

CS-MASK

Crowd-Sourced data for atmospheric Modelling At Sub-Kilometric scale

DURATION
15/12/2020 - 15/03/2025

BUDGET
321 280 €

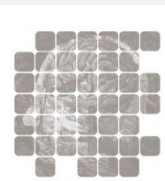
PROJECT DESCRIPTION

Extreme weather and climate events represent major societal risks, both for human health and for economic activity. For instance, Belgian insurance companies estimated the total of the damage claims due to the so-called Pentecost storm in 2014 at about 650 million EUR. In a recent study RMI estimated for the 2075-2099 period an increase in the number of heatwaves in the Brussels Capital Area with a factor of three to four. Weather forecasters, who inform the population on when and how to take measures, critically rely on numerical weather prediction (NWP) models to predict such extreme weather events. Climate impact studies are performed with high-resolution regional climate models that are of the same type as the NWP models. RMI is contributing to the development of the weather and climate models that are the most important tools to address these societal needs, and has even taken a leading role in a few aspects of these activities.

This research project delivering the first NWP experiments at hectometric scales over Belgium will allow the RMI to be at the forefront of the international modelling community. By using crowdsourced (CS) data for the evaluation of the hectometric runs, RMI is also taking a major step forward on investigating the potential of novel meteorological data sources.

Over the past decade more CS data became available, through the use of cheap sensor data available in real-time (Internet of Things technology) that are built in various applications (e.g. in cars) or that are collected by amateur weather stations, in citizen science projects (e.g. Vlinder project), etc. While they are far less reliable and accurate than the professional observations, they are abundantly available, can give spatial representations with very high resolutions and provide information on environments where we do not have traditional weather observations. CS-MASK will investigate the added value of non-traditional weather observations, not only to evaluate weather forecasts but also to develop high-resolution urban heat island (UHI) maps.

This project will deliver the following scientific results. In the initial phase, a quality control (QC) procedure will be developed in order to make the existing CS datasets (WOW, VLINDER,...) useable. At a hectometric scale an improved representation of the land-atmosphere interactions might lead to better forecasts but only if detailed and accurate land information (land cover, building height,...) is used. Therefore we will evaluate which global, regional or local land information database is most advantageous for hectometric runs over Belgium. Secondly, ALARO-SURFEX runs at 700 m resolution will be undertaken. August 2020, a month including some interesting high-impact weather events over Belgium, is selected as a case study to evaluate (based on the earlier developed QC CS database) the added value of these hectometric runs. Thanks to the significant fraction of urban observations in the CS data, this project provides a unique opportunity to experiment with the Town Energy Balance scheme that is used within SURFEX to model the urban-atmosphere interactions. Finally, UHI maps at different resolutions will be produced for Belgian cities for the August 2020 heatwave.



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The project is of large strategic importance for the RMI whose mission consists of providing accurate meteorological information over Belgium. In order to continue to offer the best forecasts in the future, the Institute needs to prepare for the milestone of sub-kilometre weather modelling. This project represents a first exploration of such predictions for the RMI and makes the Institute one of the pioneers in the field of high-resolution modelling. The scientific ambitions of the project are outspoken and the outcomes will be highly relevant for the atmospheric modelling community. The delivery of high-resolution UHI maps for Belgian cities is in line with the Institute's ambition to provide climate services. These maps will be highly relevant for urban climate stakeholders (city planners, policy makers of local, regional or federal administrations, as well as companies). Finally, the successful use of CS data for weather forecasting could also convince Belgian citizens and local authorities to share more weather measurements.

Scientific valorization will happen via the traditional channels e.g. peer-reviewed journal publications, participation at international conferences and workshops and a PhD thesis. A workshop for urban climate stakeholders is planned and, given the link of the promoters with academia, the project will also impact university education. Finally, communication to the general public will take place via the traditional RMI channels (e.g. news updates on website) and participation in science-promoting events.

CONTACT INFORMATION

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