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 …2020…….

Project Title: Development of a 3-layer thermodynamic model of the upper ocean for studies on teleconnections from the tropical oceans

Computer Project Account: …SPITKUCH……

Principal Investigator(s): Fred Kucharski……

Affiliation: …The Abdus Salam ICTP, Strada Costiera 11, 34151 Trieste, Italy……

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

Start date of the project: …1st January, 2020……

Expected end date: …31st Dec 2022……

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		950000	N/A
Data storage capacity	(Gbytes)	N/A		900	N/A

Summary of project objectives (10 lines max)

The proposed Special Project is planned in two phases. The first phase, which is expected to last one year and is covered by the 2020 proposal, will include:
a) re-tuning and testing the model in forced model with energy fluxes and PBL variables from ERA5;
b) testing the model in coupled mode with the SPEEDY AGCM and perform multi-decadal historical runs in both free and pacemaker mode;
c) coupling TOM3 to OpenIFS and test the coupled system on seasonal to multi-year (~5yr) scale.
At the end of this first phase, it is expected to have an 'optimal' set of model parameters which provide a suitably realistic representation of thermodynamically driven ocean variability.……
……
……
…….

Summary of problems encountered (10 lines max)

……
…Due to the COVID 19 outbreat, some visits planned between the researchers involved had to be cancelled, and thus progress has been somwthat slower than expected……
……
……....

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

……
…Point a) of the objectives summary is almost competed now, and for the second half of 2020 it is planned to couple the slab ocean model to the SPEEDY AGCM, addressing point b).
……
……
……
……..……

List of publications/reports from the project with complete references

……
…Not yet, we are in the very beginning of this project.
……
……
……

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 3-layer model has been further developed and tested in the beginning of 2020, driven by ERA5 renalysis data. First results are very encouraging. Fig. 1 shows a Hoevmoeller plot of the heat content in the upper 300m in the North Atlantic of the model compared to ORA-S4. The models performs very reasonable in this metric, perhaps producing slightly smoother and slightly smaller amplitude anomalies compared to reanalysis.