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	2026
Project Title:	Alternative schemes to advance seamless weather prediction
Computer Project Account:	spgbmong
Principal Investigator(s):	Beatriz Monge-Sanz
Affiliation:	University of Oxford
Name of ECMWF scientist(s) collaborating to the project (if applicable)	Antje Inness (ECMWF), Noureddine Semane (ECMWF), Massimo Bonavita (ECMWF)
Start date of the project:	2026
Expected end date:	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
High Performance Computing Facility	(units)	57.000.000	65.536.865	73.000.000	Not yet
Data storage capacity	(Gbytes)	10.000	10.000	25.000	10.000

Summary of project objectives (10 lines max)

In this project we assess the feasibility and performance of alternative fast approaches for stratospheric key radiative species that can be implemented in an ESM at low computational cost, while providing quality comparable to key chemical fields from widely used full-chemistry models. We plan to assess their impact on meteorological fields and atmospheric patterns.

The project will also assess the impact of different stratospheric processes, with particular focus on stratospheric composition, including sensitivity experiments for the assimilation of selected instrument datasets in both NWP and CAMS settings. The value of the Microwave Limb Sounder (MLS) data for key stratospheric species was recently highlighted for ozone (Monge-Sanz et al., 2025) and for humidity (Semane and Bonavita, 2025), and this project contributes to expand this line of research.

Summary of problems encountered (10 lines max)

None

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

We plan to conduct further analysis of diagnostics for completed simulations with the 49r1 IFS cycle and perform new simulations with 49r1 and 50r1 cycle versions.

The simulations we plan to carry out include:

i) Medium-range 10-day forecast experiments covering different periods of time, up to one year, mainly focused on NH winter/spring events. To asses feedbacks along the annual cycle, choosing different atmospheric conditions and high-impact meteorological patterns, such as SSWs and polar vortex breaking events.

ii) Medium-range 10-day assimilation and forecast experiments with CAMS configuration, covering different periods of time, up to three or four months, mainly focused on NH winter/spring events.

iii) Seasonal runs with 7-month integration range and typically two start dates. These runs will cover decadal periods, allowing us to assess the evolution of stratospheric interannual variability.

List of publications/reports from the project with complete references

Recent publications derived from work related to this project include:

Monge-Sanz, B., Inness, A., Errera, Q., and Sinnhuber, B.-M.: Stratospheric composition Limb observations to improve NWP forecasts and (re)analyses, EGU26-19175, https://doi.org/10.5194/egusphere-egu26-19175, 2026.

Sinnhuber, B.-M., and Coauthors, The need for a new comprehensive view of the middle atmosphere – the potential of infrared limb imaging tomography, Bulletin of the American Meteorological Society (BAMS), accepted, 2026

Sinnhuber, B.-M., and Coauthors, Executive Summary of the ESA-CAIRT PerReC Activity, DOI: 10.5281/zenodo.18758615, 2026

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.

The first months of the project have been mainly dedicated to: i) Migration of 49r1 IFS branches to the new system; ii) Preparation of related publications including the ones above; iii) Coordination of collaborations and iv) Planning of further simulations with 49r1 and 50r1 that will be carried out later this year.