SPECIAL PROJECT PROGRESS REPORT

This template is available at:
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All the following mandatory information needs to be provided. The length should *reflect the complexity and duration* of the project.

Reporting year

2019……..……

Project Title:

The dynamics of the stratosphere in the OpenIFS climate model……

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Computer Project Account:

SPITSERV……..……

Principal Investigator(s):

Federico Serva
Chiara Cagnazzo
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Affiliation:

CNR-ISMAR……..……

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

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Start date of the project:

January 2019……..……

Expected end date:

December 2021……..……

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)	N/A	N/A	3 500 000	0
Data storage capacity	(Gbytes)	N/A	N/A	6 000	0

Summary of project objectives (10 lines max)

The aim of this Special Project is to study the sensitivity of the simulated climate of the OpenIFS model to different configurations and physical parameterizations. This will be done by performing multi-decadal and free-running experiments with the latest version of the model, and comparing with reanalysis or observational data.

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Summary of problems encountered (10 lines max)

In order to use the OpenIFS model, a licence has been requested and obtained from the support team (40r1v2). While preliminary activities on the needed changes of the model output and postprocessing are ongoing, the simulations have been delayed due to availability of the latest OpenIFS model version, based on IFS 43r3. Given the major changes in the model physics (e.g., a new radiation scheme is available), and the need of working with this more recent version, no experiment has been carried out yet.

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

The latest version of the model should be released later this Summer (personal communication with the OpenIFS team). As soon as the model is available, the necessary changes to the source code will be performed, and the first set of simulations will be started.
We will ensure to communicate with the ECMWF support team in case it is necessary to change or move the resources allocated for the first year, in order to avoid any loss due to further delays.

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List of publications/reports from the project with complete references

Serva, F., and C. Cagnazzo, The stratospheric dynamics simulated by the OpenIFS model, Poster presentation, 5th OpenIFS workshop, Reading, 2019

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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.

In the first six months of the project, the licence for using the OpenIFS model has been granted. The portions of the source code needed to be modified (e.g. to include additional diagnostic output) have been identified in 40r1v2. Participation to the OpenIFS workshop (June 2019, Reading) allowed to use the new OpenIFS version, with expected release during Summer. Some sensitivity experiments have been carried out during the workshop, in order to study the model response to localized perturbation of the temperature tendencies and the implication for extratropical cyclone evolution. An example of the results, for a case study of a heavy rainfall event in Norway, is reported in Fig. 1.

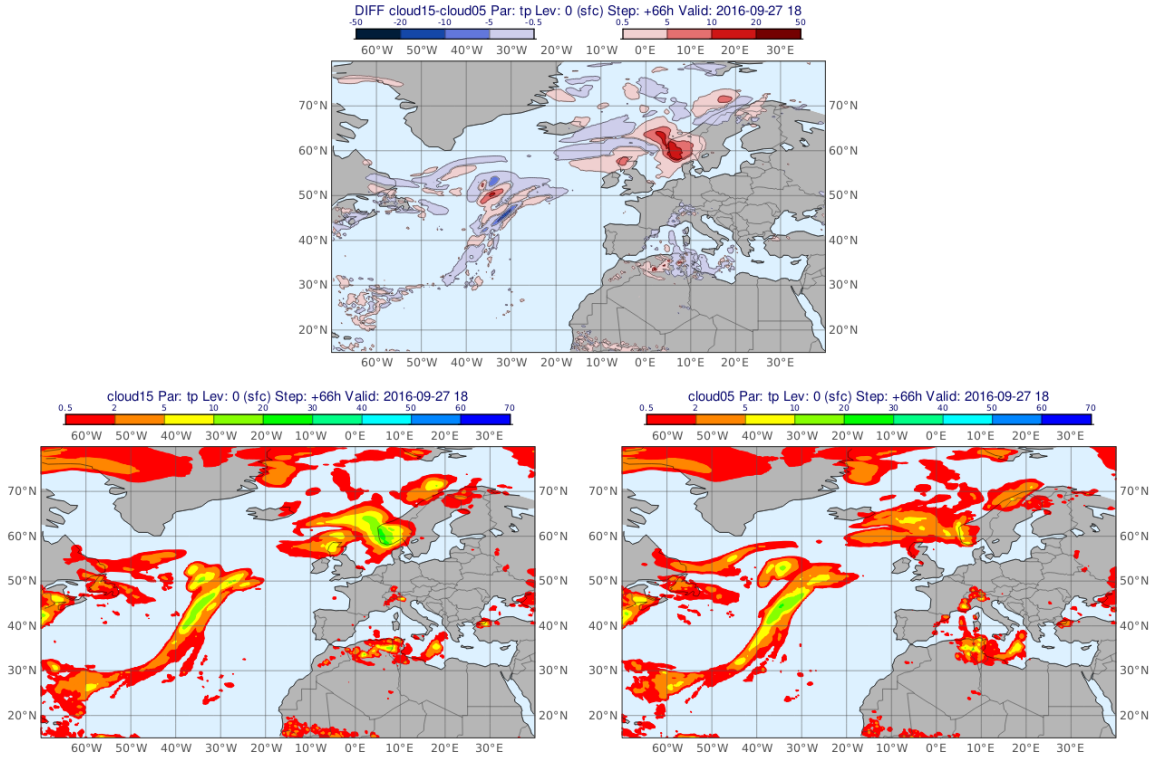

Figure 1: The modelled rainfall (mm/day) after the increase (bottom, left) or decrease (bottom, right) of the temperature tendencies due to the cloud scheme. Differences of the two experiments in the top row. The event over Norway occurs earlier, and it is also stronger, when the tendencies are artificially increased for two simulation days, during the extratropical transition.

Besides performing experiments during the workshop, there has been the chance of using ECMWF diagnostic software (e.g. Metview) for performing basic analyses of the data. The added value of using this new version of the model has been confirmed in several presentations throughout the workshop, especially due to the significant changes in the model physics. Rather than performing short simulations, during this Special Project we aim to characterize the climate of this model version.

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