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	2023
Project Title:	Numerical modelling of Mediterranean weather extremes: new developments in the framework of the Triangle-based Regional Atmospheric Model (TRAM) and Model for Prediction Across Scales (MPAS)
Computer Project Account:	SPESHOMA
Principal Investigator(s):	Romualdo Romero March
Affiliation:	Universitat de les Illes Balears
Name of ECMWF scientist(s) collaborating to the project (if applicable)	…… ……
Start date of the project:	1 January 2022
Expected end date:	31 December 2024

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)	50000000	0	50000000	0
Data storage capacity	(Gbytes)	20000	0	20000	0

Summary of project objectives (10 lines max)

The general objective of this special project is to implement recently developed ensemble generation strategies targeted at the short-range meso- and convective-scale forecasting of severe weather in the Mediterranean region. Special efforts will be devoted to improving the forecasts of flash floods and to designing very high resolution climatologies (in the context of present and future climates) of extreme precipitation at sub-hourly timescales. These aims are part of the goals established in the Spanish national project TRAMPAS (PID2020-113036RB-I00 / AEI / 10.13039/501100011033) project funded by the "Agencia Estatal de Investigación (AEI) from Ministerio de Ciencia e Innovación of Spain", which began on 1st September 2021.

Summary of problems encountered (10 lines max)

New incorporation of Alejandro Hermoso Verger at the Institute for Atmospheric and Climate Science at the ETH (Zürich, Switzerland) has delayed the use of the computational resources granted. In addition, the massive load of teaching and unavailability of the researchers involved in this project due to research stays overseas have also affected this delay in the use of the computational resources. However, we are pleased to inform that now that Alejandro is well established in his new position and our research team has finished with this teaching tasks and stays abroad, we are ready to start consuming our computational resources. Currently, we are preparing our experimental setup to start our simulations as soon as possible.

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

Because of the unexpected delay to start this project, we have slightly modified the timeline of the experiments we will perform. We will first implement a novel ensemble generation strategy to significantly improve flash flood and heavy precipitation forecasts (at very high spatial and temporal resolution). To this purpose an Ensemble Kalman Filter (EnKF) Data Assimilation (DA) algorithm coupled with a convection-permitting atmospheric model (WRF) will be implemented to improve initial conditions over observed sparse-regions, where different deep cyclones, that produced flash floods over coastal regions, were initiated. Surface wind, radiances, infrared soundings, and cloud tops from different instruments onboard satellites will be assimilated to achieve this goal. Comparison against numerical forecast without accounting for such observations will be performed to assess the real impact of using this ensemble generation strategy to improve severe weather forecasts.

List of publications/reports from the project with complete references

Because problems detailed above, no publications in this period using the ECMWF Computer Resources are registered.

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.

Due to the main problems and delays experienced during this period to start consuming resources, we do not have any relevant result to report at this point. However, it is important to note that we have started preparing the setup we need to start with our numerical simulations. We have compiled the latest version of the convection-permitting mesoscale numerical weather model WRFV.4.5 and the DART-software package that will enable us to perform the data assimilation experiments we are planning to do. We have also downloaded the initial and boundary conditions associated with different intense cyclones affecting populated coastal regions in the Mediterranean basin. We have also explored different configurations to optimize the model performance in terms of computational resources, i/o requirements, and storage needs. We expect to start running our numerical experiments next week.