DE_393: Development and Implementation of Climate Emulator for Destination Earth (DestinE)

Description

This contract is the result of the response to the Invitation to Tender (ITT) DE_393: Development and Implementation of Climate Emulator for Destination Earth (DestinE) which has been issued by ECMWF.

Launched in 2022, Destination Earth (DestinE) is a European Union-funded initiative aimed at building a highly accurate digital replica of the Earth system by 2030. This digital twin will enable the modelling, monitoring, and simulation of natural phenomena, risks, and human activities, providing an advanced tool for designing adaptation strategies and implementing mitigation measures in response to climate change.

DestinE is coordinated by the European Commission's Directorate-General for Communications Networks, Content and Technology (DG CNECT), with the active participation of the European Centre for Medium-Range Weather Forecasts (ECMWF), the European Space Agency (ESA), and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT).

One of the key developments of the DestinE framework is an AI-based climate emulator, designed to complement DestinE's digital climate twin. While the digital twin relies on high-precision physical simulations, the emulator will reproduce key results — such as long-term trends or climate variability phenomena like El Niño — using only a fraction of the computational resources. BSC has a prominent role in the Climate Adaptation Digital Twin (ClimateDT), as a key participant in the past Phase I and current Phase 2 of the DE_340 contract.

The development of the climate emulator is being carried out by a consortium of complementary organisations and experts composed of the Barcelona Supercomputing Center (BSC-CNS), the Spanish National Research Council (CSIC), the Jülich Research Centre (FZJ) in Germany, and coordinated by the Cantabria-based company Predictia Intelligent Data Solutions SL.

The consortium covers the scientific and technical aspects involved in the tender, both the methodological development of deep learning (covering climate model emulators and foundational models) and evaluation methods, as well as technical aspects of the technological stack and infrastructure required for a smooth integration of services in DestinE. In particular, the consortium operates high performance computing infrastructures and participates in the development of the DestinE components (leveraging the transversal role of the BSC in ClimateDT) and FZJ has been co-lead in the DE370c use case contract on air quality).

Barcelona Supercomputing Center - Centro Nacional de Supercomputación