

[Destination Earth Programme Climate Adaptation Dig: Destination Earth Programme Climate Adaptation Dig](#)

Description

In the last report of its first working group, the Intergovernmental Panel on Climate Change (IPCC) concluded that there is still much unknown about regional climate change. Even over a number of very large regions, seventy years of warming does not seem enough to assess if there has been a change in hydrological extremes (floods and droughts). Given that the global climate is currently close to the 1.5°C global warming level threshold set in the Paris Agreement and that climate changes are relevant for the economy, it seems obvious that current and future improvements are needed to identify the sources of climate information and to move from local and regional climate plausibility assessments to fully-developed risk assessments. This need is even more pressing given the vast requirements set by the European Green Deal for the European transition.

A key element of the Green Deal is its dependence on the digital transformation, understood as the creation of an accessible and interoperable data-driven infrastructure that facilitates decision making. The Climate Adaptation Digital Twin (climate DT), developed in response to the ITT, will design and implement a pre-exascale climate information system to support climate adaptation efforts. The climate DT system harnesses two-kilometre scale Earth-system models (ESMs) to Europe's most performant computing systems to provide the light (information) source for adaptation use cases drawn from five climate impact sectors: forestry, urban environments, hydrology, hydro-meteorology, and energy. Climate DT introduces the idea of a generic state vector (GSV), which is developed by the ESMs and streamed to applications. The GSV enforces a separation of concerns that enables the climate DT ESM's to work at an unprecedented scale (multi-decadal simulations on 5km or finer global meshes), which is required for improving both their fidelity and the relevance of the information they provide. By disentangling the provision of climate information from its consumption, it also creates the basis for an information system that can scale across an unlimited number of applications that have access to all the data they need and achieve the long-sought goal of interactivity and new ways of co-design.

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