

## **WORK PROGRAMME 2021-2022**

### **CALL: Climate Sciences and Response**

### **Development of high-resolution Earth system models for global and regional climate change projections**

**SUBMISSION: 10 February 2022**

**BUDGET: 10 MILLION Euro**

**TYPE OF ACTION: Innovation Actions**

**Consortium:** Beneficiaries will be subject to the following additional obligations regarding open science practices: • Open access to any new modules, models or tools, which are developed from scratch or substantially improved with the use of EU funding under the action must be ensured through documentation, availability of model code and input data developed under the action.

#### **Expected Outcome:**

Proposals should improve European high-resolution, fully coupled atmosphere-ocean-land Earth System Models, able to robustly simulate key climate processes, their variability and future trends for this and well into the next century in order to enhance the quality, robustness and versatility of climate projections on a range of temporal and spatial scales (global and regional) to (1) support policies implementing the goals of the Paris Agreement and (2) address the societal need to assess and respond to the adverse impacts of climate change. **Project results are expected to contribute to all of the following expected outcomes:**

- Improved climate projections with sound uncertainty estimates under different scenarios on different temporal and spatial scales.
- Improved understanding and modelling of tipping points in the climatic systems, such as the ice shields at both poles and ocean circulation.
- Advances in attribution of climate change and its phenomena to anthropogenic forcings. Support to the evaluation of mitigation, adaptation and disaster risk reduction policies through improved linkages with Integrated Assessment Models.
- Pave the way for the next cycle of the IPCC Assessment reports by a leading role in the WCRP Coupled Model Intercomparison Programme (CMIP).
- Sustain and enhance European cooperation and leadership in climate sciences.

**Scope:** Projects should foster a fully coupled atmosphere-ocean-land-ice Earth-system model approach that contributes to a better understanding and representation of the processes, including for that drive and influence climate change on global and regional scale. Arctic and Antarctic regions should be considered as key elements in global climate changes.

Projects should make efficient use of available and high quality observational data (e.g. spacebased and not space based, including in-situ and paleoclimatic data) for the development of robust model validation, verification, and improve uncertainty estimation methodologies. Where relevant, high-resolution model development and evaluation should be properly connected with major programmes in the domain of Earth Observation such as the Copernicus Programme, the ESA science satellite missions

in Europe, as well as the Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS) at global level. They should also strive to reduce uncertainty of key parameters of climate and hydrological systems.

Projects should advance methods for assessing and attributing model outputs and climate change impact on regional scales with the support of advanced digital technologies, such as artificial intelligence methodologies. The advanced climate modelling activities should support the attribution of observed and projected climatic hazards to climate change or climate variability. The activities should build on the experiences from and results of other European projects contributing to the development of a new generation of climate models<sup>43</sup>.

Beneficiaries are encouraged to take advantage of the emerging ICT infrastructures (e.g. EuroHPC and other high performance computing, cloud-based facilities) that will be made available through the Destination Earth initiative under the Digital Europe Programme<sup>44</sup>. If adding value to the project outcomes, coordination with the Destination Earth initiative can be proposed to ensure the timely development of “climate replicas” building on the new state-of-the-art IT infrastructure, including access to European high performance computing resources and an operational platform to upload and integrate the models and data developed in the course of the projects.

Connection to the European Open Science Cloud (EOSC) should be considered where relevant. When dealing with models, actions should promote the highest standards of transparency and openness, as much as possible going well beyond documentation and extending to aspects such as assumptions, code and data that is managed in compliance with the FAIR principles<sup>45</sup>. In particular, beneficiaries are strongly encouraged to publish results data in open access databases and/or as annexes to publications. In addition, full openness of any new modules, models or tools developed from scratch or substantially improved with the use of EU funding is expected. International cooperation is encouraged. Projects are expected to co-operate with other projects funded under this call, as well as other relevant projects under Destination 1 and Cluster 6, Destination 5.