

REQUEST FOR ADDITIONAL RESOURCES IN THE CURRENT YEAR FOR AN EXISTING SPECIAL PROJECT

Please email the completed form to special_projects@ecmwf.int.

MEMBER STATE:ITALY.....

Principal Investigator¹:Stefano Federico.....

Affiliation: CNR-ISAC (Institute for Atmospheric Sciences and Climate - National Research Council)...
.....
.....

Address:
Via del Fosso del Cavaliere 100, 00133 Rome
.....

Other researchers: Claudio Transerici...(cmn), Rosa Claudia Torcasio (it85).....

Project title: ...
Improvement of very-short term forecast using lightning and radar data assimilation
.....

Project account: **SPITFEDE**

Additional computer resources requested for	2023
High Performance Computing Facility (units)	15,000,000
Data storage capacity (total) (Gbytes)	/

¹ The Principal Investigator is the contact person for this Special Project

Continue overleaf

Technical reasons and scientific justifications why additional resources are needed

In the project SPITFEDE we mainly focused on lightning and radar reflectivity data assimilation. In a recent paper (Federico et al., 2022), published with the aid of this special project, we showed the possibility to predict flashes for the next day. During this last year of the project there was the need to start to study a new problem with lightning data assimilation (LDA): can LDA improve the forecast of lightning?

To tackle this issue, we will use a lightning prediction scheme (the same as in Federico et al. 2022) with the lightning data assimilation capability of the WRF model to predict lightning over Italy and the central Mediterranean for the two lightning seasons: summer and fall. The simulations to do are many because we need to run the two seasons for two different configurations of the WRF model: the control, without lightning data assimilation, and the simulations with lightning data assimilation. The configuration of the simulations is the Very Short-term forecast at 6h hours, where a 6h data assimilation phase precedes a 6h forecast phase. The horizontal resolution of the model is 3km and, a simulation at 3km horizontal resolution over Italy run with 128 cores takes 15.000 SBU. This estimate comes from the many simulations of this type that we performed in Federico et al. (2021) on the ATOS computing facility. The simulations are many ($2 * 180 * 4$), i. e. 2 types of simulations by 2 seasons (180 simulations, summer 2020 and fall 2021) by four simulations per day (very short-term forecast at 6h). In summary a total of 21.600.000 SBU is requested for this experiment. Part of this experiment will be run next year, if the new special project that we are submitting to ECMWF will be approved and, for this reason, not all the computing time is requested this year. In any case, if there isn't the possibility to have all the 15,000,000 SBU requested, we will accept lower amounts of SBU to start to tackle the problem.

Reference

Federico, S.; Torcasio, R.C.; Lagasio, M.; Lynn, B.H.; Puca, S.; Dietrich, S. A Year-Long Total Lightning Forecast over Italy with a Dynamic Lightning Scheme and WRF. *Remote Sens.* 2022, 14, 3244. <https://doi.org/10.3390/rs14143244>