

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

Please email the completed form to [special\\_projects@ecmwf.int](mailto:special_projects@ecmwf.int).

**MEMBER STATE:** Ireland

**Principal Investigator<sup>1</sup>:** Dr Paul Nolan<sup>1,2</sup>

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**Address:** Irish Centre for High-End Computing, National University of Ireland Galway.

**Other researchers:** Dr Jonathan McGovern<sup>2</sup>

**Project title:** High-Resolution EC-Earth Simulations - Ireland's Contribution to CMIP6

**Project account:** SPIENOLA

<b>Additional computer resources requested for</b>		<b>2021</b>
High Performance Computing Facility	(units)	10,000,000
Data storage capacity (total)	(Gbytes)	-

*Continue overleaf*

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<sup>1</sup> The Principal Investigator is the contact person for this Special Project

## Technical reasons and scientific justifications why additional resources are needed

The goal of the research project is two-fold; to simulate the effects of climate change on a global and regional scale.

As part of the first component, the following EC-Earth CMIP6 contributions were completed:

- 7 x EC-Earth AOGCM Historical/Veg Simulations 1850-2014
- 28 x EC-Earth AOGCM/Veg ScenarioMIP 2015-2100 Simulations; 7 x SSP1-2.6, 7 x SSP2-4.5, 7 x SSP3-7.0 & 7 x SSP5-8.5

The data were fully validated and analysed (e.g., Döscher et al., 2021; Nolan et al., 2020) and shared with the international research community on the ESGF data hosting system. The resulting datasets comprise Ireland's contribution to the Coupled Model Intercomparison Project (phase 6) (CMIP6) and are currently being analysed for inclusion in the U.N. Intergovernmental Panel on Climate Change (IPCC) AR6 reports. This first component of the research comprises the majority of the research and is fully complete

The second component involves dynamically downscaling a subset of the CMIP6 EC-Earth data to provide high resolution regional climate projections for Europe (Euro-CORDEX) and Ireland using the COSMO-CLM5 Regional Climate Model (RCM). The resulting datasets will add to a larger ensemble of RCM data currently being produced at a national and European scale (EURO-CORDEX).

As part of the Special Project, we are dynamically downscaling the EC-Earth-Veg r14i1p1f1 data (produced as part of the first component of the research) for the continuous period 1980-2100. Specifically, the following COSMO-CLM5 (12km & 4km) simulations are being run:

- 1 historical simulation, 1980-2014. **Progress to date: 1980-2012**
- 4 future simulations, 4 SSPs (SSP1-2.6, SSP2-4.5, SSP3-7.0 & SSP5-8.5), 2015-2100. **Progress to date: 2015-2040.**

The project team was aware that the allocated SBUs would not be sufficient for completion of the above RCM simulations. On exhaustion of the SPUs, it was planned to transfer the running of the RCM simulations to the local ICHEC HPC machine. However, the ICHEC machine is currently down for unscheduled maintenance.

We therefore request additional resources of 10 million SBUs so that the RCM simulation can be continued on the ECMWF HPC systems during the remaining two weeks of 2021.

### References:

- Döscher, R., Acosta, M., Alessandri, A., Anthoni, P., Arneth, A., Arsouze, T., Bergmann, T., Bernadello, R., Bousetta, S., Caron, L.-P., Carver, G., Castrillo, M., Catalano, F., Cvijanovic, I., Davini, P., Dekker, E., Doblas-Reyes, F. J., Docquier, D., Echevarria, P., Fladrich, U., Fuentes-Franco, R., Gröger, M., v. Hardenberg, J., Hieronymus, J., Karami, M. P., Keskinen, J.-P., Koenigk, T., Makkonen, R., Massonnet, F., Ménégoz, M., Miller, P. A., Moreno-Chamarro, E., Nieradzic, L., van Noije, T., Nolan, P., O'Donnell, D., Ollinaho, P., van den Oord, G., Ortega, P., Prims, O. T., Ramos, A., Reerink, T., Rousset, C., Ruprich-Robert, Y.,

Le Sager, P., Schmith, T., Schrödner, R., Serva, F., Sicardi, V., Sloth Madsen, M., Smith, B., Tian, T., Tourigny, E., Uotila, P., Vancoppenolle, M., Wang, S., Wårlind, D., Willén, U., Wyser, K., Yang, S., Yepes-Arbós, X., and Zhang, Q.: The EC-Earth3 Earth System Model for the Climate Model Intercomparison Project 6, *Geosci. Model Dev. Discuss.*, <https://doi.org/10.5194/gmd-2020-446>, 2021.

- Paul Nolan, Alastair McKinstry (2020); EC-Earth Global Climate Simulations: Ireland's Contributions to CMIP6. Environmental Protection Agency, Research Report 310. [[Read](#)].