



The challenge of using high-resolution crowdsourcing data from vehicle sensors for a comprehensive observation network

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The German National Meteorological Service (DWD) and the German car manufacturer AUDI AG are partner in the new research project called FloWKar (FlottenWetterKarte), which is supported by the German Federal Ministry for Transport and Digital Infrastructure (BMVI). The main project aim is evaluating the potential of car sensor data with respect to weather service standards.

For DWD, the goal is to assess how, in combination with existing data sources, real-time environmental data from the large number of passenger cars on Germany's roads can be used in order to improve weather products, nowcasting, and weather model forecasts. The observations on-board passenger vehicles, which mostly relate to the operation of the vehicles, but also include environmental data, for instance temperature, pressure, precipitation, or visibility, will help to fill gaps between existing in-situ observations such as weather stations and road weather stations. On the other hand, for the AUDI AG the goal is to assess all possible environmental conditions necessary to gauge driving safety and to lay the foundations for safe autonomous driving.

In order to respect data protection laws (General Data Protection Regulation GDPR), major challenges with respect to data acquisition from passenger cars have to be considered before using the data for the above-mentioned use cases. After a technical transfer control at DWD, a plausibility control of the incoming data is necessary, based on simple criteria, e.g., plausible minimum and maximum values.

After that first order of quality control, the accuracy of the data against station measurements has to be verified in order to smoothly integrate the car sensor data into the existing processing chain of nowcasting and model forecasts. Bias, correlation and dependencies between the different measured variables have to be studied on the basis of the different weather conditions in order to obtain a benefit of using this crowdsourced data in the existing modeling and nowcasting procedures. As crowdsourced data will be available from different cars, different sensor models as well as placed in different locations around the cars, many degrees of freedom for data quality and accuracy have to be studied.

This mandates a close cooperation between DWD and the AUDI AG, who processes the raw sensor data for meteorological use. Also the planned aggregation of data before delivery to DWD in an operational setting – due to GDPR – will require statistical algorithms to be implemented on the servers of AUDI AG. The resulting weather products based on model forecasts and nowcasting, enhanced by the car sensor data, will be available via GeoWebServices. The benefit of crowdsourcing data for the above mentioned goals remains a very active and exciting field.