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 …………………2022………………….……

Project Title: Effects of aerosols reduction on the Asian summer monsoon prediction skill: the case of summer 2020 with COVID-19 confinements

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Computer Project Account: ………………SPITCHER……………………….……

Principal Investigator(s): …………Annalisa Cherchi………………..……

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Affiliation: ……………CNR-ISAC…………………..……

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

Start date of the project: ……01/01/2022……………………………….……

Expected end date: ……31/12/2022……………………………….……

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)	NA	NA	709800	0.
Data storage capacity	(Gbytes)	NA	NA	2100	57.4

Summary of project objectives (10 lines max)

The objective of this special project is to evaluate the effects of the detected decreased emissions during the boreal spring of 2020 on the monsoon precipitation over Southeast and East Asia during the subsequent summer and in its seasonal prediction skill.

Summary of problems encountered (10 lines max)

So far, we mostly worked on the setup of the model and the autosubmit configuration, we have not started the simulations, yet. The project is one-year long and we are on track to complete the planned simulations in the following months.

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

We will perform a 60-members ensemble forecast for summer and fall 2020, with 1st of May as starting date and 6 months long (COVID-2020). The forecast will be produced using EC-Earth3.3 in its seasonal hindcast configuration (IFS cycle36r4, NEMO3.6, LIM3, OASIS3-MCT and XIOS2). Initial conditions for the atmosphere and the ocean are the same as in the forecast for 2020 (CTL-2020) performed by BSC (in the framework of the H2020 project APPLICATE). The two ensembles differ only for the atmospheric forcing. Once the simulation will be completed we will analyse the changes in the prediction skill of South and East Asian summer monsoon in 2020, likely due to the differences in the atmospheric forcing.

List of publications/reports from the project with complete references

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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.

Workflow manager configuration and setup

In collaboration with the colleagues at Barcelona Supercomputing Centre (BSC), the Autosubmit workflow manager has been employed. Similar to what implemented by BSC for Marenostrum 4 for the control seasonal hindcasts a semi-automated procedure for the production of the retrospective seasonal forecasts has been setup. Accordingly, the EC-Earth runtime scripts have been modified to perform parallel scheduling of the seasonal predictions for 2020 and the post-processing, and by setting up the required running environment including preparation and transfer in the working directory of the initial and boundary conditions needed by the model.

System set-up for initial and boundary conditions

The same initialization strategy used in the control seasonal hindcasts that have been performed at BSC (CTL-2020) is here employed for our experiment COVID-2020. It consists of initializing the coupled model on May 1st 2020 from a known reference state (the same as in CTL-2020 ensemble

performed at BSC). Initial conditions for IFS/HTESSEL have been prepared from ERA-Interim/ERA-Land reanalysis (Dee et al 2011; Balsamo et al 2015). ICs for NEMO have been interpolated from ORAS5 reanalysis, and sea-ice conditions for LIM3 have been produced by BSC. As atmospheric forcing in COVID-2020, we used the scenario called ssp245-covid prepared for the COVID-MIP coordinated simulations (Jones et al 2021). This scenario differs from the ssp45 because from January 1st 2020 the emissions are changed with the observed reductions (Forster et al 2020).

References:
Balsamo G et al (2015) ERA-Interim/Land: a global land surface reanalysis dataset. Hydrol Earth Syst Sci 19 389-407 https://doi.org/10.5194/hess-19-389-2015
Dee DP et al (2011) The ERA-Interim reanalysis: configuration and performance of the data assimilation system. Quart J Roy Meteor Soc 137(656) 553-597 https://doi.org/10.1002/qj.828
Forster PM et al (2020) Current and future global climate impacts resulting from COVID-19. Nat Clim Ch https://doi.org/10.1038/s41558-020-0833-0
Jones CD et al (2021) The climate response to emissions reductions due to COVID-19: Initial results from CovidMIP. Geophys Res Lett 28 e2020GL091883 https://doi.org/10.1029/2020GL091883