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Research infrastructures for climate prediction: Current data-centric challenges

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Weather and climate prediction and high-performance computing have gone hand in hand in the last few decades. Current activities in this field rely on different digital infrastructures needed both for running computationally expensive global and regional climate models (HPC infrastructures), and for storing and making available the resulting scientific data and metadata (GRID infrastructures). For instance, the Earth System Grid Federation (ESGF) is a key international effort building on different national infrastructures (e.g. ENES in Europe, http://portal.enes.org) to provide a distributed data platform enabling free world wide access to climate data (moving from Peta- to Exa-scale). ESGF provides archiving and access services for the multi-model multi-scenario climate projections obtained in successive Climate Model Intercomparison Projects (CMIPs and CORDEX), which are the basis for climate change studies (including the IPCC reports). These studies typically require accessing and post-processing huge amounts of data, for instance to harmonize and postprocess climate change information for a particular region and, therefore, require new data-centric infrastructures facilitating postprocessing services (including machine learning). Some ongoing initiatives are exploring the use of cloud services to deploy efficient data processing services, based on a data-as-a-service approach. An example is the Data and Information Access Services (DIAS) being developed by Copernicus in Europe. In this talk I will introduce the main international ongoing collaborations on climate prediction (focusing on the IPCC - Intergovernmental Panel on Climate Change) and describe the current challenges posed by the new data-centric approach on the existing digital infrastructures in this field.

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