ECMWF COPERNICUS REPORT

Copernicus Atmosphere Monitoring Service

Report on User Engagement Activities

CAMS2_72_NL_TNO - NCP

Issued by: TNO / Diane Petillon

Date: 31/12/2024

CAMS2_D72.0.3.7_202412_Report on User Engagement Activities_v1

Official reference number service contract: 2023/CAMS2_72_TNO_SC1

PROGRAMME OF THE EUROPEAN UNION

IMPLEMENTED BY ECMWF

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1. Overview of the User Engagement Activities of the contract in the framework of the CAMS NCP

We have conducted the following activities, in line with the project plan, to improve the user engagement at national level in the framework of the CAMS NCP:

- Meetings and discussions with RIVM (as a prime user of CAMS data in the Netherlands)
- CAMS downscaled source apportionment workshop

We have the following strategy for the next phase of the project:

- Strengthen collaboration with prime user RIVM through inclusion of RIVM as official project partner in the WPs on Communication and Demonstrator
- Diversify our communication channels (social media presence, etc.)

2. Training, Education and Capacity building (if applicable)

The activities related to training, education and more in general capacity building are not applicable to this contract.

2.1 Contribution to Training Materials

This part is not applicable to this contract.

2.2 Participation in Train-the-Trainer events

This part is not applicable to this contract.

2.3 Involvement in MOOCs (Massive Open Online Courses)

This part is not applicable to this contract.

3. Collection of National User Needs and requirements

In this section we provide detailed information on emerging user needs or requirements collected and analyzed during the contract.

3.1 CAMS downscaled source attribution workshop

A list of all the feedback received with respect to user needs and requirements for the current downscaled source attribution service over the Netherlands is provided in the deliverable CAMS2_72_NL_ 202407_ D72.6.3.1_Workshop_report and listed below in section 4. Based on this feedback priorities have been set for future developments which are taking into account for the next phase of the proposal of the CAMS2_72NL project.

3.2 Contribution to the User Requirements Data Base (URDB)

We have filled the URDB on request. We have stated that we organised meetings with the main user (RIVM) and a workshop for existing users and other stakeholders.

3.3 Interaction with the contract CJS_152a "Enhancing User Intelligence for CAMS: User uptake and user requirements activities"(DLR), if applicable

This part is not applicable to this contract.

4. Participation, organization or support to the organization of user related workshops or events

4.1 Participation or organization of national user events (different from events reported in sec. 3.2)

We could collect user feedback from several events. In the table below we list the most important user feedback that has been received in the first phase of CAMS NCP in The Netherlands. It is clear that a lot of detailed user feedback has been provided. Some user feedback were already implemented in the first phase of the CAMS NCP project. The user feedback is being used to define the proposal and anticipated work packages in the next phase of CAMS NCP. Some priority setting might be needed in fulfilling these user needs in the coming years.

During the contract a dedicated CAMS workshop was organized by the team on 22 May 2024 at TNO in Utrecht to collect user feedback on source apportionment and identify the user needs for further development of the downscaled source apportionment tool. More details on the Source apportionment workshop are described in the deliverable CAMS2_72_NL_ 202407_ D72.6.3.1_Workshop_report.

TNO further organised a policy workshop in January 2024, during which the CAMS NCP project was presented and the team attended the CAMS General Assembly in June 2024.

In addition, the team discussion during the CAMS NCP project meetings that were attended regularly by RIVM served as user input for the air quality forecasting work package and provided input to the user needs for further development of the downscaled air quality forecasts in The Netherlands.

Task 7234	**Evaluation of possible uptake of user feedback**		
ID	**Name**	**Description**	**user**
Downscaled air quality forecasts and analyses			
FC-1	Improve quality	Improve the quality of the NL forecasts from LOTOS-EUROS to allow use by RIVM, update modeling system to newest version and ER emissions, align with CAMS Europe runs	RIVM
FC-2	Ozone updates	Provide new ozone forecast update during day	RIVM (Joost Wesseling)
Downscaled source attribution			
SA-1	Up-to-date NL emissions	Update the NL emissions used in the TOPAS-NL to latest available ER emissions	all
SA-2	Woodsmoke contribution	Provide the woodsmoke contribution as separate label	DCMR
SA-3	Increased horizontal resolution	Provide source attribution at 100m resolution, for neighborhoods, regions around Industry, large (point) sources	From NCP-SoAp workshop requests for improvements
SA-4	Documentation	Need for more and clear documentation on how the system works, explanation labels, etc….e.g. boundary what does it mean, info button on dashboard	From NCP-SoAp workshop
SA-5	Improve quality	PM exceedance estimates from TOPAS-NL higher than observed --> reduces trust of users in tool --> evaluate possible sources of bias and define/perform development tasks to improve	From NCP-SoAp workshop
SA-6	Consistency	The information provided should be consistent with information provided by RIVM and measurements to avoid confusion and lack of trust from users	From NCP-SoAp workshop

SA-7	Download options	Need for download options of data (right mouse button), both for stations as well as API server to select location by user, also for more years in the past, parameter for species and time	From NCP-SoAp workshop
SA-8	Extension of time periods	Availability of data for longer time period, for trend evaluation (in connection to SLA)	From NCP-SoAp workshop
SA-8b	Time resolution	Allow multiple options; yearly average, monthly, daily, hour, allow user to select this	From NCP-SoAp workshop
SA-9	User friendliness	Connect to different types of users, make it less technological	From NCP-SoAp workshop
SA-10	Uncertainties	Provide information on uncertainties	From NCP-SoAp workshop
SA-11	Health relevant indicators	Coupling to health relevant indicators such as OP, UFP, particle numbers, …..link to the Clean Air Agreement in the Netherlands	From NCP-SoAp workshop
SA-12	Differentiation type of cars	Split between regular and electrical cars	From NCP-SoAp workshop
SA-13	Differentiation shipping	Split between inland shipping and international shipping	From NCP-SoAp workshop
SA-14	Extension of species/indicators	Extend service to UFP, NOx, CO, O3, BC, NH3, secondary aerosols + precursors (perspective for action), health impacting pollutants (regulated and non-regulated), species with nature impact, species with odour, air quality index	From NCP-SoAp workshop
SA-15	Emission verification	Use differences with observations to verify emissions	
SA-16	Meteorological information	Add wind roses, and other meteo information	

SA-17	Interaction technology	Connect with technological and local policy measures	From NCP-SoAp workshop

4.2 Active participation to the Atmosphere User Forum and CAMS General Assemblies

Several members of the team attended the Atmosphere User Forum in 2023 and 2024, either in Valencia, Brussels or online. The presentations from other national NCP projects were used as inspiration for the next phase of the CAMS NCP project in The Netherlands. Also, user requirements feedback from other countries on CAMS services were discussed (such as the need for higher resolution source apportionment) and these are under consideration for further application development.

5. Collection of use cases and user testimonials (if applicable)

We provide in this section a summary on collected use cases and user testimonials of how the NCP activities have demonstrated value or impacts related to new operating practices arising from the funded activity or any other engagement activities you would like to underline as successful.

5.1 Gathering and Providing Use Cases and User Testimonials

During the Atmosphere User Forum in January 2024 organized by ECMWF, RIVM has presented the use of CAMS data at RIVM for the health hub (i.e. health-related application of the CAMS Services). The summary of the presentation is the following:

- RIVM has a legal task to inform the public on air quality; past, present and (near) future.
- RIVM provides data on air quality to the public on the internet: luchtmeetnet.nl .
- Since August 2023, results from CAMS models are used as the basis for air quality forecasts, and to visualize the uncertainty.
    - Presently, SILAM is used for the hourly figures presented to the public.
    - Hourly results of LOTOS-EUROS, CHIMERE, EMEP, SILAM and the Ensemble are used to estimate the uncertainty of the forecasts for all substances.
- CAMS products have been used for several projects:
    - 2022 Olympic winter games in Beijing.
    - Used CAMS data to estimate the ratio of column and ground concentration for NO2, using TROPOMI data.
    - Combined CAMS results with hourly PM2.5 fields from sensors.
- Needs of RIVM regarding Air quality information
    - High-quality forecasts of concentration levels, at least 3-4 days ahead.
    - Communication of warnings or alarms needs a relatively good forecast of the timing of high concentration levels.
    - As warnings and alarms are issued for larger parts of the country (provinces), spatial resolution is less important than temporal resolution.
    - New models should be at least as good as the present CAMS models.
    - Uncertainty is acceptable, as long as it can be quantified.

5.2 Highlighting Successful User Engagement Initiatives

Through the workshop on the downscaled source apportionment we connected to DCMR. Their work has been presented within the national magazine 'Lucht'. An additional article on the downscaled source attribution service is foreseen in the near future.
The workshop furthermore led to a long list of user requirements that helped shaping the work plans of phase 2 of the CAMS2_72NL.

The involvement and collaboration with RIVM as partner within this contract brought up more clearly the different tools used within the NL for source attribution of air pollution. Within the contract we are discussing the differences and purposes of each tool to identify complementarities and positioning of the CAMS downscaled source apportionment tool. In the next phase we propose to make some more detailed comparisons on consistency between the tools, as this has been identified as a worry by users, which might limit the use and uptake of the CAMS tooling.

6. Recommendations and conclusion

6.1 Outlook on Future User Engagement Efforts at national level

The involvement of the prime user RIVM was limited in the first phase due to only in-kind contribution. It appeared important in the next phase of the project that the prime user needs to be more involved, with official management of a work package (Demonstrator) and dedicated budget. This will lead to greater impact of the project regarding user engagement, as the prime user will actively shape the project results. Such role for the prime user will strengthen the collaboration, discussions and final decisions.

6.2 Suggestions for Enhancing User Intelligence and User Engagement Activities in collaboration with ECMWF, including lessons learned and Best Practices

We suggest to continue the organization of the Atmosphere User Forum, so we can learn about user engagement activities of other participating countries.

6.3 Summary of Key Findings and description of the overall results of these activities in terms of user engagement with a comparison to the initial level

The official involvement of the prime user, RIVM, has led to good and improved collaboration and better understanding of their use of CAMS services, their need for future developments, and alignment between all the partners.

7. Appendices (if applicable)

We add in this section all the relevant supporting material showcasing the work described in the previous sections.

7.1 Additional Resources

This part is not applicable to this contract.

7.2 Training Materials

This part is not applicable to this contract.

7.3 Workshop Agendas

We show there the invitation and detailed program of the Downscaled Source Apportionment Workshop organized in Q2 2024.

Figure 1: Workshop invitation sent to targeted audience.

Table 1: Detailed program

Time	Session	Information
09:00 – 09:30	**Walk in**	
09:30 - 09:45	**Welcome by CAMS NCP**	Includes introduction about CAMS (available services) and CAMS-NCP (what it is, how it relates to CAMS etc.)
09:45-10:15	**Introduction guests**	Guests introduce themselves. They also prepared a question on what they want to take from workshop and prior knowledge. Discuss both.
10:15-10:45	**Source apportionment presentation**	What is source apportionment, how can it be used. Includes some slides on European CAMS source apportionment and what can be found here. Link with downscaled version for Netherlands.
10:45 – 11:00	**Coffee break**	
11:00 – 11:15	**Use case presentations**	Two current users will give a short introduction about how they use the downscaled source apportionment services.
11:15 – 12:30	**Interactive session**	Interactive session, including pop-corn style and post-it notes on flip charts. Both focus on some specific topics (such as labelling, compounds included, timeseries) as well as more general/broader discussion.
12:30-13:30	**Round up and lunch**	Round up with a clear take-home message, followed by networking lunch.

7.4 User Testimonial

See the user testimonial of RIVM in chapter 4 of the deliverable D72.0.3.6 Report on Impact and Sustainability Analysis.
Moreover, the presentation give by RIVM in the Atmosphere User Forum can be found here: CopernicusECMWF_RIVM_25jan24b.

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