": [
          7.64568,
          51.962372
        ],
        "type": "Point"
      },
      "type": "feature"
    }
  ],
  "name": "Oststr/Mauritzsteinpfad",
  "sensors": [
    {
      "_id": "57000b8745fd40c8196ad04e",
      "lastMeasurement": {
        "value": "0",
        "createdAt": "2016-11-11T21:22:01.675Z"
      },
      "sensorType": "VEML6070",
      "title": "UV-Intensität",
      "unit": "µW/cm²"
    },
    {
      "_id": "57000b8745fd40c8196ad04f",
      "lastMeasurement": {
        "value": "0",
        "createdAt": "2016-11-11T21:22:01.675Z"
      },
      "sensorType": "TSL45315",
      "title": "Beleuchtungsstärke",
      "unit": "lx"
    },
    {
      "_id": "57000b8745fd40c8196ad050",
      "lastMeasurement": {
        "value": "1019.21",
        "createdAt": "2016-11-11T21:22:01.675Z"
      },
      "sensorType": "BMP280",
      "title": "Luftdruck",
      "unit": "hPa"
    },
    {
      "_id": "57000b8745fd40c8196ad051",
      "lastMeasurement": {
        "value": "99.38",
        "createdAt": "2016-11-11T21:22:01.675Z"
      },
      "sensorType": "HDC1008",
      "title": "rel. Luftfeuchte",
      "unit": "%"
    },
    {
      "_id": "57000b8745fd40c8196ad052",
      "lastMeasurement": {
        "value": "0.21",
        "createdAt": "2016-11-11T21:22:01.675Z"
      },
```

```
      "sensorType": "HDC1008",
      "title": "Temperatur",
      "unit": "°C"
    },
    {
      "_id": "576996be6c521810002479dd",
      "sensorType": "WiFi",
      "unit": "dBm",
      "title": "Wifi-Stärke",
      "lastMeasurement": {
        "value": "-66",
        "createdAt": "2016-11-11T21:22:01.675Z"
      }
    },
    {
      "_id": "579f9eae68b4a2120069edc8",
      "sensorType": "VCC",
      "unit": "V",
      "title": "Eingangsspannung",
      "lastMeasurement": {
        "value": "2.73",
        "createdAt": "2016-11-11T21:22:01.675Z"
      },
      "icon": "osem-shock"
    }
  ],
  "updatedAt": "2016-11-11T21:22:01.686Z"
}
```


Get all senseBoxes method GET

With the optional `date` and `phenomenon` parameters you can find senseBoxes that have submitted data around that time, +/- 4 hours, or specify two dates separated by a comma.

```
GET /boxes?date=:date&phenomenon=:phenomenon&format=:format
```

Parameter

Name	Type	Description
date	ISO8601Date	optional One or two ISO8601 timestamps at which boxes should provide measurements. Use in combination with `phenomenon`.
phenomenon	String	optional A sensor phenomenon (determined by sensor name) such as temperature, humidity or UV intensity. Use in combination with `date`.
format	String	optional the format the sensor data is returned in. Default value: json Allowed values: "json","geojson"
exposure	String	optional (optional) only return sensors of boxes with the specified exposure. Can be indoor or outdoor Allowed values: "indoor","outdoor"

Post new senseBox method POST

Create a new senseBox. This method allows you to submit a new senseBox.

If you specify `mqtt` parameters, the openSenseMap API will try to connect to the MQTT broker specified by you. The parameter `messageFormat` tells the API in which format you are sending measurements in.

For `json`, the format is:

```
{   "sensorId": <value>,   "sensorId": [<value>,<createdAt>]   ... }
```

For `csv`, the format is:

```
sensorId,value sensorId,value,createdAt ...
```

```
POST /boxes
```

Headers

Name	Type	Description
content-type	String	Should be `application/json` or `application/json; charset=utf-8`

JSON request body

Name	Type	Description
name	String	the name of this senseBox.
grouptag	String	the grouptag of this senseBox.
exposure	String	the exposure of this senseBox. Allowed values: "indoor","outdoor"
boxType	String	the type of the senseBox. Currently only 'fixed' is supported. Allowed values: "fixed"
sensors	Sensor[]	an array containing the sensors of this senseBox.
loc	Location	the location of this senseBox. Must be a GeoJSON Point Feature. (RFC7946)

A single sensor for the nested Sensor parameter

Name	Type	Description
title	String	the title of the phenomenon the sensor observes.
unit	String	the unit of the phenomenon the sensor observes.
sensorType	String	the type of the sensor.
icon	String	optional the visual representation for the openSenseMap of this sensor.

Settings for a senseBox connected through MQTT

Name	Type	Description
enabled	Boolean	enable or disable mqtt Default value: false
url	String	the url to the mqtt server.
topic	String	the topic to subscribe to.
messageFormat	String	the format the mqtt messages are in. Allowed values: "json","csv"
decodeOptions	String	a json encoded string with options for decoding the message. 'jsonPath' for 'json' messageFormat.
connectionOptions	String	a json encoded string with options to supply to the mqtt client (https://github.com/mqttjs/MQTT.js#client)

Error Response

Error-Response:

```
HTTP/1.1 415 Unsupported Media Type
{"code":"NotAuthorized","message":"Unsupported content-type. Try application/json"}
```

Update a senseBox: Image and sensor names method PUT

Modify the specified senseBox.

```
PUT /boxes/:senseBoxId
```

Headers

Name	Type	Description
x-apikey	String	the secret API key which corresponds to the `senseBoxId` parameter.
content-type	String	Should be `application/json` or `application/json; charset=utf-8`

JSON request body

Name	Type	Description
description	String	the updated description of this senseBox.
image	String	the updated image of this senseBox encoded as base64 data uri.
name	String	the name of this senseBox.

grouptag	String	the grouptag of this senseBox.
exposure	String	the exposure of this senseBox. Allowed values: "indoor","outdoor"
boxType	String	the type of the senseBox. Currently only 'fixed' is supported. Allowed values: "fixed"
sensors	Sensor[]	an array containing the sensors of this senseBox.
loc	Location	the location of this senseBox. Must be a GeoJSON Point Feature. (RFC7946)

A single sensor for the nested Sensor parameter

Name	Type	Description
title	String	the title of the phenomenon the sensor observes.
unit	String	the unit of the phenomenon the sensor observes.
sensorType	String	the type of the sensor.
icon	String	optional the visual representation for the openSenseMap of this sensor.

Settings for a senseBox connected through MQTT

Name	Type	Description
enabled	Boolean	enable or disable mqtt Default value: false
url	String	the url to the mqtt server.
topic	String	the topic to subscribe to.
messageFormat	String	the format the mqtt messages are in. Allowed values: "json","csv"
decodeOptions	String	a json encoded string with options for decoding the message. 'jsonPath' for 'json' messageFormat.
connectionOptions	String	a json encoded string with options to supply to the mqtt client (https://github.com/mqttjs/MQTT.js#client)

Parameter

Name	Type	Description
:senseBoxId	String	the ID of the senseBox you are referring to.

Error Response

Error-Response:

```
HTTP/1.1 403 Forbidden
{"code":"NotAuthorized","message":"ApiKey is invalid or missing"}
```

Error-Response:

```
HTTP/1.1 415 Unsupported Media Type
{"code":"NotAuthorized","message":"Unsupported content-type. Try application/json"}
```

Delete a senseBox and its measurements method DELETE

```
DELETE /boxes/:senseBoxId
```

Headers

Name	Type	Description
x-apikey	String	the secret API key which corresponds to the `senseBoxId` parameter.

Parameter

Name	Type	Description
:senseBoxId	String	the ID of the senseBox you are referring to.

Error Response

Error-Response:

```
HTTP/1.1 403 Forbidden
{"code":"NotAuthorized","message":"ApiKey is invalid or missing"}
```

Download the Arduino script for your senseBox method GET

```
GET /boxes/:senseBoxId/script
```

Headers

Name	Type	Description
x-apikey	String	the secret API key which corresponds to the `senseBoxId` parameter.

Parameter

Name	Type	Description

:senseBoxId	String	the ID of the senseBox you are referring to.

Error Response

Error-Response:

```
HTTP/1.1 403 Forbidden
{"code":"NotAuthorized","message":"ApiKey is invalid or missing"}
```

Interpolation ---

Get a Inverse Distance Weighting Interpolation as FeatureCollection

Retrieve a JSON object containing

- `breaks` : an array containing equal distance breaks. use `numClasses` parameter to control how many breaks to return
- `featureCollection` : a GeoJSON FeatureCollection with a computed Inverse Distance Interpolation for a certain region of interest and phenomenon.

The properties of each feature in the featureCollection is an object with ISO8601 timestamps which are the timeSteps. The number of the timesteps can be controlled using the `numTimeSteps` parameter. Values falling inside each timestep are first averaged. Please be aware that requests with (areaSquareKilometers / cellWidth) > 2500 will be rejected.

```
GET /statistics/idw?bbox=7.6,51.2,7.8,51.4&phenomenon=Temperatur
```

Parameter

Name	Type	Description
phenomenon	String	the name of the phenomenon you want to download the data for.
from-date	ISO8601Date	optional Beginning date of measurement data (default: 2 days ago from now)
to-date	ISO8601Date	optional End date of measurement data (default: now)
exposure	String	optional only return sensors of boxes with the specified exposure. Can be indoor or outdoor. Default undecided. Allowed values: indoor,outdoor
gridType	String	optional The type of the grid for IDW calculation Default value: hex Allowed values: hex,square,triangle
cellWidth	Number	optional The width of the grid cells in kilometers. Must be positive Default value: 50
power	Number	optional The power of the IDW calculation Default value: 1

		Allowed values: 1-9
numTimeSteps	Number	optional Return this many timesteps between `from-date` and `to-date` Default value: 6 Allowed values: 1-10
numClasses	Number	optional Number of classes in the breaks array. Must be positive Default value: 6
bbox	String	A bounding box containing 4 WGS84 coordinates separated by comata (,). Order is longitude, latitude and southwest, northeast.

Measurements ---

Post new measurement method POST

Posts a new measurement to a specific sensor of a box.

```
POST /boxes/:senseBoxId/:sensorId
```

Headers

Name	Type	Description
content-type	String	Should be `application/json` or `application/json; charset=utf-8`

JSON request body

Name	Type	Description
value	String	the measured value of the sensor. Also accepts JSON float numbers.
createdAt	ISO8601Date	optional the timestamp of the measurement. Should be parseable by JavaScript.

Parameter

Name	Type	Description
:senseBoxId	String	the ID of the senseBox you are referring to.
:sensorId	String	the ID of the sensor you are referring to.

Error Response

Error-Response:

```
HTTP/1.1 415 Unsupported Media Type
{"code":"NotAuthorized","message":"Unsupported content-type. Try application/json"}
```

Get latest measurements of a senseBox method GET

Get the latest measurements of all sensors of the specified senseBox.

```
GET /boxes/:senseBoxId/sensors
```

Parameter

Name	Type	Description
:senseBoxId	String	the ID of the senseBox you are referring to.

Get the 10000 latest measurements for a sensor method GET

Get up to 10000 measurements from a sensor for a specific time frame, parameters `from-date` and `to-date` are optional. If not set, the last 48 hours are used. The maximum time frame is 1 month. If `download=true` `Content-disposition` headers will be set. Allows for JSON or CSV format.

```
GET /boxes/:senseBoxId/data/:sensorId?from-date=fromDate&to-datetoDate&download=true&format=json
```

Parameter

Name	Type	Description
from-date	ISO8601Date	optional Beginning date of measurement data (default: 48 hours ago from now)
to-date	ISO8601Date	optional End date of measurement data (default: now)
format	String	optional Can be 'json' (default) or 'csv' (default: json) Default value: json Allowed values: "json","csv"
download	Boolean	optional if specified, the api will set the `content-disposition` header thus forcing browsers to download instead of displaying. Is always true for format csv. Allowed values: "true","false"
:senseBoxId	String	the ID of the senseBox you are referring to.
:sensorId	String	the ID of the sensor you are referring to.
separator	String	optional Only for csv: the separator for csv. Possible values: `comma` for comma as separator, everything else: semicolon. Per default a semicolon is used. Alternatively you can use delimiter as parameter name. Allowed values: "comma"

Delete measurements of a sensor method DELETE

This method allows to delete measurements for the specified sensor. Use the request body to specify which measurements should be deleted.

```
DELETE /boxes/:senseBoxId/:sensorId/measurements
```

Headers

Name	Type	Description
x-apikey	String	the secret API key which corresponds to the `senseBoxId` parameter.
content-type	String	Should be `application/json` or `application/json; charset=utf-8`

JSON request body

Name	Type	Description
from-date	ISO8601Date	optional Beginning date of measurement data (no default)
to-date	ISO8601Date	optional End date of measurement data (no default)
timestamps	ISO8601Date[]	optional Allows to specify timestamps which should be deleted
deleteAllMeasurements	Boolean	optional Specify `deleteAllMeasurements` with a value of `true` to delete all measurements of this sensor Default value: false Allowed values: true,false

Parameter

Name	Type	Description
:senseBoxId	String	the ID of the senseBox you are referring to.
:sensorId	String	the ID of the sensor you are referring to.

Error Response

Error-Response:

```
HTTP/1.1 403 Forbidden
{"code":"NotAuthorized","message":"ApiKey is invalid or missing"}
```

Error-Response:

```
HTTP/1.1 415 Unsupported Media Type
{"code":"NotAuthorized","message":"Unsupported content-type. Try application/json"}
```

Get latest measurements for a phenomenon as CSV method GET,POST

Download data of a given phenomenon from multiple selected senseBoxes as CSV

```
GET,POST /boxes/data?boxid=:senseBoxIds&from-date=:fromDate&to-date:toDate&phenomenon=:phenomenon
```

Parameter

Name	Type	Description
senseBoxIds	String	Comma separated list of senseBox IDs.
phenomenon	String	the name of the phenomenon you want to download the data for.
from-date	ISO8601Date	optional Beginning date of measurement data (default: 2 days ago from now)
to-date	ISO8601Date	optional End date of measurement data (default: now)
columns	String	optional (optional) Comma separated list of columns to export. If omitted, columns createdAt, value, lat, lng are returned. Possible allowed values are createdAt, value, lat, lng, unit, boxId, sensorId, phenomenon, sensorType, boxName, exposure. The columns in the csv are like the order supplied in this parameter Default value: createdAt,value,lat,lng
exposure	String	optional (optional) only return sensors of boxes with the specified exposure. Can be indoor or outdoor Allowed values: "indoor","outdoor"
separator	String	optional Only for csv: the separator for csv. Possible values: `comma` for comma as separator, everything else: semicolon. Per default a semicolon is used. Alternatively you can use delimiter as parameter name. Allowed values: "comma"
bbox	String	A bounding box containing 4 WGS84 coordinates separated by comata (,). Order is longitude, latitude and southwest, northeast.

Post multiple new measurements method POST

Post multiple new measurements in multiple formats to a box. Allows the use of csv, json array and json object notation.

CSV:
For data in csv format, first use `content-type: text/csv` as header, then submit multiple values as lines in `sensorId,value,[createdAt]` form. Timestamp is optional. Do not submit a header.

JSON Array:
You can submit your data as array. Your measurements should be objects with the keys `sensor`, `value` and optionally `createdAt`. Specify the header `content-type: application/json`.

JSON Object:
The third form is to encode your measurements in an object. Here, the keys of the object are the sensorIds, the values of the object are either just the `value` of your measurement or an array of the form `[value, createdAt]`

For all encodings, the maximum count of values in one request is 2500.

```
POST /boxes/:boxId/data
```

Parameter

Name	Type	Description
:senseBoxId	String	the ID of the senseBox you are referring to.

Misc ---

Get some statistics about the database 

returns an array with three numbers which denominates the count of senseBoxes, the count of measurements and the count of measurements in the last minute.

```
GET /stats
```

Success Response

[8,13, 2]

```
[8,13, 2]
```

Users ---

confirm email address 

confirm email address to the system

```
POST /users/confirm-email
```

Parameter

Name	Type	Description
email	String	the email of the user to confirm
token	String	the email confirmation token which was sent via email to the user

Success 200

Name	Type	Description
code	String	`Ok`

message	String	

reset password with passwordResetToken method POST

reset password with token sent through email

```
POST /users/password-reset
```

Parameter

Name	Type	Description
email	String	the email of the user to reset
password	String	new password. needs to be at least 8 characters
token	String	the password reset token which was sent via email to the user

Success 200

Name	Type	Description
code	String	`Ok`
message	String	`Password successfully changed. You can now login with your new password`

Register new method POST

Register a new openSenseMap user

```
POST /users/register
```

Parameters for creating a new openSenseMap user

Name	Type	Description
firstname	String	the firstname or nickname of the user.
lastname	String	optional the lastname of the user.
email	String	the email for the user. Is used for signing in and for sending the arduino sketch.
password	String	the desired password for the user. Must be at least 8 characters long.
language	String	optional the language of the user. Used for the website and mails Default value: en_US

Created 201

Name	Type	Description
code	String	`Created`
message	String	`Successfully registered new user`
token	String	valid json web token
data	Object	`{ "user": {"firstname":"firstname","fullname":"firstname","email":"test@test.de","role":"user","language" []} }`

request password reset method POST

request a password reset in case of a forgotten password. Sends a link with instructions to reset the users password to the specified email address. The link is valid for 12 hours.

```
POST /users/request-password-reset
```

Parameter

Name	Type	Description
email	String	the email of the user to request the password reset for

Success 200

Name	Type	Description
code	String	`Ok`
message	String	`Password reset initiated`

Sign in method POST

Sign in using email and password. The response contains a valid JSON Web Token

```
POST /users/sign-in
```

Parameter

Name	Type	Description
email	String	the email of the user
password	String	the password of the user

Success 200

Name	Type	Description
code	String	`Authorized`
message	String	`Successfully signed in`
token	String	valid json web token
data	Object	`{ "user": {"firstname":"firstname","lastname":"last", "fullname":"firstname last","email":"test@test.de","role":"user","language":"en_US","boxes":[]} }`

Sign out method POST

Sign out using a valid JSON Web Token. Invalidates the current JSON Web Token

```
POST /users/sign-out
```

Headers

Name	Type	Description
Authorization	String	allows to send a valid JSON Web Token along with this request with `Bearer` prefix.

Success 200

Name	Type	Description
code	String	`Ok`
message	String	`Successfully signed out`