

# 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:** .....  
Global emissions of methane inferred from atmospheric  
inversions modelling technique  
.....

**Computer Project Account:** **SP** ECJRC  
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**Principal Investigator(s):** ...Francesco Graziosi  
.....  
.....

**Affiliation:** European Commission, Joint Research Centre (EC-JRC)  
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**Name of ECMWF scientist(s)  
collaborating to the project  
(if applicable)** .....  
.....

**Start date of the project:** ...01/01/2025.....

**Expected end date:** .....31/12/2028.....

## 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
<b>High Performance Computing Facility</b>	(units)	900.000	80.000		
<b>Data storage capacity</b>	(Gbytes)	2500	1500		

### **Summary of project objectives** (10 lines max)

The aim of the project is to determine global methane fluxes over multiannual analysis using an inverse modeling system. This system is based on the TM5-MP chemical transport model, four-dimensional variational data assimilation inverse modeling, and atmospheric observations. Additionally, the project's purpose is to analyze the relationship between natural parameters, such as temperature and precipitation, and methane fluxes over wetland areas.

### **Summary of problems encountered** (10 lines max)

No significant problems were encountered.

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

...The next steps will be collected the surface based atmospheric observation required to determine the emitted areas over the period of interest. Retrieve two different satellite methane data from GOSAT and TROPOMI. Analys physical parameter such as surface temperature, precipitation from ERA 5 dataset .

### **List of publications/reports from the project with complete references**

### **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 initial months of the project, I established the model chain and gathered a portion of the data inputs necessary for conducting the inverse model. The first stage involved running model simulations at a coarse resolution with observations limited to surface-based background data. These initial simulations allowed us to test the fundamental functionality of the model and ensure its stability under various conditions. Additionally, sensitivity tests were performed on different a priori emission fields to evaluate how changes in input assumptions affect model outputs. This groundwork is essential for refining the model and enhancing its accuracy in predicting methane fluxes. Moving forward, we plan to integrate a broader dataset and increase the resolution of the simulations to improve the model's precision and reliability.