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:	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
Data storage capacity	(Gbytes)			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)

Some circumstances difficult to anticipate at the beginning of the year have delayed the use of the computer resources until the second semester of 2022 (according to the following plans). Basically, our researcher Alejandro Hermoso Verger, who had already planned experiments at ECMWF regarding ensemble-based systems and application of machine learning-derived physical parameterizations, got a postdoc position at the Institute for Atmospheric and Climate Science, ETH Zürich (Switzerland) and left our group.

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

The project will lean on the team expertise on climate modelling to accelerate the development of the research plan. In the first place, a 10-y climatology at convection-permitting scales (2-km) over the western Mediterranean will be generated using a coupled ocean-atmosphere model. This will complement an existing experiment using an atmosphere standalone model to investigate the role of fine mesoscale air-sea interactions on events producing short and very intense rainfall rates. The same coupled model setup will be used to conduct a Pseudo-Global Warming experiment and quantify the response of extreme precipitation to a given climate change signal and advance our knowledge of ocean-atmosphere processes in this context. This will also complement an existing PGW experiment using the atmosphere-only model. In combination, the simulations completed in the framework of this Special Project will contribute to better understanding heavy rainfall events and their characteristics at unprecedented spatiotemporal detail.

List of publications/reports from the project with complete references

No publications in this period using the ECMWF Computer Resources.

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**

During the first 6 months of the project, the team has completed a series of preliminary experiments to adequately configure the model over the region of interest. We have explored different configurations to optimize the model performance in terms of computational resources, i/o requirements, and storage needs. We have also created the boundary conditions for the present and PGW simulations, and we are now ready to begin the numerical experiments at ECMWF.