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Project consortium SmartAQnet – Aerosol Akademie

Newsletter SmartAQnet

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Newsletter September 18 Smart Air Quality Network

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Project management

Collaboration activities provide first success

The collaboration activities, which were, are and furthermore will be performed by the project consortium provide the first successful contract conclusion: KIT IMK-IFU finalized a sub-contract with the “Zentrum für angewandte Energieforschung Bayern” (ZAE Bayern). The collaboration work package contains e.g. calculation of household heating missions together with the Kaminkehrerinnung Schwaben – Augsburg for the development of the emission inventory of the dispersion models GRAL and PALM4U as well as the statistical models.

First results will be presented – as soon as they are available – within the upcoming newsletters. Furthermore, they shall contribute to the 1-year project reports as well.

Data mining and campaigns

The SmartAQnet project consortium is delighted to announce that in middle of September 2018 our first intensive operation program (IOP) will start. Within this measuring campaign, the consortium wants to gain a huge amount of measuring data and gain a lot experience as well by the combination of all different measuring methods. All results gained within the measuring campaign shall be presented within the second SmartAQnet workshop, taking place from 04 to 05 December 2018. More information about the workshop can be found within the chapter “Data oriented dissemination and application”.

As some of the latest preparations for the IOP, IMK-IFU installed the ceilometer CL31 at the same place as the ceilometer CL51 at IGUA on 07 August. Furthermore, on 17 September, the ceilometer CL31 will be installed in the North-South profile in Augsburg at Klostergarten.

Beside the mechanical preparations, KIT TECO has proposed a first draft of the data modelling of Grimm devices within the Sensorthings standard and demonstrated the upload of CSV based data to the data infrastructure.

The project consortium will keep you informed about all relevant IOP news via newsletter, homepage and twitter.

Data collection and devices

The final preparations for the upcoming IOP are still running. Already finalized is the assembly of three low-cost sensors by KIT TECO. These low-cost sensors (see Figure 1 to Figure 2) can be combined with the mobile measurement efforts of HMGU and furthermore can be controlled with an Android Smartphone using Bluetooth Low Energy services. The devices are currently being shipped to HMGU in order to arrive before the start of the IOP.

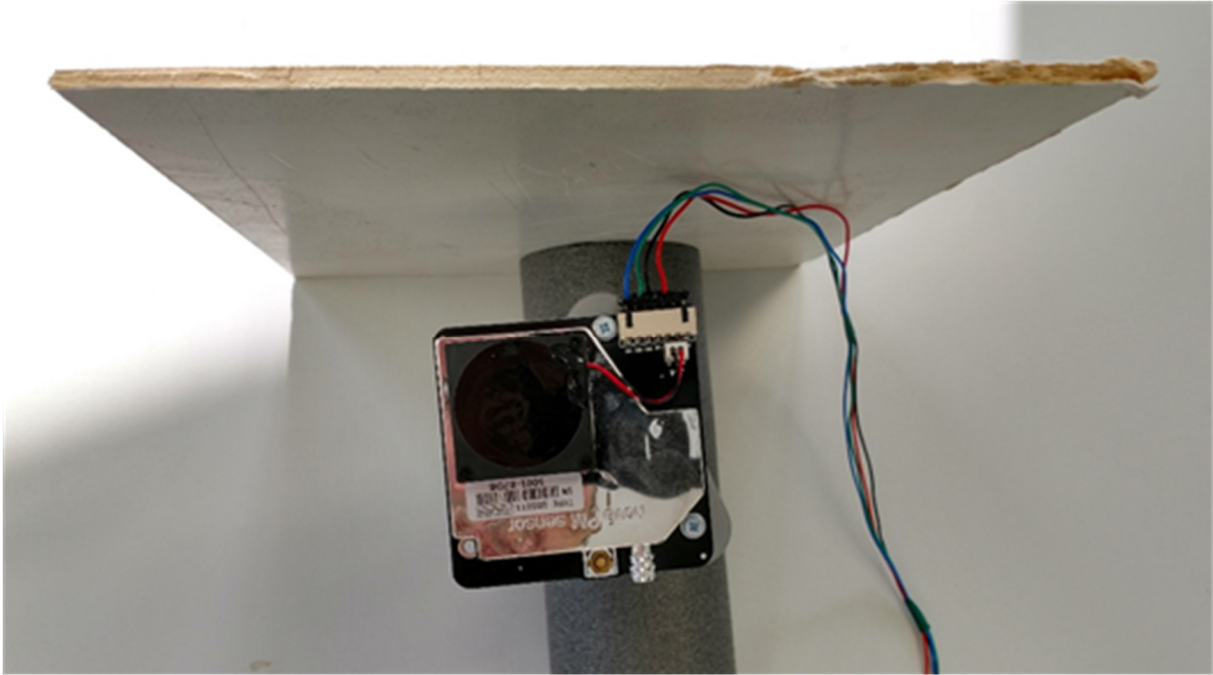


Figure 1: Picture of the low-cost sensor assembled by KIT TECO, (Picture: KIT TECO)

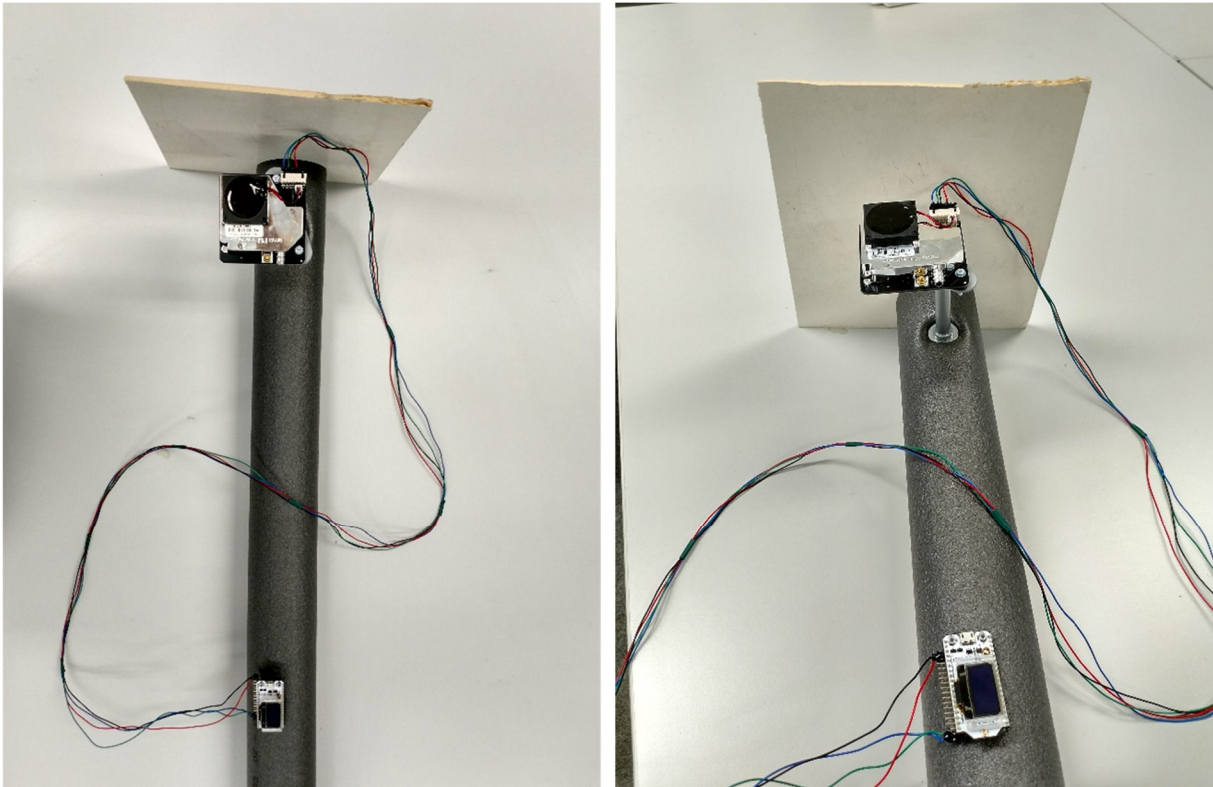


Figure 2: Total views of the assembled low-cost sensor (Picture: KIT TECO)

Data aggregation and analyses

As a part of SmartAQnet, remote sensing and numerical simulations shall be implemented within the working period. Based on historical data from 2012 by Ulrich Uhrner, TU Graz, and Johannes Werhahn, KIT/IMK-IFU, numerical simulations of the wind field by GRAMM and the PM10 concentrations by GRAL were successfully performed. The results are shown in Figure 3.

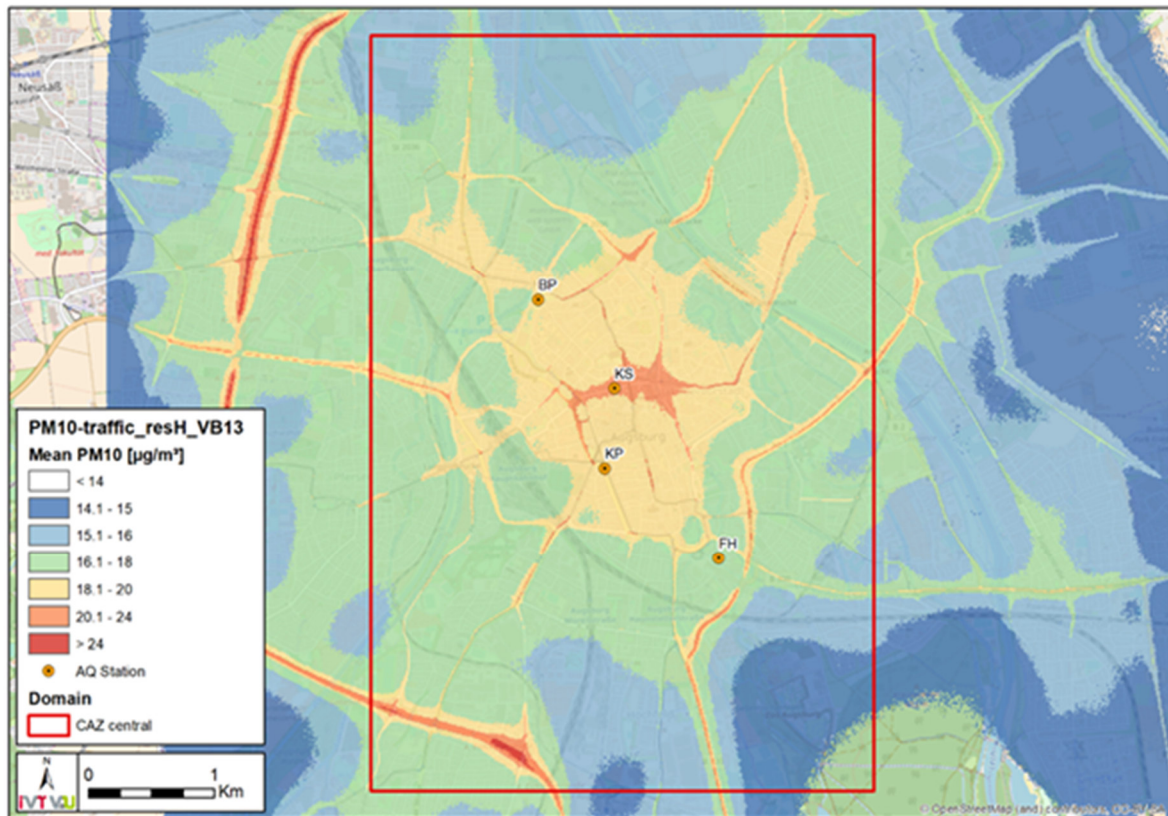


Figure 3: PM10 concentrations by LV & HDV exhaust & non-exhaust as well as residential heating (adjusted for background concentrations of $13 \mu\text{g}/\text{m}^3$)

Moreover, the numerical simulations have been compared with measuring data of the state air quality monitoring (LÜB) stations. As visualised in the preliminary results in Figure 4, there is a good agreement for annual mean data in 2017 (the abbreviations are like follows: BP – Bourgesplatz, KS – Karlstrasse, KP – Königsplatz, LfU – Landesamt für Umwelt, LfUW – weather station at Landesamt für Umwelt):

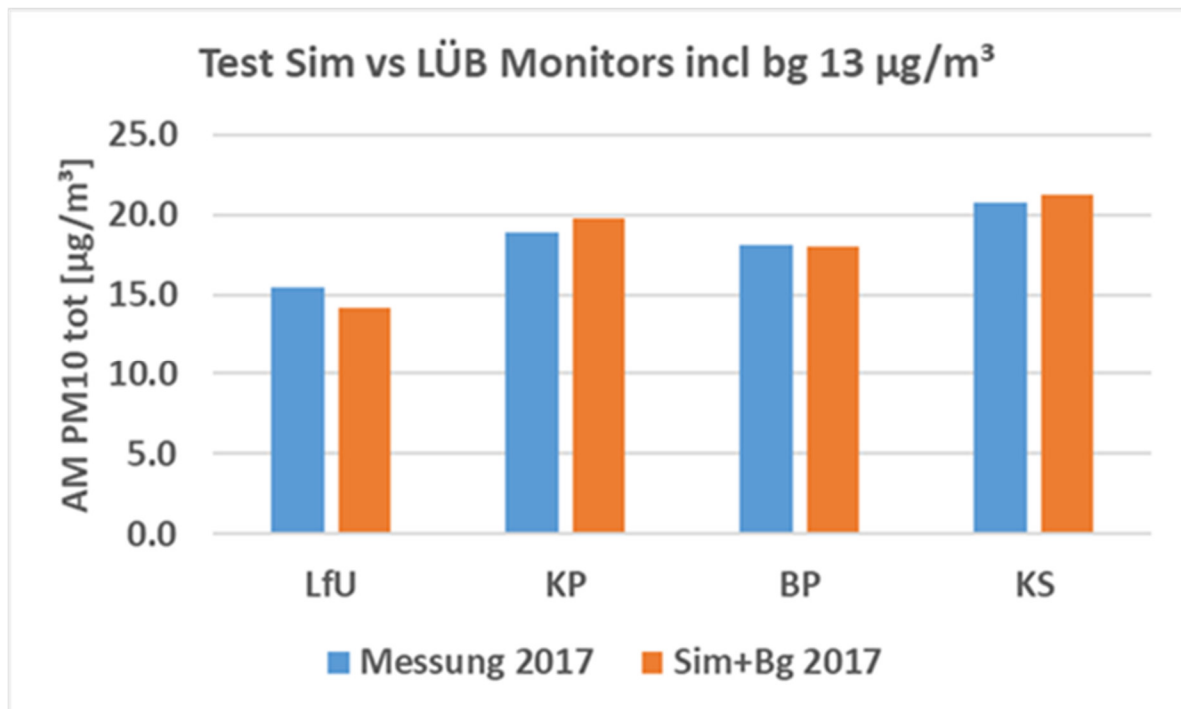


Figure 4: Comparison of numerical simulations with the measuring data at the state air quality monitoring (LÜB) stations

These numerical simulations will be continued with actual emission data from traffic modelling and residential heating to compare measurement data with results of small-scale chemistry-transport modelling for evaluation of data from multilayer, heterogeneous measurement network for air pollutants, of background conditions, initialisation and model validation as well as to reduce space-time gaps of personal exposure in the new measurement network. More about these results will follow again within the upcoming newsletters.

Data application

Now, there are no news available. However, we will keep you informed.

Data oriented dissemination and application

Hans Grimm, Christa Schmidt, Stefan Hinterreiter (all Aerosol Akademie) and Klaus Schäfer (IMK-IFU) taking care about the prearrangement of the external workshop, which is planned for winter 2018. The workshop will last two day (04 and 05 December) and is dedicated to partners taking care of SmartAQnet-related topics like e. g. operating a wide-spread distributed PM-measuring network, investigation of high-resoluted spatial-temporal distribution of PM, Internet of Things Stack using the latest Smart Data technologies and so on. More information will follow within the next newsletters.

Besides the organising activities, the project consortium managed the apply for a publication: A manuscript for the Proceedings of SPIE (combined with an oral presentation at the conference)

“Remote Sensing of Clouds and the Atmosphere” (SPIE Europe, Berlin, Germany, 10 – 13 September 2018) was accepted. The authors and the title are as follows:

J. Redelstein, M. Budde, J. Cyrus, S. Emeis, T. Gratzka, H. Grimm, M. Hank, S. Hinterreiter, C. Münkel, M. Pesch, E. Petersen, A. Philipp, T. Riedel, J. Riesterer, K. Schäfer, J. Schnelle-Kreis, U. Uhrner, J. Werhahn, V. Ziegler, M. Beigl: Smart Air Quality network for spatial high-resolution monitoring in urban area.

Further information

Aerosol Akademie

Dr. Stefan Hinterreiter will leave the Aerosol Akademie by end of September. The responsibilities of the Aerosol Akademie are clearly appointed on Christa Schmidt, Fred Keller, Klaus Schäfer and Hans Grimm. Furthermore, the replacement of Dr. Stefan Hinterreiter is running and a successor will be presented as soon as possible.