

Near real time assessment with low-cost sensors (FAIRMODE CT6)

Analysis of sensor data

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Meeting

Representatives from ISSeP, Northumbria University, INERIS, University of Aveiro, VITO, JRC, University College Cork, VMM and RIVM

Presentations

Stig Hellebust (University College Cork) has been looking at structures in the calibrated sensors. Sensors can be classified as follows:

- I) near multiple official locations,
- II) near only one official location and
- III) no nearby official locations.

There are patterns in the changes from hour to hour. The sensors can be clustered (Kmeans algorithm) after which the sensors in each cluster are calibrated using the value for the cluster mean. In general, the correction/calibration should not rely on full history of the sensors, there should be an independent hourly correction. But, it may be worthwhile to check on the use of the calibration of the previous hour as a first estimate for the present hour.

Vera Rodrigues (University of Aveiro) started converting the R script with the NL method into other methods, verifying the results. Several questions have come up regarding the amount of data that is available for estimating the calibration of the sensors. An example is the temporal profile of the calibration factors of sensors. In general we could use information about station classification, land use, meter data, etc.. Provided there is enough data AI methods can be used.

David Roet (VMM) discussed the data that has been obtained in the VACUUMS project (www.vacuums.eu). The project generated fact sheets with behaviour of sensors that can be used in CT6. The focus of work at VMM will be more the local hot-spots and phenomena, like wood burning. For this, they are looking at hierarchical clustering, validation (select the good sensors) and auto peak detection. The roughly 800 Sensor.Community sensors in Belgium clearly showed the effects of a recent forest fire in April 2021.

Pascal Joassin (ISSeP) further elaborated the method to look at sensors that are in the neighbourhood of several official stations. For these sensors correction parameters are estimated. The sensors are corrected using the information obtained for that specific sensor, not average values using other sensors also. For several day in May, the calibrated sensor data are used in a data fusion with the official Dutch data. The influence of the sensors is found to be limited due to the selection of sensors close to official stations and the calibration.

Conference at UC Davis Air Quality Research Center

After the presentations, we discussed the upcoming conference " Meteorology and Climate Modeling for Air Quality Conference to be hosted virtually by the UC Davis Air Quality Research Center, September 14-17, 2021", <https://macmaq.aqrc.ucdavis.edu/>. We are accepted to give a 10-minute presentation about the status of the FAIRMODE/CT6 work in the "Merging models with observations" section. The preliminary schedule has presentations in this section on Thursday, September 16th, 08:00-11:15 AM (Pacific Time), 04:00-07:15 PM (UK Time). We will have to provide a pre-recorded presentation as an MP4 file, due to the organisation on September 7th. There are Q&A sessions at the end of July, which I will attend. As soon as more information is available, I will let you know.

The basic idea we discussed is to have a general introduction of FAIRMODE and CT6, followed by several sheets with the approaches of different groups in CT6. The details have to be discussed. RIVM will draft a template sheet.

Next meetings

September, 7, 2021, to discuss the presentation.

September, 28, 2021, to discuss input to the FAIRMODE technical meeting.

We can invite some people from the AQUILA community or from CEN/WG42 for the second September meeting.

Tentative Schedule 2021-2022

An updated version of the actions for the upcoming two years is as follows.

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| 2021 Jan-Oct: | Work on benchmarks, regular meetings of CT6. <ul style="list-style-type: none">- Test/improve present techniques.- Develop/test new approaches.- Apply to other data sets.- ... |
| 2021 Feb: | All parties involved “play” with the data. |
| 2021 Mar: | Report proces at FAIRMODE plenary meeting.
If possible, initial results will be presented. |
| 2021 Mar: | Next technical CT6 meeting on the web.
RIVM will plan a next meeting in the second half of March. |
| 2021 April: | Show & Tell meeting. |
| 2021 June: | Show & Tell meeting. |
| 2021 Sep: | Prepare for “Conference at UC Davis Air Quality Research Center”,
discuss input Technical Meeting FAIRMODE.
Invite people from AQUILA? |
| 2021 Oct: | Technical results/feedback in a CT6 session of the
FAIRMODE technical meeting. |
| 2022 Summer: | Write article? |