

Expanding the climateprediction.net project: the creation of a multi model distributed computing infrastructure for climate science

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climateprediction.net (CPDN) is a citizen science project that uses the paradigm of volunteer distributed computing via the Berkeley Open Infrastructure for Network Computing (BOINC) software platform. This platform enables the computation of very large ensembles of climate simulations using the spare resources of the machines of volunteering members of the public. The CPDN project has been running, without interruption for over 15 years. It is a unique facility in the climate science community, enabling studies to be performed involving extremely large ensembles of climate simulations at a low cost, answering questions on uncertainty, attribution and other key problems which would otherwise be much more difficult (or impossible in some cases) to study using traditional HPC techniques.

To date the CPDN project has exclusively used models derived from the UK Meteorological Office Hadley Centre Coupled Model version 3 (HadCM3). In this work we describe the expansion of the CPDN project to allow computations to be performed using the OpenIFS and WRF models. OpenIFS is a portable research version of the European Center for Medium Range Weather Forecasts (ECMWF) developed Integrated Forecasting System (IFS), their main tool for operational forecasting. WRF (Weather Research and Forecast) model is a numerical weather prediction system produced by a collaboration of NCAR, NOAA and AFWA. Both OpenIFS and WRF have large communities of engaged scientific users. This expansion of the CPDN project capabilities expands the possible user to a new community of climate scientists, enabling a range of new studies to be performed for the first time involving very large ensembles these newly supported models. As an added benefit this will also allow inter-model comparisons to be performed between OpenIFS, WRF and HadCM3 based models.

We describe the technical challenges and design considerations necessary to enable the inclusion of the OpenIFS and WRF models into the CPDN project. We also describe the workflow and the successful implementation on both the server-side and client-side of the project, together with preliminary results that have been performed to scientifically validate these new models in the CPDN environment.

Summary

A presentation of the technical challenges and design considerations necessary to enable the inclusion of the OpenIFS and WRF models into the climateprediction.net (CPDN) volunteer distributed computing project, including the workflow and the successful implementation on both the server-side and client-side of the project, together with preliminary results that have been performed to scientifically validate these new models in the CPDN environment.

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