

SPECIAL PROJECT PROGRESS REPORT

All the following mandatory information needs to be provided. The length should *reflect the complexity and duration* of the project.

Reporting year 2025

Project Title: Assessment of model responses to emission changes in the frame of the FAIRMODE CT9 platform

Computer Project Account: spcrgasp

Principal Investigator(s): Goran Gašparac

Affiliation: Croatia Control Ltd

Name of ECMWF scientist(s) collaborating to the project (if applicable) -

Start date of the project: 1.1.2024.

Expected end date: 31.12.2026.

Computer resources allocated/used for the current year and the previous one (if applicable)

Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)	5 000 000	-	5 000 000	-
Data storage capacity	(Gbytes)	3000	-	6000	-

Summary of project objectives (10 lines max)

The goal is to evaluate the robustness of the WRF-Chem model and to address the issue of the sensitivity of model responses to emission changes. This will be done by testing model performance and responses to emission reductions (changes) over urban areas of Croatia. Exercise is a part of Fairmode CT9.

Summary of problems encountered (10 lines max)

As in previous year, emission reduction preparation – general program setup for emission reduction automation in progress. Change of personnel included in project activities – major impact on the delay.

Summary of plans for the continuation of the project (10 lines max)

Major concern was due to change of team – it is expected to regroup team within next few months (include PhD students). The full sensitivity simulations (with 25% and 50% reductions for selected precursors) are planned for the following months. Despite the delay in execution, the groundwork laid during this phase ensures a robust basis for the upcoming analyses.

List of publications/reports from the project with complete references

No publication/reports were done within this period.

Summary of results

If submitted **during the first project year**, please summarise the results achieved during the period from the project start to June of the current year. A few paragraphs might be sufficient. If submitted **during the second project year**, this summary should be more detailed and cover the period from the project start. The length, at most 8 pages, should reflect the complexity of the project. Alternatively, it could be replaced by a short summary plus an existing scientific report on the project attached to this document. If submitted **during the third project year**, please summarise the results achieved during the period from July of the previous year to June of the current year. A few paragraphs might be sufficient.

During the second reporting period, activities were focused on consolidating the model set-up, verifying input data consistency, and reviewing intermediate outputs from preparatory simulations. Although the full sensitivity analysis for PM and O₃ concentrations has not yet been executed, key steps toward its implementation have been taken. These include:

- Testing and refining the emission reduction automation tool to ensure reliable and repeatable reduction scenarios for SO_x, VOCs, NH₃, and NO_x.
- PMF and CBPF analysis of the air pollution events during year 2015 over urban areas – as a basis for the emission scenario reduction.
- Quality control of meteorological inputs and boundary conditions for the selected simulation year, with particular attention to stability over urban domains.
- Preliminary dry-run simulations (without emission reductions) were conducted to evaluate model stability and performance over the full domain, including Zagreb, Rijeka and Slavonski Brod.