EGU25-12412, updated on 08 Dec 2025
https://doi.org/10.5194/egusphere-egu25-12412
EGU General Assembly 2025

The CANARI HadGEM3 Large Ensemble: Design and evaluation of historical simulations

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Large Ensembles, or Single Model Initial Condition Large Ensembles (SMILEs) of climate model simulations, have been produced by different modelling centres in recent years. Here, we present the HadGEM3 Large Ensemble recently completed within the UK NERC multi-centre CANARI project. In the context of existing all-forcings Large Ensembles, noteworthy properties of the CANARI Large Ensemble are (i) a relatively high model resolution (60 km in the atmosphere in the mid latitudes, and about 25 km in the ocean), (ii) the availability of sub-daily output on a range of pressure levels to study weather systems, and (iii) boundary conditions allowing for regional modelling driven by the CANARI Large Ensemble for a range of CORDEX-like domains covering most land regions.

In this poster, we document the ensemble design and evaluate key aspects of historical ensemble performance against observational data, such as the global mean surface temperature evolution, the climatology of the Stratospheric Polar Vortex and of Sudden Stratospheric Warmings, the historical evolution of the Atlantic Meridional Overturning Circulation (AMOC), and trends of midlatitude storm tracks, Arctic Sea Ice area, and tropical Pacific sea surface temperature. Furthermore, an application is presented showing that analogues of the extremely hot North Atlantic sea surface temperature anomalies in the summer of 2023 can be found in the CANARI Large Ensemble, whereas there are no close analogues in the historical record.

(This poster has 40 authors, which exceeds the number of authors allowed in the abstract submission form.)